The CEQA Guidelines require that cumulative impacts be identified for "probable future projects." In addition to recently approved, pending, and proposed dairy applications recorded with the County planning agency, the Guidelines definition of probable future projects includes "*projects included in an adopted capital improvements program, general plan, regional transportation plan, or other similar plan or included in a summary of projections of projects(or development areas designated) in general plans or similar plan, and those projects anticipated as later phase of a previously approved project (e.g., a subdivision)* [and] *those public agency projects for which money has been budgeted*" (Section 15130[b][1][B][2]).

Under the Element, dairy development within the County would be limited to those areas designated as Dairy Development Overlay Zones (DDOZs). Application of manure and process water as fertilizer and irrigation supply would be restricted to the DDOZs and Nutrient Spreading Overlay Zones (NSOZs). Future dairies would be generally located in the San Joaquin Valley floor portion of Kings County: in the intensively farmed areas around Hanford and Lemoore, and between Hanford and Lemoore, and the flood zones of the Tulare Lake Basin, southwest of the Lemoore Air Station, and south of Corcoran. In addition, DDOZs and NSOZs are designated in Sunflower Valley and in the Kettleman Plain.

The Element defines the maximum theoretical dairy herd that could reasonably be supported by the amount of land available for manure and process water application. Analysis of the potential environmental impacts of "buildout" of the theoretical dairy herd was the subject of Section 4 of this EIR. In effect, the analysis evaluates the cumulative effects of the construction and operation of dairies built and expanded to accommodate the theoretical herd. The precise number and location of dairies that could be developed under the Element cannot be known with certainty.

Analysis performed for this EIR has identified five significant and unavoidable impacts, which are also cumulative impacts:

- Particulate matter (PM_{10}) emissions
- ~~Reactive organic gas~~ Ozone precursor (ROG and NOx) emissions
- Ammonia emissions
- Hydrogen sulfide emissions
- Methane emissions

These significant unavoidable impacts are discussed fully in the following section. Other cumulative impacts that are potentially significant relate to vehicular emissions, traffic and circulation, biotic habitat and wildlife movements, water quality and supply, land use, and cultural resources. These impacts would all be reduced to a less-than-significant level

under the proposed project through implementation of proposed goals, policies, and objectives, as discussed previously in this EIR and below.

For each of the environmental issues identified as causing possible cumulative impacts, the appropriate area of cumulative significant impact analysis is identified. For all environmental issues that could cause cumulative impacts, except air quality and water resources, the area of analysis is Kings County. The topography of those portions of Kings County that include designated DDOZs and NSOZs is relatively flat and used predominantly for agricultural production. The climate and surface water hydrologic conditions are relatively uniform throughout these portions of the County. The similarity of physiographic conditions and land use throughout most of the County promote defining the County boundaries as the cumulative impact area for all environmental issues associated with the proposed project, except air quality and water resources.

For the cumulative air quality analysis, the effect is at the larger air basin level but the analysis has focused on Kings County as well as other areas in the San Joaquin Valley air basin where air emissions from planned dairy facilities have been quantified. For example, although PM_{10} and reactive organic gas emissions from development associated with the project are a cumulative impact contributing to emissions generated throughout the San Joaquin Valley air basin, the area of the basin is nearly 25,000 square miles and covers all or portions of eight counties. In the case of methane releases from the proposed dairy operations, the adverse impact contributes to a global climate problem.

It is impractical and unreasonable to identify all individual past, present, or future projects within the eight-county area that may contribute to the cumulative air quality impacts identified for the proposed project. Emission of PM_{10} and ~~ROG~~ ozone precursors occurs during performance of a wide range of human activities, including vehicle use, agricultural activities, and many industrial and commercial operations.

To place the environmental effects of implementation of the proposed Element into a regional context, the cumulative impacts of air emissions from bovine dairies in the San Joaquin Valley air basin can be estimated semi-quantitatively on the basis of information available from the California Department of Food and Agriculture and similar assumptions made for estimating emissions presented in Section 4.2 of this EIR. This analysis focuses on confined animal facilities within the basin that are similar to the agricultural development proposed by the Element. The CDFA Dairy Marketing Branch provides annual estimates of the number of dairies and milk cows in dairy product-producing counties within California. The 1996 and 1999 estimated number of dairies and herd size for the eight counties within the San Joaquin Valley air basin are presented in Table 5-3. In 1996, there were 1,499 dairies with an average of 690 milk cows per dairy. The total number of dairies in 1999 decreased (1,447), but the average herd size rose to 847. The total

number of milk cows in the eight counties in 1996 and 1999 were 928,605 and 1,060,167, respectively. The Kings County dairy herd represented approximately 12 percent of the total milk cow herd in the San Joaquin Valley air basin in 1999.

TABLE 5-3: **San Joaquin Valley Dairy Herd, 1996 and 1999**

	1996			1999		
County	Cows	Dairies	Average Cows/Dairy	Cows	Dairies	Average Cows/Dairy
	Head					
Fresno	74,827	117	640	84,172	105	802
Kern	39,011	30	1,300	57,942	36	1,609
Kings	104,751	158	663	124,668	146	854
Madera	25,393	50	508	35,507	52	683
Merced	163,493	348	470	185,130	338	548
San Joaquin	86,593	162	535	88,778	154	576
Stanislaus	140,032	340	412	146,285	323	453
Tulare	292,509	294	995	337,685	293	1,253
Totals	**926,609**	**1,499**	**690**	**1,060,167**	**1,447**	**847**

Source: California Department of Food and Agriculture, Dairy Marketing Branch.

The determination of an estimate of the air emissions into the San Joaquin Valley air basin from existing dairies must consider support stock as well as milk cows. Therefore, the distribution and number of support stock were estimated using the same assumptions presented in the proposed Element (Table 5 of the Element). Furthermore, the estimated dairy cattle populations have also been converted to animal units (AU). The estimated 1999 dairy herd distribution (Table 5-4) serves as the basis for estimating the air emissions generated by the San Joaquin Valley air basin dairy herd.

Details on management practices at all 1,447 dairies within the San Joaquin Valley air basin are not available. However, the emission of ~~ROG~~ ozone precursors, methane, and ammonia from dairy cows and the decomposition of manure are directly related to the population of bovine cattle. Applying the methodologies presented in Section 4.2 of this EIR , the emissions of ~~ROG~~ ozone precursors, methane, and ammonia from the San Joaquin Valley air basin dairy herd can be estimated. The calculation of these emissions assumes that the manure decomposes under anaerobic conditions and that no advanced treatment technologies are practiced. Assuming that milking cows at new dairies are housed in freestall barns and support stock are kept in unpaved corrals also allows the PM_{10} emissions to be estimated. The calculations of air emissions for the existing (1999) San Joaquin Valley air basin dairy herd are presented in Appendix F.

TABLE 5-4: **1999 Estimated Dairy Herd Distribution, San Joaquin Valley**

	Cattle Type (Animal Units)[1]					
County	Milk Cows	Dry Cows	Heifers >2 years	Heifers 1-2 years	Calves	Baby Calves
Fresno	117,841	14,141	27,528	13,764	16,498	1,980
Kern	81,119	9,734	18,949	9,475	11,357	1,363
Kings	174,535	20,944	40,771	20,386	24,435	2,932
Madera	49,710	5,965	11,612	5,806	6,959	835
Merced	259,182	31,102	60,545	30,272	36,286	4,354
San Joaquin	124,289	14,915	29,034	14,517	17,400	2,088
Stanislaus	204,799	24,576	47,841	23,921	28,672	3,441
Tulare	472,759	56,731	110,437	55,218	66,186	7,942
Subtotal	1,484,234	178,108	346,717	173,359	207,793	24,935
					Total	**2,415,145**

[1] The estimation of animal units assumes that all dairy animals are Holstein cattle.

The economic analysis prepared for the Element (Appendix B) estimates a 2.6 percent growth rate in Kings County dairy development over the next 20 years. However, the estimate was based on the results of a survey of existing dairies in the County. Only 32 of 149 existing dairy operators responded to the survey, which included questions regarding potential expansion of existing dairies. Therefore, the 2.6 percent growth rate probably only reflects the growth associated with expansion of existing dairies. The estimate may not reflect the growth impacts associated with the development of new dairies.

Information presented in the Element (Appendix A, Table 3) on trends in dairy development in Kings County indicates that the milk cow herd in the County increased from 69,792 to 124,667 head from 1988 to 2000. Although the rate of change in the dairy herd varied year to year over this period, the herd increased by an average of approximately five percent per year.

Regionally, the growth rate of the San Joaquin Valley air basin dairy cow herd also averaged approximately five percent per year over the period 1996 to 1999. Data available from the California Department of Food and Agriculture indicate that the number of milk cows in the eight counties in the air basin increased from 928,605 in 1996 to 1,060,167 in 1999 (Table 5-3).

Based on these recent trends, the cumulative analysis for this PEIR assumes that the average annual increase in the dairy cow herd in Kings County and the San Joaquin Valley will be maintained at approximately five percent. The projected future San Joaquin Valley dairy herds for the years 2010 and 2020 (assuming a five percent annual growth rate) are

presented in Table 5-5. At a growth rate of five percent, the maximum theoretical bovine herd proposed for Kings County by the Element (381,980 milk cows) would be "built out" in the year 2022.

TABLE 5-5: **Projected Future San Joaquin Valley Dairy Herds**

		Cattle Type (head)					
Year	Projected Herd	Milk Cows	Dry Cows	Heifers >2 years	Heifers 1-2 years	Calves	Baby Calves
1999	~~2,415,145~~ 2,236,952	1,060,167	159,025	339,253	169,627	424,067	84,813
2010	~~3,269,168~~ 3,825,948	1,813,246	271,987	580,239	290,119	725,298	145,060
2020	~~3,716,842~~ 6,232,066	2,953,586	443,038	945,147	472,574	1,181,434	236,287

[1] The projection of future dairy herds assumes a five percent annual increase in the number of milk cows and support stock.

POTENTIAL CUMULATIVE AIR QUALITY IMPACTS

Increase in PM_{10} and Ozone Precursors

The dairy operations and crop production related to the proposed project would contribute incrementally to the generation of PM_{10} (refer to Impact ~~4.2-12~~ 4.2-11) and ~~reactive organic gas~~ ozone precursor (ROG and NOx) (refer to Impact ~~4.2-13~~ 4.2-12) emissions in the San Joaquin Valley air basin. The San Joaquin Valley is currently in nonattainment for both Federal and State PM_{10} and ozone standards. Any contribution of PM_{10} emissions to the environment would further exacerbate the nonattainment condition, and could cause a delay in the eventual attainment of the standards. Similarly, since ROG and NOx are ~~is a~~ precursors of ozone and the San Joaquin Valley is in nonattainment for ozone, additional ~~ROG~~ ozone precursor emissions would also exacerbate the nonattainment condition. Therefore, the project would be considered to have a significant unavoidable cumulative impact on regional air quality.

Major contributing sources of PM_{10} emissions in the air basin (in descending order of contribution) are entrained roadway dust, farming operations, waste burning, and industrial processes. The main sources of ~~ROG~~ ozone precursor emissions are vehicle and other mobile sources, solvent use, farming, petroleum storage and transfer, and waste burning. The 2000 CARB inventory estimates that 513 tons of PM_{10}, 598 tons of NOx, and 481 tons of ROG are produced daily within the air basin. The PM_{10} emissions estimates do not include the emissions from dairies and other livestock facilities. CARB has not completed a comprehensive inventory of PM_{10} and ROG emissions in the air basin. In January 2001, CARB estimated emissions of PM_{10} and ROG from dairies in the basin to be

1,700 and 19,900 tons per year; estimates of NOx emissions were not included. As discussed in Section 4.2 of this PEIR, there are discrepancies in the methods used by CARB in generating these estimates. Therefore, a reasonable estimate of the increment of increase in emissions within the basin generated by the dairies in the basin presented in this cumulative analysis is based on the analysis and assumptions presented previously in this PEIR.

The estimated ROG emissions for the existing (1999) San Joaquin Valley air basin bovine dairy herd is 14,406 tons per year or approximately 10.0 tons per year per dairy. Again, Kings County dairy cows account for approximately 12 percent of this total. The estimated PM_{10} emissions from the total dairy herd under Scenario 1[1] (Appendix F) is approximately 14,335 tons per year (or 9.9 tons per year per dairy). The SJVUAPCD threshold limits for point sources of ROG and PM_{10} emissions are 10 and 15 tons per year, respectively.

The SJVUAPCD ~~is in the process of adopting~~ has recently adopted guidelines for agricultural conservation practices to reduce the emissions of PM_{10} from agricultural activities, including management practices for off-field activities in unpaved areas. Significant emission of PM_{10} from dairies will occur even after implementation of these measures. There are no current plans to develop emission reduction practices for ROG or NOx generated by agricultural activities and significant emission of this pollutant are likely to continue.

The estimated future PM_{10} emissions from dairy operations in the San Joaquin Valley air basin for the years 2010 and 2020 are presented in Table 5-6. The estimated PM_{10} emissions in Table 5.6 do not include secondary $PM_{2.5}$ emissions, which may be generated by formation of ammonium nitrate. Therefore, the estimated PM_{10} emissions should be considered minimum values. Two distinct future conditions are considered. Under each future condition, four scenarios are presented that reflect the range of assumptions regarding emissions from a dairy, which are discussed fully ~~on page 4.2-32 of this~~ in Section 4.2 of the Draft PEIR. Future Condition 1 assumes future conditions without implementation of the proposed Element. Future Condition 2 assumes implementation of the Element. Under Future Condition 2, the emission estimate assumes a 50 percent reduction of PM_{10} at all future dairies in Kings County (**Policy DE 5.1c**). No reduction of emissions at other dairies within the basin is assumed as no specific control measures on PM_{10} emissions are known to be required in other jurisdictions. Under Future Condition 1 (Scenario 1), the expected PM_{10} emissions would be 24,517 tons per year in 2010 and

[1] Four PM_{10} emission scenarios were evaluated in this EIR, representing a range of assumptions regarding factors affecting emissions (see Section 4.2 of this EIR). For this cumulative analysis, Scenario 1 is considered the most appropriate as it assumes CARB emission factors and includes rainfall effects.

TABLE 5.6: **Estimated Total Net Increase in San Joaquin Valley Air Basin Emissions without and with the Element** (tons per year)

Activity	Future Condition 1 (without Element)					Future Condition 2 (with Element)				
	ROG	PM_{10}[4]	Ammonia	Methane	NOx	ROG	PM_{10}[4]	Ammonia	Methane	NOx
EXISTING CONDITIONS (1999)[1] ~~- Fugitive Dust from Cattle Movement at Unpaved Corral~~										
Fugitive Dust from Cattle Movement at Unpaved Corral										
Scenario 1	--	14,335	--	--	--	--	14,335	--	--	--
Scenario 2	--	28,864	--	--	--	--	28,864	--	--	--
Scenario 3	--	2,133	--	--	--	--	2,133	--	--	--
Scenario 4	--	4,295	--	--	--	--	4,295	--	--	--
Manure Decomposition[2]	14,406	--	--	125,896	--	14,406	--	--	125,896	--
Scenario 1	--	--	20,367	--	--	--	--	20,367	--	--
Scenario 2	--	--	82,767	--	--	--	--	82,767	--	--
Cattle Digestion	--	--	--	197,057	--	--	--	--	197,057	--
Vehicle Traffic Exhaust	unknown	unknown	--	--	unknown	unknown	unknown	--	--	unknown
Dairy Equipment Exhaust	unknown	unknown	--	--	unknown	unknown	unknown	--	--	unknown
1999 Total	~~**14,406**~~ **14,558**	~~**2,133 to 28,864**~~ **2,197 to 28,928**	**20,367 to 82,767**	**322,953**	**1,340**	~~**14,406**~~ **14,558**	~~**2,133 to 28,864**~~ **2,197 to 28,928**	**20,367 to 82,767**	**322,953**	**1,340**
2010 PROJECTIONS[2, 3] ~~- Fugitive Dust from Cattle Movement at Unpaved Corral~~										
Fugitive Dust from Cattle Movement at Unpaved Corral										
Scenario 1	--	24,517	--	--	--	--	24,050	--	--	--
Scenario 2	--	49,368	--	--	--	--	48,162	--	--	--
Scenario 3	--	3,648	--	--	--	--	3,579	--	--	--
Scenario 4	--	7,346	--	--	--	--	7,167	--	--	--
Manure Decomposition[2, 3]	24,639	--	--	215,324	--	~~24,222~~ 24,205	--	--	~~211,677~~ 211,525	--
Scenario 1	--	--	34,834	--	--	--	--	34,834	--	--
Scenario 2	--	--	141,560	--	--	--	--	141,560	--	--
Cattle Digestion	--	--	--	337,035	--	--	--	--	337,035	--
Vehicle Traffic Exhaust	46.27	6.56	--	--	361.34	46.27	6.56	--	--	361.34
Dairy Equipment Exhaust	154	98	--	--	1,800	154	98	--	--	1,800
2010 Total	~~**24,639**~~ **24,839**	~~**3,648 to 49,368**~~ **3,753 to 49,473**	**34,834 to 141,560**	**552,360**	**2,161**	~~**24,222**~~ **24,422**	~~**3,579 to 48,169**~~ **3,684 to 48,274**	**34,834 to 141,560**	~~**548,712**~~ **548,560**	**2,161**

TABLE 5-6 - *continued*

Activity	Future Condition 1 (without Element)					Future Condition 2 (with Element)				
	ROG	PM_{10}[4]	Ammonia	Methane	NOx	ROG	PM_{10}[4]	Ammonia	Methane	NOx
2020 PROJECTIONS[2] ~~- Fugitive Dust from Cattle Movement at Unpaved Corral~~										
Fugitive Dust from Cattle Movement at Unpaved Corral										
Scenario 1	--	39,936	--	--	--	--	38,636	--	--	--
Scenario 2	--	80,415	--	--	--	--	77,384	--	--	--
Scenario 3	--	5,943	--	--	--	--	5,749	--	--	--
Scenario 4	--	11,966	--	--	--	--	10,628	--	--	--
Manure Decomposition	40,135	--	--	350,741	--	~~38,806~~ 38,636	--	--	~~339,131~~ 338,979	--
Scenario 1	--	--	56,740	--	--	--	--	56,740	--	--
Scenario 2	--	--	230,586	--	--	--	--	230,586	--	--
Cattle Digestion	--	--	--	548,995	--	--	--	--	548,995	--
Vehicle Traffic Exhaust	31.16	8.94	--	--	298.53	31.16	8.94	--	--	298.53
Dairy Equipment Exhaust	252	160	--	--	2,932	252	160	--	--	2,932
2020 Total	**~~40,135~~ 40,418**	**~~5,943 to 80,415~~ 6,112 to 80,584**	**56,740 to 230,586**	**899,736**	**3,231**	**~~38,806~~ 39,089**	**~~5,749 to 77,384~~ 5,918 to 77,553**	**56,740 to 230,586**	**~~888,126~~ 887,974**	**3,231**

Notes: See Table 4.2-5a for notes on assumptions for emissions scenarios.

[1] The 1999 projections reflect existing conditions and, therefore, do not consider implementation of the Element emission control measures.

[2] Implementation of the Element emission control measures were applied only for applicable dairies located in Kings County.

[3] Air emissions are based on the projected future dairy herds presented in Table 5-5.

[4] Estimated PM_{10} emissions do not include the potential contribution of secondary $PM_{2.5}$, which could form by the reaction of ammonia with nitrogen oxides to form ammonium nitrate particles.

39,936 tons per year in 2020. The emissions would be reduced to 24,050 tons per year in 2010 and 38,636 tons per year in 2020 under Future Condition 2 (Scenario 1).

The Element contains provisions for the control of PM_{10} and ROG, which are discussed in Section 4.2 of this EIR. These measures would significantly reduce PM_{10} and ROG emissions. Under the provisions of the Element, the control of PM_{10} emissions from unpaved areas would be expected to be on the order of 50 percent. The effectiveness of the ROG control measures are not known as very few dairies within the San Joaquin Valley air basin are subject to such controls and direct measurement of the performance of the controls has not been made. ROG emissions would be minimized by controlled anaerobic and/or aerobic treatment of manure and process water (**Policy DE 5.1c**).

Although the reduction of ROG cannot be accurately estimated, **Policy DE 5.1c** of the Element sets a goal of 50 percent reduction in volatile solids. It is estimated that reduction in volatile solids (the food source for microbes generating ROG) would result in a similar reduction in ROG. With these controls, the future ROG emissions for Future Conditions 1 (without the Element) and 2 (with the Element) for years 2010 and 2020 are also presented in Table 5-6. Future Condition 1 assumes no controls on ROG emissions from dairies within the air basin. Under Future Condition 2, a 50 percent reduction in ROG emissions created by decomposition of manure generated by the dairy herd within Kings County that would be subject to advanced manure treatment. Under Future Condition 1, the expected ROG emissions would be 24,639 tons per year in 2010 and 40,135 tons per year in 2020. The emissions would be reduced to 24,222 tons per year in 2010 and 38,806 tons per year in 2020 under Future Condition 2.

However, the complete control of ROG and NOx emissions cannot be assured as immediate treatment of manure is not practically or technically feasible. Similarly, PM_{10} emissions can be controlled but not eliminated from farming and livestock management. Therefore, the emission of ~~ROG~~ ozone precursors and PM_{10} would be a cumulative significant unavoidable impacts.

Increase in Methane Emissions

Increases in greenhouse gases, including methane, to the atmosphere are an international environmental issue. Therefore, methane sources throughout the world (regardless of their location) contribute to the accumulation of methane in the atmosphere. Livestock and livestock manure are a major contributor to methane emissions.

Methane emissions would be generated during project operations and would contribute incrementally to the increase in greenhouse gases (refer to Impact ~~4.2-9~~ 4.2-8). Without control measures (Future Condition 1), the existing dairy herd in the San Joaquin Valley air basin is expected to generate approximately 197,057 tons per year from the cattle

themselves and 125,896 tons per year from manure decomposition (Table 5-6). The projected total emission (from cattle and manure decomposition) of methane is 552,360 tons per year in 2010 and 899,736 tons per year in 2020. Aerobic treatment and/or anaerobic treatment of manure required by the Element would significantly reduce the amount of methane emissions from manure decomposition within Kings County. Appropriate livestock management would reduce the methane emissions from the cows themselves.

Under the Element controls (Future Condition 2), it is assumed that a reduction of 50 percent of volatile solids in treated manure would result in an approximate 50 percent reduction in methane generated from decomposition of manure generated by new and expanded dairies implementing advanced manure treatment in Kings County. The effectiveness of control of methane emissions from the dairy cattle at Kings County dairies through cattle diet and health management cannot be accurately estimated. However, these controls would reduce emissions further. With controls imposed in Kings County, the cumulative emissions within the San Joaquin Valley air basin would be reduced to 548,712 tons per year in 2010 and 888,126 tons per year in 2020.

However, as described for ROG emissions, it is practically and technologically infeasible to eliminate all methane emissions. Proper herd management and implementation of biogas collection and/or treatment systems reduce, but do not eliminate, methane generation. Methane production is, therefore, considered a cumulative significant unavoidable impact.

Increase in Ammonia Emissions

Dairy development under the proposed project and existing and approved animal feed operations in the vicinity of the project site would generate ammonia emissions during operation activities. Without controls, the existing San Joaquin Valley air basin dairy herd could emit ammonia at a rate of approximately 20,367 tons per year. The estimated ammonia emission (Scenario 1) from the projected future San Joaquin Valley air basin herd would be 34,834 tons per year (in 2010 and 56,740 tons per year in 2020). Few of the existing or approved animal feed operations in the air basin are known to be designed to prevent ammonia emissions. The cumulative projects (i.e., continued dairy development within the San Joaquin Valley air basin) would further increase the amount of ammonia generated in the vicinity from confined animal facility operations. Dairy development projects under the proposed Element would be required to control ammonia emissions. However, an accurate estimate of the reduction of ammonia after implementation of the required controls cannot be made at this time because control efficiencies for ammonia have not been measured. In addition, ammonia could be emitted as soon as manure is generated (i.e., prior to treatment). Although emissions would be controlled in Kings County to the extent practical, the ammonia emissions would remain cumulatively significant and unavoidable.

Increase in Hydrogen Sulfide Emissions

Operation of existing and future dairies developed within the San Joaquin Valley air basin would result in continuing release of hydrogen sulfide emissions during manure decomposition under uncontrolled anaerobic decomposition. Currently (as described in Section 4.2 of this PEIR), an emission rate for hydrogen sulfide generated by dairy cattle manure decomposition is not available. However, the emission of hydrogen sulfide would be expected to be proportional to the amount of manure undergoing anaerobic decomposition. Under this assumption, the hydrogen sulfide emissions from the San Joaquin Valley air basin dairy herd would be expected to increase proportionally to the expected five percent per year increase in the San Joaquin Valley air basin dairy herd.

Under Future Condition 1 (No Element), the hydrogen sulfide emissions would not be controlled within the San Joaquin Valley air basin and would increase by five percent per year. Under Future Condition 2 (with implementation of the Element), hydrogen sulfide emissions would be controlled at new and expanded dairies in Kings County that would be required to implement advanced manure treatment. The hydrogen sulfide emissions would be reduced either by collection and incineration under controlled anaerobic digestion technologies or would not form under aerobic treatment technologies. The reduction in hydrogen sulfide cannot be accurately estimated but would be reduced under Future Condition 2.

As described for the emission of ROG, methane, and ammonia, hydrogen sulfide could be emitted as soon as manure is generated (i.e., prior to treatment). Therefore, increased hydrogen sulfide emissions would be expected and would remain cumulatively significant and unavoidable.

CUMULATIVE WATER QUALITY IMPACTS

The area covered by the Element is located within the Tulare Lake Basin, a hydrologic basin that covers approximately 10.5 million acres (RWQCB, 1995). The Regional Water Quality Control Board designates beneficial uses within the basin and sets water quality objectives to protect those uses. The Water Quality Control Plan for the Tulare Lake Basin ("Basin Plan") describes water quality concerns identified for the basin. Beneficial uses and water quality objectives are established for both surface and subsurface waters. Increased salinity in groundwater is identified as the most significant problem within the basin. Considered a natural condition in a closed basin in an arid environment, elevated salinity is exacerbated by human activities that result in discharges of dissolved solids to the surface and subsurface.

Irrigated agriculture and confined animal facilities, land uses proposed under the Element, are recognized in the Basin Plan as significant potential contributing sources for salt

loading within the basin. The Element specifically addresses the potential water quality impacts associated with implementation of the theoretical dairy herd. The theoretical herd size was determined on the basis of estimated capacity of croplands within the DDOZ and NSOZ to accommodate the nutrient loading associated with manure and process water generated by the herd. In addition, the theoretical herd estimate accounted for land required to accommodate the nutrient load from manure generated at existing non-dairy confined animal facilities and approved sewage sludge land application operations. Therefore, the basis of the Element accounts for cumulative impacts in Kings County.

For purposes of this EIR, it is not feasible to quantify all of the sources, the amount, and rate of dissolved solids discharges within the Tulare Lake Basin. However, the Basin Plan specifically addresses confined animal activities as a potential source of water quality degradation. Potential pollutants associated with discharge of animal manure that are recognized in the Basin Plan include bacteria, organic compounds, nitrate, and total dissolved solids. In recognition of the potential water quality degradation posed by confined animal facilities, the Basin Plan describes the regulations developed to specifically reduce the potential for pollutant releases. As described previously in this EIR, the water quality regulations for confined animal facilities are presented in Sections 2510 through 2601 in Title 23, Chapter 15 of the California Code of Regulations. Not only does the Element require all dairies to comply with these regulations, the Element sets more specific requirements for ensuring the protection of water quality (see Section 4.3 of this EIR). Therefore, the proposed project incorporates and exceeds minimum standards presented in the Basin Plan. The County, through the proposed Element, has determined that dairy projects that 1) comply with the Basin Plan and 2) comply with provisions in the Element allowing approval of an SPR, do not create a cumulatively significant environmental impact on water quality (**Objective DE 4.4**). Under CEQA Guidelines section 15064.7, a County may adopt such thresholds of significance.

The Element ensures that the State regulations will be met by all proposed and expanded dairies. In addition, the Element provides a mechanism to bring existing dairies into compliance with the requirements of the Element, including water quality protection requirements. The Element also requires groundwater quality monitoring that provides early detection of potential water quality degradation. Therefore, compliance with the Element, in combination with the Basin Plan, which will be adopted as a threshold of significance as part of this project, would reduce the cumulative impact on water quality to a less-than-significant level.

CUMULATIVE TRANSPORTATION IMPACTS

The impact of truck and other traffic generated by dairy development on roadways throughout Kings County was evaluated in Impact 4.9-1. Although individual dairy development projects could result in significant local impacts, the effect of implementation

of the Element would not significantly impact the overall County roadway system. The additional trips generated by dairies developed under the Element would be distributed on most of the principal and minor arterials within the County. All county roadways are designated truck routes and are constructed for truck traffic. In addition, nearly all roadways in the County are operating at level of service D or better. The analysis presented in Mitigation Measure 4.9-1 was included to minimize the potential local impacts related to individual projects.

A portion of the additional vehicle trips would be expected to generate additional traffic on roadways in adjacent counties. These "exported" trips would generally represent milk truck deliveries to milk processing facilities in Tulare, Merced, and Fresno counties. The distribution of the milk truck trips cannot be accurately estimated as the specific locations of dairies developed under the Element cannot be known. However, the relatively low volume of additional truck trips generated by the proposed project and the distribution of DDOZs throughout most of the County indicated that "exported trips"would not be expected to significantly impact LOS on adjacent rural County roads, State highways, or Interstate I-5. In addition, implementation of the Element would not be expected to increase future dairy development in Kings County above the recent historic growth rate of the dairy industry within Kings County. Furthermore, additional trip generation related to the proposed project would be similar to that expected for future dairy development if the Element were not implemented. Therefore, the cumulative impacts related to transportation are less-than-significant.

OTHER CUMULATIVE IMPACTS

No other potential cumulative impacts have been identified related to the remaining topics that were studied in this EIR.

SIGNIFICANT IRREVERSIBLE IMPACTS

Section 15126.2(c) of the CEQA Guidelines requires that EIRs provide a discussion of "*significant irreversible environmental changes which would be caused by the proposed project should it be implemented*." This section goes on to provide examples of such irreversible changes including use of non-renewable resources, land use actions that commit future generations to similar uses, and irreversible damage resulting from environmental accidents. Additionally, Section 15127 specifically requires irreversible changes to be considered in EIRs prepared for adoption, amendment, or enactment of a plan, policy, or ordinance of a public agency.

The development of dairies under the proposed Element would likely result in or contribute to the following irreversible environmental changes:

- The construction of the dairies and site grading would expend non-renewable fossil fuels for machinery operations and use building materials that most likely would not be reused following completion of dairy operations; and

- Operation of dairies would require use of non-renewable energy (e.g., fossil fuel) for the life of the dairies.

GROWTH-INDUCING IMPACTS

Section 15126.2(d) of the CEQA Guidelines requires that EIRs provide a discussion of the "growth inducing impacts of the proposed project." Growth inducing impacts could be caused by projects that foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Growth inducing impacts could also be caused by removing obstacles to population growth, such as an expansion of a wastewater treatment plant. Growth inducement could result from population increases that require the construction of new community services facilities that cause environmental impacts.

The development of dairies under the Element is unlikely to result in or contribute to population growth inducement. The additional population and housing associated with the dairy developments would be necessary only to serve dairy and dairy processing workers and would not be considered growth inducing. No obstacles to population growth would be removed as a result of the dairies constructed under Element guidelines, nor would there be construction of any new community service facilities that would cause environmental impacts. Specific impacts are identified and discussed in Section 4 of this EIR.

The Element would allow continued, orderly development of bovine dairies and associated growing of crops for feed and process water and manure management. Thus, the agricultural uses would be within areas zoned for such use. The Element does not propose any additional infrastructure projects to serve areas outside the County. There are therefore no direct growth-inducing activities associated with the Element.

However, dairy development could indirectly induce growth in other related industries (e.g., creameries). The Element could indirectly induce dairies to consider Kings County as a location for additional dairies. Thus, the Element may result in indirect growth inducement in Kings County. Such indirect growth would also be responsive to increases in market demand for dairy products.