



2006 Area Source Emissions Inventory Methodology

690 – COMMERCIAL COOKING OPERATIONS

I. Purpose

This document describes the Area Source Methodology used to estimate emissions of fine particulate matter less than 10 microns (PM_{10}) and volatile organic gas (VOC) from commercial cooking operations in the San Joaquin Valley Air Basin and includes: 1) charbroiling - underfired and automated units, 2) deep-fat frying, and 3) other commercial cooking such as clamshell and flat griddles. An area source category is a collection of similar emission units within a geographic area (i.e., a County). An area source category collectively represent individual sources that are small and numerous, and that may not have been inventoried as specific point, mobile, or biogenic sources. The California Air Resources Board (CARB) has grouped these individual sources with other like sources into area source categories. These source categories are grouped in such a way that they can be estimated collectively using one methodology.

II. Applicability

The emission calculations from this Area Source Methodology apply to facilities that are identified by the following Category of Emission Source (CES) codes and Reconciliation Emission Inventory Codes (REIC):

Table 1. Emission inventory codes.

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

Emissions from the area source inventory and point source inventory are reconciled against each other to prevent double counting. This is done using relationships created by the California Air Resources Board (ARB) between the area source REIC and the point sources' Standard Industry Classification (SIC) code and emissions process Source Category Code (SCC) combinations. Currently, only chaindriven charbroilers are subject to district permit, and therefore represented in out point

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source inventory. These units are reconciled to the area source inventory using the following SIC/SCC combination:

Table 2. Point source reconciliation relationships for commercial charbroiling.

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

IV. Methodology Description

This document describes PM₁₀ and VOC emissions from food for three categories of commercial cooking operations in the San Joaquin Valley Air Basin: 1) charbroiling - underfired and automated units, 2) deep-fat frying, and 3) other commercial cooking - clamshell and flat griddles. The VOC and PM₁₀ emissions calculated from this methodology are from the food only. Emissions from the combustion of cooking in other source categories 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 an emission factors to determine the emissions from each meat type on each cooking device. These are then summed for county level emissions.

V. Activity Data

Number of restaurants: The number of restaurants by type for each county in the San Joaquin Valley Air Pollution Control District ("the 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:

Table 3. Number of restaurants in the District by type & SIC code².

County	Ethnic (5812-01)	Family (5812-05)	Fast Food (5812-03)	Seafood (5812-07)	Steak & BBQ (5812-08)	Total
Fresno	358	67	385	7	32	849
Kern	213	49	367	6	23	658
Kings	30	6	63	0	1	100
Madera	39	6	50	1	1	97
Merced	71	11	71	1	5	159
San Joaquin	192	43	274	6	17	532
Stanislaus	182	33	225	4	11	455
Tulare	119	27	157	2	13	318
Total	1,204	242	1,592	27	103	3,168

²Standard Industrial Classification Code with 2-digit Dun and Bradstreet extension, 2006 data.

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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:

Table 4. Type of cooking equipment used per restaurant category.

Equipment Type	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 type^z					
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	--

^zAverage number of equipment pieces only for restaurants having equipment.

Multiplying the number of restaurants by type within the District by the percentage with equipment and then the average pieces of equipment of each type gives the total amount of equipment within the District, by restaurant type. This estimate is presented in the table below:

Table 5. Equipment type by restaurant category within the District (2006).

Equipment Type	Ethnic	Family	Fast Food	Seafood	Steak and BBQ	Total
Auto charbroilers	68	42	317	0	0	427
Underfired charbroilers	881	190	775	16	93	1,955
Deep-fat fryer	1,607	518	4,777	67	206	7175
Flat Griddles	1,419	407	1,182	11	125	3,144
Clamshell griddles	87	0	489	4	0	580
Total	4,062	1,157	7540	98	424	13,281

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), and converted into tons per year.

The per capita farm weight of frozen potatoes sold in 2006 was obtained from the United States Department of Agriculture – Economic Research Service (USDA, 2007). This value (52.7 lb/person-year) was multiplied by the total district population (3,886,722 people) (California Department of Finance, 2006), divided by the total number of deep fat fryers in the District (7,175 deep fat fryers), and finally divided by

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2,000 pounds per ton. The result of this calculation was 14.3 tons of potatoes cooked each year in deep fat fryer in the District. The consumption of all food types is displayed in the table below:

Table 6. Food cooked per device (tons/yr) in the District (2006).

Food Type	Chain-Driven Charbroilers ^a	Underfired Charbroilers	Deep-Fat Fryers	Flat Griddles	Clamshell Griddles
Steak	6.1	4.7	4.7	4.3	2.4
Hamburger	20.7	7.0	7.1	9.4	34.2
Poultry, with skin	3.8	3.7	9.5	2.3	2.9
Poultry, skinless	6.9	4.7	5.4	2.9	2.8
Pork	1.5	3.8	1.5	2.9	3.1
Seafood	3.1	3.7	4.1	2.4	16.4
Other meat	0.0	1.1	7.1	1.5	0.0
Potatoes	0.0	0.0	14.3	0.0	0.0

^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 methodology.

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. The results of these calculations are presented in the tables below:

Table 7. Distribution of meat cooked on 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%

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Table 8. Total meat cooked on chain-driven charbroilers by County (2006).

County	Meat Cooked (tons/broiler-year)	Chain-Driven Charbroilers (no.)	Total Meat Cooked (tons/year)
Fresno	42.21	108	4,559
Kern	42.21	94	3,968
Kings	42.21	15	633
Madera	42.21	13	549
Merced	42.21	20	844
San Joaquin	42.21	73	3,081
Stanislaus	42.21	61	2,575
Tulare	42.21	43	1,815

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

Table 9. 2005 Meat cooked on all chain-driven charbroilers (tons/year, 2006)

Meat Type	Total Process Rate	Point Source Process Rate	Area Source Process Rate
Fresno	4,559	1,149	3,410
Kern	3,968	798	3,170
Kings	633	105	529
Madera	549	168	381
Merced	844	286	558
San Joaquin	3,081	955	2,126
Stanislaus	2,575	938	1,637
Tulare	1,815	317	1,498

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).

Table 10. Emissions factors for commercial cooking processes.

Equipment Type	Emission Factors (lb/ton meat)			
	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. Emissions Calculations

A. Assumptions

- 1) The number and type of restaurants in the San Joaquin Valley Unified Air Pollution Control District are accurately reported by Dun and Bradstreet (Zapdata, 2006).
- 2) The survey data in the CARB sponsored study (Potepan, 2001) are representative of commercial cooking processes in the District.
- 3) The scheme used to distribute per capita consumption of frozen potatoes (for french fries) to District fryers accurately represents activity within the District.

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- 4) The commercial cooking emission factors reported by the NEI are accurate.
- 5) The types of restaurants not characterized do not contribute significantly to the emissions inventory.
- 6) CO, NO_x and SO_x emissions are considered to be from the combustion of the fuel used in cooking the food.
- 7) Spatial distribution of restaurants should reflect commercial land use patterns.

Emissions for Fresno County

Number of Ethnic Restaurants with Underfired Charbroilers: For each restaurant type, multiply the number of facilities by the fraction of each type of cooking equipment:

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

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 358 ethnic restaurants and that 47.5% used underfired charbroilers:

$$358 \text{ Ethnic Restaurants} \times 0.475 = 170 \text{ ethnic restaurants with underfired charbroilers in Fresno County}$$

Number of Underfired Charbroilers at Restaurants: 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

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Example:

Given that Fresno County has 170 ethnic food restaurants with underfired charbroilers and that there are approximately 1.54 underfired charbroilers per restaurant:

$$170 \text{ Ethnic Restaurants} \times \frac{1.54 \text{ Underfired Charbroilers}}{\text{Ethnic Restaurant}} = 262 \text{ underfired charbroilers}$$

Number of cooking equipment for all restaurant types: Sum the number of pieces of cooking equipment across restaurant types:

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

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

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

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

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

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

Example:

$$260 \text{ ethnic} + 52 \text{ family} + 166 \text{ fast food} + 4 \text{ seafood} + 31 \text{ steak and barbecue}$$

$$= 513 \text{ underfired charbroilers in all of Fresno County restaurants}$$

Amount of Meat Cooked per Restaurant Equipment: For each meat type, multiply the total number of underfired charbroilers by average pounds of meat cooked per year:

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

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

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

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

Example:

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

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

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

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

Example:

$$\frac{2,400.8 \text{ tons of steak}}{\text{year}} \times \frac{1.72 \text{ lbs VOC}}{1,000 \text{ lbs of steak}} = \frac{4.13 \text{ tons VOC}}{\text{year}}$$

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

Total Emissions per Meat Category per Cooking Device: 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 =

$$E_{\text{steak,ufc}} + E_{\text{hamburger,ufc}} + E_{\text{poultry, with skin,ufc}} + E_{\text{poultry, skinless,ufc}} + E_{\text{pork,ufc}} + E_{\text{seafood,ufc}} + E_{\text{other,ufc}} + E_{\text{potatoes,ufc}}$$

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

$E_{\text{hamburger,ufc}}$ = Total emissions from the cooking of hamburgers in underfired charbroilers

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

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

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

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

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

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

Table 11. Underfired charbroiler emissions, Fresno Co.

Emissions Source	VOC (tons/year)
<i>E_{steak,ufc}</i>	4.13
<i>E_{hamburger,ufc}</i>	28.36
<i>E_{poultry,with skin,ufc}</i>	6.98
<i>E_{poultry,skinless,ufc}</i>	8.68
<i>E_{pork,ufc}</i>	7.18
<i>E_{seafood,ufc}</i>	1.44
<i>E_{other,ufc}</i>	0.96
<i>E_{potatoes,ufc}</i>	0
Total emissions from underfired charbroilers in Fresno County	57.73

VIII. 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.

IX. Growth Factor

Growth factors are developed by either the District's Planning Department or CARB for each EIC. These factors are used to estimate emissions in future years. The growth factors associated with this emissions category may be obtained from the Air Quality Analysis Section of the District's Planning Department.

X. Control Level

Control levels are developed by either the District's Planning Department or CARB for each EIC. Control levels are used to estimate emissions reductions in future years due to implementation of District rules. These control levels take into account the effect of control technology, compliance and exemptions at full implementation of the rules.

Chain-driven charbroilers are subject to District Rule 4692 (Commercial Charbroiling). Control levels associated with this emissions category may be obtained from the Air Quality Analysis Section of the District's Planning Department.

XI. ARB Chemical Speciation

CARB has developed organic gas profiles in order to calculate reactive organic gasses (ROG), volatile organic compounds (VOC) or total organic gas (TOG) given any one of the three values. For each speciation profile, the fraction of TOG that is ROG and VOC is given. The organic gas profile codes can also be used to lookup associated toxics. CARB's speciation profile for commercial cooking is presented in Table 12.

Table 12. CARB chemical speciation profiles for commercial cooking.

Profile Description	ARB Organic Gas Profile#	Fractions	
		ROG	VOC
Species unknown - all category composite	600	0.6986	0.6986

CARB has developed particulate matter speciation profiles in order to calculate particulate matter (PM), particulate matter with a diameter less than or equal to 10 microns (PM₁₀) or particulate matter with a diameter less than or equal to 2.5 microns (PM_{2.5}) given any one of the three values. For each speciation profile, the fraction of PM that is PM₁₀ and PM_{2.5} is given. The particulate matter profile codes can also be used to lookup associated toxics. CARB's speciation profile for commercial cooking is presented in Table 13.

Table 13. CARB chemical speciation profiles for commercial cooking.

Profile Description	ARB PM Profile#	Fractions	
		PM ₁₀	PM _{2.5}
Unspecified	900	0.7	0.42

XII. 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.

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).

XIII. Emissions

Following is the 2006 area source emissions inventory for commercial charbroiling (690-680-6000-0000), commercial deep-fat frying (690-682-6000-0000), and other commercial cooking (690-684-6000-0000) estimated by this methodology. Emissions are reported for each county in the District.

Table 14. Area source emissions for commercial cooking (2006).

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5}
Commercial Charbroiling						
Fresno	0.00	0.00	0.00	36.89	277.93	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	28.70	211.76	N/A
Kings	0.00	0.00	0.00	4.34	31.56	N/A
Madera	0.00	0.00	0.00	4.09	30.77	N/A
Merced	0.00	0.00	0.00	6.76	51.51	N/A
San Joaquin	0.00	0.00	0.00	22.63	170.21	N/A
Stanislaus	0.00	0.00	0.00	19.09	144.90	N/A
Tulare	0.00	0.00	0.00	14.12	104.71	N/A
TOTAL	0.00	0.00	0.00	136.61	1023.34	N/A
Commercial Deep-Fat Frying						
Fresno	0.00	0.00	0.00	10.83	0.00	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	9.05	0.00	N/A
Kings	0.00	0.00	0.00	1.42	0.00	N/A
Madera	0.00	0.00	0.00	1.28	0.00	N/A
Merced	0.00	0.00	0.00	2.01	0.00	N/A
San Joaquin	0.00	0.00	0.00	7.12	0.00	N/A
Stanislaus	0.00	0.00	0.00	5.96	0.00	N/A
Tulare	0.00	0.00	0.00	4.19	0.00	N/A
TOTAL	0.00	0.00	0.00	41.86	0.00	N/A
Other Commercial Cooking						
Fresno	0.00	0.00	0.00	4.09	70.01	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	3.05	52.44	N/A
Kings	0.00	0.00	0.00	0.45	7.78	N/A
Madera	0.00	0.00	0.00	0.45	7.79	N/A
Merced	0.00	0.00	0.00	0.77	13.12	N/A
San Joaquin	0.00	0.00	0.00	2.51	43.05	N/A
Stanislaus	0.00	0.00	0.00	2.16	36.98	N/A
Tulare	0.00	0.00	0.00	1.52	26.04	N/A
TOTAL	0.00	0.00	0.00	14.99	257.21	N/A

(1) Includes both the Valley and non-Valley portions of Kern County.

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Following is the 2006 point source emissions inventory for commercial charbroiling (690-680-6000-0000), commercial deep-fat frying (690-682-6000-0000), and other commercial cooking (690-684-6000-0000) as reported to the District by our permit holders. Emissions are reported for each county in the District.

Table 15. Point source emissions for commercial cooking (2006).

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5}
Commercial Charbroiling						
Fresno	0.00	0.00	0.00	1.51	5.04	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	1.13	1.41	N/A
Kings	0.00	0.00	0.00	0.05	0.17	N/A
Madera	0.00	0.00	0.00	0.11	0.40	N/A
Merced	0.00	0.00	0.00	0.15	0.54	N/A
San Joaquin	0.00	0.00	0.00	0.44	1.51	N/A
Stanislaus	0.00	0.00	0.00	0.39	1.47	N/A
Tulare	0.00	0.00	0.00	0.14	0.45	N/A
TOTAL	0.00	0.00	0.00	3.92	10.99	N/A
Commercial Deep-Fat Frying						
Fresno	0.00	0.00	0.00	0.00	0.00	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	0.00	0.00	N/A
Kings	0.00	0.00	0.00	0.00	0.00	N/A
Madera	0.00	0.00	0.00	0.00	0.00	N/A
Merced	0.00	0.00	0.00	0.00	0.00	N/A
San Joaquin	0.00	0.00	0.00	0.00	0.00	N/A
Stanislaus	0.00	0.00	0.00	0.00	0.00	N/A
Tulare	0.00	0.00	0.00	0.00	0.00	N/A
TOTAL	0.00	0.00	0.00	0.00	0.00	N/A
Other Commercial Cooking						
Fresno	0.00	0.00	0.00	0.00	0.00	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	0.00	0.00	N/A
Kings	0.00	0.00	0.00	0.00	0.00	N/A
Madera	0.00	0.00	0.00	0.00	0.00	N/A
Merced	0.00	0.00	0.00	0.00	0.00	N/A
San Joaquin	0.00	0.00	0.00	0.00	0.00	N/A
Stanislaus	0.00	0.00	0.00	0.00	0.00	N/A
Tulare	0.00	0.00	0.00	0.00	0.00	N/A
TOTAL	0.00	0.00	0.00	0.00	0.00	N/A

(1) Includes only the Valley portion of Kern County.

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Following is the 2006 total unreconciled (point source plus area source) emissions inventory for commercial charbroiling (690-680-6000-0000), commercial deep-fat frying (690-682-6000-0000), and other commercial cooking (690-684-6000-0000). Emissions are reported for each county in the District.

Table 16. Total emissions for commercial cooking (2006).

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5}
Commercial Charbroiling						
Fresno	0.00	0.00	0.00	38.40	282.97	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	29.83	213.17	N/A
Kings	0.00	0.00	0.00	4.39	31.73	N/A
Madera	0.00	0.00	0.00	4.20	31.17	N/A
Merced	0.00	0.00	0.00	6.91	52.05	N/A
San Joaquin	0.00	0.00	0.00	23.07	171.72	N/A
Stanislaus	0.00	0.00	0.00	19.48	146.37	N/A
Tulare	0.00	0.00	0.00	14.26	105.16	N/A
TOTAL	0.00	0.00	0.00	140.53	1,034.33	N/A
Commercial Deep-Fat Frying						
Fresno	0.00	0.00	0.00	10.83	0.00	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	9.05	0.00	N/A
Kings	0.00	0.00	0.00	1.42	0.00	N/A
Madera	0.00	0.00	0.00	1.28	0.00	N/A
Merced	0.00	0.00	0.00	2.01	0.00	N/A
San Joaquin	0.00	0.00	0.00	7.12	0.00	N/A
Stanislaus	0.00	0.00	0.00	5.96	0.00	N/A
Tulare	0.00	0.00	0.00	4.19	0.00	N/A
TOTAL	0.00	0.00	0.00	41.86	0.00	N/A
Other Commercial Cooking						
Fresno	0.00	0.00	0.00	4.09	70.01	N/A
Kern ⁽¹⁾	0.00	0.00	0.00	3.05	52.44	N/A
Kings	0.00	0.00	0.00	0.45	7.78	N/A
Madera	0.00	0.00	0.00	0.45	7.79	N/A
Merced	0.00	0.00	0.00	0.77	13.12	N/A
San Joaquin	0.00	0.00	0.00	2.51	43.05	N/A
Stanislaus	0.00	0.00	0.00	2.16	36.98	N/A
Tulare	0.00	0.00	0.00	1.52	26.04	N/A
TOTAL	0.00	0.00	0.00	14.99	257.21	N/A

(1) Includes both the Valley and non-Valley portions of Kern County.

690-Commercial Cooking Operations

Following is the net change in total unreconciled emissions between this update (2006 inventory year) and the previous update (2005 inventory year) for commercial charbroiling (690-680-6000-0000), commercial deep-fat frying (690-682-6000-0000), and other commercial cooking (690-684-6000-0000). The change in emissions are reported for each county in the District.

Table 17. Net emissions change for commercial cooking.

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC	PM ₁₀	PM _{2.5}
Commercial Charbroiling						
Fresno	0.00	0.00	0.00	1.31	9.50	N/A
Kern	0.00	0.00	0.00	1.46	7.97	N/A
Kings	0.00	0.00	0.00	0.68	5.09	N/A
Madera	0.00	0.00	0.00	0.03	1.03	N/A
Merced	0.00	0.00	0.00	-0.58	-3.04	N/A
San Joaquin	0.00	0.00	0.00	0.92	9.93	N/A
Stanislaus	0.00	0.00	0.00	0.03	2.43	N/A
Tulare	0.00	0.00	0.00	0.08	2.00	N/A
TOTAL	0.00	0.00	0.00	3.94	34.92	N/A
Commercial Deep-Fat Frying						
Fresno	0.00	0.00	0.00	0.75	0.00	N/A
Kern	0.00	0.00	0.00	0.53	0.00	N/A
Kings	0.00	0.00	0.00	0.28	0.00	N/A
Madera	0.00	0.00	0.00	0.12	0.00	N/A
Merced	0.00	0.00	0.00	-0.04	0.00	N/A
San Joaquin	0.00	0.00	0.00	0.79	0.00	N/A
Stanislaus	0.00	0.00	0.00	0.35	0.00	N/A
Tulare	0.00	0.00	0.00	0.15	0.00	N/A
TOTAL	0.00	0.00	0.00	2.93	0.00	N/A
Other Commercial Cooking						
Fresno	0.00	0.00	0.00	0.17	2.93	N/A
Kern	0.00	0.00	0.00	0.17	2.96	N/A
Kings	0.00	0.00	0.00	0.07	1.29	N/A
Madera	0.00	0.00	0.00	0.03	0.46	N/A
Merced	0.00	0.00	0.00	-0.03	-0.48	N/A
San Joaquin	0.00	0.00	0.00	0.20	3.54	N/A
Stanislaus	0.00	0.00	0.00	0.08	1.45	N/A
Tulare	0.00	0.00	0.00	0.06	0.95	N/A
TOTAL	0.00	0.00	0.00	0.75	13.11	N/A

XIV. Revision History

2006. The methodology was reformatted to the new District standard. Process rates were updated.

2005. This is a new District methodology based on one prepared by E.H. Pechan & Associates for EPA.

XV. Update Schedule

In an effort to provide inventory information to ARB and other District programs and maximize limited resources, the District has developed an update cycle based on emissions within the source category as shown in Table 18.

Table 18. Area source update frequency criteria.

Total Emissions (tons/day)	Update Cycle (years)
<=1	4
>1 and <= 2.5	3
>2.5 and <=5	2
>5	1

Since PM₁₀ emissions for this source category exceed 5 tons per day, these area source estimates will be updated every year.

Table 19. District methodology update frequency

EIC	Frequency (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

XVI. References

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