- ~~All equipment shall be properly tuned and maintained in accordance with the manufacturer's specifications;~~

- ~~When feasible, alternative fueled or electrical construction equipment shall be used at the project site;~~

- ~~Gasoline-powered equipment shall be equipped with catalytic converters, where feasible;~~

- ~~Curtail construction during periods of high ambient pollutant concentrations; this may include ceasing of construction activity during the peak-hour of vehicular traffic on adjacent roadways;~~

- ~~Implement activity management (e.g., rescheduling activities to reduce short-term impacts).~~

The construction phase exhaust emissions would present a short-term impact. Implementation of the Element would reduce construction related exhaust emissions to a less-than-significant level.

Mitigation Measure 4.2-2

None required.

Impact 4.2-3

Operation of new or expanded dairies ~~would~~ could increase PM_{10} air pollutant emissions from fugitive dust, exhaust from agricultural and dairy equipment, vehicular traffic exhaust, and formation of secondary $PM_{2.5}$. This is a significant and unavoidable impact.

Similar to existing conditions, PM_{10} emissions from fugitive dust would be generated during operation of new or expanded dairies. Fugitive dust sources from a new or expanded dairy are attributed to cattle movement in unpaved corrals, corral maintenance activities, vehicular use along unpaved or gravel paved roadways within the dairy facilities and unpaved areas within the dairy facilities, and from combustion engines on dairy operation equipment and vehicles moving to and from the dairies.[52] Fugitive dust sources from related agricultural activities at a new or expanded dairy site would include land

[52] As previously indicated, windblown dust across dairy pasture land would generate very minimal PM_{10} emissions. However, new or expanded dairies under the Element would primarily be situated at freestall barns or unpaved corrals, and not on pasture lands.

preparation, harvesting, and from wind blowing across exposed agricultural land. Fugitive dust from cattle movement is considered the most significant source.

PM_{10} Emissions from Fugitive Dust during Cattle Movement in Unpaved Corrals

As indicated previously, the main fugitive dust source from dairies is from cattle movement in unpaved corrals. New and expanded dairies would typically house dry cows, bred heifers, heifers (one year to bred ages), calves, and baby calves would commonly be placed in unpaved corrals. Milk cows would be housed in the freestall barns; little to no fugitive dust would be expected to be generated from the freestall barns as these facilities are typically paved with concrete.

PM_{10} emissions were estimated for future conditions (emissions from all additional support stock cattle allowed under the Element) and for a typical 500-, ~~735-~~ 705-, 2,000-, and 5,000-milk cow dairy facility (Table 4.2-5c). Under future conditions, the number of support stock considered in calculating PM_{10} emissions were based on data provided in Table 5 of the Element (Theoretical Dairy Herd Capacity for Kings County).[53] In estimating the emissions for the 500-, ~~735-~~ 705-, 2,000-, and 5,000-milk cow dairies, the number of support stock assumed to be housed at the unpaved corrals were based on the individual support stock to milk cow ratio used in Table 5 of the Element.

Potential PM_{10} emissions were estimated using PM_{10} emission factors published by CARB as well as the Department of Agricultural Engineering at Texas A&M University for cattle feedlots (Tables 4.2-5a through c). However, actual PM_{10} emissions generated could be less than the estimated emissions since cattle feedlots are known to generate more PM_{10} emissions than dairy corrals constructed to current California Department of Food and Agriculture standards. The PM_{10} emission factor for dairy cattle may be less than 20 percent of the cattle feedlot PM_{10} emission factor developed by Texas A&M (15 pounds per 1,000 head per day), according to a personal communication between Mr. Jim Sweeten (Texas A&M University professor) and the Confined Livestock Air Quality Committee of the USDA Agricultural Air Quality Task Force (2000).

Similar to existing conditions, PM_{10} emissions for future conditions and typical dairy sizes were estimated using CARB's emission factor under the following two scenarios to account for PM_{10} emission reduction from the wet season (rainfall effects) and for potential additional PM_{10} emissions generated from new born calves and calves between 320 to 700 pounds:

[53] The theoretical future capacity was determined by subtracting the number of support stock at existing dairies and the individual support stock to milk cow ratio, as identified in Table 5 of the Element.

- Scenario 1: Exclude all calves in PM_{10} emission estimate and account for potential PM_{10} emission reduction during wet season;[54] and

- Scenario 2: Conservatively include all calves in PM_{10} emission estimate (assuming that PM_{10} emission rates for calves are equivalent to those for the heavier and larger dry cattle and heifers),[55] and ignore potential PM_{10} emission reduction during wet season.

Similarly, the PM_{10} emissions for future conditions and typical dairy facilities were estimated using the University's nonannualized emission factor under the following two scenarios:

- Scenario 3: Exclude all calves in PM_{10} emission estimate and account for potential PM_{10} emission reduction during wet season;[56] and

- Scenario 4: Conservatively include all calves in PM_{10} emission estimate, and ignore potential PM_{10} emission reduction during wet season.

For future conditions, potential PM_{10} emissions could range from 695 to 10,400 tons per year, based on the four scenarios; this range reflects between 5 and 77 percent of the total estimated PM_{10} emissions estimated for Kings County in 2000. However, it should be noted that the 2000 emission inventory did not account for PM_{10} emissions from unpaved corrals at dairy facilities.

Approximately 5,165, 10,400, 769, and 1,548 tons per year of PM_{10} emissions were estimated for scenarios 1, 2, 3, and 4, respectively. PM_{10} emissions ranging from 1 to 14 tons per year could be generated for a 500-cow dairy, from 1 to ~~20~~ 19 tons per year for a ~~735~~ 705-cow dairy, from 4 to 54 tons per year for a 2,000-cow dairy, and from 10 to 136 tons per year for a 5,000-cow dairy (Table 4.2-5c). The fugitive dust emission from corrals is the dominant source of PM_{10} emissions at dairy facilities.

[54] PM_{10} emission reductions from rainfall were based on guidance from CARB (Gaffney, 1999).

[55] The emission factor used to estimate PM_{10} emissions was based on beef cattle feedlots. Production of beef calves usually consists of raising calves to weaning weights of 480 pounds as part of a range-pasture program; calves from weaning to weights between 550 to 700 pounds are typically grazed on pastures and also maintained in cattle feedlots. Therefore, the emission factor would not be expected to account for PM_{10} emissions generated from baby calves or from partial raising of calves from weaning to weights of 550 to 700 pounds.

[56] PM_{10} emission reductions from rainfall were based on guidance from CARB (Gaffney, 1999).

PM_{10} Emissions from Fugitive Dust during Vehicular Use along Unpaved/Gravel Paved Roadways and Other Unpaved Areas

PM_{10} emissions would also be generated from vehicular use along potentially unpaved or gravel paved roadways and from other unpaved areas at new or expanded dairies. The amount of PM_{10} emissions that could be generated from vehicular use along roadways at a dairy facility would be dependent on various factors, including the road type, vehicle miles traveled along the roadway, number of vehicular trips, vehicle type (number or wheels and weight), travel speed, silt content of the roadway, and vehicle weight. Similarly, the amount of PM_{10} emissions that could be generated from unpaved areas throughout a dairy facility would be dependent on several factors, including area size and silt content of the area. Since these factors could vary widely with each dairy, PM_{10} emissions from vehicular use along unpaved or gravel paved roadways at new or expanded dairies could not be estimated. PM_{10} emissions from vehicular use are typically minimal compared to PM_{10} emissions generated from unpaved corrals (Kings County, 1999).

PM_{10} Emissions from Fugitive Dust during Cropland-related Activities

PM_{10} emissions from fugitive dust during cropland-related activities would continue to be generated under future conditions. Fugitive dust sources would be from land preparation, harvesting, and from wind blowing across exposed agricultural land. PM_{10} emissions generated under future conditions would be less than current conditions since the size of the agricultural cropland would be less under future conditions because of the conversion of existing cropland into new or expanded dairies.

PM_{10} emissions from land preparation activities were estimated for future conditions, assuming the maximum capacity of cattle are housed in the County. The emissions were estimated using a PM_{10} emission factor published in the August 1997 CARB Emission Inventory Procedural Manual, Volume III, Section 7.4, Agricultural Land Preparation.

The amount of PM_{10} emissions from cropland preparation depends on the crop type grown and the acreage used for each crop type. Under future conditions, the crop types that would be grown were assumed to be consistent with the crop types harvested in 1999 countywide.[57] The theoretical maximum cropland acreage available would be 235,483 acres, based on the maximum theoretical capacity of Kings County to host dairies. PM_{10} emissions from land preparation under future conditions would decrease from 1,241 tons per year (existing conditions) to 1,191 tons per year (maximum buildout of new or expanded dairies) (Table 4.2-5a). Potential future PM_{10} emissions generated from cropland

[57] The crop types are included in the Theoretical Capacity Model.

preparation reflects approximately ten percent of the total PM_{10} emissions estimated for Kings County in 2000.

PM_{10} emissions from wind blowing across the agricultural cropland were estimated for future conditions, assuming the maximum capacity of cattle are housed in the County. The emissions were estimated using a PM_{10} emission factor for non-pastureland in Kings County, as published in the August 1997 CARB Emission Inventory Procedural Manual, Volume III, Section 7.12, Wind Blown Dust, Agricultural Land. PM_{10} emissions for future conditions would reduce from 1,577 tons per year (existing conditions) to 1,514 tons per year (maximum buildout of new or expanded dairies) (Table 4.2-5a). Potential future PM_{10} emissions generated from windblown dust reflect approximately 11 percent of the total PM_{10} emissions estimated for Kings County in 2000.

In addition, crop harvesting activities would also generate PM_{10} emissions. ~~Although,~~ PM_{10} emission factors for all the crop types were not available~~, PM_{10} emissions would decrease~~. However, similar to land preparation and wind blowing, PM_{10} emissions from crop harvesting activities under future conditions would decrease compared to existing conditions due to the reduction of crops harvested in the future.

PM_{10} Emissions from Agricultural and Dairy Equipment Exhaust

PM_{10} emissions would also be generated from the use of agricultural and dairy equipment. Under existing conditions, approximately 245,300 acres subject to the Element are currently used for cropland and approximately 4,756 acres are occupied by existing dairies. Land preparation, planting, cultivation, harvesting, and postharvesting activities on the cropland would involve the use of diesel-fueled equipment, such as stalk cutters, cultivators, discing equipment, seeder, dressing- and mulch-related equipment, tractors, trucks, and miscellaneous equipment. Similarly, dairy operations would also involve the use of diesel-fueled equipment, including diesel-fueled dairy equipment such as feed trucks, tractors, and miscellaneous equipment. Ozone precursors (ROG and NOx) and PM_{10} emissions are generated from the use of diesel-fueled equipment.

Based on the theoretical capacity of Kings County to host dairies, approximately 9,817 acres of existing cropland would be converted into new or expanded dairy facilities under the Element. The net increase in PM_{10} emissions generated for an area converted from cropland to dairy facilities would depend on the specific types of equipment used, length of equipment operation, equipment rating, equipment annual operating hours, and crop type originally grown.

For example, if approximately 100 acres of cropland growing corn and wheat are converted into a 5,000-milk cow dairy facility, a net increase of 0.4, 4.6, and 0.3 tons per year of ROG, NOx, and PM_{10} emissions, respectively, could be generated from diesel exhaust at the dairy