AUG 12 2010

Bob Borba
Bob Borba Dairy
19584 Gibraltar Ct.
Hilmar, CA 95324

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: N-1073346

Dear Mr. Borba:

Enclosed for your review and comment is the District's analysis of Bob Borba Dairy's application for an Authority to Construct for a reconstructed dairy including a herd of 1,100 milk cows and 208 support stock, a 50-stall rotary milking parlor, four freestall barns, manure treatment facilities, and feed storage and handling facilities, at 6626 Central Avenue in Hilmar.

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

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

Sincerely,

David Warner
Director of Permit Services

DW:JKA

Enclosures

AUG 1 2 2010

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

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: N-1073346

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Enclosed for your review and comment is the District's analysis of Bob Borba Dairy's application for an Authority to Construct for a reconstructed dairy including a herd of 1,100 milk cows and 208 support stock, a 50-stall rotary milking parlor, four freestall barns, manure treatment facilities, and feed storage and handling facilities, at 6626 Central Avenue in Hilmar.

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Sincerely,

David Warner
Director of Permit Services

DW:JKA

Enclosure

Merced Sun-Star
Merced Sun-Star

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

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to Bob Borba Dairy for a reconstructed dairy including a herd of 1,100 milk cows and 208 support stock, a 50-stall rotary milking parlor, four freestall barns, manure treatment facilities, and feed storage and handling facilities, at 6626 Central Avenue in Hilmar.

The analysis of the regulatory basis for this proposed action, Project #N-1073346, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. Written comments on this project must be submitted within 30 days of the publication date of this notice to **DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 1990 EAST GETTYSBURG AVENUE, FRESNO, CA 93726.**

San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
Reconstructed Dairy

Facility Name:	Bob Borba Dairy	Date:	July 28, 2010
Mailing Address:	19584 Gibraltar Ct.	Engineer:	Jonah Aiyabei
	Hilmar, CA 95324	Lead Engineer:	Martin Keast
Contact Person:	Bob Borba, Owner		
Telephone:	(209) 321-5444		
Application #s:	N-7750-1-0 through 5-0.		
Project #:	N-1073346		
Deemed Complete:	June 9, 2010		

I. Proposal

Bob Borba Dairy has requested Authority to Construct (ATC) permits for a reconstructed dairy including a herd of 1,100 milk cows, 200 dry cows and 8 mature bulls; a 50-stall rotary milk barn, 4 freestall barns, anaerobic liquid manure treatment system, feed storage and handling facilities, and one 350 gallon gasoline storage tank.

The applicant purchased the pre-existing dairy in 2006 and modernized it by replacing the old milk barn, freestall barns, manure management system and feed storage and handling facilities with new ones. The applicant continued to operate under the historical herd size of the pre-existing dairy. Since all the structures at the pre-existing dairy were replaced with new ones, the fixed capital cost of the new components exceeds 50% of the fixed capital cost of a comparable entirely new dairy. The dairy is therefore a reconstructed stationary source, which, pursuant to District Rule 2201 Section 3.32, must be treated as a new stationary source.

The project's potential VOC, NH_3, and PM_{10} emissions from the milking operation, cow housing, and the liquid manure handling system exceed 2.0 lb/day. BACT is therefore triggered for VOC, NH_3, and PM_{10}.

The project triggers the public notice requirements of District Rule 2201. Therefore, the preliminary decision will be submitted to the California Air Resources Board (CARB), a public notice will be published in a local newspaper of general circulation in the county of the project, and a 30-day public comment period will be completed prior to issuance of the ATCs.

The proposed dairy is a discretionary project subject to the requirements of the California Environmental Quality Act (CEQA). As a public agency with discretionary authority, the District must determine that the requirements of the California Environmental Quality Act (CEQA) have been properly satisfied prior to the issuance of any dairy permits. The project is located in Merced County, which has discretionary approval authority on dairy projects. However, the county considers the dairy to be an existing facility and has determined that the renovation was an allowed use that required only building permits. The county therefore did not prepare any CEQA documents because the project was considered exempt. As a result, the District will serve as a Lead Agency in the CEQA review process.

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 (9/21/06)
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)
CH&SC 41700	Health Risk Assessment
Rule 4550	Conservation Management Practices (CMP) (8/19/04)
Rule 4570	Confined Animal Facilities (CAF) (6/15/06)
Rule 4621	Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants (12/20/07)
Rule 4622	Transfer of Gasoline into Vehicle Fuel Tanks (12/20/07)
CH&SC 42301.6	School Notice
Senate Bill 700 (SB 700)	
California Environmental Quality ACT (CEQA)	

III. Project Location

The facility is located at 6626 Central Avenue in Hilmar, Merced 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 Bob Borba Dairy is the production of milk, which is used to make various 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 the 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.

Milk Barn

The milk barn is a separate building, apart from the lactating cow confinement. The milk barn is designed to facilitate changing the groups of cows milked and to allow workers access to the cows during milking. A holding area confines the cows that are ready for milking. The holding area is covered with open sides and is part of the milk barn, which in turn, is located in the immediate vicinity of the cow housing. The milk barn has concrete floors sloped towards a drainage system. Manure that is deposited in the milk barn is sprayed or flushed into the drainage using fresh water after each milking. The effluent from the milk barn is carried through pipes into the liquid manure treatment system.

Cow Housing

Lactating cows and dry cows will be housed in freestall barns with flushed manure 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.

The special needs area serves the gestating cows at the dairy or any cows that are in need of medical condition. This area acts as a veterinary area. It is also the area in which cows are given special attention as they progress from dry cow, a mature cow that is gestating and not lactating, to maternity, to milking status or until their health improves.

Feed Storage and Handling

The feed storage and handling area is used for the storage of ingredients for preparing daily rations. Silage, the main ingredient in dairy feed rations, is stored in large elongated piles on concrete slabs. The require amount is extracted daily from one end of the pile. Other ingredients such as hay, grains and cotton seed are stored in covered barns (hay and commodity barns) to prevent damage from exposure to weather elements. The feed storage and handling area is also used for mixing daily rations. Front-end loaders retrieve the required proportions of the different ingredients and load them into a feed truck with a built in mixer. Once the ingredients are thoroughly mixed, the feed truck drives over to the cow housing areas to spread the feed along the stanchions.

Gasoline Storage Tank

Gasoline is delivered to the storage tank via a delivery vessel. Gasoline is then dispensed from the storage tank into equipment fuel tanks during refueling.

V. Equipment Listing

N-7750-1-0: 1,100 COW MILKING OPERATION WITH ONE 50-STALL ROTARY MILKING PARLOR.

N-7750-2-0: COW HOUSING – 1,100 MILK COWS, 200 DRY COWS AND 8 MATURE BULLS HOUSED IN FOUR FREESTALL BARNS WITH A FLUSH SYSTEM.

N-7750-3-0: LIQUID MANURE MANAGEMENT CONSISTING OF TWO PROCESSING PITS (20'X20'X8 EACH), MECHANICAL SEPARATOR, ANAEROBIC TREATMENT LAGOON (457'X168'X14'), STORAGE POND (303'X168'X14'), AND LAND APPLICATION OF LIQUID MANURE BY FLOOD IRRIGATION.

N-7750-4-0: SOLID MANURE MANAGEMENT SYSTEM CONSISTING OF SEPARATED SOLIDS STOCKPILES.

N-7750-5-0: FEED STORAGE AND HANDLING CONSISTING OF SILAGE PILES, HAY BARNS AND COMMODITY BARNS.

N-7750-7-0: AGRICULTURAL GASOLINE DISPENSING OPERATION WITH ONE 350 GALLON ABOVEGROUND STORAGE TANK SERVED BY TWO-POINT PHASE I VAPOR RECOVERY SYSTEM; AND 1 FUELING POINT WITH 1 PHASE II EXEMPT GASOLINE DISPENSING NOZZLE USED PRIMARILY FOR IMPLEMENTS OF HUSBANDRY.

VI. Emission Control Technology Evaluation

PM_{10}, VOC, and NH_3 are the major pollutants of concern from dairy operations. Gaseous pollutant emissions at a dairy result from the ruminant digestive processes (enteric emissions), the decomposition and fermentation of feed, and also the decomposition of organic material in dairy manure. Volatile Organic Compounds (VOCs) are formed as intermediate metabolites when organic matter in manure degrades. Ammonia volatilization is the result of the microbial decomposition of nitrogenous compounds in manure. The quantity of enteric emissions depends directly on the number and types of cows. The quantity of emissions from manure decomposition depends on the amount of manure generated, which also depends on the number and types of cows. Therefore, the total herd size and composition is the critical factor in quantifying emissions from a dairy.

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

Milking Parlor

This dairy uses a flush/spray system to wash out the manure from the milking parlor after each group of cows is milked. Since the milking parlor is constantly flushed, there will be no particulate matter emissions from the milking parlor. Manure, which is a source of VOC emissions, is removed from the milking parlor many times a day by flushing after each milking.

Because of ammonia's high affinity for and solubility in water, volatilization of ammonia from the milking parlor will also be reduced by flushing after each milking.

Cow Housing – Freestall Barns

Particulate matter emissions from freestall barns are greatly reduced because the cows will be on a paved surface rather than on dry dirt. Additionally, flushing of the freestall lanes creates a moist environment, which further decreases particulate matter emissions.

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

Feeding Animals in Accordance with the NRC Guidelines

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

Liquid Manure Treatment System:

All emissions from the liquid manure handling system are the result of manure decomposition. The applicant has proposed to use an anaerobic treatment lagoon, which consists of a two-stage anaerobic lagoon treatment system designed in accordance with the specifications set forth in NRCS practice standard 359. A properly designed and operated anaerobic treatment lagoon system will reduce VOC emissions because the organic compounds in the manure will be mostly converted into methane, carbon dioxide, and water rather than a significant amount of VOCs. A two-stage anaerobic treatment lagoon system also has an air pollution benefit over single lagoon systems. Odorous emissions are reduced with a two-stage system since the primary lagoon has a constant treatment volume, which promotes more efficient anaerobic digestion. The proposed anaerobic treatment lagoon meets the design requirements, as shown in Appendix A.

Solids Separation:

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

Feed Handling and Storage

The proposed emission reduction measures for feed handling and storage include best management practices such as minimizing the surface area of silage exposed to the atmosphere. This can be done by covering the silage pile securely with a tarp and removing feed only from a small area of the pile (face of pile). Leftover feed at the feed bunks will also be cleaned up and disposed of appropriately to avoid decomposition that can result in increased emissions.

Gasoline Dispensing Operation

The refueling operation will use Air Resources Board (ARB) certified Phase I vapor recovery system. The Phase I vapor recovery system is designed to reduce VOC emissions by at least 95% during tank filling.

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 gasoline tank and lagoons 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 the facility, as discussed in section VII.C.5.
- The PM_{10} control efficiencies for the proposed practices and mitigation measures are based on the SJVAPCD memo – *Dairy and Feedlot PM_{10} Mitigation Practices and their Control Efficiencies*.
- All PM_{10} emissions from the dairy will be allocated to the cow housing permit.
- Because of the moisture content of the separated solids, PM_{10} emissions from solid manure handling are considered negligible.
- The PM_{10} emission factors for the dairy animals are based on a District document entitled "Dairy and Feedlot PM_{10} Emissions Factors", which compiled data from studies performed by Texas A & M ASAE and a USDA/UC Davis report quantifying dairy and feedlot emissions.
- The VOC and NH_3 emission factors for milk cows are based on an internal document entitled "*Breakdown of Dairy VOC Emission Factor into Permit Units*". The VOC and NH_3 emission factors for the other cows were developed by taking the ratio of manure generated by the different types of cows to the milk cow and multiplying it by the milk cow emission factor.
- Since a separate feed emission factor has not yet been established for the feed storage and handling permit unit, BACT will not be evaluated for this unit. However, several of the mitigation measures from the BACT analysis for the cow housing permit unit, which are expected to reduce feed emissions, will be placed on the feed storage and handling permit.

- Feeding animals in accordance with the National Research Council (NRC) guidelines is a feed formulation practice used to improve animal health and productivity. This typically limits the overfeeding of certain feed that have the potential of increasing emissions. This mitigation measure has the potential of reducing a significant amount of emissions, however, since there is not much data available, a conservative control efficiency of 5% will be applied to the overall dairy EF.
- Flushing or hosing down the milking parlor immediately prior to, immediately after, or during each milking has the potential of reducing a significant amount of emissions since many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water and the fresh excreted manure is almost immediately flushed out of the milk barn. However, a conservative control efficiency estimate of 75% will be applied at this time. This control efficiency does not apply to the enteric emissions generated from the cows themselves. Taking that into account, the overall control efficiency for the milk barn is approximately 16.7%. (EF from milk barn is = 0.9 lbs/hd-yr; EF from fresh waste is equal to 0.2 lb/hd-yr; 75% of 0.2 lb/hd-yr = 0.15 lb/hd-yr; 0.15 lbs/hd-yr/0.9 lbs/hd-yr = 16.7% control).
- Flushing the feed lanes four times per day is expected to reduce emissions since manure degradation and decomposition in the feed lanes is reduced. Increasing the frequency of the flush will remove manure, which is a source of VOC emissions. Many of the compounds emitted from the fresh manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs) are highly soluble in water. Based on calculations in the Final Dairy Permitting Advisory Group's (DPAG) Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley" dated January 31, 2006 (http://www.valleyair.org/busind/pto/dpag/dpag_idx.htm), a 47% control will be applied to flushing the corral lanes four times per day, until better data becomes available. This control efficiency only applies to the manure and does not apply to the enteric emissions generated from the cows themselves. Taking that into account, the overall control efficiency for the cow housing is approximately 18.2%. (Milk Cow EF from cow housing is = 12.4 lb/hd-yr; EF from fresh waste = 4.8 lb/hd-yr; 47% x 4.8/12.4 lb/hd-yr = 18.2% control).
- Many of the mitigation measures required will also have a reduction in ammonia emissions, however, due to limited data, these reductions will not be quantified in this evaluation.
- The maximum daily gasoline throughput for tank filling is 350 gallons (total capacity of the tank.)
- The maximum daily gasoline throughput for fuel dispensing is 226 gallons.

B. Emission Factors

The following emission factors will be used to calculate the emissions:

Milk Barn				
Category	Open Corral Housing		Freestall Housing	
	(lb-VOC/hd-yr)	(lb-NH_3/hd-yr)	(lb-VOC/hd-yr)	(lb-NH_3/hd-yr)
Milk cows	0.9	1.3	0.9	1.2

Cow Housing				
Category	Open Corral Housing		Freestall Housing	
	(lb-VOC/cow-yr)	(lb-NH_3/cow-yr)	(lb-VOC/cow-yr)	(lb-NH_3/cow-yr)
Milk cows	12.4	32.3	12.4	28
Dry cows	8.2	20.6	8.2	17.9
Heifers (15 - 24 mon)	5.7	14.4	5.7	12.6
Heifers (7 - 14 mon)	5.0	12.6	4.9	11.0
Heifers (3 - 6 mon)	4.5	11.4	4.5	9.9
Calves (0 - 3 mon)	4.3	10.7	4.3	9.3
Mature bulls	7.7	19.3	7.7	16.8

Cow Housing - PM_{10}		
Category	EF (lb/hd-yr)	Source
Mature cows in freestalls	1.37	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Mature cows and bulls in open corrals	5.46	Based on a Summer 2003 study by Texas A&M ASAE at a West Texas Dairy
Heifers in open corrals	10.55	Based on a USDA/UC Davis report quantifying dairy and feedlot emissions in Tulare & Kern Counties (April '01)
Calves	1.37	SJVAPCD

Lagoon/Storage Pond				
Category	Open Corral Housing		Freestall Housing	
	(lb-VOC/cow-yr)	(lb-NH_3/cow-yr)	(lb-VOC/cow-yr)	(lb-NH_3/cow-yr)
Milk cows	2.3	15.5	2.7	15.7
Dry cows	1.4	9.5	1.7	9.6
Heifers (15 - 24 mon)	1.0	6.7	1.2	6.7
Heifers (7 - 14 mon)	0.9	5.8	1.0	5.9
Heifers (3 - 6 mon)	0.8	5.3	0.9	5.3
Calves (0 - 3 mon)	0.7	4.9	0.9	5.0
Mature bulls	1.3	8.9	1.6	9.0

Land Application of Liquid Manure				
Category	Open Corral Housing		Freestall Housing	
	(lb-VOC/cow-yr)	(lb-NH_3/cow-yr)	(lb-VOC/cow-yr)	(lb-NH_3/cow-yr)
Milk cows	3.7	24.9	5.0	29.1
Dry cows	2.3	15.3	3.1	17.9
Heifers (15 - 24 mon)	1.6	10.7	2.1	12.5
Heifers (7 - 14 mon)	1.4	9.3	1.9	10.9
Heifers (3 - 6 mon)	1.3	8.5	1.7	9.9
Calves (0 - 3 mon)	1.2	7.9	1.6	9.3
Mature bulls	2.1	14.3	2.9	16.8

Solid Manure Handling:

An emissions factor for solid manure has not yet been fully established. Results of emissions studies by Dr. C.E. Schmidt at a Merced dairy indicate that VOC and NH_3 emissions from solid manure at a dairy are minimal[1]. Therefore, although some emissions reductions are expected from the required mitigation measures, they will not be quantified at this time.

Feed Handling and Storage:

Although there are potentially significant emissions from the feed handling and storage operation, an emission factor has not been established and will not be calculated in this evaluation. Subsequently, although emissions reductions from the proposed mitigation measures are expected, they will not be quantified at this time.

Hydrogen Sulfide (H2S):

Currently, there is no approved emission factor or data for Hydrogen Sulfide (H2S) emissions. Therefore, H2S emissions will not be calculated for this project. The District expects that research will be completed in the near future, which may be used to establish an emission factor for Hydrogen Sulfide.

GDO

These emission factors were obtained from Appendix A - Emission Factors for Gasoline Stations published by CAPCOA Air Toxic "Hot Spots" Program in the Gasoline Service Station Industrywide Risk Assessment Guidelines dated December 1997. The emission factors are summarized in the following table:

1 "Assessment of Reactive Organic Gases and Amines from a Northern California Dairy Using the USEPA Surface Emission Isolation Flux Chamber", CE Schmidt, Tom Card, EMC, and Patrick Gaffney, CARB (ftp://ftp.arb.ca.gov/carbis/ag/agadvisory/schmidt05jan26.pdf)

VOC Emission Factors	
Emission Factor (lb/1,000 gal)	**Emission Source**
0.42	Tank filling loss (95%)
0.053	Breathing loss (A/G tank)
8.4	Vehicle fueling loss (Uncontrolled)
0.42	Spillage
9.293	**Total VOC Losses**

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since this is a new source, PE1 = 0 for all pollutants and all emission units.

2. Post Project Potential to Emit (PE2)

PE2 calculations are shown in Appendix B.

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

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

Since this is a new source, SSPE1 = 0 for all pollutants and all emission units.

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

Pursuant to Section 4.10 of District Rule 2201, the Post Project Stationary Source Potential to Emit (SSPE2) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site. The SSPE2 for this facility is as shown in the following table:

Post Project Stationary Source Potential to Emit (lb/year)						
Permit Unit	NO_X	SO_X	PM_{10}	CO	VOC	NH_3
N-7750-1 Milk barn	0	0	0	0	783	1,320
N-7750-2 Cow housing	0	0	1,792	0	11,922	34,514
N-7750-3 Liquid manure	0	0	0	0	5,396	54,986
N-7750-4 Solid manure	0	0	0	0	0	0
N-7750-5 Feed	0	0	0	0	0	0
N-7750-6 GDO	0	0	0	0	768	0
Post-Project SSPE (SSPE2):	**0**	**0**	**1,792**	**0**	**18,869**	**90,820**

5. Major Source Determination

Pursuant to Section 3.25 of District Rule 2201, a major source is a stationary source with post-project emissions or a Post Project Stationary Source Potential to Emit (SSPE2), equal to or exceeding one or more of the following threshold values. However, Section 3.25.2 states "for the purposes of determining major source status, the SSPE2 shall not include the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site."

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

> *plants; (xxiv) Glass fiber processing plants; (xxv) Charcoal production plants; (xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or (xxvii) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.*

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

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

Milk Barn:

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

Cow Housing:

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

Manure Storage Areas:

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

Land Application:

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

Feed Handling and Storage:

Although there are potentially significant emissions from the feed handling and storage operation, an emission factor has not been established. The majority of dairies store the silage piles underneath a tarp or in an AgBag. The entire pile is covered except for the face of the pile. The face of the pile is kept open due to the continual need to extract the silage for feed purposes. The silage pile is disturbed 2-3 times per day. Because of the ongoing disturbance to these piles, it makes it extremely difficult to capture any of the emissions from these piles. A system has not been designed to extract the gases from the face of the pile to capture them. Therefore, the District cannot reasonably demonstrate that these emissions can pass through a stack, chimney, or vent for the purpose of reducing emissions.

Liquid Manure Storage Lagoons/Ponds:

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

The post-project emissions from the lagoons/storage ponds at this dairy are shown in Appendix B. The following table shows the non-fugitive Post-Project Stationary Source Potential to Emit for the dairy:

Major Source Determination (lb/year)					
	NO_X	SO_X	PM_{10}	CO	VOC
N-7750-1 Milk Barn	0	0	0	0	0
N-7750-2 Cow housing	0	0	0	0	0
N-7750-3 Liquid manure	0	0	0	0	1,894
N-7750-4 Solid manure	0	0	0	0	0
N-7750-5 Feed	0	0	0	0	0
N-7750-7 GDO	0	0	0	0	768
Non-Fugitive SSPE	**0**	**0**	**0**	**0**	**2,662**
Major Source Threshold	**50,000**	**140,000**	**140,000**	**200,000**	**50,000**
Major Source?	**No**	**No**	**No**	**No**	**No**

As shown in the table above, the facility is not a major source.

6. Baseline Emissions (BE)

BE = Pre-project Potential to Emit 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 Section 3.23

As shown in Section VII.C.5 above, the facility is not a Major Source for any criteria pollutant. Therefore, BE = PE1 for all pollutants and emission units.

7. Major Modification

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.*"

As discussed in Section VII.C.5 above, the facility is not a Major Source for any criteria pollutant; therefore, the project does not constitute a Major Modification.

8. Federal Major Modification

As shown above, this project does not constitute a Major Modification. Therefore, in accordance with District Rule 2201, Section 3.17, this project does not constitute a Federal Major Modification and no further discussion is required.

9. 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 C.

VIII. Compliance

Rule 1070 Inspections

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

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

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

Rule 2010 Permits Required

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

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

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 for the following*:

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 a Title I Modification.

*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

Since this dairy is being permitted as a new facility, all the emission units will be considered new. The following table is a summary of the daily emissions for each emissions unit:

Emissions unit	Daily Emissions (lb/day)					
	NOx	SOx	PM10	CO	VOC	NH3
N-7750-1 - Milk Barn	0.0	0.0	0.0	0.0	2.1	3.6
N-7750-2 - Cow Housing - Freestall Barns	0.0	0.0	4.9	0.0	32.7	94.6
N-7750-3 - Liquid Manure Management	0.0	0.0	0.0	0.0	14.8	150.7
N-7750-4 – Solid Manure Management	0.0	0.0	0.0	0.0	0.0	0.0
N-7750-5 - Feed Storage and Handling.	0.0	0.0	0.0	0.0	0.0	0.0
N-7750-7 - GDO.	0.0	0.0	0.0	0.0	0.1[2]	0.0

As shown in the table above, emissions exceed 2 lb/day and hence BACT is triggered for the following emission units:

- Milk barn: VOC and NH3
- Cow Housing: PM10, VOC and NH3
- Liquid manure management system: VOC and NH3
- GDO - VOC

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 due to relocation of an emissions unit.

[2] This is the PE after 95% control phase I vapor recovery system; Pre-control PE is 2.9 lb/day.

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

All the emission units at this facility will be treated as new units; hence BACT is not triggered under this category.

d. Major modification

As discussed in Section VII.C.7 above, this project does not constitute a major modification; therefore BACT is not triggered for major modification purposes.

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 in Appendix E, BACT has been satisfied with the following:

Milk Barn:

VOC and NH_3: Flush/Spray down milking parlor after each group of cows is milked

Cow Housing – Freestall Barns:

VOC:
1) Feed lanes and walkways constructed of concrete.
2) Feed lanes and walkways flushed four times per day.
3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
4) Refused feed refed or removed from feed lanes on a daily basis to prevent decomposition.
5) VOC mitigation measures required by District Rule 4570.

NH_3:
1) Concrete feed lanes and walkways.
2) Feed lanes and walkways flushed four times per day.
3) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

PM_{10}: 1) Freestall barn housing with concrete feed lanes and walkways.

Liquid Manure Management System

VOC: Anaerobic treatment lagoon.

NH_3: Anaerobic treatment lagoon.

GDO:

VOC: Phase I vapor recovery system.

B. Offsets

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

C. Public Notification

1. Applicability

Public noticing is required for:

a. Any new Major Source, which is a new facility that is also a Major Source,

b. Major Modifications,

c. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,

d. Any project which results in the offset thresholds being surpassed, and/or

e. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.

a. New Major Source

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

b. Major modification

As demonstrated in VII.C.7, this project does not constitute a major modification. Public noticing for major modification purposes is therefore not required.

c. PE > 100 lb/day

Applications which include a new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. The following table is a summary of daily emissions for each new emissions unit:

Emissions unit	Daily Emissions (lb/day)					
	NOx	SOx	PM10	CO	VOC	NH3
N-7750-1 - Milk Barn	0.0	0.0	0.0	0.0	2.1	3.6
N-7750-2 - Cow Housing - Freestall Barns	0.0	0.0	4.9	0.0	32.7	94.6
N-7750-3 - Liquid Manure Management	0.0	0.0	0.0	0.0	14.8	150.7
N-7750-4 – Solid Manure Management	0.0	0.0	0.0	0.0	0.0	0.0
N-7750-5 - Feed Storage and Handling.	0.0	0.0	0.0	0.0	0.0	0.0
N-7750-7 - GDO.	0.0	0.0	0.0	0.0	0.1[3]	0.0

As shown in the table above, the proposed project includes a new emission unit with potential emissions exceeding 100 lb/day. The project therefore triggers public notice requirements.

d. Offset Threshold

Public notification is required if the Pre-Project Stationary Source Potential to Emit (SSPE1) is increased from a level below the offset threshold to a level exceeding the emissions offset threshold, for any pollutant. The following table compares the SSPE1 and the SSPE2 to the offsets theresholds in order to determine if any offset thresholds have been surpassed due to this project.

Offsets Threshold				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offsets Threshold (lb/yr)	Public Notice Required?
NO_X	0	0	20,000	No
SO_X	0	0	54,750	No
PM_{10}	0	1,792	29,200	No
CO	0	0	200,000	No
VOC	0	18,869	20,000	No

As shown above, there were no offsets thresholds surpassed due to this project; hence public noticing is not required for offsets threshold purposes.

e. SSIPE > 20,000 lb/year

Public notice is required for any permitting action that results in a Stationary Source Increase in Permitted Emissions (SSIPE) of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE is calculated as the Post Project Stationary Source Potential to Emit (SSPE2) minus the Pre-Project Stationary Source Potential to Emit (SSPE1), i.e. SSIPE = SSPE2 – SSPE1. The

3 This is the PE after 95% control phase I vapor recovery system; Pre-control PE is 2.9 lb/day.

values for SSPE2 and SSPE1 are calculated according to Rule 2201, Sections 4.9 and 4.10, respectively.

The SSIPE is compared to the SSIPE Public Notice thresholds in the following table:

Stationary Source Increase in Permitted Emissions [SSIPE] – Public Notice					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	Public Notice Threshold (lb/year)	Public Notice Required?
NO_x	0	0	0	20,000	No
SO_x	0	0	0	20,000	No
PM_{10}	1,792	0	1,792	20,000	No
CO	0	0	0	20,000	No
VOC	18,869	0	18,869	20,000	No
NH_3	90,820	0	90,820	20,000	Yes

As demonstrated in the preceding table, the SSIPE for NH_3 is greater than 20,000 lb/year. Public notice for SSIPE purposes is therefore required.

2. Public Notice Action

As discussed above, public notice is required for this project. Public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation in Tulare County prior to the issuance of the ATCs for the project.

D. Daily Emission Limits (DELs)

Daily Emission Limits (DELs) and other enforceable conditions are required to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.17.1 and 3.17.2, 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 by the number and types of cows listed in the permit equipment description for the Cow Housing (Permit N-7750-2). The following conditions will be placed on the permit to enforce these requirements:

Dairy Operation - Cow Housing:

- The total number of cattle housed at the dairy at any one time shall not exceed any of the following limits: 1,100 milk cows, 200 dry cows, and 8 mature bulls. [District Rule 2201]

GDO:

For the refueling operation the DEL is established by the maximum tank capacity, the emission factors as shown in Section VII.B of this document, and the following fuel dispensing throughput limit:

- The fuel dispensing throughput shall not exceed 226 gallons per day. [District Rule 2201] N.

E. Compliance Assurance

1. Source Testing

Dairy Operation:

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

GDO:

Source testing is required by District Rule 4621, *Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants*. This gasoline dispensing operation is subject to the source testing requirements of this rule. Source testing requirements will therefore be discussed under Rule 4621.

2. Monitoring

Dairy Operation - Cow Housing:

Based on guidelines from University of Idaho in a document entitled "*Dairy Odor Management & Control Practices*"[4], the following conditions will be placed on the permit to ensure that emissions from the dairy are minimized:

- Inspection for potholes and other sources of emissions shall be done on a monthly basis. [District Rule 2201] N
- Firm, stable, and not easily eroded soils shall be used for the exercise pens. A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. [District Rule 2201] N
- Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the exercise pen surfaces. [District Rule 2201] N
- Permittee shall maintain water systems such as overflow water, misters, and any water distribution areas in good condition. These systems if broken or

[4] http://courses.ag.uidaho.edu/bae/bae404/Dairy%20Odor%20Mgmt.pdf

malfunctioning shall be repaired in a timely fashion. Holes and wallows near watering troughs and feeding areas should be a high priority. Permittee shall inspect water pipes and troughs and repair leaks at least once every fourteen (14) days [District Rules 2201 and 4570] N

- Fencelines shall be inspected weekly to remove any ridges or build-up of manure that form under them. [District Rule 2201] N

GDO:

Monitoring is required by District Rule 4621, *Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants*. This gasoline dispensing operation is subject to the monitoring requirements of this rule. Monitoring requirements will therefore be discussed under Rule 4621.

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the offsets, public notification and daily emission limit requirements of Rule 2201.
Dairy Operation:

Recordkeeping for the Milk Barn, the Liquid Manure Management System, and the Solid Manure Management System is satisfied with the records that must be kept to demonstrate compliance with the numbers and types of cows listed on the permit equipment description for the Cow Housing. The following conditions will be added to the permit for the Cow Housing:

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

- Permittee shall maintain records of: (1) the number of times freestall barn feed lanes and walkways are flushed per day; (2) daily removal of refused feed, (3) pothole inspections; (4) fenceline manure buildup inspections and removal; and (5) compliance with National Research Council (NRC) feeding guidelines. [District Rules 1070 and 2201] N

- {3246} All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 1070]

Additional recordkeeping requirements are shown under the Rule 4570 compliance section.

GDO:

Recordkeeping is required by District Rule 4621, *Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants.* This gasoline dispensing operation is subject to the recordkeeping requirements of this rule. Recordkeeping requirements will therefore be discussed under Rule 4621.

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis

Section 4.14.1 of this Rule requires that an ambient air quality analysis (AAQA) 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 Technical Services Division of the SJVAPCD conducted the required analysis. Refer to Appendix D of this document for the AAQA summary sheet.

As discussed in the Risk Management Review summary in Appendix D, a comparison of the original dairy layout to the reconstructed dairy layout showed a decrease in health risk and ambient air concentrations of all pollutants. This project therefore will not cause or worsen any violation of an air quality standard.

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 Section 112(g) of the Clean Air Act (administered locally through SJVAPCD Rule 2550, *Federally Mandated Preconstruction Review for Major Sources of Air Toxics*), newly constructed facilities or reconstructed units or sources 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 as Maximum Achievable Control Technology (MACT).

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. A conclusion that MACT requirements are triggered would necessarily involve consideration of controlled emissions levels:

Dairy Hazardous Air Pollutant Emissions		
HAP	lb/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	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	0.162	
Cadmium	0.009	Air Resources Board's Profile No. 423, Livestock Operations Dust
Hexavalent Chromium	0.004	
Nickel	0.026	
Arsenic	0.005	
Cobalt	0.003	
Lead	0.033	
Total	**1.828**	

The emission calculations for HAPs from the proposed dairy are as shown below:

HAP Emissions					
Category	Number of cows		Emission Factor * lbs/hd-yr		lbs/yr (tons/yr)
Milk cows	1,100	x	1.828	=	2,011 (1.0)
Dry cows and bulls	208	x	1.123	=	234 (0.1)
			Total =		**2,245 (1.1)**

* The emission factor has been adjusted for each category of cows using the ratio of amount of manure generated by that category to the amount generated by milk cows.

As shown in the table above, total HAP emissions from this facility are less than 10 tons/year. This demonstrates that the facility is below the 10 tons/year individual HAP threshold as well as the 25 tons/year total HAPs threshold. This facility is therefore not a major air toxics source and the provisions of Rule 2550 do not apply.

There are several recently completed and ongoing research studies that will be considered in future revisions of the current emission factors for dairies. These studies have not been fully vetted or reviewed in the context of establishing standardized emission factors. For instance, although some studies indicate a high methanol emissions rate from fresh manure, the same studies also indicate 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 not until the scientific review process is complete and the District has had an opportunity to consider public comment on any proposed changes.

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 & 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.

As discussed in Section I, this project is a reconstruction at an existing site. The dairy housing and manure management facilities have been upgraded to modern standards, with no increase in the historical herd size for the site. The upgrade of the facility and requirement to comply with permit requirement, including rule 4570 emission mitigation measures, is expected to result in a decrease in hazardous air pollutants.

Since there is no increase in hazardous air pollutants due to this project, a health risk assessment is not required.

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.

The facility submitted a CMP Plan application on May 29, 2007. The application was processed and CMP plan issued under project S-1072817.

The facility's CMP plan is currently valid hence compliance with District Rule 4550 is expected.

Rule 4570 Confined Animal Facilities (CAF)

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

Section 5.0 Requirements

Pursuant to Section 5.1, owners/operators of any CAF shall submit, for approval by the APCO, a permit application for each Confined Animal Facility.

Pursuant to Section 5.2, owners/operators of any CAF shall include an emission mitigation plan within the permit application that lists the VOC mitigation measures that the facility will use to comply with all applicable requirements of Sections 5.6 through 5.13.

Pursuant to Section 5.3, owners/operators of any CAF shall implement all VOC emission mitigation measures, as contained in the permit application, on and after 365 days from the permit issuance date.

Pursuant to Section 5.4, notwithstanding Section 5.3, an owner/operator may temporarily suspend use of mitigation measure(s) provided all of the following requirements are met:

- It is determined by a licensed veterinarian, certified nutritionist, CDFA, or USDA that any mitigation measure being suspended is detrimental to animal health,
- The owner/operator notifies the District, within forty-eight (48) hours of the determination that the mitigation measure is being temporarily suspended; the specific health condition requiring the mitigation measure to be suspended; and the duration that the measure must be suspended for animal health reasons,
- The emission mitigation measure is not suspended for longer than recommended by the licensed veterinarian or certified nutritionist for animal health reasons,
- If such a situation exists, or is expected to exist for longer than thirty (30) days, the owners/operators shall, within that thirty (30) day period, submit a new emission mitigation plan designating a mitigation measure to be implemented in lieu of the mitigation measure that was suspended, and
- The APCO, ARB, and EPA approve the temporary suspension of the mitigation measure for the time period requested by the owner/operator.

The following condition will be placed on each permit:

> {3508} 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, 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] N

Section 6.0 Requirements

Pursuant to Section 6.1, owners/operators of any facility shall submit an Authority to Construct or Permit to Operate application by December 15, 2006 that includes the following:

- The name, business address, and phone number of the owners/operators responsible for the preparation and the implementation of the mitigation measures listed in the permit.
- The signature of the owners/operators attesting to the accuracy of the information provided and adherence to implementing the activities specified in the CAF Plan at all times and the date that the application was signed.
- An emission mitigation plan including a list of all mitigation measures chosen to comply with Rule 4570 requirements and the location of these mitigation measures.
- The number of animals at the facility in each production stage.
- A thirty-day public noticing and commenting period on the permit application.

The applicant has submitted an application containing all the requirements above. Since public noticing is required for this project, a public notice will be published in a local newspaper of general circulation prior to the issuance of these ATCs.

Pursuant to Section 6.2, owners/operators shall submit an update of the permit application to the District for review at least once every three (3) years. The update shall reflect changes in the operation and feasibility of mitigation measures.

The basis of this requirement comes from Senate Bill 700, which actually requires the District to review permits and update them to reflect changes in the operation, or to include or remove mitigation measures based on changes in the feasibility of such measures. Therefore, since this requirement was intended for the District, no update from the applicant will be required.

Pursuant to Section 6.3, the District shall act upon the Authority to Construct application or Permit to Operate application within six (6) months of receiving a complete application.

Section 7.0 Requirements

Pursuant to Section 7.1.1, all records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. Therefore, the following condition will be placed on the permit:

Owners/Operators shall keep and maintain all records for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570] N

7.1.1.2 Owners/operators subject to the requirements of Section 5.0 shall maintain:

- Copies of all of the facility's permits
- Copies of all laboratory tests, calculations, logs, records, and other information required to demonstrate compliance with all applicable requirements of this rule, as determined by the APCO, ARB, EPA.
- Records of the number of animals of each species and production group at the facility on the permit issuance date. Quarterly records of any changes to this information shall also be maintained, (e.g. Dairy Herd Improvement Association records, animal inventories done for financial purposes, etc.)

The following condition will be placed on the cow housing permit:

{3656} Owners/Operators 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] N

Specific recordkeeping and monitoring conditions are shown below under the appropriate mitigation measures.

Sections 7.1.1.2.4 through 7.1.12.21 require specific record keeping conditions for each mitigation measure. These conditions are shown below with each mitigation measure.

Section 7.2 requires specific monitoring or source testing conditions for each mitigation measure. These conditions are shown below with each mitigation measure.

The Dairy has chosen the following Mitigation Measures. All conditions required for compliance with Rule 4570 for the mitigation measures selected by the applicant are shown below. These conditions will be placed on the appropriate permits.

General Conditions

{3508} 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, the Permittee must notify the District in writing within forth-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] N

{3657} All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570] N

Feed Mitigation Measures

Feed according to National Research Council (NRC) guidelines.

{3511} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 4570] N

{3512} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570] N

Feed animals high moisture corn or steam-flaked corn and not feed animals dry rolled corn.

{3513} Permittee shall feed high moisture corn or steam-flaked corn to animals and shall not feed any dry rolled corn to animals. [District Rule 4570] N

{3514} Permittee shall maintain records to demonstrate animals are fed high moisture corn or stream-flaked corn and no dry rolled corn. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570] N

At least once every 14 days remove feed from the area where animals stand to eat feed (concrete feed lanes).

{3515} Permittee shall remove feed from the area where animals stand to eat feed at least once every fourteen (14) days. [District Rule 4570] N

{3516} Permittee shall maintain records of dates when feed was removed from the area where animals stand to eat. [District Rule 4570] N

At least once every 14 days remove spilled feed from the area where equipment travels to place feed in the feed bunk (feed storage and feeding areas).

{3517} Permittee shall remove spilled feed from the area where feed equipment travels at least once every fourteen (14) days. [District Rule 4570] N

{3518} Permittee shall maintain records of dates when spilled feed was removed from the area where feed equipment travels. [District Rule 4570] N

Remove uneaten wet feed from feed bunks within twenty-four hours of a rain event.

{3519} Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours of a rain event. [District Rule 4570] N

{3520} Permittee shall maintain records of when uneaten wet feed was removed from feed bunks. [District Rule 4570] N

Feed or dispose of rations within 48 hours of grinding and mixing rations.

{3521} Permittee shall feed or dispose of rations within forty-eight (48) hours of grinding and mixing rations. [District Rule 4570] N

{3522} Permittee shall maintain records of when feed was either fed to animals or disposed of within forty-eight (48) hours of grinding and mixing rations.

Store grain in a weatherproof storage structure from October through May

{3523} Permittee shall store grain in a weatherproof storage structure from October through May. [District Rule 4570] N

{3524} Permittee shall maintain records when grain is stored in a weatherproof storage structure from October through May. [District Rule 4570] N.

Cover the horizontal surface of silage piles, except for the area where feed is being removed from the pile.

{3525} Permittee shall cover all silage piles, except for the area where feed is being removed from the pile. [District Rule 4570] N

Collect leachate from the silage piles and send it to a waste treatment system such as a lagoon at least once every 24 hours.

{3526} Permittee shall collect leachate from the silage piles and send it to a waste treatment system such as a lagoon at least once every twenty-four (24) hours. [District Rule 4570] N

Milk Parlor Mitigation Measures

Flush or hose milk parlor immediately prior to, immediately after, or during each milking.

{3537} Permittee shall flush or hose milk parlor immediately prior to, immediately after, or during each milking. [District Rule 4570] N

{3538} Permittee shall provide verification that milk parlors are flushed or hosed prior to, immediately after, or during each milking. [District Rule 4570] N

Freestall Barn Mitigation Measures

Inspect water pipes and troughs and repair leaks at least once every 14 days.

{3545} Permittee shall inspect water pipes and troughs and repair leaks at least once every fourteen (14) days. [District Rule 4570] N

{3546} Permittee shall record the dates of inspection and repair of water pipes and troughs. [District Rule 4570] N

Remove animal waste that is not dry from individual cow freestall beds at least once every 14 days.

{3548} Permittee shall remove animal waste that is not dry from individual cow freestall beds at least once every fourteen (14) days. [District Rule 4570] N

{3549} Permittee shall record the date that animal waste that is not dry is removed from individual cow freestall beds. [District Rule 4570] N

Groom (rake, harrow, scrape, or grade) bedding in freestalls at least once every 14 days.

{3550} Permittee shall groom (rake, harrow, scrape, or grade) bedding in freestalls at least once every fourteen (14) days. [District Rule 4570] N

{3551} Permittee shall record the date that bedding in freestalls is raked, harrowed, scraped or graded at least once every fourteen (14) days. [District Rule 4570] N

Solid Waste Mitigation Measures

Cover dry separated solids outside the pens with a weatherproof covering from October through May, except for times, not to exceed 24 hours per event, when wind events remove the covering.

{3600} Permittee shall cover dry separated solids outside the pens with a weatherproof covering from October through May, except for times, not to exceed twenty-four (24) hours per event, when wind events remove the covering. [District Rule 4570] N

{3601} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over solid animal waste and/or weatherproof covering over separated solids, are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rule 4570] N

{3602} Permittee shall maintain records to demonstrate dry separated solids outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570] N

Liquid Waste Mitigation Measures

Remove solids from the waste system with a solids separator system prior to the waste entering the lagoon.

{3624} Permittee shall remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. [District Rule 4570] N

Land Application Mitigation Measures

Allow liquid animal waste to stand in the fields no more than 24 hours after irrigation.

{3643} Permittee shall not allow liquid animal waste to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570] N

{3644} Permittee shall maintain records to demonstrate liquid animal waste will does not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570] N

Land incorporate all solid animal waste within 72 hours of removal from animal housing.

{3652} Permittee shall land incorporate all solid animal waste within seventy-two (72) hours of removal from animal housing. [District Rule 4570] N

{3653} Permittee shall maintain records to demonstrate that all solid animal waste has been incorporated within seventy-two (72) hours of removal from animal housing. [District Rule 4570] N

In order to show compliance with this rule, the facility must select at least 19 mitigation measures *unless "not applicable" was selected for any of the mitigation categories*. The number of measures selected is summarized in the following table:

Category	Requirement	# of Measures Selected
Feed	5	9
Milk Parlor	1	1
Freestall Barn	2	3
Corral	N/A	N/A
Solid Waste	2	1
Liquid Waste	1	1
Land Application	2	2
Total Measures	13	17

As show in the table above, the facility has selected more than the minimum number of mitigation measures. Compliance with this rule is therefore expected.

Rule 4621 Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants

This rule applies to stationary gasoline storage containers with a capacity greater than 250 gallons, stationary gasoline storage containers with a capacity greater than 250 gallons and less than 19,800 gallons located at bulk plants, and gasoline delivery vessels.

The rule exempts the transfer of gasoline into any stationary storage container with a capacity of 550 gallons or less used primarily for the fueling of implements of husbandry, if such container is equipped with a permanent submerged fill pipe, from the requirements of sections 5.2.1 and 5.2.2.
Section 5.1 states "loading equipment and vapor collection equipment shall be installed, maintained, and operated such that it is leak-free, with no excess organic liquid drainage at disconnect."

The following conditions will be placed on the permit to ensure compliance:

{modified 3911} The fuel loading equipment and vapor collection equipment shall be installed, maintained and operated such that it is leak-free, with no excess organic liquid drainage at disconnect. [District Rule 4621]

{3912} A leak is defined as the dripping of VOC-containing liquid at a rate of more than three (3) drops per minute, or the detection of any gaseous or vapor emissions with a concentration or total organic compound greater than 10,000 ppmv, as methane, above background when measured in accordance with EPA Test Method 21. [District Rule 4621]

In addition, ARB has the additional certification requirements, including applicable rules and regulations of the Division of Measurement Standards, the Department of Food and Agriculture, the Office of the State Fire Marshal, the Department of Forestry and Fire Protection, the Division of Occupational Safety and Health, the Department of Industrial Relations, and the Division of Water Quality of the State Water Resources Control Board that have been made conditions of the certification.

Therefore, the following permit condition will be placed on the ATC to ensure compliance with this requirement:

{3976} The Phase I vapor recovery system shall be installed and maintained in accordance with the manufacturer specifications and the ARB Executive Order specified in this permit, including applicable rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture, the Office of the State Fire Marshal of the Department of Forestry and Fire Protection, the Division of Occupational Safety and Health of the Department of Industrial Relations, and the Division of Water Quality of the State Water Resources Control Board that have been made conditions of the certification. [District Rule 4621]

Section 5.4.1 states "all aboveground storage containers shall be constructed and maintained in a leak-free condition." Therefore, the following permit condition will be placed on the ATC to ensure compliance with this requirement:

{3980} The storage container shall be installed, maintained, and operated such that it is leak-free. [District Rule 4621]

Section 5.4.5 states "operators of an aboveground storage container not located at a bulk plant shall conduct and pass the performance test specified in Sections 6.4.9 to determine compliance at least once every 36 months, (no more than 30 days before or after the required performance test date) unless otherwise required under ARB Executive Order." Therefore, the following permit condition will be placed on the ATC to ensure compliance with this requirement:

{3927} The permittee shall conduct all periodic vapor recovery system performance tests specified in this permit, no more than 30 days before or after the required compliance testing date, unless otherwise required under the applicable ARB Executive Order. [District Rule 4621]

{4020} The permittee shall perform and pass a Static Leak Test for Aboveground Tanks using ARB TP-201.3B or TP-206.3 within 60 days after initial start-up and at least once every 36 months thereafter. [District Rule 4621]

Section 5.5 states "All Phase I vapor recovery systems shall be inspected according to the frequency specified in Table 1. The person conducting the inspections shall, at a minimum, verify that the fill caps and vapor caps are not missing, damaged, or loose, that the fill cap gasket and vapor cap gaskets are not missing or damaged, that the fill adapter and vapor adapter are securely attached to the risers, that, where applicable, the spring-loaded submerged fill tube seals properly against the coaxial tubing, and the dry break (poppet-valve) is not missing or damaged and that the submerged fill tube is not missing or damaged." Therefore, the following permit conditions will be placed on the ATC to ensure compliance with these requirements:

{3924} Periodic maintenance inspections of the Phase I vapor recovery system shall include, at a minimum, verification that 1) the fill caps and vapor caps are not missing, damaged, or loose; 2) the fill cap gasket and vapor cap gaskets are not missing or damaged; 3) the fill adapter and vapor adapter are securely attached to the risers; 4) where applicable, the spring-loaded submerged fill tube seals properly against the coaxial tubing;

5) the dry break (poppet-valve) is not missing or damaged; and 6) the submerged fill tube is not missing or damaged. [District Rule 4621]

{3922} The permittee shall conduct periodic maintenance inspections based on the greatest monthly throughput of gasoline dispensed by the facility in the previous year as follows: A) less than 2,500 gallons - one day per month; B) 2,500 to less than 25,000 gallons - one day per week; or C) 25,000 gallons or greater - five days per week. All inspections shall be documented within the O & M Manual. [District Rule 4621]

Section 5.7.2 states "no person shall operate, or allow the operation of a delivery vessel unless valid State of California decals which attest to the vapor integrity of the container are displayed." Therefore, the following permit condition will be placed on the ATC to ensure compliance with this requirement:

{3915} No gasoline delivery vessel shall be operated or be allowed to operate unless valid State of California decals are displayed on the cargo container, which attest to the vapor integrity of the container. [District Rule 4621]

Section 6.1.4 states "all records required to demonstrate compliance with the requirements of this rule shall be retained on the premises for a minimum of five years and made available on site during normal business hours to the APCO, ARB, or EPA, and submitted to the APCO, ARB, or EPA upon request." Therefore, the following permit conditions will be placed on the ATC to ensure compliance with these requirements:

{4009} The permittee shall maintain monthly and annual gasoline throughput records. [District Rule 4621]

{3973} All records required by this permit shall be retained on-site for a period of at least five years and shall be made available for made available for District inspection upon request. [District Rule 4621]

Section 6.2.3 states "Operators shall notify the District at least seven days prior to any performance testing."

Section 6.2.4 states "Operators shall submit all performance test results to the District within 30 days of test completion."

Therefore, the following permit condition will be placed on the ATC to ensure compliance with these requirements:

{3968} The permittee shall notify the District at least 7 days prior to each performance test. The test results shall be submitted to the District no later than 30 days after the completion of each test. [District Rule 4621]

Section 6.3.1 states "on and after June 20, 2008, installation and maintenance contractors shall be certified by the ICC for Vapor Recovery System Installation and Repair (VI) and make available onsite proof of ICC certification for VI, and have and make available on site proof of any and all certifications required by the Executive Order and installation and operation manual in order to install or maintain specific systems, or work under the direct and personal supervision of an individual physically present at the work site who possesses and makes available onsite a current certificate from the ICC, indicating he or she has passed the VI exam and all certifications required by the applicable Executive Order.

Section 6.3.2 states "All ICC certifications shall be renewed every 24 months by passing the appropriate exam specific to the certification being sought."

Section 6.3.3 states "Effective on and after March 21, 2008, Gasoline Dispensing Facility Testers wishing to conduct vapor recovery system testing and repair at facilities located within the District, shall be in full compliance with District Rule 1177 (Gasoline Dispensing Facility Tester Certification)."

Therefore, the following permit condition will be placed on the ATC to ensure compliance with these requirements:

{4013} A person performing installation of, or maintenance on, a certified Phase I vapor recovery system shall be certified by the ICC for Vapor Recovery System Installation and Repair, or work under the direct and personal supervision of an individual physically present at the work site who is certified. The ICC certification shall be renewed every 24 months. [District Rule 4621]

{4015} Proof of the ICC certification and all other certifications required by the Executive Order and installation and operation manual shall be made available onsite. [District Rule 4621]

{4006} A person conducting testing of, or repairs to, a certified vapor recovery system shall be in compliance with District Rule 1177 (Gasoline Dispensing Facility Tester Certification). [District Rule 4621]

Standing Loss Control For Existing Tanks (VR-301)

As part of the enhanced vapor recovery (EVR) requirements for aboveground tanks, ARB, via Executive Order VR-301, requires existing tanks (those installed prior to April 2009) to be coated with a specially formulated white paint in order to reduce absorption of solar radiation, which causes excessive breathing and loss of vapors from the tanks. Existing tanks have until April 2013 to come into full compliance with the standing loss control requirements specified in Executive Order VR-301.

The following condition will be listed on the ATC to ensure compliance with the requirements of Executive Order VR-301 within the appropriate timeline:

Prior to April 1, 2013, this tank shall be in full compliance with the requirements of ARB Executive Order VR-301 (Standing Loss Control for Existing Installation). The permittee shall obtain an Authority to Construct permit from the District prior to implementation of the requirements of VR-301. [District Rule 4621]

Rule 4622 Transfer of Gasoline into Vehicle Fuel Tanks

This rule applies to gasoline dispensing facilities that fuel motor vehicles. Pursuant to section 4.2, the requirements of this rule shall not apply to gasoline storage containers that are exempt pursuant to Section 4.0 of Rule 4621 (Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants).

Since the proposed equipment is exempt under section 4.0 of Rule 4621, the requirements of this rule are not applicable.

California Health and Safety Code 42301.6 (School Notice)

The applicant states 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 Senate Bill 700 (SB 700)

Bob Borba Dairy is an agricultural operation that raises dairy cows for the production of milk for human consumption. Pursuant to Senate Bill (SB) 700, all agricultural operations, including Confined Animal Facilities (CAF), with emissions greater than ½ the major source emissions threshold levels (12.5 ton/year of NO_X or VOC), are required to obtain a District permit.

Both the pre-project and post-project emissions from the dairy exceed the 12.5 ton-VOC/year threshold and the dairy is classified as a large CAF by the California Air Resources Board (ARB). The facility has applied for ATC permits for the dairy operation pursuant to the requirements of SB 700.

California Environmental Quality Act (CEQA)

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

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

Greenhouse Gas (GHG) Significance Determination

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

The proposed project involves the issuance of a permit to operate for a reconstructed existing operation. Since the operation is limited in scope to its historical capacity, there is no increase in GHG emissions. The District therefore concludes that the project would have a less than cumulatively significant impact on global climate change.

District CEQA Findings

The project consists of issuing air permits to an existing, reconstructed dairy. The applicant purchased the existing dairy in 2006 and replaced the milk barn, freestall barns, manure management system, and feed storage/handling facilities. The project is located in Merced County and is subject to County land use zoning and permit requirements. The County determined that renovation of the existing dairy and operation of the reconstructed dairy was an allowed use that required only building permits. Since reconstruction, the applicant has continued to operate consistent with the historical herd size of the pre-existing dairy. The facility is a "Reconstructed Source" as defined in District Rule 2201 (New and Modified Stationary Source Review) §3.32.

The District's permitting action is limited to issuance of air permits for operation of stationary sources at the reconstructed dairy. Since the facility is classified as a reconstructed source for NSR purposes, it is required to implement Best Available Control Technology (BACT) on all emission units with a potential to emit exceeding 2 lb/day. The BACT requirements are discussed in Appendix E. The District's engineering evaluation demonstrates that through a combination of project design elements, BACT, and other permit conditions, operation of permitted stationary source would have a less than significant impact on air quality.

In addition, the reconstructed dairy occurs on the same site and has substantially the same purpose and capacity as the previous facility. The District finds that the project is categorically exempt from the provisions of CEQA pursuant to CEQA Guideline §15302 (Replacement or Reconstruction).

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful public noticing period, issue Authorities to Construct N-7750-1-0, 2-0, 3-0, 4-0, 5-0, and 7-0 subject to the permit conditions on the attached draft Authorities to Construct in Appendix F.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-7750-1-0	3020-06	Milk Barn	$89.00
N-7750-2-0	3020-06	Cow Housing	$89.00
N-7750-3-0	3020-06	Liquid Manure Handling System	$89.00
N-7750-4-0	3020-06	Solid Manure Handling System	$89.00
N-7750-5-0	3020-06	Feed Storage and Handling	$89.00
N-7750-7-0	3020-11-A	One Nozzle	$34.00

XI. Appendices

A: Anaerobic Treatment Lagoon Design Check
B: Post-Project Potential to Emit (PE2) Calculations
C: Quarterly Net Emissions Change (QNEC) Calculations
D: Risk Management Review Summary
E: BACT Analysis
F: Draft ATCs

APPENDIX A

Anaerobic Treatment Lagoon Design Check

Lagoon Design Check in Accordance with NRCS Guideline #359

Proposed Lagoon Volume

Volume of treatment lagoon = $(L \times W \times D) - (S \times D^2) \times (W + L) + (4 \times S^2 \times D^3 \div 3)$

Primary Treatment Lagoon Dimensions

Length	457	ft
Width	168	ft
Depth	14	ft
Slope	2	ft

Primary Lagoon Volume	**844,499 ft3**

Lagoon Design Check in Accordance with NRCS Guideline #359

Net Volatile Solids loading Calculation

Net Volatile Solids (VS) Loading of Treatment Lagoons									
Breed: Holstein Type of Cow	Number of Animals	x	VS Excreted[1] (lb/day)	x	% Manure in Flush[2]	x	(1 - % VS Removed in Separation[3])	=	Net VS Loading (lb/day)
Milk Cows	1,100	x	17	x	71%	x	(1 – 50%)	=	**6,639**
Dry Cow	200	x	9.2	x	71%	x	(1 – 50%)	=	**653**
Heifer (15 to 24 months)	0	x	7.1	x	48%	x	(1 – 50%)	=	**0**
Heifer (7 to 14 months)	0	x	4.9	x	48%	x	(1 – 50%)	=	**0**
Heifer (3 to 6 months)	0	x	2.7	x	48%	x	(1 – 50%)	=	**0**
Calf (under 3 months)	0	x	1.0	x	100%	x	(1 – 50%)	=	**0**
Bulls	8	x	9.2	x	48%	x	(1 – 50%)	=	**18**
Total for Dairy									**7,309**

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

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

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Minimum Treatment Volume Calculation

MTV = TVS/VSLR

Where:

MTV = Minimum Treatment Volume (ft^3)

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

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

Minimum Treatment Volume in Primary Lagoon					
Breed: Holstein **Type of Cow**	**Net VS Loading (lb/day)**		**VSLR** (lb/ft3-day)[1]		**MTV (ft^3)**
Milk Cows	6,639	÷	0.011	=	**603,500**
Dry Cow	653	÷	0.011	=	**59,382**
Heifer (15 to 24 months)	0	÷	0.011	=	**0**
Heifer (7 to 14 months)	0	÷	0.011	=	**0**
Heifer (3 to 6 months)	0	÷	0.011	=	**0**
Calf (under 3 months)	0	÷	0.011	=	**0**
Bulls	18	÷	0.011	=	**1,606**
Total for Dairy					**664,488**

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

Lagoon Design Check in Accordance with NRCS Guideline #359

Sludge Accumulation Volume

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

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

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

SAV = VPL - MTV

Where:

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

SAV =	**VPL**	**- MTV**	
SAV =	**844,499**	**664,488 =**	**180,011 (ft3)**

Lagoon Design Check in Accordance with NRCS Guideline #359

Hydraulic Retention Time (HRT) Calculation

The anaerobic treatment lagoon and covered lagoon anaerobic digester must be designed to provide sufficient Hydraulic Retention Time (HRT) to adequately treat the waste entering the lagoon and to allow environmentally safe utilization of this waste. The NRCS Technical Guide Code 365 – Anaerobic Digester – Ambient Temperature specifies a minimum HRT 38 days in the San Joaquin Valley.

The Hydraulic Retention Time (HRT) is calculated as follows:

HRT = MTV/HFR

where:

HFR = Hydraulic flow rate (1000ft^3/day)

HRT = Hydraulic Retention Time (day)

The Hydraulic Flow Rate is Calculated below

Type	# of cows		Amount of Manure*			HFR	
Milk Cows	1,100	x	2.40	ft^3	=	2,640	ft^3/day
Dry Cows	200	x	1.30	ft^3	=	260	ft^3/day
Heifers (15-24 mo)	0	x	0.78	ft^3	=	-	ft^3/day
Heifers (7-14 mo)	0	x	0.78	ft^3	=	-	ft^3/day
Heifers (3-6 mo)	0	x	0.30	ft^3	=	-	ft^3/day
Calves	0	x	0.15	ft^3	=	-	ft^3/day
Bulls	8	x	1.30	ft^3	=	10	ft^3/day
Total	1,308					**2,910**	**ft^3/day**
Fresh water per milk cow used in flush at milk parlor			**50**	gal/day			

*Table 1.b - Section 3 of ASAE D384.2 (March 2005). The calf manure was estimated to be 1/2 of the calf number found in the table, since the average weight of these calves is approx. 1/2 of the calves identified in the table.

Lagoon Design Check in Accordance with NRCS Guideline #359 Cont.

Formula:

Gallon	**#**	**x**	**ft3**	**+**	ft3
Milk Cow*Day	**Milk Cows**		**gallon**		**day**

Total HFR:

50 ~~gal~~	1100 ~~milk cows~~	x	**ft3**	+	2,910 **ft3**
~~milk cow *~~ day			7.48 ~~gal~~		day

= **10,263.3** **ft3/day**

Formula:

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

HRT:

664,488 ~~ft3~~	day	=
	10,263.3 ~~ft3~~	

= **64.743793** **days**

APPENDIX B

Post-Potential to Emit (PE2) Calculations

PE2 for from the Milking Parlor (Expansion)							
		Uncontrolled EF		Control		Emissions	
Type of Cow	# of Cows	(lb-VOC/hd-yr)	lb-NH3/hd-yr	Flushing/Spraying down milk parlor after each	Feeding to NRC Guidelines (5%)	(lb-VOC/yr)	(lb-NH3/yr)
Milk Cows		0.9		x (1 - 0.167)	x (1- 0.05) =	783	
Freestall	1,100		1.2	=			1,320
		0.9		x (1 - 0)	x (1- 0) =	0	
Open Corral	0		1.3	=			0
				lb/yr		783	1,320
PE2 (Expansion) for from the Milking Parlor				lb/day =		2.1	3.6

PE2 from the Cow Housing Permit (Expansion)							
		Uncontrolled EF				Emissions	
Type of Cow	# of Cows	(lb-VOC/hd-yr)	lb-NH3/hd-yr	Control		(lb-VOC/yr)	(lb-NH3/yr)
				Feeding to NRC guidelines (5%)	Flushing freestall lanes four times per day (18.2%)		
Milk Cow		12.4		x (1 - 0.05)	x (1 - 0.182) =	10,600	
Freestall	1,100		28.0				30,800
		12.4		x (1 - 0)	x (1 - 0) =	0	
Open Corrall	0		32.3				0
				Feeding to NRC guidelines (5%)	Flushing freestall lanes four times per day (18.2%)		
Dry Cow		8.2		x (1 - 0.05)	x (1 - 0.182) =	1,274	
Freestall	200		17.9				3,580
		8.2		x (1 - 0)	x (1 - 0) =	0	
Open Corrall	0		20.6				0
				Feeding to NRC guidelines (5%)	Flushing lanes two times per day (0%)		
Heifer (15-24 mon)		5.7		x (1 - 0)	x (1 - 0) =	0	
Freestall	0		12.6				0
		5.7		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		14.4				0
				Feeding to NRC guidelines (5%)	Flushing lanes two times per day (0%)		
Heifer (7-14 mon)		5.0		x (1 - 0)	x (1 - 0) =	0	
Freestall	0		11.0				0
		5.0		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		12.6				0
				Feeding to NRC guidelines (5%)	Flushing lanes two times per day (0%)		
Heifer (4-6 mon)		4.5		x (1 - 0)	x (1 - 0) =	0	
Freestall	0		9.9				0
		4.5		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		11.4				0
Calves <3 mo				Feeding to NRC guidelines (5%)	Flushing lanes two times per day (0%)		
Open Corral		4.3		x (1 - 0)	x (1 - 0) =	0	
	0		10.7				0
A/G Scraped		4.3		x (1 - 0)	x (1 - 0) =	0	
	0		10.7				0
				Feeding to NRC guidelines (5%)	Flushing lanes two times per day (0%)		
Bulls		7.7		x (1 - 0.05)	x (1 - 0.182) =	48	
Freestall	8		16.8				134
		7.7		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		19.3				0
					lb/yr	11,922	34,514
PE2 (Expansion) for VOC from the Cow Housing Permit					lb/day = lb/yr÷ (365 day/yr)	32.7	94.6

PE2 from the Lagoon/Storage Pond (Expansion)							
		Uncontrolled EF				Emissions	
Type of Cow	# of Cows	(lb-VOC/hd-yr)	lb-NH3/hd-yr	Control		(lb-VOC/yr)	(lb-NH3/yr)
Milk Cow				Feeding to NRC guidelines (5%)	Anaerobic Treatment Lagoon		
		2.7		x (1 - 0.05)	x (1 - 0.4) =	1,693	
Freestall	1,100		15.7				17,270
		2.3		x (1 - 0)	x (1 - 0) =	0	
Open Corrall	0		15.5				0
Dry Cow				Feeding to NRC guidelines (5%)	Anaerobic Treatment Lagoon		
		1.7		x (1 - 0.05)	x (1 - 0.4) =	194	
Freestall	200		9.6				1,920
		1.4		x (1 - 0)	x (1 - 0) =	0	
Open Corrall	0		9.5				0
Heifer (15-24 mon)				Feeding to NRC guidelines (5%)	Anaerobic Treatment Lagoon		
		1.2		x (1 - 0)	x (1 - 0) =	0	
Freestall	0		6.7				0
		1.0		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		6.7				0
Heifer (7-14 mon)				Feeding to NRC guidelines (5%)	Anaerobic Treatment Lagoon		
		1.0		x (1 - 0)	x (1 - 0) =	0	
Freestall	0		5.9				0
		0.9		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		5.8				0
Heifer (4-6 mon)				Feeding to NRC guidelines (5%)	Anaerobic Treatment Lagoon		
		0.9		x (1 - 0)	x (1 - 0) =	0	
Freestall	0		5.3				0
		0.8		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		5.3				0
Calves <3 mo				Feeding to NRC guidelines (5%)	Anaerobic Treatment Lagoon		
Open Corral		0.7		x (1 - 0)	x (1 - 0) =	0	
	0		4.9				0
A/G Scraped		0.7		x (1 - 0)	x (1 - 0) =	0	
	0		4.9				0
Bulls				Feeding to NRC guidelines (5%)	Anaerobic Treatment Lagoon		
		1.6		x (1 - 0.05)	x (1 - 0.4) =	7	
Freestall	8		9.0				72
		1.3		x (1 - 0)	x (1 - 0) =	0	
Open Corral	0		8.9				0
					lb/yr	1,894	19,262
PE2 (Expansion) from the Liquid Manure Handling - Lagoon/Storage Pond					lb/day = lb/yr÷ (365 day/yr)	5.2	52.8

PE2 from the Liquid Manure Handling - Land Application (Expansion)						
		Uncontrolled EF			Emissions	
Type of Cow	# of Cows	(lb-VOC/hd-yr)	lb-NH3/hd-yr	Control	(lb-VOC/yr)	(lb-NH3/yr)
Milk Cow				Feeding to NRC guidelines (5%) / Anaerobic Treatment Lagoon		
		5.0		x (1 - 0.05) x (1 - 0.4) =	3,135	
Freestall	1,100		29.1			32,010
		3.7		x (1 - 0) x (1 - 0) =	0	
Open Corrall	0		24.9			0
Dry Cow				Feeding to NRC guidelines (5%) / Anaerobic Treatment Lagoon		
		3.1		x (1 - 0.05) x (1 - 0.4) =	353	
Freestall	200		17.9			3,580
		2.3		x (1 - 0) x (1 - 0) =	0	
Open Corrall	0		15.3			0
Heifer (15-24 mon)				Feeding to NRC guidelines (5%) / Anaerobic Treatment Lagoon		
		2.1		x (1 - 0) x (1 - 0) =	0	
Freestall	0		12.5			0
		1.6		x (1 - 0) x (1 - 0) =	0	
Open Corral	0		10.7			0
Heifer (7-14 mon)				Feeding to NRC guidelines (5%) / Anaerobic Treatment Lagoon		
		1.9		x (1 - 0) x (1 - 0) =	0	
Freestall	0		10.9			0
		1.4		x (1 - 0) x (1 - 0) =	0	
Open Corral	0		9.3			0
Heifer (4-6 mon)				Feeding to NRC guidelines (5%) / Anaerobic Treatment Lagoon		
		1.7		x (1 - 0) x (1 - 0) =	0	
Freestall	0		9.9			0
		1.3		x (1 - 0) x (1 - 0) =	0	
Open Corral	0		8.5			0
Calves <3 mo				Feeding to NRC guidelines (5%) / Anaerobic Treatment Lagoon		
		1.2		x (1 - 0) x (1 - 0) =	0	
Open Corral	0		7.9			0
		1.2		x (1 - 0) x (1 - 0) =	0	
A/G Scraped	0		7.9			0
Bulls				Feeding to NRC guidelines (5%) / Anaerobic Treatment Lagoon		
		2.9		x (1 - 0.05) x (1 - 0.4) =	13	
Freestall	8		16.8			134
		2.1		x (1 - 0) x (1 - 0) =	0	
Open Corral	0		14.3			0
				lb/yr	3,502	35,724
PE2 (Expansion) from the Liquid Manure handling - Land Application				lb/day = lb/yr÷ (365 day/yr)	9.6	97.9

Total Emissions from Liquid Manure Handling System (Expansion)		
Pollutants	lbs/day	lbs/year
VOC	14.8	5,396
NH3	150.6	54,986

Total PE2 from all Permit units				
	VOC		NH3	
	lbs/dy	lbs/yr	lbs/dy	lbs/yr
Milk Parlor	0.0	0	0.0	0
Milk Parlor	2.1	783	3.6	1,320
Cow Housing	0.0	0	0.0	0
Cow Housing	32.7	11,922	94.6	34,514
Lagoon/Storage	0.0	0	0.0	0
Lagoon/Storage	5.2	1,894	52.8	19,262
Land Application	0.0	0	0.0	0
Land Application	9.6	3,502	97.9	35,724
Total		18,101		90,821

Post-Project PM10 Emissions									
Type of Cow		**# of Cows**		**EF**		**CE**		**Total Emissions (lb/yr)**	
Milking Cow	Freestall	1,100	x	1.37	x	0	=	1507	
	Open Corral	0	x	5.46		0	=	0	
Dry Cow	Freestall	200	x	1.37	x	0	=	274	
	Freestall	0	x	5.46		0	=	0	
Heifer (15-24 mo)	Freestall	0	x	1.37	x	0	=	0	
	Open Corral	0	x	10.55		0	=	0	
Heifer (7-14 mo)	Freestall	0	x	1.37	x	0	=	0	
	Open Corral	0	x	10.55		0	=	0	
Heifer (4-6 mo)	Freestall	0	x	1.37	x	0	=	0	
	Open Corral	0	x	10.55		0	=	0	
Calf (under 3 mo)	Open Corral	0	x	1.37	x	0	=	0	
Calf (under 3 mo)	A/G Scraped	0	x	1.37	x	0.85	=	0	
Bulls	Freestall	8	x	1.37		0	=	11	
	Open Corral	0	x	10.55	x	0	=	0	
						lb/yr		**1,792**	
PE2 for PM10 from the Cow Housing Permit						**lb/day**			
						= lb/yr÷ (365 day/yr)		**4.9**	

Total Post-Project Emissions

Total Post-Project PM10 Emissions								
Type of Cow		**Existing**		**Expanding**			**(lbs-PM10/yr)**	
Milking Cow	Freestall	0	+	1507		=	1507	
	Open Corral	0	+	0		=	0	
Dry Cow	Freestall	0	+	274		=	274	
	Open Corral	0	+	0		=	0	
Heifer (15-24 mo)	Freestall	0	+	0		=	0	
	Open Corral	0	+	0		=	0	
Heifer (7-14 mo)	Freestall	0	+	0		=	0	
	Open Corral	0	+	0		=	0	
Heifer (4-6 mo)	Freestall	0	+	0		=	0	
	Open Corral	0	+	0		=	0	
Calf (under 3 mo)	Open Corral	0	+	0		=	0	
	A/G Scraped	0	+	0		=	0	
Bulls	Freestall	0	+	11		=	11	
	Open Corral	0	+	0		=	0	
				lb/yr			**1,792**	
				lb/day			**4.9**	
PE2 for PM10 from the Cow Housing Permit				= lb/yr÷ (365 day/yr)				

Increase in emissions = Post-Project - Project						
Pre-Project = Existing dairy					-	lbs/syr
Post-Project Emissions =					1,792	lbs/syr
Increase in Emissions					**1,792**	**lbs/yr**
					4.9	**lbs/day**

GDO Emissions

<u>Daily VOC emissions</u>:

Tank Filling (Phase I):

VOC (lb/day) = daily throughput (gal/day)/1,000 x (EF lb-VOC/1,000 gal)

= (350 gal/day)/1,000 x (0.42 lb-VOC/1,000 gal)

= 0.1 lb-VOC/day

Breathing losses:

VOC (lb/day) = daily throughput (gal/day)/1,000 x (EF lb-VOC/1,000 gal)

= (226 gal/day)/1,000 x (0.053 lb-VOC/1,000 gal.)

= 0.0 lb-VOC/day

Equipment refueling (Phase II):

VOC (lb/day) = daily throughput (gal/day)/1,000 x (EF lb-VOC/1,000 gal)

= (226 gal/day)/1,000 x (8.4 lb-VOC/1,000 gal.)

= 1.9 lb-VOC/day

Spillage:

VOC (lb/day) = daily throughput (gal/day)/1,000 x (EF lb-VOC/1,000 gal)

= (226 gal/day)/1,000 x (0.42 lb-VOC/1,000 gal.)

= 0.1 lb-VOC/day

<u>Annual VOC emissions</u>

Tank Filling (Phase I):

Annual emissions (lb/yr) = daily emissions (lb/day) x (365 days/yr)

= 0.1 lb/day x 365 days/yr

= 37 lb/yr

Breathing Losses:

Annual emissions (lb/yr) = daily emissions (lb/day) x (365 days/yr)

= 0.0 lb/day x 365 days/yr

= 0 lb/yr

Equipment refueling (Phase II):

Annual emissions (lb/yr) = daily emissions (lb/day) x (365 days/yr)

= 1.9 lb/day x 365 days/yr

= 694 lb/yr

Spillage:

Annual emissions (lb/yr) = daily emissions (lb/day) x (365 days/yr)

= 0.1 lb/day x 365 days/yr

= 37 lb/yr

Total annual emissions = (tank filling emissions) + (breathing losses) + (equipment refueling emissions) + spillage
= 37 lb/yr + 0 lb/yr +694 lb/yr + 37 lb/yr
= 768 lb/yr

APPENDIX C

Quarterly Net Emissions Change (QNEC) Calculations

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 - BE, where:

QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr.
PE2 = Post Project Potential to Emit for each emissions unit, lb/qtr.
BE = Baseline Emissions (per Rule 2201) for each emissions unit, lb/qtr.

Using the values in Sections VII.C.2 and VII.C.6 in the evaluation above, quarterly PE2 and quarterly BE can be calculated as follows:

Milk Barn (N-7750-1-0)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0.0
CO	0	÷	4 qtr/year	=	0.0
VOC	783	÷	4 qtr/year	=	195.75
NH_3	1,320	÷	4 qtr/year	=	330.0

Since this is a new emissions unit at a non-major source, BE = PE1 = 0 lb/qtr for all pollutants.

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	195.75	-	0.0	=	195.75
NH_3	330.0	-	0.0	=	330.0

Cow Housing (N-7750-2-0)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	1,792	÷	4 qtr/year	=	448.0
CO	0	÷	4 qtr/year	=	0.0
VOC	11,922	÷	4 qtr/year	=	2,980.5
NH_3	34,514	÷	4 qtr/year	=	8,628.5

Since this is a new emissions unit at a non-major source, BE = PE1 = 0 lb/qtr for all pollutants.

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	448.0	-	0.0	=	448.0
CO	0.0	-	0.0	=	0.0
VOC	2,980.5	-	0.0	=	2,980.5
NH_3	8,628.5	-	0.0	=	8,628.5

Liquid Manure Handling System (N-7750-3-0)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0.0
VOC	5,396	÷	4 qtr/year	=	1,349
NH_3	54,986	÷	4 qtr/year	=	13,746.5

Since this is a new emissions unit at a non-major source, BE = PE1 = 0 lb/qtr for all pollutants.

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	1,349	-	0.0	=	1,349
NH_3	13,746.5	-	0.0	=	13,746.5

Solid Manure (N-7750-4-0) and Feed Handling and Storage (N-7750-5-0)

Since no emissions are assigned to these emission units, QNEC = 0 lb/qtr for all pollutants.

Gasoline Dispensing Operation (N-7750-7-0)

Quarterly PE2					
Pollutant	PE2 (lb/year)	÷	4 qtr/year	=	PE2 (lb/qtr)
NO_X	0	÷	4 qtr/year	=	0.0
SO_X	0	÷	4 qtr/year	=	0.0
PM_{10}	0	÷	4 qtr/year	=	0
CO	0	÷	4 qtr/year	=	0.0
VOC	768	÷	4 qtr/year	=	192
NH_3	0	÷	4 qtr/year	=	0.0

Since this is a new emissions unit at a non-major source, BE = PE1 = 0 lb/qtr for all pollutants.

QNEC					
Pollutant	PE2 (lb/qtr)	-	BE (lb/qtr)	=	QNEC (lb/qtr)
NO_X	0.0	-	0.0	=	0.0
SO_X	0.0	-	0.0	=	0.0
PM_{10}	0.0	-	0.0	=	0.0
CO	0.0	-	0.0	=	0.0
VOC	192	-	0.0	=	192
NH_3	0.0	-	0.0	=	0.0

APPENDIX D

Risk Management Review Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review

To: Jonah Aiyabei – Permit Services

From: Cheryl Lawler – Technical Services

Date: May 17, 2010

Facility Name: Bob Borba Dairy

Location: 6626 Central Avenue, Hilmar

Application #(s): N-7750-1-0 thru 5-0, 7-0

Project #: N-1073346

A. RMR SUMMARY

RMR Summary		
Categories	**Dairy – Original Configuration (Units 1-0 thru 5-0, 7-0)**	**Dairy – New Configuration (Units 1-0 thru 5-0, 7-0)**
Prioritization Score	70.1	70.1
Acute Hazard Index	30.39	9.21
Chronic Hazard Index	2.88	1.29
Maximum Individual Cancer Risk as Proposed	4.72E-05	1.44E-05
T-BACT Required?	N/A	N/A
Special Permit Conditions?	N/A	N/A

B. RMR REPORT

I. Project Description

Technical Services received a request on May 11, 2010, to perform a Risk Management Review (RMR) and Ambient Air Quality Analysis (AAQA) for an existing dairy operation. This dairy was determined to be a grandfathered-in permitted facility by District engineering staff. However, the dairy has recently reconfigured the locations and layout of all permit units at the facility site. This RMR/AAQA was performed to determine if risks from the new configuration of the dairy will increase or decrease risks that previously existed under the original configuration.

II. Analysis

To determine whether there was an increase or decrease in risks with the new configuration of the dairy, Technical Services performed prioritizations and refined level health risk assessments for both configurations of the dairy. The AERMOD model was used, with area source parameters provided by the facility and 5-year concatenated meteorological data from Modesto 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 Hot Spots Analysis and Reporting Program (HARP) risk assessment module to calculate the chronic and acute hazard indices and the carcinogenic risks for each configuration of the dairy. Technical Services then compared results from each run, to determine the overall increase or decrease in risk.

When the refined RMR results from the original configuration and the new configuration of the dairy were compared, the new current configuration of the dairy clearly showed decreases in all areas (see RMR Summary on Pg. 1).

The following parameters were used for the RMRs:

Analysis Parameters			
Total Herd		1,308	
Annual NH3 (lb/yr)	90,820	**Hourly NH3 (lb/hr)**	10.37
Annual PM10 (lb/yr)	1,792	**Hourly PM10 (lb/hr)**	0.20
Annual H2S (lb/yr)	15,964	**Hourly H2S (lb/hr)**	1.82

In addition to the RMR, Technical Services performed modeling for the pollutants PM_{10} and H2S using AERMOD. The emission rates used were 1,792 lb PM_{10}/year and 15,964 lb H2S/year. The results from the Pollutant Modeling are as follows:

Pollutant Modeling Results

Category	Original Configuration	New Configuration
H2S (hourly Acute Risk)	175	59.2
PM10 Significance Level ($\mu g/m^3$)	49.245	41.687

As can be seen in the above results, risks from H2S and PM10 have decreased with the new current configuration of the dairy.

III. Conclusion

The ambient air quality impacts from PM_{10} emissions at the dairy have **decreased** under the current configuration of the dairy. The acute index results from H2S have **decreased** under the current configuration of the dairy. The acute and chronic indices, and the maximum individual cancer risk associated with the dairy have all **decreased** under the current configuration of the dairy. Therefore, due to the "grandfathered" status of this facility, and since the RMR/AAQA modeling shows decreases in all values, no risks/scores will be recorded as part of this facility's cumulative totals.

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.

APPENDIX E

BACT Analysis

TOP-DOWN BACT ANALYSIS

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

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

I. Pollutants Emitted from Dairies

1. PM_{10} Emissions from Dairies

The National Ambient Air Quality Standards currently regulate concentrations of particulate matter with a mass median diameter of 10 micrometers or less (PM_{10}). Studies have shown that particles in the smaller size fractions contribute most to human health effects. A $PM_{2.5}$ standard was published in 1997, but has not been implemented pending the results of ongoing litigation.

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

2. VOC Formation and Emissions from Manure:

Volatile Organic Compounds (VOCs) result from ruminant digestive processes and are formed as intermediate metabolites when organic matter manure decomposes. Under aerobic conditions, any VOCs formed in the manure are rapidly oxidized to carbon dioxide and water. Under anaerobic conditions, complex organic compounds are microbially decomposed to volatile organic acids and other volatile organic compounds, which in turn are mostly converted to methane and carbon dioxide by methanogenic bacteria. When the activity of the methanogenic bacteria is not inhibited, virtually all of the VOCs are metabolized to simpler compounds, and the potential for VOC emissions is minimized. However, the inhibition of methane formation results in a buildup of VOCs in the manure

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

and ultimately to volatilization to the air. Inhibition of methane formation typically is caused by low temperatures or excessive loading rates, which both create an imbalance between the populations of microorganisms responsible for the formation of VOC and methane. VOC emissions will vary with temperature because the rate of VOC formation, reduction to methane, and volatilization and the solubility of individual compounds vary with temperature.[6] VOC emissions from manure and the associated field application site can be minimized by a properly designed and operated stabilization process (such as an anaerobic treatment lagoon). In contrast, VOC emissions will be higher from storage tanks, ponds, overloaded anaerobic lagoons, and the land application sites associated with these systems.

3. Ammonia Emissions from Dairies

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

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

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

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

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

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

II. Top Down BACT Analysis for the Milk Barn

1. BACT Analysis for VOC Emissions from the Milk Barn:

a. Step 1 - Identify all control technologies

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

1) Enclose, capture, and incineration (≈ 93%; 95% Capture, 98% Control)
2) Enclose, capture, and biofiltration (≈ 76%; 95% Capture, 80% Control)
3) Flush/spray down milk barns after each group of cows is milked (≈ 16.5% of the total VOC emissions from the milk barns; 75% of manure emissions)

Description of Control Technologies

1) Milk barn vented to an incinerator capable of achieving 98% control

Milk barns can be either naturally or mechanically ventilated. According to some dairy designers, mechanical ventilation is more reliable than natural ventilation. Mechanical ventilation can be easily applied to all areas of the milk barns, except the holding area. The mechanical system for the milk barns can be utilized to capture the gases emitted from the milk barns, however in order to capture all of the gases, and to keep an appropriate negative pressure throughout the system, the holding area would also need to be entirely enclosed. No facility currently encloses the holding area since cows are continuously going in and out of the barn throughout the day. The capital required to enclose this large area would also be significant. Although the feasibility of such a technology is in question, it will be considered in this analysis. The captured VOC emissions could then be sent to an incinerator. Thermal incineration is a well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. It is assumed that 95% of the gasses emitted from the milk barn will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration[9]; therefore the total control for VOCs from the milk barn = 0.95 x 0.98 = 93.1%.

2) Milk barn vented to a biofilter capable of achieving 80% control

A biofilter is a device for removing contaminants from a gas in which the gas is passed through a media that supports microbial activity by which the pollutants are degraded by biological oxidation. In the biofiltration process, live bacteria biodegrade organic contaminants and ammonia into carbon dioxide, nitrogen and water. Bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade organics are called aerobic cultures. These bacteria are found in

[9] OAQPS Control Cost Manual, 4th Edition, EPA 450/3-90-006, January 1990, page 3-8.

soil, peat, compost and natural water bodies including ponds, lakes, rivers and oceans. They are environmentally friendly and non-harmful to humans unless ingested.

Since biofilters rely on living organisms to function, the temperature, moisture content, and pH of the filter media should be monitored to ensure optimum operating conditions. The filter media also needs to be replaced periodically because of deterioration. It is assumed that 95% of the gasses emitted from the milk barns will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs[10]; therefore, the total control for VOCs from the milk barn = 0.95 x 0.80 = 76%.

3) Milk barn flushed/sprayed down after each group of cows is milked

Almost all dairy operations utilize some type of flush or spray system to wash out the manure that dairy cows deposit in the milk barns. The primary purpose of the flush or spray system is to maintain the minimum level of sanitation required in the milk barns. However, this system also serves as an emission control for reducing VOC and ammonia emissions. The manure deposited in the milk barn, which is a source of VOC emissions, is removed from the milk barns many times a day by flushing after each milking. Many of the VOCs emitted from fresh cow manure, such as alcohols (ethanol and methanol) and many Volatile Fatty Acids (VFAs), are highly soluble in water. Therefore, a large percentage of these compounds will dissolve in the flush water and will not be emitted from the milk barns. 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 flushing or spraying out the milk barns after each group of cows is milked 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. It will be assumed that the control efficiency for VOCs emitted from manure is 75%. Enteric emissions compose approximately 78% of the VOC emissions from the milk barn and VOC emissions from the manure make up the remaining 22%; therefore the total control for VOCs from the milk barn = 0.75 x 0.22 =16.5%.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Enclose, capture, and incineration (≈ 93% of VOC emissions from the milk barns)

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[10] According to the SCAQMD Rule 1133.2 final staff report (page 18) "Technology Assessment Report states a well designed, well operated, and well-maintained biofilter is capable of achieving 80% destruction efficiency for VOC and NH_3."

2) Enclose, capture, and biofiltration (≈ 76% of VOC emissions from the milk barns)
3) Flush/spray after each group of cows is milked (≈ 16.5% of VOC emissions from the milk barns)

d. Step 4 - Cost Effectiveness Analysis

Thermal and Catalytic Incineration:

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

Milk Barn Air Flow Rate

In order to effectively calculate the costs of this control option, the airflow rate of the milk barn must be determined. According to Cornell University's publication "Environmental Controls for Today's Milking Center", the minimum ventilation rate required for milk barns is 15 room air exchanges per hour in the winter and 60 to 90 room air exchanges per hour in the summer.[11] For calculation purposes, an average airflow rate of 35 room air exchanges will assumed for the new milk barn.

According to the drawings submitted, the milk barn is approximately 320 ft long by 140 ft wide and is conservatively assumed to have a height of 20 feet. The total airflow rate is calculated as follows:

(320 ft x 140 ft x 20 ft) x 35/hr = 31,360,000 ft^3/hr

Fuel Requirement for Thermal Incineration:

The gas leaving the milk barn is principally air, with a volumetric specific heat of 0.0194 Btu/scf - °F under standard conditions.

Natural Gas Requirement = (flow)(Cp_{Air})(ΔT)(1-HEF)

Where:

Flow (Q) = exhaust flow rate of VOC exhaust
Cp_{Air} = specific heat of air: 0.0194 Btu/scf
ΔT = increase in the temperature of the contaminated air stream required for catalytic oxidation to occur (It will be assumed that the air stream would increase in temperature from 100 °F to 600 °F.)
HEF = heat exchanger factor: 0.7

Natural Gas Requirement = (31,360,000 scf/hr)(0.0194 Btu/scf)(600 °F - 100 °F)(1-0.7)
= **91,257,600 Btu/hr**

[11] Environmental Control for Today's Milking Center, C.A. Gooch, http://www.ansci.cornell.edu/tmplobs/doc217.pdf

Fuel Cost for Thermal Incineration:

The cost for natural gas will be based upon the average spot market contract price (industrial) for the November 2009 – April 2010 taken from the Energy Information Administration, website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).

Average Cost for natural gas = $7.77/MMBtu

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

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

91,257,600 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $7.77/MMBtu = **$3,105,734/year**

VOC Emission Reductions for Thermal Incineration

The annual VOC Emission Reductions for the milk barns is calculated as follows:

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

= (1,100 milk cows) x (0.9 lb-VOC/milk cow-year) x (0.95) x (0.98)
= **922 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($3,105,734/year)/((922 lb-VOC/year)(1 ton/2000 lb))
= **$6,736,950/ton of VOC reduced**

As shown above, the natural gas cost alone for thermal or catalytic incineration would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. The equipment is therefore not cost effective and is being removed from consideration at this time.

Biofiltration:

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

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

Cost of Biofiltration

The cost estimate for a biofiltration system is taken from the United States EPA Report

"Using Bioreactors to Control Air Pollution". The cost is largely dependent on the airflow rate that the filter must handle. According to University of Minnesota, Biofilters used to treat ventilating air exhausted from a livestock building should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The EPA report gives a range of $2.35 - $37.06 per cfm for the initial construction of a biofilter. As stated above, the minimum ventilation rate required for milk barn is 15 room air exchanges per hour in the winter and 60 to 90 room exchanges per hour in the summer[21]. For more conservative calculations, a warm weather airflow rate of 60 room air exchanges will be assumed for the milk barn.

The maximum airflow rate entering the biofilter is calculated as follows:

320 ft x 140 ft x 20 ft x 60/hr x 1 hr/60 min = 896,000 cfm

Capital Cost

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

The capital cost of the biofilter is calculated as follows:

$2.35 cfm x 896,000 cfm = $2,105,600

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

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

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

$$A = [\$2,105,600 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$

$$= \mathbf{\$342,679/year}$$

VOC Emission Reductions for Biofiltration

The annual VOC Emission Reductions for the milk barns is calculated as follows:

[Number of milk cows] x [Uncontrolled Milk Barn VOC EF (lb/milk cow-year)] x [Capture Efficiency] x [Biofilter Control Efficiency]

= (1,100 milk cows) x (0.9 lb-VOC/milk cow-year) x (0.95) x (0.80)
= **752 lb-VOC/year**

Cost of VOC Emission Reductions

Cost of reductions = ($342,679/year)/((752 lb-VOC/year)(1 ton/2000 lb))
= **$911,380/ton of VOC reduced**

As shown above, the capital cost alone for a biofilter would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of the District BACT policy. Therefore, this option is not cost effective and is being removed from consideration at this time.

Flushing/Spraying down Milk Barn after each Group of Cows is Milked:

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

e. Step 5 - Select BACT

The facility is proposing to flush or spray down the milk barn after each group of cows is milked, which satisfies the BACT requirements.

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

2. BACT Analysis for NH_3 Emissions from the Milk Barn:

a. Step 1 - Identify all control technologies

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

Flushing or spraying down the milk parlor after milking each group of cows has been identified as a possible control for the NH_3 emissions from the milk barn. No other control technologies that meet the definition of Achieved-in-Practice have been identified for NH_3 emissions from the milk barns.

1) Flush/spray after each group of cows is milked

Description of Control Technology

1) Milk Barn Flushed/Sprayed down after each Group of Cows is milked

Almost all dairy operations utilize some type of flush or spray system to wash out the manure that dairy cows deposit in the milk barns. The primary purpose of the flush or spray system is to maintain the minimum level of sanitation required in the milk barns. However, this system also serves as an emission control for reducing VOC and ammonia emissions. The manure deposited in the milk barn, which is a source of NH_3 emissions, is removed from the milk barn many times a day by flushing after each milking. Ammonia has a high affinity for water and is highly soluble in water. Therefore, a large proportion of ammonia will dissolve in the flush water and will not be emitted from the milk barns.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Flush/spray down milk barns after each group of cows is milked

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to flush or spray down the milk barn after each group of cows is milked, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from the milk parlor.

III. Top Down BACT Analysis for the Cow Housing

1. BACT Analysis for PM_{10} Emissions from the Cow Housing (Milk Cows and Dry Cows):

a. Step 1 - Identify all control technologies

The following control options were identified for PM_{10} emissions from the milk cows and dry cows:

- Freestall barn housing, including all concrete feed lanes and walkways

Description of Control Technologies

A freestall Barn is a partially enclosed structure. The structure has a fully covered permanent roof, fully paved floors and open walls. Housing animals in freestall barns significantly reduces PM10 emissions because most of the cow movements and activities occur over a paved surface with little loose dirt or particulate matter that may be disturbed and entrained into the air.

Freestall barn feed lanes and walkways are cleaned by flushing with large volumes of water several times a day. In addition, during hot weather cows in freestall barns are usually cooled using misting fans that blow water droplets into the air above the cows. As a result of this method of cleaning, as well as hot weather cooling, most freestall barn surfaces are generally moist year-round and inconducive to the generation of any dry particulate matter that may become airborne.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

- Freestall barn housing, including all concrete feed lanes and walkways.

d. Step 4 - Cost Effectiveness Analysis

- Freestall barn housing, including all concrete feed lanes and walkways.

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

e. Step 5 - Select BACT

The facility is proposing freestall barn housing, including all concrete feed lanes and walkways. The proposed control option satisfies BACT requirements for PM10.

2. BACT Analysis for VOC Emissions from the Milk Cows and Dry Cows:

a. Step 1 - Identify all control technologies

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

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

1) Enclosed freestall barns vented to an incinerator - (≈ 93%; 95% Capture, 98% Control of 100% of cow housing emissions)
2) Enclosed freestalls vented to a biofilter - (≈ 76%; 95% Capture, 80% Control of 100% of cow housing emissions)
3) Feed and Manure Management Practices (≈ 22%)
   - Concrete feed lanes and walkways
   - Freestall feed lanes and walkways flushed four times per day (≈ 18% for total emissions from cow housing; 47% for emissions from manure)
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations (5% of total emissions from dairy cows)
   - Uneaten feed re-fed to the animals or removed from feed lanes on a daily basis to prevent decomposition

Description of Control Technologies

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

In a freestall barn, cows are grouped in large pens with free access to feed bunks, water, and stalls for resting. In the mild climate of the San Joaquin Valley, the typical freestall barn is an open structure (roof but no sides). The primary freestall design consists of a roof that provides shade with all sides open to allow air to flow through, which in turn keeps the cows cool. No enclosed freestall barns that were installed at a California dairy could be identified. However, partially enclosed freestall barns are available. These include tunnel-ventilated freestall barns, which are found in the southern and eastern parts of the United States, and greenhouse barns. Greenhouse barns use a lightweight, galvanized steel tube frame to support one or two layers of a commercial-grade plastic film as covering. The most common use for these structures is as heated chambers for growing plants. Although the potential to enclose cows in a barn exist, the feasibility of reasonably collecting the biogas through a stack, chimney, or vent remains in question considering the extremely large amounts of airflow going through the barns needed to keep the cows cool. The airflow requirements will be even higher in the San Joaquin valley, where temperatures reach in excess of 110 degrees in the dry summer. Although the feasibility of such a technology is in question, it will be considered in this analysis. If the gases can be properly captured and sent to a control device, then those gases may be either incinerated or treated in a biofilter (see biofilter discussed in the option below). It is assumed that 95% of the gasses emitted from the freestall barns will be captured by the mechanical ventilation system and that 98% of the captured VOCs will be eliminated by thermal incineration[9]; therefore the total control for VOCs from the freestall barns = 0.95 x 0.98 = 93.1%.

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

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

Since biofilters rely on living organisms to function, the temperature, moisture content, and pH of the filter media should be monitored to ensure optimum operating conditions. The filter media also needs to be replaced periodically because of deterioration. It is assumed that 95% of the gasses emitted from the cow housing area will be captured by the mechanical ventilation system and that a properly functioning biofilter will eliminate 80% of the captured VOCs[10]; therefore, the total control for VOCs from the cow housing permit unit = 0.95 x 0.80 = 76%.

3) Feed and Manure Management Practices

<u>Frequent Flushing of Concrete Lanes and Walkways</u>

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

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

The flush water can then carry the manure and the dissolved volatile compounds to a treatment lagoon or other manure stabilization process.

It must be noted that the flush system will only control the VOCs emitted from the manure. It will have little or no effect on enteric emissions produced from the cows' digestive processes. As stated above, the feed lanes and walkways in the cow housing areas are typically flushed twice per day. Flushing the lanes four times per day will increase the frequency that manure is removed from the cow housing permit unit and should result in a higher percentage of soluble volatile compounds being dissolved in the flush. Based on calculations given in the final DPAG report[12], flushing the freestall lanes four times per day will be assumed to have a control efficiency of 47% for VOCs emitted from manure until better data becomes available. Enteric emissions compose approximately 61% of the VOC emissions from the cow housing permit unit and VOC emissions from the manure make up the remaining 39%; therefore the total VOC control for flushing the feed lanes and walkways in the cow housing areas four times per day is calculated as follows: 0.47 x 0.39 =18%.

<u>Animals fed in accordance with (NRC) or other District-approved Guidelines</u>

Nutritional management of dairy feed is routinely practiced to improve milk production and herd health. The potential for 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.[13] This undigested protein also produces ammonia emissions. The level of microbial action in the manure corresponds to the level of organic nitrogen content in the manure; the lower the level of nitrogen the lower the level of microbial action and the lower the production of ammonia and VOCs.

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

Based on very limited data (Klaunser, 1998, *J Prod Agric),* diet manipulation decreased nitrogen excretion by 34% while improving milk production. Up to 70% of excess nitrogen is lost off of the farm through volatilization, denitrification and leaching. Because of limited research, feeding 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% for both enteric VOC emissions from dairy animals and VOC emissions from manure.

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

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

Refused feed re-fed to the animals or removed from feed lanes on a daily basis to prevent decomposition.

Removing or re-feeding refused feed from the feed lanes on a daily basis will minimize gaseous emissions from decomposition. The feed that is removed must be properly disposed of to ensure that the emissions are not just relocated to another area of the dairy. Although this practice is expected to reduce emissions from the cow housing permit unit, there is not sufficient research to estimate the emissions reductions and no VOC control efficiency will be assigned for this practice.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Enclosed freestalls vented to an incinerator (≈ 93%; 95% Capture, 98% Control)
2) Enclosed freestalls vented to a biofilter (≈ 76%; 95% Capture, 80% Control)
3) Feed and Manure Management Practices (≈ 22%)
   - Concrete feed lanes and walkways for all cows
   - Freestall feed lanes and walkways flushed four times per day (≈ 18% for total emissions from cow housing; 47% for emissions from manure) and feed lanes and walkways in the corrals for the remaining animals flushed at least two times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. (5% of total emissions from dairy cows)
   - Uneaten feed re-fed or removed from feed lanes on a daily basis to prevent decomposition.

d. Step 4 - Cost Effectiveness Analysis

Thermal and Catalytic Incineration:

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

Required Airflow Rate of the Freestall Barns

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

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

The minimum summer ventilation rate listed for mature cows is 500 cfm per cow. However, according to the University of Minnesota publication and Cornell University's publication "Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?", the required airflow rate in the summer increases to 1,000 cfm per cow if tunnel ventilation is used to provide additional cooling.[14]

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

As discussed in the evaluation, the project consists of 1,100 milk cows, 200 dry cows, and 8 mature bulls for a total of 1,308 mature cows.

The total required airflow rate for housing for these animals in freestalls is calculated as follows:

Total airflow = # of cows x airflow (ft^3/min)/cow x 60 min/hour
=1,308 cows x 335 ft^3/min x 60 min/hr
=26,290,800 ft^3/hour

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

Fuel Requirement for Catalytic Incineration

The gas leaving the freestall barns will be principally air, with a volumetric specific heat of 0.0194 Btu/scf - °F under standard conditions.
Natural Gas Requirement = (flow)(Cp_{Air})(ΔT)(1-HEF)

Where:
Flow (Q) = exhaust flow rate of VOC the freestall barns
Cp_{Air} = specific heat of air: 0.0194 Btu/scf - °F
ΔT = increase in the temperature of the contaminated air stream required for catalytic oxidation to occur (It will be assumed that the air stream would increase in temperature from 100 °F to 600 °F.)
HEF = heat exchanger factor: 0.7

= (26,290,800 scf/hr)(0.0194 Btu/scf - °F)(600 °F - 100 °F)(1-0.7)
= **76,506,228 Btu/hr**

The cost for natural gas will be based upon the average spot market contract price (industrial) for the November 2009 – April 2010 taken from the Energy Information Administration website (http://tonto.eia.doe.gov/dnav/ng/ng_sum_lsum_dcu_SCA_m.htm).

Average Cost for natural gas = $7.77/MMBtu

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

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

76,506,228 Btu/hr x 1 MMBtu/10^6 Btu x 12 hr/day x 365 day/year x $6.01/MMBtu
= **$2,603,706/year**

VOC Emission Reductions

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

[Number of cows] x [Uncontrolled Cow Housing VOC EF (lb/cow-year)] x [Capture Efficiency] x [Catalytic Incineration Control Efficiency]
= (1,100 cows x 12.4 lb/cow-yr x 0.95 x 0.98) + (200 cows x 8.2 lb/cow-yr x 0.95 x 0.98) + (8 bulls x 7.7 lb/bull-yr x 0.95 x 0.98)
= 12,699 lb/yr + 1,527 lb/yr + 57
= 14,283 lb/yr

Cost of VOC Emission Reductions

Cost of reductions = ($2,603,706/year)/((14,283 lb-VOC/year)(1 ton/2000 lb))
= **$364,588/ton of VOC reduced**

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

Biofiltration:

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

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

Cost of Biofiltration

The cost estimate for a biofiltration system is taken from the United States EPA Report "Using Bioreactors to Control Air Pollution"[15]. The cost is largely dependent on the airflow rate that the filter must handle. According to University of Minnesota, Biofilters used to treat ventilating air exhausted from a livestock building should be sized to treat the maximum ventilation rate, which is typically the warm weather rate. The EPA report gives a range of \$2.35 - \$37.06 per cfm for the initial construction of a biofilter. As discussed above in the thermal/catalytic incineration section, the average year round airflow requirements for mature cows will be assumed to be 335 cfm/cow (average of 170 and 500 cfm per cow).

As discussed in the evaluation, the project consists of 1,100 milk cows, 200 dry cows, and 8 mature bulls for a total of 1,308 mature cows.

The total required airflow rate for housing for these animals in freestalls is calculated as follows:

Total airflow = # of cows x airflow (cfm)/cow

=1,308 cows x 335 cfm/cow

=438,180 ft^3/hour

Capital Cost

The cost estimate for the biofilter includes the costs of the fans, media, plenum, engineering, and labor but does not include installation of the required ductwork. As

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

stated above, the United States EPA Report gives a capital cost range of between \$2.35 per cfm and \$37.06 per cfm. In general, the lower cost per cfm is associated with a higher flow rate. To be conservative, the lowest cost in the report of \$2.35 per cfm will be assumed in this cost analysis.

The capital cost of the biofilter is calculated as follows:

\$2.35/cfm x 438,180 cfm = **\$1,029,723**

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

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

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

$$A = [\$1,029,723 \times 0.1(1.1)^{10}]/[(1.1)^{10}-1]$$
= **\$167,583/year**

<u>VOC Emission Reductions for Biofiltration</u>

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

[Number of cows] x [Uncontrolled Cow Housing VOC EF (lb/cow-year)] x [Capture Efficiency] x [Biofilter Control Efficiency]
= (1,100 cows x 12.4 lb/cow-yr x 0.95 x 0.80) + (200 cows x 8.2 lb/cow-yr x 0.95 x 0.80)
+ (8 bulls x 7.7 lb/bull-yr x 0.95 x 0.80)
= 10,366 lb/yr + 1,246 lb/yr + 47
= 11,659 lb/yr

<u>Cost of VOC Emission Reductions</u>

Cost of reductions = (\$167,583/year)/((11,659 lb-VOC/year)(1 ton/2000 lb))
= **\$28,747/ton of VOC reduced**

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

Feed and Manure Management Practices:

- Freestall feed lanes and walkways flushed four times per day
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.
- Uneaten feed re-fed to animals or removed from feed lanes on a daily basis to prevent decomposition.

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

e. Step 5 - Select BACT

The facility is proposing concrete feed lanes and walkways; to flush the freestall feed lanes and walkways four times per day; to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations; and to re-feed or remove refused feed from feed lanes on a daily basis to prevent decomposition.

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

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

a. Step 1 - Identify all control technologies

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

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

1) Feed and Manure Management Practices
    - Concrete feed lanes and feed walkways for all cows

- Feed lanes and walkways flushed four times per day
- All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Description of Control Technologies

1) Feed and Manure Management Practices

Concrete Feed Lanes and Walkways, and Increased Flushing

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

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

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.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Feed and Manure Management Practices
   - Concrete feed lanes and feed walkways for all cows
   - Freestall feed lanes and walkways flushed four times per day
   - All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing concrete feed lanes and feed walkways; to flush the freestall feed lanes and walkways four times per day; and to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

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

IV. Top Down BACT Analysis for the Liquid Manure Handling System - Lagoon & Storage Pond

1. BACT Analysis for VOC Emissions from the Lagoon & Storage Pond:

a. Step 1 - Identify all control technologies

Since, specific control efficiencies have not been identified in the literature for VOC emissions from dairy lagoons and storage ponds, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.

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

Lagoon and Storage Pond:

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 95%; based information provided by Dr. Ruihong Zhang of UC Davis)
2) Covered Lagoon Anaerobic Digester with biogas collected and vented to a destruction device such as an internal combustion engine or flare, and treated waste discharged into a secondary lagoon or storage pond. (≈ 75%) (Note: not required unless required by the final Dairy BACT Guideline)
3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈ 40%)

Description of Control Technologies

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L

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

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) Covered Lagoon Anaerobic Digester

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.

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

As stated above, the gas generated in the covered lagoon can be captured and then sent to a suitable combustion device. Combustion (thermal incineration) is a generally accepted, well-established VOC control technique. During combustion, gaseous hydrocarbons are oxidized to form CO_2 and water. The VOCs emitted from the liquid manure in the covered lagoon can be reduced by 95% with the use of an appropriate combustion device. Therefore, installation of the digester will lower the total VOCs emitted from the liquid manure from the liquid manure handling system. Although the control efficiency of the gas captured from the primary lagoon is expected to be 95% or more, the overall control efficiency is expected to be less since VOCs will also be emitted from the storage pond and as fugitive emissions. The overall control efficiency is assumed to be 75% of the emissions that would have been emitted from the lagoon and storage pond.

3) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Although, the VS reduction is expected to be at least 50%, a conservative control efficiency of 40% will be assumed for anaerobic treatment lagoons, until better data becomes available.

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 95%)
2) Covered Lagoon Anaerobic Digester with biogas collected and vented to a destruction device such as an internal combustion engine or flare, and treated waste discharged into a secondary lagoon or storage pond. (≈ 75%)
3) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈ 40%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

The following cost analysis demonstrates that the energy costs alone, not including any capital costs, causes complete aeration to exceed the District VOC cost effective threshold.

Energy Requirement for Complete Aeration

In order to effectively calculate the costs of this control option, the energy requirement for complete aeration must be determined. According to Dr. Ruihong Zhang of the University of California, Davis, 2.4 lbs (1.1 kg) of oxygen (O_2) per cow must be provided each day for complete removal of Biological Oxygen Demand (BOD_5).[16] This does not include the additional oxygen that would be required for conversion of ammonia to nitrate (nitrification). The typical aeration efficiencies for mechanical aerators range from 1 to 2 kg of oxygen (O_2) provided per kW-hr of energy utilized.[16] For this analysis it will be assumed that the mechanical aerators provide the average of 1.5 kg of oxygen (O_2) per kW-hr of energy. The yearly energy requirement per cow is calculated as follows:

(1.1 kg/cow-day) ÷ (1.5 kg/kW-hr) x (365 day/year) = 267.67 kW/cow-year

The total yearly energy requirement is calculated below. Based on animal units (AU), it is assumed that the BOD loading (and the energy requirement) for the dry cows will be 80% of that of the milk cows, the BOD loading from the large heifers will be 73% of milk cows, the BOD loading from the small and medium heifers will be 35% of milk cows,

[16] An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005, page 35 (http://www.arb.ca.gov/ag/caf/dairypnl/dmtfaprprt.pdf)

and the BOD loading from the baby calves will be 21% of milk cows.[17]

As discussed in the evaluation, after completion of the project, the dairy will house 1,100 Holstein milk cows, 200 dry cows, and 8 mature bulls. The amount of electricity required for complete aeration of the lagoon system is calculated as follows:

(1,100 milk cows x 267.67 kW/cow-year) + (208 dry cows and bulls x 0.8 x 267.67 kW/cow-year)

= 338,977 kW-hr/year

Cost of Electricity for Complete Aeration:

The cost for electricity is based upon on an average retail price of industrial electricity in California for the year 2010 taken from the Energy Information Administration (EIA) Website: http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html.

Average Cost for electricity = $0.0974/kW-hr

The electricity costs for complete aeration are calculated as follows:

338,977 kW-hr/year x $0.0974/kW-hr
= $33,016/year

VOC Emission Reductions for Complete Aeration

Complete aeration is estimated to control at least 95% of the emissions from the lagoon and storage pond. The annual VOC emission reductions for the lagoons and storage ponds are calculated as follows:

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

[(1,100 milk cows x 2.7 lb-VOC/milk cow-year) + (200 dry cows x 1.7 lb-VOC/milk cow-year) + (8 mature bulls x 1.6 lb-VOC/cow-year)] x 0.95

= [3,323 lb-VOC/year x 0.95]
= 3,157 lb-VOC/year

Cost of VOC Emission Reductions

Cost of reductions = ($33,016/year)/((3,157 lb-VOC/year)(1 ton/2000 lb))
= **$20,916/ton of VOC reduced**

As shown above, the electricity cost alone for complete aeration would cause the cost of the VOC reductions to be greater than the $17,500/ton cost effectiveness threshold of

[17] Animal Unit (AU) factors are taken from the California Regional Water Quality Control Board Central Valley Region Annual Report for Dairies Subject to Monitoring and Reporting (http://www.waterboards.ca.gov/centralvalley/available_documents/dairies/genorderwdrform.pdf)

the District BACT policy. The equipment is therefore not cost effective and is being removed from consideration at this time.

Covered Lagoon Anaerobic Digester:

Pursuant to Section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc, installation of an anaerobic digester will only be required if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline.

The applicant has proposed to install an anaerobic digester if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline. Since the applicant has proposed this option in accordance with the Settlement Agreement, a cost-effective analysis is not required. If an anaerobic digester is required in the final Dairy BACT Guideline, the applicant will be required to install the system in accordance with the timeframes and procedures established by the APCO in the final Dairy BACT Guideline.

Anaerobic Treatment Lagoon:

The applicant has proposed an anaerobic treatment lagoon, as described in full detail under section VI, Emission Control Technology Evaluation, of the main evaluation. The applicant's proposal therefore meets the BACT requirements under this category.

e. Step 5 - Select BACT

The facility is proposing an anaerobic treatment lagoon designed according to National Resource Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install an anaerobic digester if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

2. BACT Analysis for NH_3 Emissions from the Lagoon & Storage Pond

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 considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc, the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH_3 emissions from the lagoon and storage pond. No other control technologies that meet the definition of Achieved-in-Practice have been identified for the lagoon or storage pond.

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

<u>Description of Control Technologies</u>

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from the lagoons/storage ponds.

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

1. BACT Analysis for VOC Emissions from Liquid Manure Land Application:

a. Step 1 - Identify all control technologies

Since, specific control efficiencies have not been identified in the literature for VOC emissions from dairy lagoons and storage ponds, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.
The following options were identified as possible controls for VOC emissions from the Lagoon and Storage Pond:

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 95%)

2) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈ 40%)

3) Injection of Liquid and Slurry Manure (≈ 50%)

Description of Control Technologies

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L

An aerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of wastewater by microbes in the presence of oxygen (O_2). The process of aerobic decomposition results in the conversion of organic compounds in the wastewater into carbon dioxide (CO_2), and (H_2O), nitrates, sulphates and inert biomass (sludge). The process of aerobic digestion is sometimes referred to as nitrification (especially when discussing NH_3 transformation). Complete aerobic digestion (100% aeration) removes nearly all malodors and also virtually eliminates VOCs, H_2S, and NH_3 emissions from liquid waste. Because these compounds would be removed from the liquid manure, emissions from liquid manure land application would also be eliminated.

Sufficient oxygen must be provided to sustain the aerobic microorganisms in completely aerated lagoons. Lagoons can be considered completely aerobic if sufficient oxygen is provided to achieve a dissolved oxygen (DO) content of 2.0 mg/L or more. Oxygen is typically provided by mechanical aerators. These aerators may float on the lagoon surface or be submerged in the lagoon. Aeration can also be performed by injection of tiny air bubbles into the lagoon water, mixing of the lagoon water, or spraying of the water into the air. According to Dr. Ruihong Zhang, a researcher at the University of California, Davis, at least 95% VOC control can be achieved if the dissolved oxygen (DO) content of the liquid manure is 2.0 mg/L or more. A major disadvantage of completely aerated lagoons is the enormous cost of the energy required to run the aerators continuously. Because of this, it has been determined that completely aerated lagoons are not cost effective options for dairy facilities at the present time.

2) Anaerobic Treatment Lagoon

An anaerobic treatment lagoon is a waste treatment lagoon that is designed to facilitate the decomposition of manure by microbes in the absence of oxygen. The process of anaerobic decomposition results in the preferential conversion of organic compounds in the wastewater into methane (CH_4), carbon dioxide (CO_2), and water rather than intermediate metabolites (VOCs). The National Resource Conservation Service (NRCS) California Field Office Technical Guide Code 359 - Waste Treatment Lagoon specifies criteria for the design of anaerobic treatment lagoons. A properly designed anaerobic treatment lagoon will reduce the Volatile Solids (VS) by at least 50% and will reduce the biological oxygen demand (BOD), which will result in greater efficiency in degrading compounds that contain carbon into methane and carbon dioxide rather than VOCs. Since 50% of the volatile solids in the liquid manure will have been removed or digested in the lagoon, there will be less volatile solids remaining in the effluent to decompose into VOCs. Although, the Volatile Solids reduction will be at least 50%, to be conservative a 40% control will be applied to irrigation from a storage pond after an anaerobic treatment lagoon.

3) Injection of Liquid and Slurry Manure

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

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

b. Step 2 - Eliminate technologically infeasible options

Option 3 - Injection of Liquid and Slurry Manure

The Dairy Permitting Advisory Group (DPAG) found that injection of flushed manure was not be a feasible BACT option in their report of BACT options for dairies in the San Joaquin Valley.[18]

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

c. Step 3 - Rank remaining options by control effectiveness

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

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

1) Aerobic Treatment Lagoon – mechanical aeration to achieve a dissolved oxygen concentration of 2.0 mg/L (≈ 95%)

2) Anaerobic Treatment Lagoon designed to meet Natural Resources Conservation Service (NRCS) standards (≈ 40%)

d. Step 4 - Cost Effectiveness Analysis

Aerobic Treatment Lagoon:

The preceding cost analysis performed for the BACT analysis for VOC emissions from the lagoon and storage pond demonstrated that the energy costs alone, not including any capital costs, caused complete aeration to exceed the District VOC cost effective threshold. Therefore, no further cost analysis is required for complete aeration.

Anaerobic Treatment Lagoon:

The applicant has proposed this control method, hence a cost-effectiveness analysis is not required.

e. Step 5 - Select BACT

The facility is proposing an anaerobic treatment lagoon that is designed according to National Resource Conservation Service (NRCS) Guidelines. Additionally, the facility is proposing to install an anaerobic digester if determined to be an effective emissions control in the final Dairy BACT guideline. Therefore, the BACT requirements are satisfied.

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

2. BACT Analysis for NH_3 Emissions from the Liquid Manure Land Application

a. Step 1 - Identify all control technologies

A cost effectiveness threshold has not been established for ammonia. Therefore, only options that meet the District's definition of Achieved-in-Practice controls will be considered for ammonia at this time. (Although these options must meet the District definition of Achieved-in-Practice, pursuant to the Settlement Agreement (9/20/2004) between the District and Western United Dairyman and Alliance of Western Milk Producers Inc, the District will not deem any control options Achieved-in-Practice until after the Dairy BACT Guideline has been established.)

The following practice has been identified as a possible control option for the NH_3 emissions from the liquid manure land application. No other control technologies that meet the definition of Achieved-in-Practice have been identified for liquid manure land application.

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Description of Control Technologies

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

1) Animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to feed all animals in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations, which satisfies the BACT requirements.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from liquid manure land application.

VI. Top Down BACT Analysis for the Solid Manure Handling and Land Application System

Solid manure refers to manure that has a solid content of 20% or greater, such as manure scraped from the feed lanes and walkways prior to flushing.

1. BACT Analysis for VOC Emissions from Solid Manure Handling & Land Application:

a. Step 1 - Identify all control technologies

Since specific control efficiencies have not been identified in the literature for VOC emissions from solid manure handling, the control efficiencies listed are based on the control efficiencies of similar processes and engineering judgment.

The following options were identified as possible controls for VOC emissions from Solid Manure Handling and Land Application:

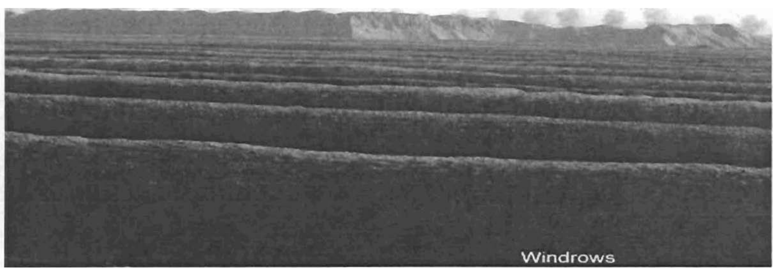
1) Open Windrow Composting
2) Open Aerated Static Pile (ASP) (≈ 23.2%)
3) Open Negatively Aerated Static Pile vented to biofilter ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈ 84.6%)
4) Enclosed Negatively Aerated Static Pile (≈ 33.2%)
5) In-Vessel/Enclosed Negative Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈ 86.6%)

6) Aeration and drying with immediate incorporation when applied to land (≈ 43.5%)

Description of Control Technologies

1) Open Windrow Composting

Composting is the aerobic decomposition of manure or other organic materials in the thermophilic temperature range (104 –149 degrees F). It is the same process that decays leaves and other organic debris in nature. Composting controls the conditions so that the natural decomposition process occurs at a faster rate. Composting can be performed using windrows. A windrow process involves forming long piles (windrows as shown in the picture below) turned by specially designed machines. Typically the rows are 1 to 2 meters high and 2 to 5 meters at the base. The piles are turned periodically to mix and introduce and rebuild bed porosity. This helps to insure that all the material is uniformly composted. However, studies have shown that VOC and ammonia emissions from open windrow composting are significant.



Co-composting is a three-stage process that begins as soon as appropriate materials are combined and piled together. The initial stage of the process is referred to as active composting followed by curing or finishing, and storage and/or processing of composted products.

The composted material is usually odorless, fine-textured, and low-moisture, and can be bagged and sold for use in gardens, nurseries or used as fertilizer on cropland. Composting improves the handling characteristics of any organic residue by reducing its volume and weight. Composting also kills pathogens and weed seeds. Composting reduces material volume through natural biological action and produces a product that enhances soil structure and benefits new growth.

Active composting phase (Thermophilic stage):

Based on SCAQMD Rule 1133.2, titled "Emission Reductions from Co-Composting Operations" the active composting phase is the phase of the composting process that begins when organic materials are mixed together for composting purposes and lasts approximately 22 days. According to SCAQMD, 80% of VOC emissions and 50% of NH_3 emissions occur during the first 22 days of composting.[19] The active phase of composting is where the population of thermophilic microorganisms is usually the

[19] Page 8 of SCAQMD Rule 1133 final staff report

highest. This stage is characterized by high temperatures, high level of oxygen demand, and high evaporation rates due to temperature.

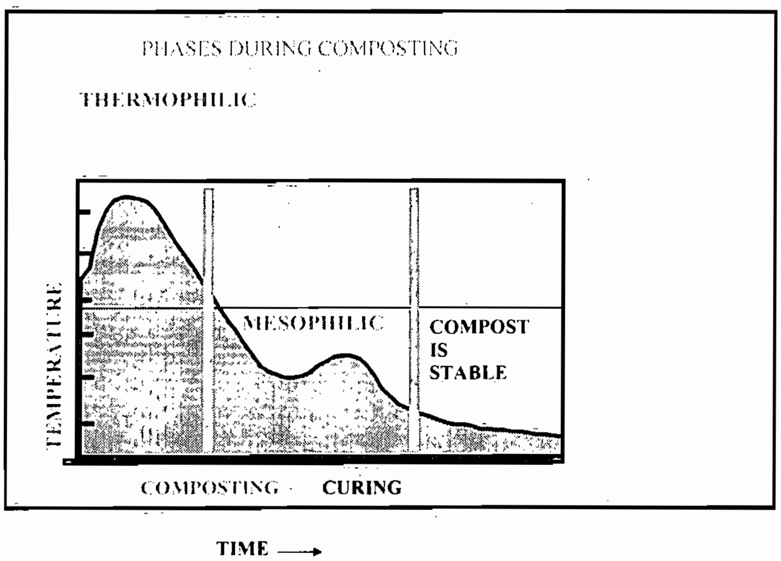
Curing phase (Mesophilic stage):

Conversely, the curing stage of the process is where the mesophilic microorganism population is the highest and the need for oxygen and evaporation rates decreases. The curing phase is defined in SCAQMD Rule 1133.2 as "a period that begins immediately after the active phase and lasts 40 days or until the compost exhibits a Solvita Maturity Index of 7, or the product respiration rate is below 10 milligrams of oxygen per gram of volatile solids per day as measured by direct respirometry". 20% of VOC emissions and 50% of NH_3 emissions are expected to occur during this phase.[20]

VOC emissions from composting:

VOC emissions primarily occur during the active and curing phases of the composting. To ensure consistent temperatures within the piles, a layer of finished compost can be placed on top of the active and curing phase piles. This helps minimize volatility of VOCs at the surface of the compost piles.

There is a linkage between the microbial activity and the VOC emissions profile from composting operations. Emissions are generally higher during thermophilic temperatures and lower during mesophilic temperatures. The figure below illustrates the oxygen demand and microbial profile of the various composting stages. This figure also illustrates the corresponding VOC emissions primarily occurring during active and curing phases of composting.[21]



This graphic was provided by Eliot Epstein, Ph.D. Chief Environmental Scientist, Tetra Tech, Inc.
*VOC emissions are expected to follow the similar profile as oxygen demand.

[20] SCAQMD Rule 1133 Technology Assessment
[21] Page 9-10, SCAQMD Final Staff Report for Proposed Rules 1133, 1133.1, and 1133.2.

During the composting process the volume of waste will be reduced anywhere from 40-50 percent. The rate at which manure will compost depends on the following[22]: moisture content; pH; temperature; amount of oxygen available; size of particles in the material; the carbon-to-nitrogen ratio - the weight of decomposable carbon to the weight of total nitrogen in an organic material

The bacterial breakdown of substrates in the material being composted produces various organic and inorganic gases that can contribute to several different air pollution problems. Source testing conducted by the SCAQMD District in 1994 and early 1995 indicated that outdoor windrow composting of dewatered sewage sludge releases significant levels of ammonia, methane and VOCs (SCAQMD, 1995).
Disadvantages of composting organic residues include loss of nitrogen and other nutrients, time for processing, cost for handling equipment, available land for composting, odors, marketing, and slow release of available nutrients. During a three year Nebraska study as much as 40 percent of total beef feedlot manure nitrogen and 60 percent of total carbon was lost to the atmosphere during composting.[23] Increasing the carbon-to-nitrogen ratio by incorporating high carbon materials (leaves, plant residue, paper, sawdust, etc.) can reduce nitrogen loss.

2) Negatively Aerated Static Pile (ASP)

Aerated static piles are piles that are aerated directly with forced or drawn air systems to speed up the compost process. The aerated static pile is constructed to allow forced airflow (low pressure-high volume blowers and a piping system) so that the oxygen supply can be more accurately controlled. The material is piled over perforated pipes connected to a blower to withdraw air from the pile. The result is improved control of aerobic degradation or decomposition of organic waste and biomass bulking agents. This is considered a more efficient composting method than the industry standard of windrow composting (non-aerated piles turned mechanically with front-end loaders or scarabs as discussed above).

VOC emissions primarily occur during the active and curing phases of the composting. To ensure consistent temperatures and prevent escape of odors and VOCs, the piles should be covered with a thick layer (12 to 18 inches) of finished compost or bulking agent.

With positive pressure aeration, contaminated air is pushed through the pile to the outer surface; therefore, making it difficult to be collected for odor treatment. However, positive pressure aeration is more effective at cooling the pile because it provides better airflow.

With negative aeration, air is pulled through the pile from the outer surface. Contaminated air is collected in the aeration pipes and can be directed to an odor treatment system. To avoid clogging, condensed moist air drawn from the pile must be removed before reaching the blower. Negative aeration might create uneven drying of

[22] Proposed SCAQMD Rule 1133 (Pages 1-6)
[23] University of Nebraska-Lincoln

the pile due to its airflow patterns.

A study conducted by City of Columbus, Ohio, demonstrated that the weighted-average odor emissions from an outdoor negative aeration pile is approximately 67% lower than those from an outdoor positive aeration pile. Negative aeration is usually used during the beginning of the composting process to greatly reduce odors. In enclosed active composting area, negative pressure aeration also reduces moisture released into the building, and thus, reduces fogging. Positive aeration is used mostly near the end of the composting cycle for more efficient drying of the compost.[24]

An odor and emissions study done at the City of Philadelphia biosolids co-composting facility by the Department of Water[25] also concluded that controlling the temperature by controlling the oxygen availability using negative aeration composting is expected to result in lower emissions than those from open windrow composting.

3) Open negatively aerated static pile with exhaust vented to a biofilter > 80% control efficiency

This technology is the same as that described above for negatively aerated static piles except that the exhaust gases are vented to a biofilter. As discussed above negative aeration appears to be more efficient in reducing odors and emissions than positive aeration.

Biofiltration is an air pollution control technology that uses a solid media to absorb and adsorb compounds in the air stream and retains them for subsequent biological oxidation. A biofilter consists of a series of perforated pipes laid in a bed of gravel and covered with an organic media. As the air stream flows up through the media, the odorous compounds are removed by a combination of physical, chemical and biological processes. However, depending upon the airflow from the composting material and the design and material selection for the biofilter, the organic matter could quickly deteriorate.

In the biofiltration process, live bacteria biodegrade organic contaminants from air into carbon dioxide and water. Bacterial cultures (microorganisms that typically consist of several species coexisting in a colony) that use oxygen to biodegrade organics are called aerobic cultures. These bacteria are found in soil, peat, compost and natural water bodies including ponds, lakes, rivers and oceans. They are environmentally friendly and non-harmful to humans unless ingested. Chemically, the biodegradation reaction for aerobic cultures is written as:

Organic(s) + Oxygen + Nutrients + Microorganisms => CO_2 + H_2O + Microorganisms

The organic(s) are air contaminants, the oxygen is in air, the nutrients are nitrogen and phosphorus mineral salts needed for microbial growth and the microorganisms are live

[24] Technology Assessment for SCAQMD proposed Rule 1133 Page 3-2
[25] Conclusion # 2, "Measurement and Control of Odor and VOC emissions from the largest municipal aerated-static pile biosolids composting facility in the United States". William Toffey, Philadelphia Water Department; Lawrence Hentz, Post, Buckley, Shuh and Jerigan.

bacteria on the biofilter media.

Biofiltration is a well-established emission and control technology in Europe where over two hundred biofilters were in use as of 1984 and even more are expected today. In the United States, biofilters have been mainly utilized for the treatment of odors as well as VOCs in wastewater treatment plants. Based on the information collected by SCAQMD, existing biofilter composting applications have achieved control efficiencies of about 80% to 90% for VOC and 70% to over 90% for ammonia (one of this composting applications reported an initial control efficiency of 65 percent for VOC but was later improved to achieve an 80 percent control efficiency). This specific field example along with other available data presented in SCAQMD's Technology Assessment Report demonstrates that a well-designed, well-operated, and well-maintained biofilter is capable of achieving 80% control efficiency for VOC and ammonia.[26]

4) Enclosed Aerated Static Pile

An enclosed aerated static pile uses the same forced aeration principle of an open ASP, except that the entire pile is fully enclosed. There are a few companies that are promoting this type of system. In this evaluation, the following two companies will be discussed: AgBag International Ltd and the Gore Cover. Both technologies are briefly described below:

AgBag International Ltd.

The AgBag system was developed by Compost Technology International and is based in Oregon. The system has controlled aeration capabilities and has minimal space requirements. It is suited for small to mid-size composting. The system is comprised of the following components:

- Large sealed bags (pods) of adjustable length up to 200 ft, either 5 ft or 10 ft diameter
- 9 mm recyclable plastic (not re-usable)
- Adjustable aeration system with inserted valved vents
- Hopper, mixer & compost compactor

The Ag-Bag Environmental system provides a cycle time of as little as 8 weeks. Curing adds another 30 to 60 days. AgBag states that three annual composting cycles could be obtained. The area needed to compost is determined by the volume of waste material.

Mixing – A composite mix of materials needs to be balanced for proper carbon to nitrogen (C:N) ratio. This means a mix of greens (nitrogen sources) to browns (carbon sources). The best ratio that AgBag recommends is between 20 to 40:1, with 30:1 being ideal.

The oxygen supply is replenished by forced aeration. This eliminates the labor-

[26] SCAQMD Final Staff Report for Rule 1133, page 18

intensive need to turn piles. Temperature monitors indicate when the airflow needs adjusting to maintain proper temperatures. Moisture is adjusted at time of filling or added to the total mixture upon blending. The compost matrix is sufficient in size to maintain heat, even in cold climates. The system contains vents throughout to allow air to escape. These vents are controlled by the operator. Ag-Bag is considered an in-vessel system.

After 8-12 weeks of composting, the compost cycle is completed. The "Pod", as AgBag likes to call it, is opened and the material is static piled for 30-60 days to cure or mature.

A representative of AgBag has claimed very high control efficiencies for both VOCs and ammonia and have claimed that the system acts as its own biofilter, thus reducing emissions. However, VOC and ammonia control efficiencies are not readily available at this time. Furthermore, AgBag has not provided any technical information to support their claimed level of control.

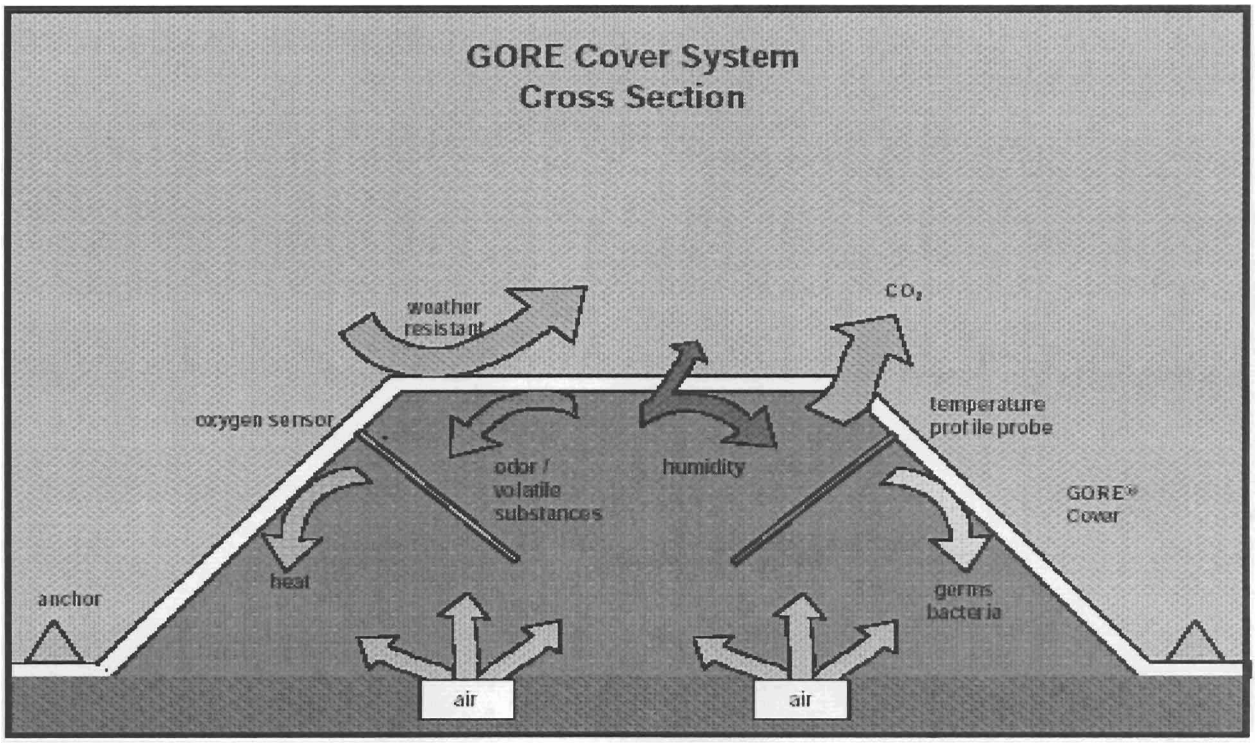
AgBag is working closely with SCAQMD and the Milk Producers Council to perform a pilot study to evaluate the efficiency of this technology. Until the study is completed, this technology will be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum control efficiency of 33.2%. Once the study is completed, the District will be able to more accurately determine the control efficiency for this technology.

Gore Cover

The Gore Cover, manufactured by Gore Creative Technologies Worldwide, utilizes positive aeration and a specially designed cover to create an enclosed system that controls odors, microorganisms and creates a consistent product unaffected by outside environmental conditions. Medium pressure aerators connect to aeration pipes on the floor or aeration ducts in the floor. Stainless steel probes inserted into the pile monitor oxygen and temperature parameters. The data is relayed to and stored in a computer. This data controls the aerators to keep pile conditions consistent. The Gore Cover system can significantly reduces odors by the controlled use of a semi permeable membrane that is permeable to oxygen but impermeable to large molecules. The cover protects the pile from weather conditions, but allows release of CO_2. These controlled conditions allow consistent product to be produced without risk of damp pockets, resulting in anaerobic conditions and, therefore increased odors.

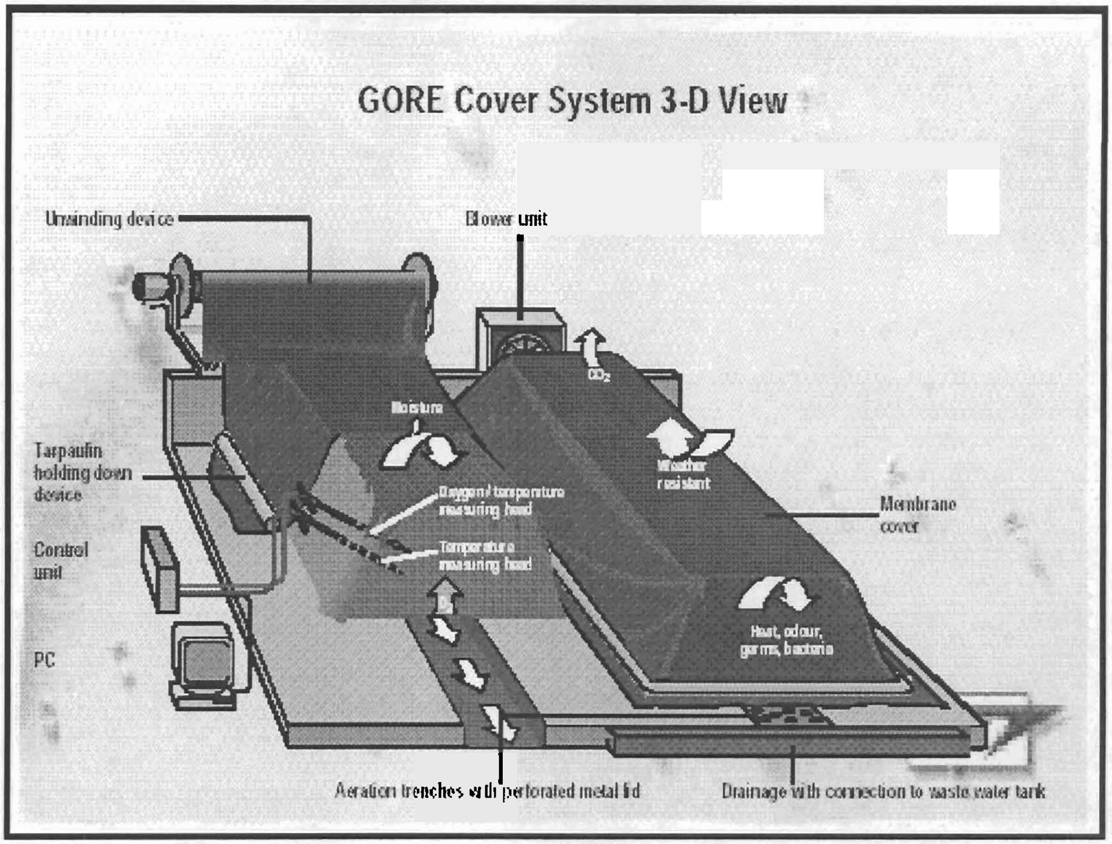
In addition to the membrane, which covers the organic material during composting, the system includes a concrete floor and wall, blowers for aeration, and a winder for efficient movement of the cover. The system also requires consistent management including preparation of materials to achieve a homogenous mixture with moisture content of 55-60% and monitoring of temperature and oxygen levels. With this system, the composting process takes eight weeks. The "heap" of organic material is covered by the membrane, which is secured to the ground, allowed to compost for four weeks, then moved and re-covered for two weeks for stabilization. During the final two weeks of curing, the heap is uncovered.

A fine film of condensation develops during the composting process that collects on the inside cover. According to the manufacturer, the moisture helps to dissolve the gases. The condensation then drips back onto the pile, where they can continue to be broken down by the composting process.



The system, according to Gore Cover, shortens the time required to produce finished, premium compost, as follows:

- First zone – Four weeks – Material stays on the initial placement zone in-vessel
- Second zone – Two weeks – Material moved to another in-vessel zone with minimizing addition of water. Water addition is nominal because the in-vessel system retains the initial moisture within the system and only releases minimal amounts.
- Third zone – Two weeks – the final move is to a third uncovered zone.
- Screening – Material will be screened then ready to sell within 15 days.



The Gore Cover technology is being implemented in over 140 facilities, mainly in Europe and the Mid East. This technology is capable of reducing anywhere from 90-97% of the odor created. However, not much is known regarding the control efficiencies for VOC and ammonia emissions. Oley Shermeta from Oley Shermeta Environmental has stated that this technology is superior to other in-vessel systems and has control efficiencies greater than 80% for both VOC and ammonia. However, at this point in time, there is no data to validate this. Mr. Shermeta has stated that he will gather all the information necessary to validate his claims and will provide this information to the District as soon as possible.

Until the data is presented, this technology will also be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum control efficiency of 33.2% (similar to AgBag). Once the data is available, the District will be able to more accurately determine the control efficiency for this technology.

5) In-Vessel/Enclosed Negatively Aerated Static Piles with exhaust vented to biofilter > 80% control efficiency

An in-vessel system confines the composting material within a building or container and uses forced air and mechanical turning to speed up the composting process. The systems enclosed ASP discussed above (AgBag and the Gore Cover) are also considered in-vessel systems. In these types of systems, close to 100% capture efficiency can be achieved. The captured gases can be sent to a control device such as a biofilter.

The enclosed systems typically allow treatment to be completed in less time than the windrow or aerated pile by providing better control of composting conditions. Rapid treatment time is offset by the high initial cost of the composting reactor.

There are a few co-composting facilities that compost in a fully enclosed building. One of these facilities is located in Rockland County, New York. This facility began operations in February of 1999. However, this facility processes biosolids from five publicly owned treatment works (POTWs) and does not process any dairy manure. A brief explanation of system at this the facility is discussed below in order to show some of the intricacies and costs of this type of system.

The facility was designed to handle 110 wet tons/day. The facility had to go through a 12-week odor control acceptance test, which included performance testing of ammonia, reduced sulfur compounds, VOCs and hydrogen sulfide. The facility is located approximately 1,000 feet away from a residential development. New York state regulations required that the facility not cause any objectionable odor impacts, however the required removal rates could not be guaranteed with conventional open biofilter systems. Consequently, proposals for proprietary biofilter systems were evaluated where the required performance could be guaranteed. A system was selected supplied by Envirogen with a guaranteed odor removal rate of 94%. The Envirogen package cost $1,670,000 and included supply and construction/installation of the exhaust fans, dual pretreatment scrubbers with chemical feed system, enclosed biofilter, and discharge stack. In addition to odor concentration, removal rate guarantees were provided for ammonia, hydrogen sulfide, and methyl mercaptn. Ammonia removal of 99% was achieved. VOC concentrations in the inlet averaged in the 20-ppmv range with peaks exceeding 200 ppmv as propane. Based on the data collected, VOCs were reduced from an average 15 ppmv in the inlet to less than 0.5 ppmv in the outlet, or a removal rate greater than 95 percent.

There are also two in-vessel composting systems that are currently being operated in the South Coast AQMD. Both use control equipment for ammonia, VOCs, and odors as well. However, these operations are currently composting materials other than manure.

No dairy or heifer facilities could be identified that are currently utilizing these types of in-vessel composting systems at their facility. The in-vessel systems, although very efficient in controlling emissions, can be extremely costly and are not considered to be cost effective for confined animal facilities at this time.

6) Daily Incorporation of Solid Manure into cropland

Incorporation of solid manure into the soil immediately after removal from animal housing will reduce emissions by minimizing the amount of time that the solid waste is exposed to the atmosphere. Limiting the exposure of the solid manure to the atmosphere will reduce the rate of volatilization of gaseous pollutants, such as VOCs and ammonia, thereby reducing overall emissions. Once the solid manure has been incorporated into the soil, VOCs will be absorbed onto particles of soil providing the opportunity for the VOCs to be oxidized into carbon dioxide and water[27].

Based on estimates in the Final DPAG Report - "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley", daily incorporation of solid manure removed from the cow housing will be assumed to have a 43% control efficiency for VOC emissions from solid manure handling and land application until data becomes available.

b. Step 2 - Eliminate technologically infeasible options

All technologies listed in step 1 are currently considered to be technologically feasible.

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) In-Vessel/Enclosed Negative Aerated Static Piles vented to biofilter ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈ 86.6%)[28]

2) Open Negatively Aerated Static Pile vented to biofilter ≥ 80% destruction efficiency for both active and curing phases (or a combination of controls) (≈ 84.6%)[29]

3) Daily Land Application with Immediate Incorporation (≈ 43.5%)

4) Enclosed Negatively Aerated Static Pile (≈ 33.2%)[30]

5) Open Negatively Aerated Static Pile (ASP) (≈ 23.2%)[31]

6) Open Windrow Composting (0%)

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

[28] According to the SCAQMD Rule 1133.2 final staff report (page 18) "Technology Assessment Report states a well designed, well operated, and well-maintained biofilter is capable of achieving 80% destruction efficiency for VOC and NH3." The overall control efficiency of this technology is equal to the combined control efficiencies of the enclosed aerated system (33.2%) and the biofilter. (80%), calculated as follows: (0.332) + (1-0.332)*0.8 =86.6%

[29] The overall control efficiency of this technology is equal to the combined control efficiencies of the open aerated system (23.2%) and the biofilter. (80%), calculated as follows: (0.232) + (1-0.232)*0.8 =84.6%

[30] There is no control efficiency available at this time for enclosed aerated static piles, however vendors for this technology are claiming a high degree of control. A study is under way by SQAQMD and the Milk Producers Council to determine the control efficiencies for VOC and ammonia emissions from enclosed aerated composting systems. Until the study is conducted, this technology will be conservatively assumed to control emissions by at least 10% more than open aerated static piles, with a minimum control efficiency of 33.2%.

[31] Control Efficiency is based on emissions capture efficiency of 25 to 33% from an open ASP multiplied by a conservative 80% control equipment efficiency from the Technology Assessment for Proposed Rule 1133 Table 3-2. The average control efficiency for open aerated static piles based on the Technology Assessment is 23.2%. Additional emission reduction potential from ASP cannot be quantified at this time.

d. Step 4 - Cost Effectiveness Analysis

Option 1) In-Vessel/Enclosed Composting vented to a biofilter; Option 2) Open Aerated Static Pile (ASP) vented to a biofilter; Option 4) Enclosed ASP; and Option 5) Open ASP

A cost effectiveness was evaluated by SCAQMD for a variety of controls for new and existing co-composting facilities based on implementation of several possible scenarios. The cost effectiveness for new co-composting facilities was estimated to be about $24,000 to $27,000 per ton of VOC reduced or $11,000 to $12,000 per ton of VOC and ammonia reduced based on fabric or concrete type of enclosure for the active phase of composting and forced aeration system for the active and curing phases vented to a bio-filter.[32]

For existing co-composting operations, SCAQMD analyzed a few different scenarios. Under one of the scenarios, assuming enclosure without an aeration system for active phase of composting and a forced aeration system for curing phase (both vented to a biofilter) and depending on the type of enclosure, the cost-effectiveness ranged from $11,400 to $15,400 per ton of VOC and ammonia reduced, or $30,000 to $40,000 per ton of VOC reduced. Under another scenario, using enclosure and aeration system for active phase, and aeration system for curing phase, both vented to biofilter, the cost effectiveness ranged from $8,700 to $10,000 per ton of VOC and ammonia reduced or $23,000 to $26,500 per ton of VOC reduced (depending on the type of enclosure). Under another scenario, assuming that forced aeration system (in combination with process controls, optimized feedstock mix ratios, and best management practices) for both active and curing phases (combined with a biofiltration system) could achieve the required reductions (i.e., 70% for VOC and ammonia), the cost-effectiveness could be as low as $6,500 per ton of VOC and ammonia reduced or $17,000 per ton of VOC reduced. However, SCAQMD stated that additional test data would be necessary to validate the efficiency of such control methods.[33]

The VOC and ammonia baseline emission factors, used in determining the cost effective analysis (also included in Rule 1133.2), were developed based on the AQMD source tests conducted in 1995 and 1996 for three windrow co-composting facilities (1.78 pounds of VOC and 2.93 pounds of ammonia per ton of throughput). These emission factors do not accurately represent the baseline emissions of manure storage piles from dairy/calf facilities. The emission factor for manure piles may in fact be lower.

Enclosed ASP or in-vessel systems with control equipment, while feasible and effective at significantly reducing emissions, are costly. There may be additional emission reductions associated with ASP systems that have not been quantified in this evaluation. Additional testing of ASP systems, such as the ones discussed in this evaluation would allow the emission reduction potential of all control scenarios to be refined.

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[32] Final Staff report for proposed Rule 1133, 1133.1, and 1133.2)

[33] The cost assumptions used in this analysis (capital and operating cost) are included in the Technology Assessment Report for SCAQMD PR1133 (Attachment A to the Final Staff Report)

Therefore, all aerated static composting systems will be eliminated at this time.

Aeration and drying with immediate incorporation when applied to land (≈ 43.5%)

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

e. Step 5 - Select BACT

The facility is proposing aeration and drying with immediate incorporation when applied to land for solid manure.

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

2. BACT Analysis for NH_3 Emissions from Solid Manure Handling & Land Application:

a. Step 1 - Identify all control technologies

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

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

1) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Description of Control Technologies

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

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

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

b. Step 2 - Eliminate technologically infeasible options

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

c. Step 3 - Rank remaining options by control effectiveness

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

2) All animals fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

d. Step 4 - Cost Effectiveness Analysis

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

e. Step 5 - Select BACT

The facility is proposing to feed all animals at the dairy in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations.

Additionally, District Rule 2201 defines BACT as including the most stringent emission limitation or control technique, including process and equipment changes, that has been found by the APCO to be cost effective and technologically feasible for such class or category of sources or for a specific source. The District has found that the mitigation measures required by District Rule 4570 are technologically feasible for confined animal facilities and the applicant has proposed these options. Although District Rule 4570 is only intended to reduce VOC emissions, many of these measures also reduce ammonia emissions. Therefore, in addition to the BACT requirements determined in the Top-Down BACT Analysis above, implementation of the mitigation measures that the applicant has selected to comply with Rule 4570 will also be required as part of BACT for NH_3 emissions from solid manure handling and land application.

VII. Top Down BACT Analysis for the Gasoline Dispensing Operation

Best Available Control Technology (BACT) Guideline 4.6.1*

Last Update: October 1, 2002

Emissions Unit: Motor Vehicle Gasoline Storage and Dispensing Operation

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	CARB certified Phase I and Phase II vapor recovery systems		

Determinations 4.6.1 and 4.6.2 were combined 10/01/02 since BACT requirements were identical for both classes of this source category.

BACT Analysis for VOC Emissions:

Step 1 - Identify All Possible Control Technologies

Emission control system consisting of ARB certified Phase I vapor recovery system.

Step 2 - Eliminate Technologically Infeasible Options

All control technologies listed in the clearinghouse are feasible.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

ARB certified Phase I vapor recovery system.

Step 4 - Cost Effectiveness Analysis

A cost effectiveness analysis is not required when the applicant proposes the most effective control method identified as technologically feasible. A Phase I vapor recovery system is identified as technologically feasible and achieved in practice BACT. Therefore, further cost effectiveness analysis is not required.

Step 5 - Select BACT

The applicant's proposed use of Phase I vapor recovery for the control of VOC emissions satisfies District's BACT requirements.

APPENDIX F

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7750-1-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BOB BORBA
MAILING ADDRESS: 19584 GIBRALTAR CT
HILMAR, CA 95324-9650

LOCATION: 6626 CENTRAL AVENUE
HILMAR, CA

EQUIPMENT DESCRIPTION:
1,100 COW MILKING OPERATION WITH ONE 50-STALL ROTARY MILKING PARLOR.

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. Permittee shall flush or hose down milking parlor immediately after each milking. [District Rules 2201 and 4570]
5. Permittee shall provide verification that milking parlor is flushed or hosed down immediately after each milking. [District Rules 2201 and 4570]
6. {3657} All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
N-7750-1-0 : Jun 28 2010 2:24PM -- AIYABEIJ : Joint Inspection NOT Required

7. {3658} This permit does not authorize the violation of any conditions established for this facility (e.g. maximum number of animals or animal units, construction requirements, etc.) 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. [District Rules 2070 and 2080]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-7750-2-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BOB BORBA
MAILING ADDRESS: 19584 GIBRALTAR CT
HILMAR, CA 95324-9650

LOCATION: 6626 CENTRAL AVENUE
HILMAR, CA

EQUIPMENT DESCRIPTION:
COW HOUSING - 1,100 MILK COWS, 200 DRY COWS AND 8 MATURE BULLS HOUSED IN FOUR FREESTALL BARNS WITH A SCRAPE AND A FLUSH SYSTEM.

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. The total number of cattle housed at the dairy at any one time shall not exceed any of the following limits: 1,100 milk cows; 200 dry cows; and 8 mature bulls. [District Rule 2201]
5. All cattle shall be fed in accordance with National Research Council (NRC) or other District-approved guidelines utilizing routine nutritional analysis for rations. [District Rules 2201 and 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services

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

6. Refused feed shall be removed from feed bunks on a daily basis to prevent decomposition. [District Rule 2201]
7. All cattle shall be housed in freestall barns with feed lanes and feed walkways constructed of concrete. [District Rule 2201]
8. Feed lanes and walkways shall be flushed at least four times per day. [District Rule 2201]
9. {3548} Permittee shall remove animal waste that is not dry from individual cow freestall beds at least once every fourteen (14) days. [District Rule 4570]
10. {3549} Permittee shall record the date that animal waste that is not dry is removed from individual cow freestall beds. [District Rule 4570]
11. {3550} Permittee shall groom (rake, harrow, scrape, or grade) bedding in freestalls at least once every fourteen (14) days. [District Rule 4570]
12. {3551} Permittee shall record the date that bedding in freestalls is raked, harrowed, scraped or graded at least once every fourteen (14) days. [District Rule 4570]
13. Inspection for potholes and other sources of emissions shall be done on a monthly basis. [District Rule 2201]
14. Firm, stable, soil that is not easily eroded shall be used for the corral and exercise pen surfaces. A supply of fill soil shall be kept on site in order to fill areas where erosion and gouging occurs. [District Rule 2201]
15. Clean rainfall runoff shall be diverted around exercise pens to reduce the amount of water that is potentially detained on the corral and exercise pen surfaces. [District Rule 2201]
16. {3545} Permittee shall inspect and repair leaks on the water pipes and troughs at least once every fourteen (14) days. [District Rule 4570]
17. {3546} Permittee shall record the date that water pipes and troughs are inspected and leaks are repaired. [District Rule 4570]
18. Permittee shall maintain water systems such as overflow water, misters, and any water distribution areas in good condition. These systems if broken or malfunctioning shall be repaired in a timely fashion. Holes and wallows near watering troughs and feeding areas should be a high priority. [District Rule 2201]
19. Fence lines shall be inspected weekly to remove any ridges or build-up of manure that form under them. Records of fence line inspection and fence line manure build-up removal shall be maintained. [District Rule 2201]
20. Permittee shall maintain a record of the number of animals of each production group at the facility and shall maintain quarterly records of any changes to this information. Such records may include DHIA monthly records, milk production invoices, ration sheets or periodic inventory records. [District Rules 2201 and 4570]
21. Permittee shall maintain records of: (1) the number of times freestall barn feed lanes and walkways are flushed per day; (2) daily removal of refused feed, (3) pothole inspections; (4) fenceline manure buildup inspections and removal; and (5) compliance with National Research Council (NRC) feeding guidelines. [District Rules 1070, 2201 and 4570]
22. {3657} All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570]
23. {3658} This permit does not authorize the violation of any conditions established for this facility (e.g. maximum number of animals or animal units, construction requirements, etc.) 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. [District Rules 2070 and 2080]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7750-3-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BOB BORBA
MAILING ADDRESS: 19584 GIBRALTAR CT
HILMAR, CA 95324-9650

LOCATION: 6626 CENTRAL AVENUE
HILMAR, CA

EQUIPMENT DESCRIPTION:
LIQUID MANURE MANAGEMENT CONSISTING OF TWO PROCESSING PITS (20'X20'X8 EACH), MECHANICAL SEPARATOR, ANAEROBIC TREATMENT LAGOON (457'X168'X14'), STORAGE POND (303'X168'X14'), AND LAND APPLICATION OF LIQUID MANURE BY FLOOD IRRIGATION.

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
N-7750-3-0 : Jun 28 2010 2:25PM – AIYABEIJ : Joint Inspection NOT Required

4. All liquid manure shall be treated in an anaerobic treatment lagoon that is designed and operated according to the Natural Resources Conservation Service (NRCS) technical guide No. 359. Permittee shall maintain records of design specifications and calculations for the Anaerobic Treatment Lagoon system in order to demonstrate that the system has been designed and is operating according to the applicable Natural Resources Conservation Service (NRCS) technical guide. [District Rule 2201]

5. Liquid manure used for irrigation of cropland shall only be taken from the storage pond/secondary lagoon after treatment in the primary lagoon. [District Rule 2201]

6. Liquid manure that is applied to cropland shall be mixed with irrigation water at a ratio in compliance with the facility nutrient management plan and applied at agronomic rates in accordance with the requirements of Regional Water Quality Control Board. [District Rule 2201]

7. Permittee shall maintain records to demonstrate that only liquid animal waste treated with an anaerobic treatment lagoon is applied to fields. [District Rule 2201]

8. Permittee shall remove solids from the waste system with a solid separator system, prior to the waste entering the lagoon. Separated solids shall be removed from the separation area stacking pads at least weekly. [District Rules 2201 and 4570]

9. Permittee shall maintain records of the weekly removal of the separated solids from the separation area. [District Rule 2201]

10. {3643} Permittee shall not allow liquid animal waste to stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]

11. {3644} Permittee shall maintain records to demonstrate liquid animal waste does not stand in the fields for more than twenty-four (24) hours after irrigation. [District Rule 4570]

12. {3657} All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570]

13. {3658} This permit does not authorize the violation of any conditions established for this facility (e.g. maximum number of animals or animal units, construction requirements, etc.) 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. [District Rules 2070 and 2080]

14. Pursuant to section 5.3 of the Settlement Agreement (9/20/2004) between the District and the Western United Dairyman and the Alliance of Western Milk Producers Inc., the permittee shall install a covered anaerobic digester with a biogas collection system vented to an IC engine or similar control device, if this technology is proven effective in reducing emissions and is required by the final Dairy BACT Guideline. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-7750-4-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BOB BORBA
MAILING ADDRESS: 19584 GIBRALTAR CT
HILMAR, CA 95324-9650

LOCATION: 6626 CENTRAL AVENUE
HILMAR, CA

EQUIPMENT DESCRIPTION:
SOLID MANURE MANAGEMENT SYSTEM CONSISTING OF DIRECT INJECTION INTO CROPLAND.

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. {3652} Permittee shall land incorporate all solid animal waste within seventy-two (72) hours of removal from animal housing. [District Rule 4570]
5. {3653} Permittee shall maintain records that show that all solid animal waste has been incorporated within seventy-two (72) hours of removal from animal housing. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services

N-7750-4-0 : Jun 28 2010 2:25PM -- AIYABEIJ : Joint Inspection NOT Required

6. {3600} Permittee shall cover dry separated solids outside the pens with a weatherproof covering from October through May, except for times, not to exceed twenty-four (24) hours per event, when wind events remove the covering. [District Rule 4570]

7. {3601} Permittee shall maintain records, such as manufacturer warranties or other documentation, demonstrating that the weatherproof covering over solid animal waste and/or weatherproof covering over separated solids, are installed, used, and maintained in accordance with manufacturer recommendations and applicable standards listed in NRCS Field Office Technical Guide Code 313 or 367, or any other applicable standard approved by the APCO, ARB, and EPA. [District Rule 4570]

8. {3602} Permittee shall maintain records to demonstrate dry separated solids outside the pens are covered with a weatherproof covering from October through May. [District Rule 4570]

9. {3657} All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570]

10. {3658} This permit does not authorize the violation of any conditions established for this facility (e.g. maximum number of animals or animal units, construction requirements, etc.) 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. [District Rules 2070 and 2080]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7750-5-0 **ISSUANCE DATE:** DRAFT

DRAFT

LEGAL OWNER OR OPERATOR: BOB BORBA
MAILING ADDRESS: 19584 GIBRALTAR CT
HILMAR, CA 95324-9650

LOCATION: 6626 CENTRAL AVENUE
HILMAR, CA

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

CONDITIONS

1. {3215} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to enter the permittee's premises where a permitted source is located or emissions related activity is conducted, or where records must be kept under condition of the permit. [District Rule 1070]
2. {3216} Upon presentation of appropriate credentials, a permittee shall allow an authorized representative of the District to have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit. [District Rule 1070]
3. {4035} If a licensed veterinarian, a certified nutritionist, the California Department of Food and Agriculture (CDFA), or the United States Department of Agriculture (USDA) determines that any VOC mitigation measure (with a Rule 4570 reference) is detrimental to animal health and needs to be suspended, the Permittee 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 2201 and Rule 4570]
4. {3511} Permittee shall feed all animals according to National Research Council (NRC) guidelines. [District Rule 4570]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
N-7750-5-0 : Jun 28 2010 2:25PM -- AIYABEIJ : Joint Inspection NOT Required

5. {3512} Permittee shall maintain records of feed content, formulation, and quantity of feed additive utilized, to demonstrate compliance with National Research Council (NRC) guidelines. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]
6. {3513} Permittee shall feed high moisture corn or steam-flaked corn to animals and shall not feed any dry rolled corn to animals. [District Rule 4570]
7. {3514} Permittee shall maintain records to demonstrate animals are fed high moisture corn or steam-flaked corn and no dry rolled corn. Records such as feed company guaranteed analyses (feed tags), ration sheets, or feed purchase records may be used to meet this requirement. [District Rule 4570]
8. {3515} Permittee shall remove feed from the area where animals stand to eat feed at least once every fourteen (14) days. [District Rule 4570]
9. {3516} Permittee shall maintain records of dates when feed was removed from the area where animals stand to eat. [District Rule 4570]
10. {3517} Permittee shall remove spilled feed from the area where feed equipment travels at least once every fourteen (14) days. [District Rule 4570]
11. {3518} Permittee shall maintain records of dates when spilled feed was removed from the area where feed equipment travels. [District Rule 4570]
12. {3519} Permittee shall remove uneaten wet feed from feed bunks within twenty-four (24) hours of a rain event. [District Rule 4570]
13. {3520} Permittee shall maintain records of when uneaten wet feed was removed from feed bunks. [District Rule 4570]
14. {3521} Permittee shall feed or dispose of rations within forty-eight (48) hours of grinding and mixing rations. [District Rule 4570]
15. {3522} Permittee shall maintain records of when feed was either fed to animals or disposed of within forty-eight (48) hours of grinding and mixing rations. [District Rule 4570]
16. {3523} Permittee shall store grain in a weatherproof storage structure from October through May. [District Rule 4570]
17. {3524} Permittee shall maintain records when grain is stored in a weatherproof storage structure from October through May. [District Rule 4570]
18. {3525} Permittee shall cover all silage piles, except for the area where feed is being removed from the pile. [District Rule 4570]
19. {3526} Permittee shall collect leachate from the silage piles and send it to a waste treatment system such as a lagoon at least once every twenty-four (24) hours. [District Rule 4570]
20. {3657} All records shall be kept and maintained for a minimum of five (5) years and shall be made available to the APCO, ARB and EPA upon request. [District Rule 4570]
21. {3658} This permit does not authorize the violation of any conditions established for this facility (e.g. maximum number of animals or animal units, construction requirements, etc.) 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. [District Rules 2070 and 2080]

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San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-7750-7-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: BOB BORBA
MAILING ADDRESS: 19584 GIBRALTAR CT
HILMAR, CA 95324-9650

LOCATION: 6626 CENTRAL AVENUE
HILMAR, CA

EQUIPMENT DESCRIPTION:
AGRICULTURAL GASOLINE DISPENSING OPERATION WITH ONE 350 GALLON ABOVEGROUND STORAGE TANK SERVED BY TWO-POINT PHASE I VAPOR RECOVERY SYSTEM; AND 1 FUELING POINT WITH 1 PHASE II EXEMPT GASOLINE DISPENSING NOZZLE USED PRIMARILY FOR IMPLEMENTS OF HUSBANDRY.

CONDITIONS

1. The fuel dispensing throughput shall not exceed 226 gallons per day. [District Rule 2201]
2. The fuel loading equipment and vapor collection equipment shall be installed, maintained and operated such that it is leak-free, with no excess organic liquid drainage at disconnect. [District Rule 4621]
3. {3980} The storage container(s) shall be installed, maintained, and operated such that they are leak-free. [District Rule 4621]
4. {3912} A leak is defined as the dripping of VOC-containing liquid at a rate of more than three (3) drops per minute, or the detection of any gaseous or vapor emissions with a concentration of total organic compound greater than 10,000 ppmv, as methane, above background when measured in accordance with EPA Test Method 21. [District Rule 4621]
5. {3976} The Phase I vapor recovery system shall be installed and maintained in accordance with the manufacturer specifications and the ARB Executive Order specified in this permit, including applicable rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture, the Office of the State Fire Marshal of the Department of Forestry and Fire Protection, the Division of Occupational Safety and Health of the Department of Industrial Relations, and the Division of Water Quality of the State Water Resources Control Board that have been made conditions of the certification. [District Rule 4621]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services
N-7750-7-0 : Jun 28 2010 2:25PM -- AIYABEIJ : Joint Inspection NOT Required

6. {3927} The permittee shall conduct all periodic vapor recovery system performance tests specified in this permit, no more than 30 days before or after the required compliance testing date, unless otherwise required under the applicable ARB Executive Order. [District Rule 4621]
7. {4020} The permittee shall perform and pass a Static Leak Test for Aboveground Tanks using ARB TP-201.3B or TP-206.3 within 60 days after initial start-up and at least once every 36 months thereafter. [District Rule 4621]
8. {3924} Periodic maintenance inspections of the Phase I vapor recovery system shall include, at a minimum, verification that 1) the fill caps and vapor caps are not missing, damaged, or loose; 2) the fill cap gasket and vapor cap gaskets are not missing or damaged; 3) the fill adapter and vapor adapter are securely attached to the risers; 4) where applicable, the spring-loaded submerged fill tube seals properly against the coaxial tubing; 5) the dry break (poppet-valve) is not missing or damaged; and 6) the submerged fill tube is not missing or damaged. [District Rule 4621]
9. {3922} The permittee shall conduct periodic maintenance inspections based on the greatest monthly throughput of gasoline dispensed by the facility in the previous year as follows: A) less than 2,500 gallons - one day per month; B) 2,500 to less than 25,000 gallons - one day per week; or C) 25,000 gallons or greater - five days per week. All inspections shall be documented within the O & M Manual. [District Rule 4621]
10. {3915} No gasoline delivery vessel shall be operated or be allowed to operate unless valid State of California decals are displayed on the cargo container, which attest to the vapor integrity of the container. [District Rule 4621]
11. The permittee shall maintain daily, monthly and annual gasoline throughput records. [District Rules 2201 and 4621]
12. {3973} All records required by this permit shall be retained on-site for a period of at least five years and shall be made available for District inspection upon request. [District Rule 4621]
13. {3968} The permittee shall notify the District at least 7 days prior to each performance test. The test results shall be submitted to the District no later than 30 days after the completion of each test. [District Rule 4621]
14. {4013} A person performing installation of, or maintenance on, a certified Phase I vapor recovery system shall be certified by the ICC for Vapor Recovery System Installation and Repair, or work under the direct and personal supervision of an individual physically present at the work site who is certified. The ICC certification shall be renewed every 24 months. [District Rule 4621]
15. {4015} Proof of the ICC certification and all other certifications required by the Executive Order and installation and operation manual shall be made available onsite. [District Rule 4621]
16. {4006} A person conducting testing of, or repairs to, a certified vapor recovery system shall be in compliance with District Rule 1177 (Gasoline Dispensing Facility Tester Certification). [District Rule 4621]
17. Prior to April 1, 2013, this tank shall be in full compliance with the requirements of ARB Executive Order VR-301 (Standing Loss Control for Existing Installation). The permittee shall obtain an Authority to Construct permit from the District prior to implementation of the requirements of VR-301. [District Rule 4621]