APPENDIX K

4.2 AIR QUALITY

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4.2 AIR QUALITY

Clean air is a vital resource to public health and welfare, to the local agricultural economy, and to the quality of life. Air pollution adversely affects public health, diminishes the production and quality of agricultural crops, reduces visibility, degrades materials, and damages native vegetation. This section discusses regional air quality in the San Joaquin Valley air basin and sources and quantities of air emissions expected from the proposed project..

SETTING

CLIMATIC CONDITIONS

The project is located in the San Joaquin Valley air basin, which is defined by the Sierra Nevada in the east, the Coast Ranges in the west, and the Tehachapi mountains in the south. The surrounding topographic features restrict air movement through and out of the basin and, as a result, impede the dispersion of pollutants from the basin. Inversion layers are formed in the San Joaquin Valley air basin throughout the summer and winter; an inversion layer is created when a mass of warm dry air sits over cooler air near the ground, preventing vertical dispersion of pollutants from the air mass below. During the summer, the San Joaquin Valley experiences daytime temperature inversions at elevations from 2,000 to 2,500 feet above the valley floor; during the winter months, inversions occur from 500 to 1,000 feet above the valley floor (SJVUAPCD, 1998).

The average summer high temperature in Kings County is in the upper 90° F (degrees Fahrenheit) range; during the summer, wind rose data for the valley indicate that the wind usually originates from the north end of the San Joaquin Valley and flows in a southeasterly direction. During winter months, the average temperature in the County is in the low 50° F; wind flows from the south end of the San Joaquin Valley toward the north. Low wind speeds and low inversion layers during the winter result in high carbon monoxide and particulate matter concentrations (National Climatic Data Center, undated).

AIR QUALITY STANDARDS AND LEGISLATION

FEDERAL

National Ambient Air Quality Standards

National ambient air quality standards (NAAQS) for six criteria pollutants (carbon monoxide, ozone, particulate matter, nitrogen dioxide, sulfur dioxide, and lead) were established by the Administrator of the U.S. Environmental Protection Agency (EPA) through the 1970 Federal Clean Air Act (CAA) (Table 4.2-1). In July 1997, EPA promulgated new NAAQS for ozone and particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$) (Table 4.2-1). The existing 1-hour ozone standard (0.12 ppm) will eventually be phased out and replaced with an 8-hour standard of 0.08 ppm.[1] The new $PM_{2.5}$ standard has been established for both an annual average and 8-hour periods.

TABLE 4.2-1: **National and State Ambient Air Quality Standards**

Pollutant	Averaging Period	California Standards	Federal Standards
Ozone	8 hours	–	0.08 ppm
	1 hour	0.09 ppm	0.12 ppm
Carbon monoxide	8 hours	9.0 ppm	9.0 ppm
	1 hour	20.0 ppm	35.0 ppm
Nitrogen dioxide	Annual	–	0.053 ppm
	1 hour	0.25 ppm	–
Sulfur dioxide	Annual	–	0.03 ppm
	24 hours	0.04 ppm	0.14 ppm
	1 hour	0.25 ppm	–
Suspended particulate matter; diameter $\leq$ 10 microns (PM_{10})	Annual arithmetic mean	–	50.0 $\mu g/m^3$
	Annual geometric mean	30.0 $\mu g/m^3$	–
	24 hours	50.0 $\mu g/m^3$	150.0 $\mu g/m^3$
Suspended particulate matter; diameter $\leq$ 2.5 microns ($PM_{2.5}$)	Annual	–	15.0 $\mu g/m^3$
	24 hours	–	65.0 $\mu g/m^3$
Hydrogen sulfide	1 hour	0.03 ppm	–
Lead	Calendar quarter	–	1.5 $\mu g/m^3$
	30-day	1.5 $\mu g/m^3$	–

Source: SJVUAPCD, 1998.

Notes: ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.
-- = Not available

[1] However, as of the preparation of this EIR, the U.S. Court of Appeals for the District of Columbia Circuit has ruled that: 1) the revised ozone and new $PM_{2.5}$ standards were improperly adopted; 2) U.S. EPA is prohibited from enforcing the revised ozone standard; and 3) it is in the process of determining the course of action for $PM_{2.5}$.

The CAA and subsequent Federal Clean Air Act Amendments of 1977 and 1990 require geographical areas to be designated as in attainment or nonattainment with the national ambient air quality standards. A geographical area is considered to be in attainment if the air pollutant level for that area meets the corresponding national standard; geographical areas for which an air pollutant exceeds the corresponding national standard are classified as nonattainment areas. State Implementation Plans (SIP) must be developed for nonattainment areas to identify strategies for achieving attainment of the national standard.

The San Joaquin Valley is currently in nonattainment for the Federal standards for ozone and particulate matter with an aerodynamic diameter less than or equal to ten microns (PM_{10}). As a result, the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) has prepared PM_{10} and ozone attainment demonstration plans; these plans identify the regulatory framework necessary to bring the San Joaquin Valley into compliance with the Federal ozone and PM_{10} standards. The PM_{10} attainment demonstration plan was approved by the California Air Resources Board (CARB) on 26 June 1997 and constitutes the PM_{10} SIP for the San Joaquin Valley; the PM_{10} SIP has not yet been approved by EPA (Guerra, 1999). The ozone attainment demonstration plan was incorporated into CARB's 1994 ozone SIP; CARB's ozone SIP also includes attainment demonstration plans for nonattainment areas other than the San Joaquin Valley and statewide measures intended to attain the Federal ozone standard. The 1994 ozone SIP was approved by EPA on 25 September 1996.

Methane

Regulatory requirements for the reduction or control of methane emissions have not been established on the Federal, State, or local levels. However, EPA prepares methane emission source inventories on an ongoing basis, as required by the CAA amendments. The five major anthropogenic sources of methane in the United States have been identified to be (in order of contribution) landfills, domesticated livestock, natural gas and oil production, coal mining, and livestock manure (U.S. EPA, 1999). Methane has been determined to be the second most significant greenhouse gas that contributes to global warming. The effects of greenhouse gases have been recognized as a worldwide problem and international efforts are being made to reduce the emission of these gases (U.S.EPA, 1995).

In 1988, the United Nations established the Intergovernmental Panel on Climate Change to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United States joined with other countries around the world in signing the United Nations' Framework Convention on

Climate Change agreement; the goal of the agreement was to control greenhouse gas emissions, including methane.[2]

As a result, the Climate Change Action Plan was developed to address the reduction of greenhouse gases in the United States. The plan consists of more than 50 voluntary programs, including the Ruminant Livestock Efficiency Program (RLEP) and AgStar Program.[3] The RLEP, developed by EPA in coordination with the U.S. Department of Agriculture (USDA), provides a series of improved livestock production practices that could readily be implemented to reduce methane emissions from ruminant animals. The AgStar Program, developed by EPA, USDA, and U.S. Department of Energy, encourages the use of methane recovery technologies at confined animal feeding operations that manage manure as liquids or slurries to reduce methane emissions (U.S. EPA, 1997).

CALIFORNIA

The California Air Resources Board is responsible for enforcing the Federally-required SIP in an effort to achieve and maintain the national ambient air quality standards. In addition, CARB has established State Ambient Air Quality Standards (SAAQS) for the criteria pollutants (Table 4.2-1) as well as for other pollutants for which there are no corresponding Federal standards. The SAAQS for the criteria pollutants are equal to or more stringent than the Federal standards. CARB is responsible for assigning air basin attainment and nonattainment designations in California.

Analogous to the CAA and its amendments, the 1988 California Clean Air Act (CCAA) requires areas within the State to be designated as attainment or nonattainment with the SAAQS. The CCAA similarly requires that plans be prepared for nonattainment areas describing strategies to achieve the SAAQS.

The San Joaquin Valley is currently in nonattainment for the State ozone and PM_{10} standards; the urbanized area of Fresno located within the San Joaquin Valley is also in nonattainment for the State carbon monoxide standard (SJVUAPCD, 1998). In 1991, the SJVUAPCD prepared an air quality attainment plan for the San Joaquin Valley to establish

[2] The agreement was ratified by the U.S. Senate in October 1992 (Breidenich, 1999).

[3] Ruminant animals have a four-chamber digestive system that converts otherwise unusable plant materials into nutritious food and fiber as well as methane; ruminant animals include cattle, sheep, buffalo, and goats.

the regulatory framework necessary to bring the San Joaquin Valley into compliance with the State ozone and carbon monoxide standards; this plan was last updated in 1994.[4]

SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

The San Joaquin Valley Air Basin includes all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare counties, and a portion of Kern County (SJVUAPCD, 1998). The SJVUAPCD was formed in 1992 and has jurisdiction over air quality issues in the San Joaquin Valley Air Basin; however, agricultural and livestock operations are exempt by State law from permitting requirements but are responsible for following prohibitory rules. The SVJUAPCD and CARB have joint responsibility for attaining and maintaining the State and Federal ambient air quality standards in the San Joaquin Valley Air Basin.

The San Joaquin Valley Unified Air Pollution Control District is currently working with CARB and other parties (i.e., industry) on the development of a comprehensive program of monitoring, emissions inventory development, data analysis, and modeling of particulate matter, specifically PM_{10} and $PM_{2.5}$. The purpose of the study is intended to provide an improved understanding of PM_{10} and $PM_{2.5}$, establish a strong scientific foundation for informed decision making, and to prepare efficient and cost-effective emission control strategies to achieve the PM_{10} and $PM_{2.5}$ standards in central California. The study includes particulate matter associated with agricultural and livestock operations, including dairy facilities. The study is expected to be completed in 2003.

KINGS COUNTY

The Kings County Right-to-Farm Ordinance (Kings County Code of Ordinances, Chapter 14, Article III, Section 14-38) indicates that it is the County's policy to *"protect agricultural land, operations, and facilities from conflicting uses due to the encroachment of incompatible, non-agricultural uses of the land in agricultural areas of the county,"* and to *"advise developers, owners, and subsequent purchasers of property in the County of the inherent potential inconveniences and discomforts often associated with agricultural activities and operations, including, but not limited to, equipment and animal noise; farming activities conducted on a 24-hour a day, 7-day a week basis; odors from manure, fertilizers, pesticides, chemicals, or other sources; the aerial and ground application of chemicals and seeds; dust; flies and other insects; and smoke from agricultural operations."*

The ordinance also indicates that no lawful agricultural activity, operation, or facility *"conducted for commercial agricultural purposes in a manner consistent with proper and accepted customs and standards as established and followed by similar agricultural operations in the same*

[4] Although the San Joaquin Valley is currently in nonattainment for the State PM_{10} standard, the SJVUAPCD is currently not required to prepare a State Implementation Plan to attain the PM_{10} State standard.

locality, shall be or become a nuisance, private or public, due to any changed condition in or about the locality, including, but not limited to, the encroachment of non-agricultural uses such as rural residences." The ordinance requires that all approvals for rezonings, land divisions, zoning permits, and residential building permits in the County shall include a condition that notice and disclosure of this policy be given to subsequent owners and occupants of the property, and that transfers of property also include the notice.

AMBIENT AIR QUALITY

The San Joaquin Valley Air Basin is approximately 250 miles long and averages 35 miles in width. The width of the Valley in the area of the project site averages about 50 to 60 miles. It is the second largest air basin in California and has one of the most severe air pollution problems in the State. The following is a description of the sources, physical and health effects, and the air basin's attainment status, where appropriate, for air pollutants.

Ozone (O_3), also known as smog, is not emitted directly into the environment. Ozone is generated from complex chemical reactions that occur in the presence of sunlight. One of the primary components of the chemical reactions is nitrogen oxide (NOx), which is referred to as an ozone precursor. NOx generators in the San Joaquin Valley include mobile sources, solvents, and fuel combustion. Ozone exposure causes eye irritation and damage to lung tissue in humans. Ozone also harms vegetation, reduces crop yields, and accelerates deterioration of paints, finishes, rubber products, plastics, and fabrics. The San Joaquin Valley Air Basin is currently in nonattainment for the Federal and State standards for ozone.

Unlike ozone, **carbon monoxide** (CO) is released directly into the atmosphere by stationary and mobile sources. CO is an odorless, colorless gas formed by the incomplete combustion of fuels. CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood when inhaled at high concentrations. Only the urbanized area of Fresno is currently in nonattainment for the State CO standard. In 1998, the urbanized areas of Fresno, Stockton, Modesto, and Bakersfield were reclassified from nonattainment to attainment status for the Federal CO standard.[5]

PM_{10} is released directly into the atmosphere by stationary and mobile sources. PM_{10} consists of a wide range of solid and liquid particles, including smoke, dust, aerosols, and metallic oxides. Major sources of PM_{10} include vehicles, power generation, industrial processing, wood burning, road dust, construction/farming activities, and fugitive

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[5] Based on personal communication between Mr. Joe O'Bannon of San Joaquin Valley Unified Air Pollution Control District and Ms. Rhodora Del Rosario of BASELINE Environmental Consulting on 10 March 1999.

windblown dust. The 1995 PM_{10} emission inventory for the San Joaquin Valley Air Basin indicated that fugitive windblown dust, farming operations, and road dust were the three leading sources of PM_{10} (SJVUAPCD, 1998). The San Joaquin Valley Air Basin is currently in nonattainment for the Federal and State PM_{10} standards.

Like PM_{10}, **$PM_{2.5}$** is also released directly into the atmosphere by stationary and mobile sources. Sources of $PM_{2.5}$ include vehicles, power generation, industrial processes, and wood burning. The effects of $PM_{2.5}$ are similar to those of PM_{10}. None of the air basins has been designated as attainment or nonattainment for the $PM_{2.5}$ standard due to the current lack of $PM_{2.5}$ data and the recent adoption of the $PM_{2.5}$ standard. As of the preparation of this EIR, the U.S. Court of Appeals for the District of Columbia Circuit has ruled that the new $PM_{2.5}$ standard was improperly adopted; the district is in the process of determining the course of action for $PM_{2.5}$.

Ammonia and **hydrogen sulfide** are generated during anaerobic decomposition of manure. Ammonia can severely irritate the eye, ear, and throat at high concentrations. Ammonia reacts with nitrates and sulfates in the air to form ammonium nitrate, which is a particulate less than or equal to 2.5 microns. Hydrogen sulfide has a rotten egg odor and can cause dizziness, respiratory tract irritation, nausea, and headaches at low concentrations. Ammonia does not have Federal or State standards but is a precursor of $PM_{2.5}$. Hydrogen sulfide has a State standard but the San Joaquin Valley is unclassified in attainment status.

Methane is an odorless greenhouse gas that absorbs and reflects terrestrial radiation back to the earth, potentially causing the earth surface temperature to gradually increase (U.S.EPA, 1995). Methane is emitted into the environment from various sources, including ruminant livestock and manure decomposition.[6] Methane released from domesticated ruminant livestock accounts for about 20 percent (about 80 million metric tons per year) of the anthropogenic methane generated in the United States (Agricultural Education, University of Missouri, et al., 1998; U.S. EPA, 1998a).

Of the ruminant livestock, dairy cattle generate about 1.5 million metric tons of methane per year, or about two percent of the total ruminant livestock methane generated and only about 0.4 percent of the total anthropogenic methane generated in the United States (U.S. EPA, 1998a). Ruminant animals produce methane emissions as part of their special digestive process. A portion of the feed material is converted into energy needed to support the maintenance and production (e.g., body tissue growth, milk, reproduction) of the animal. Feed that is not transformed into maintenance and production energy is

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[6] Other anthropogenic sources of methane include landfills, natural gas and petroleum systems, rice cultivation, agricultural residue burning, coal mining, and fossil fuel production (U.S. EPA, 1998a).

converted into methane as a by-product. Methane generation from dairy cattle is influenced by feed quality, essential nutrients in the feed, feeding level and schedule, and animal health. Methane is released through the animal's mouth and nostrils.

Methane is also generated from anaerobic decomposition of livestock manure. Approximately 26 million metric tons per year of methane are generated from livestock manure in the United States, about seven percent of the total anthropogenic methane generated in the United States (Agricultural Education, University of Missouri, et al., 1998). The remaining major anthropogenic methane sources, producing 73 percent of methane emissions, are rice farming, natural gas/petroleum use, coal mining, biomass burning, landfills, and publicly owned wastewater treatment systems.

Reactive organic gases (ROG) are also generated during decomposition of manure. ROG consist of hydrocarbons that undergo photochemical reactions to form ozone and are considered ozone precursors. The San Joaquin Valley is in nonattainment for both Federal and State ozone standards.

The nearest permanent air quality monitoring stations to the project site are the Van Dorsten, Patterson, and Hanford stations. The Van Dorsten Avenue and Patterson stations in Corcoran are located approximately 7.0 miles southeast of the project site; the two stations are located within 1.0 mile of each other. The Patterson station was opened in 1996 to replace the Van Dorsten Avenue station; the criteria pollutant monitored at the two stations is PM_{10}. The Hanford station is located approximately 9.0 miles northeast of the project site; the criteria pollutants monitored at the Hanford station are PM_{10}, ozone, and nitrogen dioxide. The air quality data for the last three available years (1995 to 1997) are summarized in Table 4.2-2.

AVAILABLE MANURE TREATMENT TECHNOLOGIES

Animal manure will naturally undergo anaerobic decomposition (Westerman and Zhang, 1996).[7] A wide variety of gaseous compounds are created and released into the environment at various stages of the decomposition process, including reactive organic gases, methane, carbon dioxide, ammonia, and hydrogen sulfide, some of which are odorous (i.e., ammonia, hydrogen sulfide, and reactive organic gases). Several technologies have been developed to control emissions and odors generated from manure decomposition. These technologies include biological additives, chemical additives,

[7] Raw dairy manure solids consist of volatile organics such as fats, carbohydrates, proteins, and nutrients. Manure provides the food and energy source for bacteria to grow and reproduce. Because oxygen is quickly consumed, manure undergoes natural anaerobic decomposition.

permeable and impermeable covers, natural crust formed cover, composting, aerobic[8] treatment systems, and anaerobic digestion.[9]

TABLE 4.2-2: **Summary of Air Quality Data, 1995-1997**

Pollutant	Standard		1995	1996	1997
Van Dorsten and Patterson Stations					
PM_{10}	State 24-hours (50 µg/m³)	Days over standard	24[1]	17/6	16/15
	Federal 24-hours (150 µg/m³)	Days over standard	2[1]	0/0	1/1
	State annual geometric mean (30 µg/m³)	Annual geometric mean concentration (µg/m³)	39.9[1]	35.4/37.3	40.0/42.3
	Federal annual arithmetic mean (50 µg/m³)	Annual arithmetic mean concentration (µg/m³)	51.5[1]	41.0/52.0	44.8/48.1
Hanford Station					
PM_{10}	State 24-hours (50 µg/m³)	Days over standard	25	18	23
	Federal 24-hours (150 µg/m³)	Days over standard	1	0	1
	State annual geometric mean (30 µg/m³)	Annual geometric mean concentration (µg/m³)	43.6	35.4	41.3
	Federal annual mean (50 µg/m³)	Annual mean concentration (µg/m³)	53.8	41.0	46.5
Ozone	State 1-hour (0.09 ppm)	Days over standard	2	78	23
	Federal 1-hour (0.12 ppm)	Days over standard	0	8	2
		Highest 1-hour concentration (ppm)	0.10	0.14	0.13
Nitrogen dioxide	State 1-hour (0.09 ppm)	Days over standard	0	0	0
	Federal 1-hour (0.12 ppm)	Days over standard	0	0	0
		Highest 1-hour concentration (ppm)	0.09	0.07	0.08

Source: CARB, 1996, 1997a, 1998

Notes: µg/m³ = micrograms per cubic meter.
xx/yy = Van Dorsten Avenue data/Patterson data.
Values in parentheses indicate corresponding standard.

[1] Values available only for Van Dorsten Avenue.

Biological Waste Supplements

Biological waste supplements may be applied to a manure collection area in an attempt to reduce **hydrogen sulfide** and **ammonia** gas generation. The supplements are intended to enhance bacteria growth, including sulfur reducing bacteria. However, this technology has been identified to be questionable (MPCA, 1999). This technology also does not address

[8] Aerobic decomposition occurs in the presence of oxygen.

[9] It should be noted that the technologies described in this air quality analysis are summaries of the most common technologies that address some of the gases generated by manure decomposition.

the reduction of methane or reactive organic gases generated from natural anaerobic decomposition of the manure.

Chemical Additives

The primary purpose of chemical additives is to mask and counteract **odors** generated from anaerobic decomposition. Additives such as lime may be added to increase the pH of the manure and reduce **hydrogen sulfide** emissions. However, the rate of ammonia gas generation increases with elevated pH levels. This technology does not address the reduction of other gases generated from natural anaerobic decomposition of the manure.

Permeable and Impermeable Covers

Several types of impermeable and permeable covers have been developed for placement over manure storage systems such as holding ponds; covers act as a physical barrier between liquid manure and the air. **Permeable** covers (known as biocovers) typically consist of an 8- to 12- inch wheat or barley straw layer (or other type of organic layer) lined with geotextile fabric; this type of cover acts as a biofilter and reduces the odor-related emissions such as **ammonia** and **hydrogen sulfide** (Jacobson, et al., 1998; MPCA, 1999). However, this type of permeable cover would not prevent emission of other gases (i.e., methane) generated from the anaerobically decomposing manure contained in the waste storage system (Sullivan, 1999).

Impermeable covers have been used to retain gases generated from manure waste storage systems. However, gases generated (**methane, reactive organic compounds, ammonia, hydrogen sulfide**) from natural anaerobic decomposition of the stored manure must be treated to remove air pollutants before being emitted into the environment. Treatment may include a biofilter and/or flare; therefore, the impermeable covers would need to be equipped with a gas collection system, similar to a covered lagoon anaerobic digester.

Biofilters would capture and reduce odor-related compounds (e.g., **ammonia** and **hydrogen sulfide**) but are not expected to reduce methane emissions (MPCA, 1999; Sullivan, 1999). Burning gases (collected from the covers by flaring) generate combustion gases; as a result, ozone precursor gases and carbon monoxide would be generated.

Natural Crust Formed Cover

Stored dairy manure can form a natural crust layer cover, depending on factors such as solids content, holding storage surface area, feed type, and weather conditions (Sullivan, 1999; Jacobson, et al., 1998). For instance, the tendency for a crust layer to form is reduced with increasing storage surface area and decreasing solids content. At least two to three years of operation are typically required before a crust layer can form (Sullivan, 1999). The effectiveness of natural crust layers is similar to that of impermeable covers discussed above. However, minimal agitation, which is typically inevitable, of a crust layer would release gases formed within the system; in addition, non-odorous gases, such as methane, may escape through the crust layer. Furthermore, the Kings Mosquito Abatement District (undated) prohibits the formation of natural crusts on dairy process water lagoons.

Composting

Manure composting is a biological treatment process conducted ideally under aerobic conditions (Clanton, 1997). Composting is commonly used for manure with solids content of at least 25 to 30 percent (Bicudo, 1999); raw dairy manure typically contains 14 to 16 percent solids (U.S. EPA, 1999). However, carbon sources (e.g., straw) may be added to raw manure to increase the solids content of the manure. Composting of flushed manure, common at dairy facilities, would not be appropriate due to the low solids content.

Composting requires the continuous aeration of the system for the aerobic process to continue; otherwise, waste could undergo anaerobic decomposition, generating methane and other gases (Richard, 1996). Aeration can be affected by forced aeration mechanical systems or passive aerated systems, which depend on diffusion and natural convection to aerate the waste. Land availability is a major limitation for composting. For instance, passive aerated windrows typically are three to nine feet in height and six to 18 feet in width (double the height). For forced aeration systems, the ideal windrow size will depend on the characteristics of the manure being composted; typically, the maximum height of a compost pile is from six to nine feet. Therefore, both systems require large areas to feasibly and appropriately handle manure; this technology would likely be inappropriate for dairies generating large volumes of scraped manure on a daily basis.

The composting process will result in the elimination or reduction of **methane, hydrogen sulfide,** and **reactive organic gases** compared to natural anaerobic decomposition of manure; however, ammonia emissions would be released into the environment. Equipment operations needed for the composting process would generate exhaust emissions. In addition, composting requires pretreatment of the manure such as sorting, mixing, grinding, temporary storage, and amendment addition (Clanton, 1999); these operations may cause air pollutants (e.g., methane, reactive organic gases, ammonia, hydrogen sulfide) to be released into the environment if anaerobic decomposition of the manure were to occur while the manure was being stored.

Aerobic Treatment Systems

Aerobic treatment is a process that enhances the decomposition of livestock manure slurries by aerobic bacteria with the addition of oxygen, thus preventing anaerobic decomposition. Various aerobic treatment systems have been used for managing livestock manure slurries, including activated sludge reactors, aerated lagoons, and oxidation ditches (Westerman and Zhang, 1996). Depending on the system, mechanical aerators may be used to enhance oxygen transfer to the waste liquid or diffused air may be introduced within the treatment volume. Various mechanical aerators include compressed air, mechanical surface, mechanical subsurface, combined compressed air/mechanical, and pumped liquid aerator.

Aerobic treatment systems would reduce or prevent the generation of **hydrogen sulfide, reactive organic gases,** and **methane**. End products from aerobic systems are carbon dioxide, water, sulfates, and nitrates; however, ammonia emissions would continue to be emitted into the environment, depending on the pH (Zandergheynst, 1999; Brady, 1990).

The liquid and solid effluent may be applied to land provided that the manure is completely stabilized; otherwise, anaerobic decomposition would occur and result in the generation and release of various gases including hydrogen sulfide, reactive organic gases, and methane. The main disadvantage of aerobic treatment is the high energy costs required to continuously aerate the treatment volume sufficiently (Westerman and Zhang, 1996).

Aerobic treatment systems have recently been used at two dairy facilities in the San Joaquin Valley, one in Kings County and the other in Kern County. The aerobic treatment system in Kings County was a six-month pilot study conducted at the Longfellow Dairy in Hanford; the study was conducted by Rain for Rent, Mazzei Injector Corporation, University of California at Davis, and the University of California Cooperative Extension Service. The treatment system was designed to handle approximately 5,000 gallons per day of flushed manure. The system consisted of a solids separator, two treatment tanks equipped with aerators (two stage treatment), and an effluent storage basin. Flushed manure was effectively treated to eliminate the potential generation of ammonia gases. However, although the treatment would reduce the total suspended solids of the manure, periodic cleaning of the system would be needed to remove eventual solids accumulation in the tanks (Grundvig, 1999).[10]

The aerobic treatment system in Kern County was constructed in May 1999 and is currently being operated to treat flushed dairy manure. The system was installed at the Visser Dairy located in McFarland, which handles approximately 3,000 cows. The system requires continuous maintenance and consists of two treatment ponds equipped with aerators and agitators and a storage pond. Microbes are also added to the treatment ponds to aid in the aerobic digestion of the manure. Similar to the pilot study performed in Kings County, the

[10] The system was not monitored to evaluate the releases of hydrogen sulfide, reactive organic gases, or methane. However, these gases are not typically generated under aerobic conditions.

process water was effectively treated to eliminate the potential generation of ammonia gases. Treated effluent, a liquid slurry, is currently applied on agricultural fields (Lubin, 1999).[11]

Anaerobic Digester Systems

Anaerobic digestion is an enclosed and controlled biological waste treatment process that is conducted in the absence of oxygen. The process includes capturing biogases generated from anaerobic digestion (**methane, carbon dioxide,** and trace gases such as **hydrogen sulfide** and **ammonia**) to minimize or prevent release into the environment. **Reactive organic gases** would also be minimized since the organic compounds would remain in liquid phase (due to the limited head space in the fully enclosed system) and eventually be converted into the biogases (Zhang, 1999).

The three basic types of anaerobic digesters operated in the United States are covered lagoons, plug flow digesters, and complete mix digesters. A covered lagoon is a fully enclosed lagoon, which typically is designed to have a retention time of 50 to 60 days; the lagoon design is similar to that of a dairy holding pond, but on a smaller scale (Sharp, 1999). Complete mix and plug flow digesters are designed and operated to enhance anaerobic decomposition and typically require less land area than lagoon systems. Selection of the appropriate digester system would depend on numerous factors such as, but not limited to, climate, manure solids content, solids characteristics, and land availability.

The biogases generated from anaerobic digester systems may be converted into electricity for on-site use or resale. Biogases may also be used directly as a fuel for a boiler to produce steam for facility operations.

Solid effluent, which is stable and rich in nutrients (ammonia, phosphorous, and potassium) is generated from the digester process; the effluent may be used for crop irrigation. In addition, the solids are an excellent soil conditioner, and may be used as a livestock feed additive when dried (U.S. DOE, undated). However, effluent would have the potential to release ammonia during storage and application. In addition, operation of the anaerobic digester treatment system would generate exhaust emissions from fuel-operated equipment and from burning of the biogas.

The AgStar Program promotes the development and operation of biogas systems (e.g., anaerobic digester treatment systems) at commercial farms (e.g., dairy, swine, and poultry)

[11] The system was also not monitored to evaluate the releases of hydrogen sulfide, reactive organic gases, or methane. However, these gases are not typically generated under aerobic conditions.

in the United States to reduce air pollutant emissions. However, installation of a biogas system at dairy facilities has not been considered to be a practical solution to reducing the methane generated from dairy manure because of the cost to design and construct the system as well as the labor required to maintain and operate it.[12]

A survey conducted in 1995 (Morse, et al., 1995) identified six dairy producers in California who had operated anaerobic digester systems as part of their dairy manure management systems. The installation costs for the digesters ranged from $100,000 to $950,000, generally increasing with the size of the dairy herd, which ranged from 200 to 1,500 cows. Of those dairies, only one continued to operate the digester. Three had discontinued use of the digester system, and the other two no longer operated their dairies. Producers who discontinued use of the digesters indicated that operational problems and maintenance costs were significant problems. In addition, the differential between the price dairy producers paid electrical companies for electricity and the price electrical companies paid for electricity generated at the dairies from biogas fueled turbines created additional economic problems. The results of the survey indicated that the economical feasibility of operating digesters in California was marginal in 1995 but that correction of operational problems and establishment of a trained service industry for operating digesters could promote their use as a viable component of dairy manure management systems.

EXISTING CONDITIONS AT PROJECT SITE

The project site is located on contiguous parcels of land in Kings County, approximately 45 miles south of Fresno, midway between the cities of Hanford and Corcoran in Kings County (Figure 3-1). The project site is 5,915 acres and is currently used for agriculture; cotton, wheat, corn, and other row crops are being grown on the project site. Existing sources of air pollutant emissions from agricultural activities include fugitive dust from land preparation, crop harvesting, and fugitive windblown dust; and agricultural equipment exhaust emissions.

PM_{10} Emissions from Fugitive Dust

PM_{10} emissions from fugitive dust are released into the atmosphere during land preparation for planting and post-harvest activities. Typical land preparation operations include stubble disking, finish disking, mulching, and other mechanical disturbances. Soil preparation activities are dependent on the crop type being grown. Typically, land preparation for cotton occurs from October through April; corn land preparation occurs

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[12] Based on personal communication between Mr. Tom Shultz, Farm Advisor with the University of California Cooperative Extension (Tulare County) and Rhodora Del Rosario, P.E., of BASELINE Environmental Consulting on 6 May 1999.

from November through March; and wheat land preparation occurs in November and December (CARB, undated a).

Land preparation activities at the project site could generate up to 32 tons per year of PM_{10} emissions. The proposed dairy facilities would be completely located on the project site. Dairy units A, B, C, and D would encompass 960, 1,116, 2,399, and 1,440 acres, respectively. Of the 32 tons per year of PM_{10} emissions, up to 5 tons per year could be generated from current land preparation activities on the Dairy A unit footprint area. Similarly, 7, 10, and 9 tons per year of PM_{10} emissions could be generated from current land preparation activities on Dairies B, C, and D footprint areas, respectively (Tables 4.2-4a through 4.2-4e). The estimates were based on emission factors developed by CARB for the current crops produced on the project site (cotton, wheat, and corn) and the crop planting area (CARB, 1997b).[13]

Windblown dust across agricultural fields also releases PM_{10} emissions to the environment. Up to 37 tons per year of PM_{10} emissions could be released due to windblown dust at the project site; of this amount, up to 6 tons per year could be generated from current land preparation activities on the Dairy A unit footprint area. Similarly, 7, 15, and 9 tons per year of PM_{10} emissions could be generated from windblown dust on the Dairy B, C, and D unit footprint areas, respectively (Tables 4.2-4a through 4.2-4e). The estimated emissions were based on the size of the current agricultural field (5,915 acres) and the CARB-developed emission factor for soil conditions in Kings County for nonpasture lands (CARB, 1997c).

Crop harvesting activities would also generate PM_{10} emissions from current operations. However, emission factors are only available for cotton; therefore, PM_{10} emissions from crop harvesting are not estimated.

Agricultural Equipment Exhaust Emissions

Air pollutant emissions from agricultural equipment exhaust include ozone precursors (i.e., ROG and NOx) and PM_{10}. ROG, NOx, and PM_{10} emissions generated from agricultural equipment were estimated based on site specific data regarding equipment types and duration as well as emission factors and load factors developed by CARB for farm

[13] Dust emissions calculated for land preparation were reduced by 25 percent for the months of December and March, as suggested by CARB; similarly, dust emissions calculated for January and February were reduced by 50 percent to reflect a typical seasonal decrease in land preparation activities and conditions that are more consistent with ambient air dust levels at that time.

equipment (CARB, 1995).[14] Estimated ROG, NOx, and PM_{10} emissions generated at the project site from current operations are calculated to be 0.9, 12.1, and 0.6 tons per year, respectively (Tables 4.2-4a through 4.2-4e).

EXISTING CONDITIONS NEAR PROJECT SITE

The project site is surrounded by agricultural land uses including poultry and dairy facilities and rural farm residences (Figure 4.7-1). Five poultry facilities are located near the project site, at distances of approximately 175 feet to 1.7 miles from the project site. A dairy facility (Machado Dairy) is located approximately 1.8 miles northeast of the project site. Nuisance complaints for the Machado Dairy have not been recorded by SJVUAPCD since 1992 (SJVUAPCD, 1999). However, the SJVUAPCD does not document complaints since SJVUAPCD's odor nuisance rule does not apply to agricultural operations associated with growing crops or raising fowl or animals. During the period September 1996 through September 1999, the Kings County Department of Public Health received a total of eight complaints regarding dairy facilities. Five of the complaints related to the management of process water and/or flies. The remaining three complaints related to odors at one dairy facility (Tucker, 1999).

RECEPTORS

Receptors are generally regarded to be people exposed to air emissions generated by development construction and operation. The SJVUAPCD defines a "sensitive receptor" as a location where human populations, especially children, seniors, and sick persons are present, and where there is a reasonable expectation of continuous human exposure to pollutants, according to the averaging period for the ambient air quality standards, such as 24-hour, 8-hour, or 1-hour. Examples of receptors include residences, hospitals, and schools (SJVUAPCD, 1998). Although the SJVUAPCD definition of receptors includes residences, it is generally interpreted to include areas designated by the General Plan for residential use. The proposed project site is located in a rural area were residences are generally isolated and surrounded by large agricultural fields. Receptors in such agricultural areas are subject to the Right-to-Farm Ordinance and are expected to be subject to discomfort and inconveniences caused by air emissions associated with standard agricultural operations or practices.

Potential receptors near the project site include rural farm residences, including mobile homes. A rural farm residence and two mobile homes are located from 0.33 to 0.8 mile northwest of the project site, north of Laurel Avenue; the rural farm residence is located

[14] Load factors were obtained from the 1996 Power Systems Research database; this information was obtained in personal communications between Ms. Debbie Lum of the California Air Resources Board and Ms. Rhodora Del Rosario of BASELINE Environmental Consulting on 2 March 1999.

at a poultry facility. Rural residences and mobile homes are located north of the project site, between 0.75 and 1.5 miles from the northern project boundary. Rural farm residences are also located northeast of the project site, between 1.5 and 2.25 miles from the northeastern project boundary. Similarly, three rural residences are located east of the project site, at distances of 175 feet to 1.0 mile from the southeast project boundary.

IMPACTS AND MITIGATION MEASURES

CONSISTENCY WITH PLANS AND POLICIES

The Air Quality section of the Resources Conservation Element of the Kings County General Plan does not contain specific goals, objectives, or policies related to air quality pollutants that would be relevant to the proposed project. The main goal of the General Plan is to protect human health and preserve the environment by achieving good air quality.

Goal 13: Protect human health and preserve the environment by achieving good air quality.

Objective 13.1: Implement air quality standards that protect human health and prevent crop, plant, and property damage.

Policy 13b: Require that commercial and industrial development minimize air pollution emissions by using Best Available Control Technology (BACT).

Policy 13c: Refer development projects to the San Joaquin Valley Unified Air Pollution Control District as appropriate for their review and comment. Consider their suggestions and requirements as conditions of approval.

The proposed project may not be consistent with the General Plan's main goal since air pollutants would be released into the environment at levels that would exceed significance thresholds established by the SJVUAPCD, as discussed in the impacts discussions below. It should be noted that, although Policy 13c indicates that development projects should be referred to the SJVUAPCD as appropriate for their review and comment, agricultural and livestock operations, such as the proposed project, are exempt from the permitting requirements of SJVUAPCD.

SIGNIFICANCE CRITERIA

Based on the recently amended environmental checklist in the CEQA Guidelines (Appendix G), a project could have a potentially significant air quality impact on the environment if it would:

- conflict with or obstruct implementation of air quality plan;
- violate ambient air quality standards or contribute substantially to an existing or projected air quality violation;
- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under Federal or State standards;
- expose receptors to substantial pollutant concentrations; or
- create objectionable odors affecting a substantial number of people.

An impact resulting from construction activities would also be considered significant if feasible construction control mitigation measures identified in SJVUAPCD's Guide for Assessing and Mitigating Air Quality Impacts (guidelines) were not implemented.

According to SJVUAPCD guidelines, a project could also have a significant air quality impact on the environment if project operations have the potential to frequently expose members of the public to objectionable odors; the SJVUAPCD has indicated that dairies located within 1.0 mile of a sensitive receptor could generate odors that may be significant (SJVUAPCD, 1998).

The SJVUAPCD has established thresholds for certain criteria pollutants for determining whether a project's operation would have a significant air quality impact (Table 4.2-3). In general, if any of the estimated ROG, NOx, and CO emissions generated from a project exceeds the thresholds, the project would be considered to have a significant air quality impact. The thresholds established by the SJVUAPCD are used in this air quality analysis as criteria for determining significant environmental impacts.

TABLE: 4.2-3: SJVUAPCD Significance Thresholds for Projects

Pollutant	Threshold of Significance[1]
ROG	10 tons per year
NOx	10 tons per year
CO	9 ppm (8-hour average) 20 ppm (1-hour average)
PM_{10}	15 tons per year[2]

Notes: ROG = Reactive organic gas
NOx = Oxides of nitrogen
PM_{10} = Particulate matter with a diameter less than or equal to ten microns
ppm = parts per million
SJVUAPCD = San Joaquin Valley Unified Air Pollution Control District

1 Refer to text for discussion of the applicability of these thresholds to emissions from the proposed project.

2 The PM_{10} emission threshold level (15 tons per year or 80 pounds per day) is the designated "offset" value specified in the SJVUAPCD permit conditions. An offset value is the maximum allowed pollutant emission rate an owner/operator of a source can release into the environment. If an owner/operator intends to release PM_{10} emissions at a rate greater than the offset value, the owner/operator must identify how the excess emissions would be offset, which is typically done by "purchasing" emission credits from a former PM_{10} emission source. Although SJVUAPCD has not included a significance threshold value for PM_{10} in their guidelines, the offset value of 15 tons per year has been defined as a significance criterion for this air quality analysis.

Local air emissions can have cumulative global impacts. For example, worldwide halocarbon (a class of compounds containing chlorine and/or fluorine) emissions have been linked to ozone depletion in the upper atmosphere. Similarly, worldwide greenhouse gas emissions have also been linked to the gradual increase in near-surface temperatures. Methane is the second most significant gas causing increases in greenhouse gases (after carbon dioxide). Therefore, emissions that contribute to a global adverse environmental condition are also considered to be a significant impact in this air quality analysis.

IMPACTS ANALYSIS APPROACH

The proposed project would generate construction-related and project operation-related emissions. Construction-related emissions would include PM_{10} emissions from fugitive dust generated during soil movement activities; and exhaust emissions (e.g., ROG, NOx, and PM_{10}) from construction equipment. Construction-related impacts are addressed in 4.2-1 and 4.2-2. Project operations would also generate air pollutant emissions, including ROG, NOx, PM_{10}, ammonia, hydrogen sulfide, carbon monoxide, and methane. The following is a list of the air pollutant emissions and the corresponding sources generated from project operations:

- PM_{10} emissions from fugitive dust generated during agricultural activities (e.g., land preparation and windblown dust) and dairy operations;
- Exhaust emissions (ROG, NOx, PM_{10}) from dairy and agricultural equipment;
- ROG, hydrogen sulfide, ammonia, and methane emissions from manure decomposition;
- Methane emissions from cattle digestion; and
- Localized (CO) and regional emissions (ROG, NOx, PM_{10}) from motor vehicle use associated with the project.

Tables 4.2-4a to 4.2-4d identify the emissions generated from each project operation source and provide the total net increase in emissions from project operations at each dairy unit; Table 4.2-4e identifies the total project operation and total net increase in emissions for all the dairy units combined. In addition to air pollutant emissions, project operations would also generate adverse odor.

TABLE 4.2-4a: **Total Emissions from Project Operations at Dairy A Unit**

Activity	ROG	NOx	PM_{10}	Ammonia	Methane
	(tons per year)				
Existing Conditions					
Fugitive Dust					
Land Preparation	--	--	5	--	--
Windblown Dust	--	--	6	--	--
Subtotal	--	--	11	--	--
Exhaust, Agricultural Equipment	0.2	2.0	0.1	--	--
Proposed Project					
Fugitive Dust (*Impact 4.2-3*)					
Land Preparation	--	--	3	--	--
Windblown Dust	--	--	6	--	--
Cattle Movement at Unpaved Corral	--	--	42 to 89[1]	--	--
Unpaved Road Dust	--	--	4	--	--
Subtotal	--	--	55 to 102	--	--
Exhaust, Agricultural and Dairy Equipment (*Impact 4.2-4*)	0.5	6.7	0.4	--	--
Manure Decomposition (*Impacts 4.2-6, 4.2-7, 4.2-9*)	54	--	--	77	475
Cattle (*Impact 4.2.-9*)	--	--	--	--	703
Regional Emissions, Vehicular Traffic (*Impact 4.2-11*)	0.19	0.97	0.02	--	--
Net Emissions Increase					
Fugitive Dust	--	--	**44 to 91**	--	--
Exhaust, Agricultural and Dairy Equipment	0.3	4.7	0.3	--	--
Manure Decomposition	**54**	--	--	77	475
Cattle	--	--	--	--	703
Regional Emissions, Vehicular Traffic	0.19	0.97	0.02	--	--
Total Net Increase	**54.49**	5.67	**44.32 to 91.32**	77	1,178
Significance Threshold	10	10	15	--	--

Notes: ROG = Reactive organic gases

NOx = Nitrogen oxides

PM_{10} = Particulate matter with an aerodynamic diameter of less than or equal to ten microns

-- = Not applicable

Bold values under the Net Emissions Increase section indicate emission exceeds significance threshold.

See Appendix B for air quality calculations.

Hydrogen sulfide emissions are not included since an emission factor for hydrogen sulfide from manure decomposition could not be found and, therefore, hydrogen sulfide emissions could not be calculated.

Calculation of carbon monoxide emissions generated from additional vehicular traffic were not necessary, based on SJVUAPCD guidelines (See Impact 4.2-9).

1 PM_{10} emission factors from dust generated at unpaved corrals are currently unavailable from U.S. EPA or CARB. The PM_{10} emission factor from dust generated at cattle feedlots was selected to conservatively estimate PM_{10} emissions generated at unpaved corrals as the PM_{10} emission factor for cattle feedlot is currently the most applicable factor available by U.S. EPA and CARB; actual PM_{10} emissions generated at unpaved corrals would be expected to be less than the estimated emissions since cattle feedlots are known to generate more PM_{10} emissions than unpaved corrals. The lower PM_{10} emission value accounts for rainfall effects and neglects PM_{10} emissions generated from calves and baby calves; the higher PM_{10} emission value ignores rainfall effects and assumes PM_{10} emission rates from calves and baby calves are equivalent to heifers and dry cows.

TABLE 4.2-4b: **Total Emissions from Project Operations at Dairy B Unit**

Activity	ROG	NO_x	PM_{10}	Ammonia	Methane
	(tons per year)				
<u>Existing Conditions</u>					
Fugitive Dust					
Land Preparation	--	--	7	--	--
Windblown Dust	--	--	7	--	--
Subtotal	--	--	14	--	--
Exhaust, Agricultural Equipment	0.2	2.4	0.1	--	--
<u>Proposed Project</u>					
Fugitive Dust (*Impact 4.2.3.3*)					
Land Preparation	--	--	3	--	--
Windblown Dust	--	--	7	--	--
Cattle Movement at Unpaved Corral	--	--	49 to 104[1]	--	--
Unpaved Road Dust	--	--	4	--	--
Subtotal	--	--	63 to 118	--	--
Exhaust, Agricultural and Dairy Equipment (*Impact 4.2-4*)	0.6	7.0	0.4	--	--
Manure Decomposition (*Impacts 4.2-6, 4.2-7, 4.2-9*)	63	--	--	90	555
Cattle (*Impact 4.2-9*)	--	--	--	--	821
Regional Emissions, Vehicular Traffic (*Impact 4.2-11*)	0.23	1.10	0.02	--	--
<u>Net Emissions Increase</u>					
Fugitive Dust	--	--	**49 to 104**	--	--
Exhaust, Agricultural and Dairy Equipment	0.4	4.6	0.3	--	--
Manure Decomposition	**63**	--	--	90	555
Cattle	--	--	--	--	821
Regional Emissions, Vehicular Traffic	0.23	1.10	0.02	--	--
Total Net Increase	**63.63**	5.70	**49.32 to 104.32**	90	1,376
Significance Threshold	10	10	15	--	--

<u>Notes</u>: See Table 4.2-4a

TABLE 4.2-4c: **Total Emissions from Project Operations at Dairy C Unit**

Activity	ROG	NOx	PM10	[illegible]	Methane
			(tons per year)		
<u>Existing Conditions</u>					
Fugitive Dust					
Land Preparation	--	--	10	--	--
Windblown Dust	--	--	15	--	--
Subtotal	--	--	25	--	--
Exhaust, Agricultural Equipment	0.3	4.6	0.2	--	--
<u>Proposed Project</u>					
Fugitive Dust (*Impact 4.2-3*)					
Land Preparation	--	--	6	--	--
Windblown Dust	--	--	14	--	--
Cattle Movement at Unpaved Corral	--	--	108 to 234[1]	--	--
Unpaved Road Dust	--	--	10	--	--
Subtotal	--	--	138 to 264	--	--
Exhaust, Agricultural and Dairy Equipment (*Impact 4.2-4*)	0.7	9.4	0.5	--	--
Manure Decomposition (*Impacts 4.2-6, 4.2-7, 4.2-9*)	143	--	--	203	1,247
Cattle (*Impact 4.2-9*)	--	--	--	--	1,846
Regional Emissions, Vehicular Traffic (*Impact 4.2-11*)	0.51	2.57	0.06	--	--
<u>Net Emissions Increase</u>					
Fugitive Dust	--	--	**113 to 239**	--	--
Exhaust, Agricultural and Dairy Equipment	0.4	4.8	0.3	--	--
Manure Decomposition	**143**	--	--	203	1,247
Cattle	--	--	--	--	1,846
Regional Emissions, Vehicular Traffic	0.51	2.57	0.06	--	--
Total Net Increase	**143.91**	7.37	**113.36 to 239.36**	203	3,093
Significance Threshold	10	10	15	--	--

<u>Notes:</u> See Table 4.2-4a

TABLE 4.2-4d: **Total Emissions from Project Operations at Dairy D Unit**

Activity	ROG	NOx	PM_{10}	Ammonia	Methane
	(tons per year)				
Existing Conditions					
Fugitive Dust					
Land Preparation	--	--	9	--	--
Windblown Dust	--	--	9	--	--
Subtotal	--	--	18	--	--
Exhaust, Agricultural Equipment	0.2	3.1	0.2	--	--
Proposed Project					
Fugitive Dust (*Impact* 4.2-3)					
Land Preparation	--	--	3	--	--
Windblown Dust	--	--	8	--	--
Cattle Movement at Unpaved Corral	--	--	62 to 134[1]	--	--
Unpaved Road Dust	--	--	6	--	--
Subtotal	--	--	79 to 151	--	--
Exhaust, Agricultural and Dairy Equipment (*Impact* 4.2-4)	0.6	7.8	0.4		--
Manure Decomposition (*Impacts* 4.2-6, 4.2-7, 4.2-9)	82	--	--	116	714
Cattle (*Impact* 4.2-9)	--	--	--	--	1,058
Regional Emissions, Vehicular Traffic (*Impact* 4.2-11)	0.29	1.40	0.03	--	--
Net Emissions Increase					
Fugitive Dust	--	--	61 to 133	--	--
Exhaust, Agricultural and Dairy Equipment	0.4	4.7	0.2	--	--
Manure Decomposition	82	--	--	116	714
Cattle	--	--	--	--	1,058
Regional Emissions, Vehicular Traffic	0.29	1.40	0.03	--	--
Total Net Increase	82.69	6.10	61.23 to 133.23	116	1,772
Significance Threshold	10	10	15	--	--

Notes: See Table 4.2-4a

TABLE 4.2-4e: **Total Emissions from Project Operations at All Dairy Units**

[illegible] Activity	ROG	NOx	[illegible] (tons per year)	Ammonia	Methane
<u>Existing Conditions</u>					
Fugitive Dust					
Land Preparation	--	--	31	--	--
Windblown Dust	--	--	37	--	--
Subtotal	--	--	68	--	--
Exhaust, Agricultural Equipment	0.9	12.1	0.6	--	--
<u>Proposed Project</u>					
Fugitive Dust (*Impact 4.2-3*)					
Land Preparation	--	--	15	--	--
Windblown Dust	--	--	35	--	--
Cattle Movement at Unpaved Corral	--	--	261 to 561[1]	--	--
Unpaved Road Dust	--	--	24	--	--
Subtotal	--	--	335 to 635	--	--
Exhaust, Agricultural and Dairy Equipment (*Impact 4.2-4*)	2.4	30.9	1.7	--	--
Manure Decomposition (*Impacts 4.2-6, 4.2-7, 4.2-9*)	342	--	--	486	2,991
Cattle (*Impact 4.2-9*)	--	--	--	--	4,428
Regional Emissions, Vehicular Traffic (*Impact 4.2-11*)	1.22	6.04	0.13	--	--
<u>Net Emissions Increase</u>					
Fugitive Dust	--	--	267 to 567	--	--
Exhaust, Agricultural and Dairy Equipment	1.5	18.8	1.1	--	--
Manure Decomposition	342	--	--	486	2,991
Cattle	--	--	--	--	4,428
Regional Emissions, Vehicular Traffic	1.22	6.04	0.13	--	—
Total Net Increase	344.72	24.84	268.23 to 568.23	486	7,419
Significance Threshold (four times significance threshold for individual project)	40	40	60	--	--

<u>Notes</u>: See Table 4.2-4a.

Impact 4.2-1
Increases in PM_{10} emissions during construction. This is a significant impact.

Construction activities associated with development of the four dairy facilities would include site preparation, soil excavation, grading, equipment traffic on paved and possibly unpaved roads, and construction of buildings (dairy structures and future residences on the project site). The applicant has indicated that diesel-fueled equipment would be used during grading, including scrapers, water trucks, backhoes, bulldozer, and miscellaneous equipment.

Substantial short-term PM_{10} emissions would cause a temporary increase in localized PM_{10} concentrations. Soils exposed during excavation and grading would be subject to wind erosion. The highest potential for PM_{10} emissions would occur when the soils are dry during late spring, summer, and early fall. PM_{10} emissions are considered by SJVUAPCD to be the pollutant of greatest concern from construction activities.

As previously mentioned, the proposed dairy facilities would be completely located on the project site. Dairy units A, B, C, and D would consist of 960, 1,116, 2,399, and 1,440 acres, respectively. A dairy facility would be constructed on a portion of each dairy unit. Approximately 103 acres of the proposed Dairy A unit would become a dairy facility. Similarly, 103, 225, and 130 acres of the proposed Dairies B, C, and D, respectively, would become dairy facilities. An estimated range between 101,000 and 174,000 cubic yards of soil would be moved on the dairy units during construction; soils would not be imported or exported from the project site.

The total amount of PM_{10} emissions resulting from grading activities could potentially be on the order of 103 pounds per day or 4,706 pounds total, based on an average grading rate of about ten acres per day for a period of two months and a PM_{10} emission factor of 220 pounds per acre-month; the estimate assumes that grading activities would be completed one dairy at a time (Table 4.2-5).[15]

In addition, four residences may be constructed on the project site; one at each proposed dairy unit. Construction of these homes would also generate PM_{10} emissions from site preparation, soil excavation, grading, equipment traffic, and building construction.

[15] The emission factor is consistent with that used in the URBEMIS7G computer model for estimating PM_{10} emissions from fugitive dust and is based on a report prepared for the South Coast Air Quality Management District (Jones & Stokes Associates, 1998).

The SJVUAPCD has established comprehensive control measures for PM_{10} emissions from construction-related activities. The control measures are divided into the following three components: 1) control measures from the SJVUAPCD Regulation VIII - Fugitive PM_{10} Prohibitions, Rule 8020, 2) enhanced control measures, and 3) additional control measures. Regulation VIII control measures are required for all construction projects and aim to reduce the amount of PM_{10} emissions generated from fugitive dust sources. Enhanced and additional control measures provide a greater degree of PM_{10} reduction compared to Regulation VIII. According to SJVUAPCD, enhanced control measures are applicable to construction projects that would be expected to generate large PM_{10} emissions and additional control measures are applicable for projects with large construction sites, located near receptors, or that for other reasons warrant additional emissions reductions.[16]

TABLE 4.2-5: **Short-term PM_{10} Emissions from Fugitive Dust during Construction Activities at Each Dairy Unit**

Pollutant	Daily (lb/day)	Total (lb)
PM_{10}	103	4,706

Notes: Emission factors were obtained from URBEMIS7G model.
lb = pounds
PM_{10} = Particulate matter with a diameter less than or equal to ten microns

PM_{10} emissions generated from fugitive dust during construction-related activities would constitute a significant impact since the emissions would impair short-term air quality and could expose nearby residents and other receptors, such as the rural residences and mobile homes located less than 2.0 miles northwest, northeast, and east of the project site. In addition, the SJVUAPCD would consider project construction activities to be a significant impact if the established control measures were not implemented.

Mitigation Measure 4.2-1(a)

The owner/operator and construction crew shall ensure that the following dust control measures specified in SJVUAPCD Regulation VIII, Rule 8020 are implemented during construction activities, as a condition of approval, to reduce PM_{10} emissions:

- *All disturbed areas, including storage piles, that are not being actively used for construction purposes, shall be effectively stabilized to minimize fugitive dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover;*

[16] Based on the Guide for Assessing and Mitigating Air Quality Impacts established by the San Joaquin Valley Unified Air Pollution Control District; the Guide does not provide a quantitative threshold that would trigger the implementation of enhanced and additional control measures. The need for enhanced and additional control measures would be determined on a case-by-case basis.

- *All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized to minimize fugitive dust emissions using water or chemical stabilizer/suppressant;*

- *All land clearing, grubbing, scraping, excavating, land leveling, grading, and cut and fill activities shall be controlled to minimize fugitive dust emissions using application of water or by presoaking;*

- *All operations shall minimize the accumulation of mud or dirt on adjacent public streets or expeditiously remove dirt at least once every 24 hours when operations are occurring (the use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions; use of blower devices is expressly forbidden); and*

- *Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, the piles shall be effectively stabilized to minimize fugitive dust emissions using sufficient water or chemical stabilizer/suppressant.*

Mitigation Measure 4.2-1(b)

The owner/operator and construction crew shall select from the following SJVUAPCD-developed enhanced and additional control measures for implementation <u>during construction activities</u> as a condition of approval to reduce PM_{10} emissions:

- *Limit traffic speeds on unpaved roads to 15 miles per hour;*

- *Install sandbags or other erosion control measures to prevent silt runoff to public roadways from those portions of the site with a slope greater than one percent;*

- *Wash off all trucks and equipment leaving the site;*

- *Install temporary wind breaks at windward side(s) of the construction areas;*

- *Suspend excavation and grading activity when winds exceed 20 miles per hour; and*

- *Limit the areal extent of land subject to excavation, grading, and other construction activity at any one time.*

Mitigation Measure 4.2-1(c)

The Kings County Code Compliance Specialist shall inspect construction areas to ensure that construction activities are conducted in accordance with SJVUAPCD control measures identified in (a) and (b) above.

Implementation of the above mitigation measures would reduce construction-related PM_{10} emissions to a less-than-significant level.

Impact 4.2-2

Construction related exhaust emissions. This is a significant impact.

Construction activities would generate short-term exhaust emissions from heavy-duty construction equipment; three scrapers, two water trucks, one bulldozer, and miscellaneous equipment would be used during construction of each dairy. The primary pollutants associated with exhaust emissions from construction-related equipment consist of ozone precursors (ROG and NOx) and PM_{10}. Daily exhaust emissions due to grading activities were estimated based on a grading duration of approximately two months, eight hour work days, and emission factors from the URBEMIS7G computer model prepared for SJVUAPCD for selected construction equipment (Table 4.2-6) (Jones & Stokes Associates, 1998); the estimate assumes that grading at one dairy would be completed before grading at the next dairy begins.[17] Approximately 519 pounds of ROG, 7,954 pounds of NOx, and 702 pounds of PM_{10} could be generated from exhaust during grading activities at the project site.

TABLE 4.2-6: **Short-term Exhaust Emissions from Construction Equipment at Each Dairy Unit**

Pollutant	Daily (lb/day)	Total (lb)
ROG	11	519
NOx	174	7,954
PM_{10}	15	702

Notes: Emission factors were obtained from URBEMIS7G model.
lb = pounds
ROG = Reactive organic gas
NOx = Oxides of nitrogen
PM_{10} = Particulate matter with a diameter less than or equal to ten microns

PM_{10} emissions from exhaust emissions (ROG, NOx, and PM_{10}) generated during construction-related activities would constitute a significant impact since the emissions would impair short-term air quality and could expose nearby residents and other receptors located downwind (e.g., poultry farm residence located 175 feet from the southern project boundary) to temporary substantial pollutant concentrations.

Mitigation Measure 4.2-2

As a condition of approval, the owner/operator and construction crew shall ensure that the following control measures are implemented during construction activities to reduce exhaust emissions from construction related equipment:

[17] The emission factor is consistent with that used in the URBEMIS7G computer model for estimating PM_{10} emissions from fugitive dust and is based on a report prepared for the South Coast Air Quality management District (Jones & Stokes Associates, 1998).

SECTION 2
SUMMARY

INTRODUCTION

This section provides a summary of the proposed project and areas of controversy that have been identified by the public and public agencies in response to the Notice of Preparation. This section also provides a summary of the discretionary actions required to implement the proposed project.

PROPOSED PROJECT

The proposed project evaluated in this Environmental Impact Report (EIR) consists of the construction and operation of four dairies. The dairies would be located on a 5,915-acre site approximately 5.5 miles south of Hanford and 4.7 miles northwest of Corcoran in an unincorporated area of Kings County. The site is designated "General Agriculture" in the Kings County General Plan and is zoned General Agriculture- 40 acre minimum parcel size (AG-40).

The four dairy units would range in size from 960 to 2,399 acres. The dairy facilities, including dairy barns and outdoor corrals, would occupy a small portion of each dairy unit. The dairies would support a total herd size of about 47,700 cattle, of which 24,800 would be producing cows and the remainder related stock, such as dry cows, heifers, and calves. The dairy operations would generate process water and dry manure. The process water would be mixed with well and/or surface water and used to irrigate crops grown on the remainder of the site, which will be used for feed for the cattle. Dry manure would be used as fertilizer at off-site farming operations.

NOTICE OF PREPARATION AND SCOPING SESSIONS

A Notice of Preparation (NOP) was prepared and distributed to public agencies, community organizations, and all adjacent property owners. The NOP contained a detailed project description and an Initial Study (environmental checklist) that indicated which environmental issues were proposed to be studied in depth in the environmental impact report. The NOP solicited public response as to the issues that should be included in the EIR. The NOP was mailed out on 17 July 1999 and responses were requested within a 30-day period, as required by Section 15082(a) of the CEQA Guidelines.

Land uses in the area adjacent to the project site are dominated by intensive agriculture, but also include non-irrigated fields, three poultry farms, rural farm residences, and evaporation ponds operated by the Tulare Lake Drainage District. There are nine residences within 1.0 mile of the proposed dairies, including at least one mobile home that is not occupied. There are no existing residences on the four proposed dairy units.

PROJECT CHARACTERISTICS

The **Chamberlain Ranch Planned Dairy Development** consists of the construction and operation of four dairies (Figure 3-2). The applicant, J.G. Boswell Company, has applied to receive permits for four separate dairy operations. The company would not construct or own the dairies; the permitted dairy sites would be sold to dairy operators.

The applicant has submitted four conditional use permit applications to Kings County for Dairy units A, B, C, and D, including technical reports and plans that identify the location of each of the dairy facilities, as well as the surrounding agricultural fields to be used for feed production and irrigation with process water.

Project Data

The acreage of the four dairy units varies in size from 960 to 2,399 acres (Table 3-1). The proposed area of the dairy facilities ranges from 103 to 225 acres. Each dairy would consist of freestall corrals, dairy barns, pasture, roads, settling ponds and lagoons (Figure 3-3), and associated facilities, surrounded by crop lands. The surrounding agricultural fields would produce feed crops, such as silage for the dairy herd, and would be irrigated with well and surface water mixed, at times, with process water generated at the dairy facilities.

The number of animals each site is proposed to accommodate ranges from 7,560 head (milking cows and support stock) at Dairy A to 19,900 head (milking cows and support stock) at Dairy C. The total number of dairy stock for the proposed four dairies would be approximately 47,700 animals, including 24,804 lactating cows (Table 3-1).

TABLE 3-1: **Project Data for Chamberlain Ranch Dairies**

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Crop land (acres)	857	1,013	2,174	1,310	5,354
Dairy facility (acres)	103	103	225	130	561
Total site (acres)	960	1,116	2,399	1,440	5,915
Milk cows	3,931	4,597	10,348	5,928	24,804
Total herd	7,560	8,841	19,900	11,400	47,700
Total animal units	*8,442*	*9,860*	*22,151*	*12,690*	*53,143*

Source: Nevins, 1998a, b, c, d and BASELINE.