Potential Additional PM_{10} Emissions Related to Secondary $PM_{2.5}$ Emissions

Ammonium nitrate particles in the $PM_{2.5}$ range could form as the result of reactions between ammonia emissions and nitrates available in the environment. These secondary $PM_{2.5}$ emissions are generated as the organic nitrogen contained in cattle fecal manure decomposes and the urea manure hydrolyzes. $PM_{2.5}$, known as fine particulates, comprise a fraction of PM_{10}.

As indicated in the discussion of existing conditions, limited information about $PM_{2.5}$ secondary particulate emissions from ammonia reactions is currently available. In the San Joaquin Valley, ammonia is believed to be more abundant than nitrates, indicating that the generation of ammonium nitrate is dependent on the availability of nitrates in the environment rather than the availability of ammonia (Gaffney, 2001). Potential $PM_{2.5}$ emissions from ammonium nitrate formation cannot be accurately estimated for new and expanded dairies.

Fugitive dust from unpaved corrals at new or expanded dairies would likely be the largest contributor of PM_{10} emissions from fugitive dust. Crop production and exhaust from dairy equipment and vehicular traffic would also contribute additional PM_{10} emissions. Formation of secondary $PM_{2.5}$ would also produce an unknown but potentially significant amount of additional PM_{10} emissions. The increase of PM_{10} emissions from a new or expanded dairy, compared to existing conditions, could exceed 15 tons per year (the PM_{10} significance threshold level for SJVUAPCD), depending on the cattle capacity of a new or expanded dairy.

The Element includes goals, objectives, and policies for dairy siting, control, monitoring, and reviewing the effectiveness of control measures specified. **Policy DE 3.1a** adequately requires that air quality, including dust control from construction and operation, be considered during the preparation of the countywide policy designed to evaluate and distribute dairies within the County.

Policy DE 5.1e sufficiently requires the control of fugitive dust emissions from cattle movement and maintenance activities at the unpaved corrals, perimeter roadways, and other unpaved areas throughout dairy ~~sites~~ facilities. This policy's PM_{10} reduction control efficiencies are based on the control efficiencies in SJVUAPCD's ~~Draft~~ Regulation VIII (SJVUAPCD, ~~2000~~ 2001).

PM_{10} emissions for future conditions were estimated based on the implementation of **Policy DE 5.1e** (Tables 4.2-5b and 4.2-6). The emissions reflect a 50 percent reduction of PM_{10} emissions through implementation of a stabilizer throughout unpaved corrals at new and expanded dairies only. No reduction was considered for existing dairies. Similar to existing conditions, four scenarios were considered in the estimation. The emissions

accounted for natural PM_{10} reduction from rainfall from December through March for scenarios 1 and 3. The reduction of PM_{10} emissions from implementation of a 50 percent effective stabilizer at new and expanded dairies ranges from 202 to 3,503 tons per year (Table 4.2-6). Table 4.2-6 provides a breakdown of the PM_{10} emissions from unpaved corrals for new and expanded dairies with and without the 50 percent effective stabilization.

TABLE 4.2-6: **PM_{10} Emissions Reduction from Stabilization at Unpaved Corrals for New and Expanded Dairies**

Scenario	Future Net Emissions (tons/year)		Future Net PM_{10} Emissions Reduction (tons/year)
	Without 50 Percent Effective Stabilization	With 50 Percent Effective Stabilization	
1	3,479	2,122	1,357
2	7,006	3,503	3,503
3	518	316	202
4	1,043	521	521

Notes: The scenarios exclude PM_{10} emissions from existing dairies.
See Tables 4.2-5a and b for scenario description.

The Element includes two additional measures to support **Policy DE 5.1e**. **Policy DE ~~5.1h~~ 5.1g** requires all applications for proposed dairies to estimate the anticipated PM_{10} emissions from cattle movement and maintenance activities at the unpaved corrals, perimeter roadways, and other unpaved areas throughout the dairy site; the policy also requires the preparation of a Fugitive Dust Emissions Control Plan (FDECP). The FDECP must describe and demonstrate conformance with **Policy DE 5.1e** and **DE ~~5.1i~~ 5.1h**.

Policy DE ~~5.1i~~ 5.1h requires compliance with the ~~Best Available Control Measures (BACM)~~ control measures for fugitive dust emissions from agricultural sources as established by the most recently adopted SJVUAPCD Regulation VIII. ~~The proposed rules address administrative requirements (rule 8011), construction, demolition, excavation, extraction, landfill, and other earth moving activities (rule 8021), bulk materials (rule 8031), carryout and trackout (rule 8041), open areas and vacant lots (rule 8051), paved and unpaved roads (rule 8061), unpaved vehicle and equipment traffic areas (rule 8071), and off-site agricultural sources (rule 8081).~~ The SJVUAPCD estimates the control efficiency for ~~BACMs~~ control measures for unpaved roads ranges from 37 percent (reduced speed) to 75 percent (apply chemical treatment). The control efficiency of ~~BACMs~~ control measures for bulk materials range from approximately 60 to 80 percent (SJVUAPCD, 2000).

Policies DE ~~6.1b~~, ~~6.1e~~ 6.2d, and ~~**6.2a**~~ **6.3a** provide for monitoring of dairy operations to demonstrate the Element's effectiveness in protecting the environment and the effectiveness of the mitigation measures required for each operating dairy facility in Kings County. ~~**Policy**~~ **Objective DE ~~6.1b~~ 6.1** provides for continuous monitoring of dairies to determine whether operations are being operated within the limits of the standards specified in the Element. **Policy DE ~~6.1e~~ 6.2d** requires the preparation of a dairy system monitoring program. **Policy DE ~~6.2a~~ 6.3a** provides for a continuous testing program to demonstrate that a dairy facility is operating within its approved parameters. **Policy DE ~~6.1d~~ 6.2c** has been included in the Element to require establishment of specific monitoring standards for dust control monitoring at dairy facilities. At a minimum, the standards shall provide for the following:

- Performance of periodic visual inspections at dust sources throughout the dairy (i.e., cattle movement at unpaved corrals and all other unpaved or gravel paved areas).

- Visual inspections shall be conducted and documented by the dairy operator to determine the effectiveness of dust control measures required under **Policy DE 5.1e** and presence/absence of breeding of mosquitoes and other vectors due to the implementation of dust control measures.

- Visual inspections shall be conducted at the dairy site boundaries and shall be conducted at least on a weekly basis during the dry season (April through October) and on a monthly basis during the remainder of the year. During periods of high winds and dry conditions, more frequent inspections shall be conducted, as deemed necessary by the Dairy Monitoring Office.

- All visual inspections shall be documented by the dairy operator in logs maintained at the Dairy Facility.

- Performance of ~~routine~~ inspection and ~~(at least monthly)~~ documentation on the implementation of the Fugitive Dust Emissions Control Plan (FDECP) and ~~BACM~~ control measures required by the most recently adopted SJVUAPCD Regulation VIII by the dairy operator at the dairy shall be done no less frequently than monthly.

Policies DE ~~7.1a,~~ 6.1a.A ~~7.1b~~ 6.1a.B, and ~~**7.1c**~~ **6.1a.C** provide a mechanism for the County to track and evaluate monitoring data (**Policy DE ~~7.1a~~ 6.1a.A**), address dairy operational problems encountered (**Policy DE ~~7.1b~~ 6.1a.B**), and compile general results of the monitoring program specified under the Element for submittal to the Planning Commission (**Policy DE ~~7.1c~~ 6.1a.C**). The Element provides **Policy DE ~~7.1d~~ 6.1b** to ensure that the Dairy Monitoring Office includes a qualified compliance specialist to review all monitoring control plans, including FDECPs prepared for and implemented at the dairies.