



San Joaquin Valley Unified Air Pollution Control District

Emission Inventory Methodology 690 - Commercial Cooking Operations

I. Purpose

This methodology estimates area source emissions from commercial cooking operations. It is based on a methodology developed by E.H. Pechan & Associates, Inc. (Pechan, 2005) for the San Joaquin Valley Unified Air Pollution Control District.

II. Applicability

The emission calculations from this Area Source Methodology apply to facilities that are identified by the following CES and EIC code(s):

CES	REIC	Description
60418	690-680-6000-0000	Commercial Charbroiling
66811	690-682-6000-0000	Commercial Deep-Fat Frying
82180	690-684-6000-0000	Other Commercial Cooking

III. Point Source Reconciliation

These emission categories reconcile against the following SCC/SIC combination in our point source inventory.

EIC	SIC	SCC	Point Source Type
690-680-6000-0000	5812	30299998	Commercial Cooking - Eating Places - Miscellaneous

IV. Methodology Description

This document describes PM and VOC emissions coming from food for these three categories of commercial cooking operations in the San Joaquin Valley Air Basin: 1) charbroiling, which includes underfired and automated units, 2) deep-fat frying, and 3) other commercial cooking, which includes clamshell and flat griddles. The emissions we are estimating come from the food only. The only emissions expected to come from the food are VOC and PM. The combustion of the fuel used to prepare the food is covered by other methodologies such as: Commercial Natural Gas Combustion - Other (EIC 060-995-0110-0000) and Commercial L.P.G. Combustion (EIC 060-995-0120-0000).

This methodology uses a study performed for the California Air Resources Board and the number of restaurants listed in each county as surrogates for determining the number of

cooking devices and the amount of food (meats and potatoes) cooked in each county. The amount of food cooked on each device is multiplied by the appropriate emission factors to determine the emissions from each meat type on each cooking device. These are then summed for county level emissions. This is discussed in further detail throughout the rest of the methodology.

V. Activity Data

Number of restaurants: The number of restaurants by type for each county in the air district was obtained from Dun and Bradstreet’s online database at www.zapdata.com. The restaurants were identified by their SIC codes, along with a secondary designation given by Dun and Bradstreet, and are presented in the table below:

County	Number of Restaurants (By Type & SIC Code ²)					Total
	Ethnic (5812-01)	Family (5812-05)	Fast Food (5812-03)	Seafood (5812-07)	Steak & BBQ (5812-08)	
Fresno	355	66	342	7	34	804
Kern	206	43	345	6	22	622
Kings	29	6	49	0	1	85
Madera	39	6	43	1	1	90
Merced	74	14	71	1	3	163
San Joaquin	184	42	234	5	17	482
Stanislaus	178	32	205	4	15	434
Tulare	117	25	152	2	11	307
Total	1,182	234	1,441	26	104	2,987

²Standard Industrial Classification Code with 2-digit Dun and Bradstreet extension.

Cooking equipment: The fraction of restaurants using different types of cooking equipment and the average pieces of equipment used in each of these restaurants was derived from a CARB sponsored survey (Roe, 2003). The following table summarizes this data:

Equipment Type	Restaurant Category				
	Ethnic	Family	Fast Food	Seafood	Steak and BBQ
Percent of restaurants with equipment					
Auto charbroilers	3.5	10.1	18.6	0.0	6.9
Underfired charbroilers	47.5	60.9	30.8	52.6	55.2
Deep-fat fryer	81.9	91.4	96.8	100.0	82.8
Glad griddles	62.7	82.9	51.9	36.8	89.7
Clamshell griddles	4.0	1.4	14.7	10.5	0.0
Average number of units per restaurant type²					
Auto charbroilers	1.62	1.71	1.07	--	--
Underfired charbroilers	1.54	1.29	1.58	1.10	1.63
Deep-fat fryer	1.63	2.34	3.10	2.47	2.42
Glad griddles	1.88	2.03	1.43	1.11	1.35
Clamshell griddles	1.80	--	2.09	1.50	--

²Average number of equipment pieces only for restaurants having equipment.

The total amount of equipment within the district, by restaurant type, is shown in the following table:

Equipment Type	Total Equipment Within the District					
	Ethnic	Family	Fast Food	Seafood	Steak&BBQ	Total
Auto Charbroilers	67	40	287	0	0	394
Underfired Charbroilers	862	184	701	15	94	1,856
Deep-Fat Fryers	1,574	500	4,324	64	208	6,670
Flat Griddles	1,390	394	1,069	11	126	2,990
Clamshell Griddles	85	0	443	4	0	532
Total	3,978	1,118	6,824	94	428	12,442

Process Rates

Emissions estimates are based upon commercial cooking of meats (hamburger, steak, seafood, pork, chicken, and “other” meats) and potatoes. The average weekly pounds of meat cooked by equipment type was described by Potepan (2001).

The per capita farm weight of frozen potatoes sold in 2005 was obtained from the United States Department of Agriculture – Economic Research Service (USDA, 2006). This value (55.1 lb/person-year) was multiplied by the total district population (3,789,907 people) (California Department of Finance, 2006), divided by the total number of deep fat fryers in the district (6,670 deep fat fryers), and finally divided by 52 weeks/year in order to obtain pounds of potatoes cooked in deep-fat fryers each week. The result of this calculation was 602 pounds of potatoes cooked per week per deep fat fryer in the district. The consumption of all food types is displayed below.

Type of Food	Total Food Cooked per Device (lb/week)				
	Chain-Driven Charbroilers ^a	Underfired Charbroilers	Deep-Fat Fryers	Flat Griddles	Clamshell Griddles
Steak	236	180	181	166	94
Hamburger	798	270	274	362	1,314
Poultry, with skin	147	144	365	88	113
Poultry, skinless	266	179	208	111	108
Pork	58	148	59	112	118
Seafood	119	143	159	92	632
Other meat	--	42	274	58	--
Potatoes	--	--	602	--	--

^a Chain-Driven Charbroilers

Because the district permits chain-driven charbroilers, the total amount of food cooked on these devices for the area source portion of emissions is determined by subtracting the process rate reported through the District’s point source inventory from the total process rate estimated by the CARB study (Potepan, 2001).

The total process rate (tons of meat cooked per year) for chain-driven charbroilers in each county is determined by summing the average use of all meat types and multiplying that by the number of chain-driven charbroilers in each county.

Distribution of Meat Cooked in Chain-Driven Charbroilers		
Meat Type	Tons of Meat Cooked Per Year on One Chain-Driven Charbroiler	Percentage of Total Meat Consumption
Steak	6.14	14.54%
Hamburger	20.75	49.15%
Poultry, with skin	3.82	9.05%
Poultry, skinless	6.92	16.38%
Pork	1.50	3.55%
Seafood	3.09	7.33%
Total	42.21	100.00%

Total Meat Cooked on Chain-Driven Charbroilers By County			
County	Tons of Meat Cooked Per Year on One Chain-Driven Charbroiler (All Types)	# of Chain-Driven Charbroilers in Each County	Total Meat Cooked Per County (Tons/Year)
Fresno	42.21	100	4,221
Kern	42.21	88	3,714
Kings	42.21	12	507
Madera	42.21	12	507
Merced	42.21	21	886
San Joaquin	42.21	64	2,701
Stanislaus	42.21	56	2,364
Tulare	42.21	41	1,731

The point source process rate (tons of meat cooked per year) is then subtracted from the total process rate as seen below.

2005 Meat Cooked on All Chain-Driven Charbroilers (Tons of Meat Cooked/Year)			
Meat Type	Total Process Rate	Point Source Process Rate	Area Source Process Rate
Fresno	4,221	164	4,057
Kern	3,714	127	3,587
Kings	507	25	482
Madera	507	63	444
Merced	886	50	836
San Joaquin	2,701	74	2,627
Stanislaus	2,364	319	2,045
Tulare	1,731	0	1,731

The area source process rate is then redistributed by meat type within each county using the percentages of total meat consumption in the table above.

VI. Emission Factors

Emission factors for commercial cooking processes were obtained from the 2002 National Emissions Inventory (US EPA 2002b). These emission factors were based on a study performed by Welch and Norbeck (1998).

Emission Factors (lb/1000 lb meat)				
Equipment Type	Meat/Food	PM ₁₀	PM _{2.5}	VOC
Underfired Charbroilers	Steak	34.4	33.6	1.72
	Hamburger	65.4	63.8	7.88
	Poultry (with and without skin)	21	19.8	3.64
	Pork	21	19.8	3.64
	Seafood	6.6	6.4	0.76
	Other	34.4	33.6	1.72
Deep Fat Fryers	Poultry (with and without skin)	-	-	0.24
	Pork	-	-	0.24
	Seafood	-	-	0.28
	Potatoes	-	-	0.42
Flat Griddles	Steak	10	7.6	0.14
	Hamburger	10	7.6	0.14
	Poultry (with and without skin)	-	-	0.8
	Pork	-	-	0.8
	Seafood	-	-	0.22
	Other	10	7.6	0.14
Clamshell Griddles	Steak	1.7	1.44	0.02
	Hamburger	1.7	1.44	0.02
	Poultry (with and without skin)	-	-	0.11
	Pork	-	-	0.11
	Seafood	-	-	0.03
Chain-Driven Charbroilers	Steak	14.8	14.6	4.54
	Hamburger	14.8	14.6	4.54
	Poultry (with and without skin)	21	19.8	3.64
	Pork	21	19.8	3.64
	Seafood	6.6	6.4	0.76

VII. Sample Calculations

Emissions for Fresno County

Step 1. For each restaurant type, multiply the number of facilities by the fraction of each type of cooking equipment expected to be in those restaurants:

$$N_{ethnic} \times f_{ethnic,ufc} = N_{ethnic,ufc}$$

where: N_{ethnic} = Number of ethnic food restaurants in county

f_{ethnic} = Fraction of ethnic food restaurants with underfired charbroilers

$N_{ethnic,ufc}$ = Number of ethnic food restaurants with underfired charbroilers

Example:

Given that Fresno County had 355 ethnic restaurants and that 47.5% of them used underfired charbroilers:

$$355 \text{ Ethnic Restaurants} \times 0.475 = 169 \text{ ethnic restaurants with underfired charbroilers in Fresno County}$$

Step 2. For each restaurant and equipment type, multiply the number of restaurants by the average number of pieces of equipment expected to be in those restaurants:

$$N_{ethnic,ufc} \times e_{ethnic,ufc} = E_{ethnic,ufc}$$

where: $N_{ethnic,ufc}$ = Number of ethnic food restaurants with underfired charbroilers

$e_{ethnic,ufc}$ = Number of underfired charbroilers at ethnic food restaurants with at least one underfired charbroiler

$E_{ethnic,ufc}$ = Total number of underfired charbroilers at ethnic food restaurants in Fresno County

Example:

Given that Fresno County has 169 ethnic food restaurants with underfired charbroilers and that there are approximately 1.54 underfired charbroilers per restaurant:

$$169 \text{ Ethnic Restaurants} \times \frac{1.54 \text{ Underfired Charbroilers}}{\text{Ethnic Restaurant}} = 260 \text{ underfired charbroilers in ethnic food restaurants in Fresno County}$$

Step 3. Sum the number of pieces of cooking equipment across restaurant types:

$$E_{ethnic,ufc} + E_{family,ufc} + E_{fast,ufc} + E_{seafood,ufc} + E_{S\&B,ufc} = E_{all,ufc}$$

where: $E_{ethnic,ufc}$ = Total number of underfired charbroilers at ethnic food restaurants

$E_{fast,ufc}$ = Total number of underfired charbroilers at fast food restaurants

$E_{seafood,ufc}$ = Total number of underfired charbroilers at seafood restaurants

$E_{S\&B,ufc}$ = Total number of underfired charbroilers at steak & barbecue restaurants

$E_{all,ufc}$ = Total number of underfired charbroilers at all restaurants

Example:

260 ethnic + 52 family + 166 fast food + 4 seafood + 31 steak and barbecue
= 513 underfired charbroilers in all of Fresno County restaurants

Step 4. For each meat type, multiply the total number of underfired charbroilers by average pounds of meat cooked per year:

$$E_{all,ufc} \times m_{steak,ufc} = M_{steak,ufc}$$

where: $E_{all,ufc}$ = Total number of underfired charbroilers at all restaurants

$m_{steak,ufc}$ = Average tons per year of steak cooked on one underfired charbroiler

$M_{steak,ufc}$ = Total tons per year of steak cooked on all underfired charbroilers in the county

Example:

$$513 \text{ underfired charbroilers} \times \frac{4.68 \text{ tons of steak}}{\text{underfired charbroiler - year}} = \frac{2,400.8 \text{ tons of steak}}{\text{year}}$$

Therefore, there are 2,400.8 tons of steak cooked per year on underfired charbroilers in Fresno County.

Step 5. Multiply the mass of meat by the appropriate emission factor and convert emissions to tons per year.

$$Steak\ Emissions\ (E_{steak,ufc}) = M_{steak,ufc} \times Emission\ Factor \times \left(\frac{2000\ lbs\ of\ meat}{ton\ of\ meat} \right) \times \left(\frac{1\ ton\ VOC}{2000\ lbs\ VOC} \right)$$

Example:

$$\frac{2,400.8\ tons\ of\ steak}{year} \times \frac{1.72\ lbs\ VOC}{ton\ of\ steak} \times \frac{1\ ton}{2000\ lbs} = \frac{2.06\ tons\ VOC}{year}$$

Therefore, 2.06 tons of VOC are generated through the cooking of steak on underfired charbroilers in Fresno County every year.

Step 6. Sum the emissions from each meat category within each device type to get the total emissions from each device.

Total emissions from underfired charbroilers in Fresno County =

$$E_{steak,ufc} + E_{hamburgerufc} + E_{poultry,withskin,ufc} + E_{poultry,skinlessufc} + E_{pork,ufc} + E_{seafoodufc} + E_{other,ufc} + E_{potatoesufc}$$

where: $E_{steak,ufc}$ = Total emissions from the cooking of steak in underfired charbroilers

$E_{hamburgerufc}$ = Total emissions from the cooking of hamburgers in underfired charbroilers

$E_{poultry,withskin,ufc}$ = Total emissions from the cooking of poultry, with skin in underfired charbroilers

$E_{poultry,skinlessufc}$ = Total emissions from the cooking of skinless poultry in underfired charbroilers

$E_{pork,ufc}$ = Total emissions from the cooking of pork in underfired charbroilers

$E_{seafoodufc}$ = Total emissions from the cooking of seafood in underfired charbroilers

$E_{other,ufc}$ = Total emissions from the cooking of other meats in underfired charbroilers

$E_{potatoesufc}$ = Total emissions from the cooking of potatoes in underfired charbroilers

Emissions Source	VOC (tons/year)
$E_{steak,ufc}$	2.06
$E_{hamburger,ufc}$	14.18
$E_{poultry,with\ skin,ufc}$	3.49
$E_{poultry,skinless,ufc}$	4.34
$E_{pork,ufc}$	3.59
$E_{seafood,ufc}$	0.72
$E_{other,ufc}$	0.48
$E_{potatoes,ufc}$	0.00
Total emissions from underfired charbroilers in Fresno County	28.90

VIII. Assumptions

- a. The number and type of restaurants in the San Joaquin Valley Unified Air Pollution Control District are accurately reported by Dun and Bradstreet (Zapdata, 2005).
- b. The survey data in the CARB sponsored study (Potepan, 2001) are representative of commercial cooking processes in the district.
- c. The scheme used to distribute per capita consumption of frozen potatoes (for french fries) to district fryers accurately represents activity within the District.
- d. The commercial cooking emission factors reported by the NEI are accurate.
- e. The types of restaurants not characterized do not contribute significantly to the emissions inventory.
- f. CO, NO_x and SO_x emissions are considered to be from the combustion of the fuel used in cooking the food. These processes are covered by other methodologies.

IX. Temporal Variation

- a. Daily: ARB code 38. Activity during meal time hours (i.e. commercial cooking).
- b. Weekly: ARB code 7. 7 days per week - uniform activity every day of the week
- c. Monthly: Uniform activity. 8.33% of yearly activity per month.

X. Spatial Variation

The number of restaurants in 2005 for each county in the SJVAPCD were obtained from Dun and Bradstreet. This information was presented previously in Section 4. Spatial distribution should reflect commercial land use patterns.

XI. Growth Factor

See Appendix A, B, and C.

XII. Control Level

Chain-driven charbroilers used to cook meat are subject to District Rule 4692 (Commercial Charbroiling).

XIII. ARB Chemical Speciation

Profile Description	ARB Profile#		Fractions			
	Organic Gas	PM	ROG	VOC	PM ₁₀	PM _{2.5}
Unspecified		900			0.7	0.42
Species unknown - all category composite	600		0.6986	0.6986		

XIV. Assessment Of Methodology

This estimation does not include all commercial cooking emissions. Cooking at institutions (schools, prisons), public events (fairs, sporting events), and non-permanent sources (lunch wagons and other catered events) are not covered by this methodology.

The amount of meat that was cooked per week and the number of equipment was determined by PRI based on a survey of restaurants in the entire state of California. To improve the accuracy, the District might want to conduct it's own survey of restaurants within the District only.

The survey conducted by PRI targeted restaurants suspected of having charbroilers. In the future, it is recommended to survey other restaurants as well, to see if their contributions to emissions are significant (Potepan 2001).

It is possible that the Dun and Bradstreet business database could classify some restaurants improperly, therefore, the user should be careful when using it (Potepan 2001).

XV. Emissions Comparison

CEIDARs Inventory Year 2004			
County	Emissions (tons/year)		
	VOC	PM₁₀	PM_{2.5}
Commercial Charbroiling - Underfired & Chain-Driven			
Fresno	43.80	182.50	127.75
Kern	25.55	113.15	76.65
Kings	7.30	25.55	18.25
Madera	3.65	21.90	14.60
Merced	10.95	51.10	36.50
San Joaquin	25.55	113.15	80.30
Stanislaus	21.90	102.20	69.35
Tulare	18.25	76.65	54.75
TOTAL	156.95	686.20	478.15
Commercial Deep Fat Frying			
Fresno	0.00	372.30	259.15
Kern	0.00	0.00	0.00
Kings	0.00	0.00	0.00
Madera	0.00	0.00	0.00
Merced	0.00	0.00	0.00
San Joaquin	0.00	0.00	0.00
Stanislaus	0.00	0.00	0.00
Tulare	0.00	0.00	0.00
TOTAL	0.00	372.30	259.15
Other Commercial Cooking - Flat & Clamshell Griddles			
Fresno	0.00	0.00	0.00
Kern	0.00	0.00	0.00
Kings	0.00	0.00	0.00
Madera	0.00	0.00	0.00
Merced	0.00	0.00	0.00
San Joaquin	0.00	0.00	0.00
Stanislaus	0.00	0.00	0.00
Tulare	0.00	0.00	0.00
TOTAL	0.00	0.00	0.00

Emissions Calculated From This Methodology (2005)			
County	Emissions (tons/year)		
	VOC	PM₁₀	PM_{2.5}
Commercial Charbroiling - Underfired & Chain-Driven			
Fresno	36.98	273.10	264.09
Kern	28.33	205.03	198.28
Kings	3.69	26.61	25.73
Madera	4.02	29.67	28.69
Merced	7.47	55.02	53.21
San Joaquin	22.13	161.69	156.36
Stanislaus	19.35	143.54	138.80
Tulare	14.18	103.16	99.76
TOTAL	136.16	997.82	964.92
Commercial Deep Fat Frying			
Fresno	10.08	0.00	0.00
Kern	8.53	0.00	0.00
Kings	1.15	0.00	0.00
Madera	1.16	0.00	0.00
Merced	2.04	0.00	0.00
San Joaquin	6.33	0.00	0.00
Stanislaus	5.61	0.00	0.00
Tulare	4.04	0.00	0.00
TOTAL	38.93	0.00	0.00
Other Commercial Cooking - Flat & Clamshell Griddles			
Fresno	3.92	67.08	51.33
Kern	2.88	49.48	37.94
Kings	0.38	6.49	4.98
Madera	0.43	7.32	5.61
Merced	0.80	13.60	10.41
San Joaquin	2.31	39.50	30.26
Stanislaus	2.07	35.53	27.21
Tulare	1.46	25.09	19.22
TOTAL	14.24	244.10	186.95

County	Change in Emissions - 2004 to 2005		
	Emissions (tons/year)		
	VOC	PM ₁₀	PM _{2.5}
Commercial Charbroiling			
Fresno	-6.82	90.60	136.34
Kern	2.78	91.88	121.63
Kings	-3.61	1.06	7.48
Madera	0.37	7.77	14.09
Merced	-3.48	3.92	16.71
San Joaquin	-3.42	48.54	76.06
Stanislaus	-2.55	41.34	69.45
Tulare	-4.07	26.51	45.01
TOTAL	-20.79	311.62	486.77
Commercial Deep Fat Frying			
Fresno	10.08	-372.30	-259.15
Kern	8.53	0.00	0.00
Kings	1.15	0.00	0.00
Madera	1.16	0.00	0.00
Merced	2.04	0.00	0.00
San Joaquin	6.33	0.00	0.00
Stanislaus	5.61	0.00	0.00
Tulare	4.04	0.00	0.00
TOTAL	38.93	-372.30	-259.15
Other Commercial Cooking			
Fresno	3.92	67.08	51.33
Kern	2.88	49.48	37.94
Kings	0.38	6.49	4.98
Madera	0.43	7.32	5.61
Merced	0.80	13.60	10.41
San Joaquin	2.31	39.50	30.26
Stanislaus	2.07	35.53	27.21
Tulare	1.46	25.09	19.22
TOTAL	14.24	244.10	186.95

* Numbers may not add correctly due to rounding

XVI. Update Schedule

It is recommended that this methodology be updated and revised on a yearly basis. Dun & Bradstreet updates their business listings database regularly, population statistics are released annually, and the District's point source inventory is entered on a yearly basis.

EIC	Frequency (In years)	Source of Emissions (Point Source Inventory / Data Gathering)
690-680-6000-000	1	Point Source Inventory / Data Gathering
690-682-6000-000	1	Data Gathering
690-684-6000-000	1	Data Gathering

XVII. References

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XVIII. Appendix A - California Air Resources Board Growth Parameters for EIC 690-680-6000-0000

Year	Growth Activity Parameter by County							
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare
2000	3.31	2.14	3.28	2.41	1.78	2.81	3.85	2.20
2001	3.42	2.21	3.36	2.48	1.84	2.90	3.97	2.26
2002	3.49	2.25	3.40	2.54	1.89	2.95	4.06	2.31
2003	3.55	2.29	3.45	2.61	1.92	3.00	4.13	2.35
2004	3.62	2.34	3.53	2.68	1.96	3.06	4.22	2.38
2005	3.70	2.39	3.57	2.74	2.01	3.11	4.31	2.43
2006	3.74	2.41	3.61	2.81	2.03	3.14	4.37	2.45
2007	3.80	2.45	3.65	2.84	2.07	3.19	4.44	2.49
2008	3.86	2.48	3.69	2.91	2.10	3.23	4.52	2.53
2009	3.92	2.52	3.77	2.94	2.13	3.28	4.60	2.56
2010	4.00	2.56	3.82	3.01	2.16	3.34	4.69	2.61
2015	4.31	2.74	4.10	3.24	2.31	3.59	5.09	2.79
2020	4.61	2.91	4.35	3.47	2.45	3.82	5.46	2.96
2025	4.94	3.11	4.64	3.74	2.6	4.07	5.86	3.13
2030	5.35	3.36	5.05	4.07	2.83	4.38	6.35	3.39

XIX. Appendix B - California Air Resources Board Growth Parameters for EIC 690-682-6000-0000

Year	Growth Activity Parameter by County							
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare
2000	3.31	2.14	3.28	2.41	1.78	2.81	3.85	2.20
2001	3.42	2.21	3.36	2.48	1.84	2.9	3.97	2.26
2002	3.49	2.25	3.40	2.54	1.89	2.95	4.06	2.31
2003	3.55	2.29	3.45	2.61	1.92	3.00	4.13	2.35
2004	3.62	2.34	3.53	2.68	1.96	3.06	4.22	2.38
2005	3.70	2.39	3.57	2.74	2.01	3.11	4.31	2.43
2006	3.74	2.41	3.61	2.81	2.03	3.14	4.37	2.45
2007	3.80	2.45	3.65	2.84	2.07	3.19	4.44	2.49
2008	3.86	2.48	3.69	2.91	2.10	3.23	4.52	2.53
2009	3.92	2.52	3.77	2.94	2.13	3.28	4.60	2.56
2010	4.00	2.56	3.82	3.01	2.16	3.34	4.69	2.61
2015	4.31	2.74	4.10	3.24	2.31	3.59	5.09	2.79
2020	4.61	2.91	4.35	3.47	2.45	3.82	5.46	2.96
2025	4.94	3.11	4.64	3.74	2.60	4.07	5.86	3.13
2030	5.35	3.36	5.05	4.07	2.83	4.38	6.35	3.39

XX. Appendix C - California Air Resources Board Growth Parameters for EIC 690-684-6000-0000

Year	Growth Activity Parameter by County							
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare
2000	806,100	666,900	130,300	127,400	210,200	567,600	450,900	369,700
2001	822,000	681,900	132,700	130,000	216,400	590,900	465,600	375,800
2002	839,825	704,250	136,925	135,650	222,275	604,575	479,875	387,350
2003	857,650	726,600	141,150	141,300	228,150	618,250	494,150	398,900
2004	875,475	748,950	145,375	146,950	234,025	631,925	508,425	410,450
2005	893,300	771,300	149,600	152,600	239,900	645,600	522,700	422,000
2006	908,820	791,360	152,740	157,860	245,260	662,040	535,680	431,560
2007	924,340	811,420	155,880	163,120	250,620	678,480	548,660	441,120
2008	939,860	831,480	159,020	168,380	255,980	694,920	561,640	450,680
2009	955,380	851,540	162,160	173,640	261,340	711,360	574,620	460,240
2010	970,900	871,600	165,300	178,900	266,700	727,800	587,600	469,800
2015	1,043,100	972,700	180,800	203,000	292,400	803,400	646,800	515,600
2020	1,134,600	1,088,600	198,700	229,200	322,700	887,600	712,100	570,900
2025	1,226,100	1,204,500	216,600	255,400	353,000	971,800	777,400	626,200
2030	1,317,600	1,320,400	234,500	281,600	383,300	1,056,000	842,700	681,500