San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

2006 Area Source Emissions Inventory Methodology
060 – COMMERICAL DISTILLATE OIL, RESIDUAL OIL, AND LPG COMBUSTION

I. Purpose

This document describes the Area Source Methodology used to estimate emissions of carbon monoxide (CO), nitrogen oxides (NO_x), fine particulate matter less then 10 microns (PM_{10}), volatile organic compounds (VOC), and sulfur oxides (SO_x) resulting from the combustion of distillate oil, residual oil, and liquid petroleum gas (LPG)-- collectively referred to as "Liquid Fuels"-- from the commercial sector within the San Joaquin Valley Air Basin. An area source is a collection of similar emission units within a geographic area (ie., a County). Area sources 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
58727	060-995-0120-0000	Commercial L.P.G. Combustion
47159	060-995-1220-0000	Commercial Distillate Oil Combustion
47183	060-995-1500-0000	Commercial Residual Oil Combustion

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. The area sources in this methodology reconcile against processes in our point source inventory with the SIC/SCC combinations listed in Appendix A.

IV. Methodology Description

This methodology is a top down estimation of CO, NO_x, PM_{10}, VOC, and SOx emissions from the combustion of distillate, residual oil, and LPG gas by the commercial sector within the San Joaquin Valley. The Energy Information Administration (EIA) reports annual statewide consumption of liquid fuels by economic sector. This data is available on their website at http://www.eia.doe.gov/ through the State Energy Data Systems (SEDS). The statewide commercial liquid fuel consumption was disaggregated to the county level using commercial employment statistics from the California Employment Development Department (Cal EDD). From this, the amount of liquid fuel reported to the District's point source inventory as consumed by commercial sources was subtracted. The difference was considered the area source process rate. To estimate area source emissions, the area source process rate was multiplied by emission factors.

V. Activity Data

Consumption: The Energy Information Administration (EIA) collects and reports annual statewide fuel consumption by type and sector. The commercial sector as defined by the EIA, is an energy-consuming sector that consists of service-providing facilities and equipment of: businesses; Federal, State, and local governments; and other private and public organizations. Facilities and equipment used for producing, processing, or assembly of goods such as: agriculture, forestry, mining, oil and gas extraction is considered in the Industrial Sector and therefore not included in this methodology. The amount of liquid fuel consumed by the commercial sector in California is presented in the following table:

Table 2. Consumption of liquid fuels by California's commercial sector in 2006 as reported by the EIA-SEDS.

Liquid Fuel Type	1,000's of Barrels	1,000's of Gallons(1)
Commercial Distillate Oil	1,481	62,202
Commercial Residual Oil	0	0
Commercial LPG	1,233	51,786

(1) EIA reports the consumption of liquid fuels in 1,000's of barrels. For this methodology we assume one barrel equals 42 gallons.

The EIA reported that the commercial sector in California did not consume any residual oil in 2006. This agrees with the District's 2006 point source inventory, which also reports no usage of residual oil by commercial facilities in the San Joaquin Valley. Therefore, the area source emissions from the combustion of residual oil in the commercial sector in the District shall be set to zero for 2006.

The statewide liquid fuel consumption was disaggregated to the county level using commercial employment data obtained from the California Employment Development Department (Cal EDD). Since only a portion of Kern County is within the District, Kern County consumption was adjusted using population data for Mojave and Valley portions of Kern County provided by CARB. From this data it was estimated that 82% of Kern County's commercial business employment occurs in the District (Valley portion of Kern County). This data is summarized in the table below, with more detailed employment data presented in Appendix B.

Table 3. Disaggregation of statewide liquid fuel consumption data using county commercial employment data (2006).

County	Employees (no.)		Consumption (1,000's of gallons)	
	Commercial Employment	% of State Total	Distillate	LPG
Fresno	222,530	2.05	1,277.60	1,063.66
Kern(1)	137,211	1.27	787.76	655.85
Kings	27,451	0.25	157.60	131.21
Madera	26,363	0.24	151.36	126.01
Merced	40,254	0.37	231.11	192.41
San Joaquin	149,629	1.38	859.06	715.20
Stanislaus	111,390	1.03	639.52	532.43
Tulare	79,016	0.73	453.65	377.68
SJV Total	793,844	7.33	4,557.66	3,794.45
State Total	10,834,241	100	62,202	51,786

(1) Includes only Valley portions of Kern County. Emissions were distributed utilizing population data for the Mojave and Valley portions of Kern County provided by CARB.

The District's point source inventory of commercial liquid fuel combustion processes was then reconciled against the total amount of liquid fuel disaggregated to the counties. The commercial area source consumption was calculated as the difference between the total consumption and the consumption reported through the point source inventory. This calculation is presented in the table below:

Table 4. Commercial liquid fuel consumption (2006).

County	Process Rate (1,000's of gallons)		
	Total Consumption	Point Source	Area Source
COMMERCIAL DISTILLATE OIL COMBUSTION			
Fresno	1,277.60	262.63	1,014.97
Kern[(1)]	787.76	296.81	490.96
Kings	157.60	72.80	84.80
Madera	151.36	38.02	113.34
Merced	231.11	91.43	139.68
San Joaquin	859.06	298.38	560.67
Stanislaus	639.52	93.76	545.75
Tulare	453.65	113.10	340.55
Total Distillate	**4,557.65**	**1,266.94**	**3,290.72**
COMMERCIAL L.P.G. COMBUSTION			
Fresno	1,063.66	37.04	1,026.62
Kern[(1)]	655.85	30.22	625.63
Kings	131.21	15.48	115.73
Madera	126.01	56.70	69.31
Merced	192.41	7.24	185.17
San Joaquin	715.20	4.79	710.41
Stanislaus	532.43	1.65	530.78
Tulare	377.68	31.28	346.41
Total L.P.G.	**3,794.45**	**184.40**	**3,610.06**

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

Categorization. In the commercial sector, energy is consumed for space and water heating, cooling, lighting, and miscellaneous processes. In a 1998 survey prepared by the EIA for the Pacific Census Region, 60% of commercial distillate and residual fuels were found to be consumed for water and space heating and 40% were used by miscellaneous applications. Water and space heating processes are assumed to be powered by boilers/heaters/burners, and miscellaneous applications are powered by internal combustion (IC) engines.

Table 5. Commercial end use categories and combustion devices for liquid fuel types from EIA Pacific Census Region Report.

Fuel Type	End Use Category	Usage (%)	Combustion Process
Distillate & residual oil	Water & space heating	60	Boilers/heaters/burners
	Miscellaneous applications	40	Distillate & diesel-fired IC engines[(1)]
L.P.G.	Water & space heating	100	Boilers/heaters/burners

(1) Area source emissions from diesel-fired IC engines are estimated by CARB in EIC 099-040-1200-0000.

The California Air Resources Board already estimates emissions from all diesel-fired IC engines in REIC 099-040-1200-0000 (Stationary Engines - Diesel). Therefore, to avoid double counting emissions from diesel IC engines, the District will exclude them from this methodology. This means that all commercial distillate and residual oil emissions will be from boilers/heaters/burner. Since all boilers greater than 5

MMBtu/hr are permitted by the District and reported through the point source inventory, these units are assumed to be small.

No information could be found to quantitatively relate commercial L.P.G. consumption to specific combustion processes. It would be conservative to assume that there are some small (less than 50 horsepower) commercial-grade LPG engines operating within District. However, at this time there is no reasonable way to estimate the activity of these units. Therefore, at this time we will assume that all small non-permitted commercial LPG/propane combustion sources in the District are boilers, heaters, and burners used for water and space heating. The District is currently collecting data through its Permit-Exempt Equipment Registration (PEER) program. When enough units are registered, this data set may be used to better - identify these small commercial combustion processes.

VI. Emission Factors

CO, NOx, SOx, VOC and PM emission factors for commercial distillate, residual and LPG/propane boilers were obtained from the EPA's AP-42 (EPA, 1996 & 1999) and are summarized in the following table:

Table 6. Emission factors for commercial liquid fuel combustion processes.

Fuel Type and Process	Emission Factors (pounds per thousand gallons)				
	CO	NOx	SOx[4]	VOC	PM
Distillate Oil[1]; 0.5 to 10 MMBtu/hr commercial boiler	5.0	20.0	7.1	0.34	3.3[5]
Residual Oil[2]; 0.5 to 10 MMBtu/hr commercial boiler	5.0	55.0	78.5	1.13	7.8
LPG[3]; commercial boiler	7.5	13.0	1.5	1.0	0.7[5]

(1) It was assumed that within the commercial sector, distillate fuels were grade No. 2
(2) It was assumed that within the commercial sector, residual fuels were grade No. 6.
(3) It was assumed that all LPG consumed within the commercial sector was propane.
(4) District assumes sulfur contents of 0.05% for distillate oil, 0.5% for residual oil, and 15gr/100cf of propane
(5) PM emission factor includes filterable and condensable particulate matter.

VII. Emissions Calculations

The emissions for each criteria pollutant within this area source methodology can be calculated using the following equation:

$$Emissions = Fuel\ Use\left(\frac{1000s\ of\ \ gallons}{year}\right)\times(\%\ enduse)\times Emission\ \ Factor\left(\frac{lbs\ of\ \text{pollutant}}{1{,}000\ gallons}\right)$$

$$Emissions = \frac{lbs\ of\ \text{pollutant}}{\text{year}}$$

Convert lbs/year to tons/year:

$$Emissions\ in\ \frac{tons}{year} = \left(\frac{lbs\ of\ \text{pollutant}}{year}\right)\times\left(\frac{1\ ton}{2{,}000\ lbs}\right)$$

Sample Calculation:

For NO_x emissions due to LPG/propane combustion in commercial boilers in Fresno County:

Given:

1. The 2006 commercial area source consumption of LPG/propane gas in Fresno County was 1,026.62 thousands of gallons (1,026,620 gallons).
2. In this service area, 100% of the commercial LPG/propane end use was for space and water heating.
3. The NOx emission factor for commercial LPG/propane boilers is 13.0 lb/1000gal

Calculate Emissions:

$$NOx\ Emissions = 1{,}026.62\left(\frac{1000s\ gal\ LPG}{year}\right)\times(100\%)\times\left(\frac{13\,lb\ of\ NOx}{1000\ gal\ LPG}\right) = 13{,}346.06\frac{lbs\ of\ NOx}{year}$$

$$NOx\ Emissions = 13{,}346.06\left(\frac{lbs\ of\ NOx}{Year}\right)\times\left(\frac{1\,ton}{2{,}000\,lbs}\right) = 6.67\frac{tons\ of\ NOx}{Year}$$

VIII. Temporal Variation

A. Daily

ARB Code 24. 24 hours per day - uniform activity during the day.

B. Weekly

ARB Code 7. 7 days per week - uniform activity every day of the week

C. Monthly

Monthly consumption of commercial liquid fuel is available from the U.S. Department of Energy's Energy Information Administration and is summarized in the table below:

Table 7. Consumption of liquid fuels by the commercial sector in California (2006).

Month (2006)	Activity Level (% of annual)		
	Distillate Oil	Residual Oil	LPG/ Propane
January	7.60	0	9.57
February	8.15	0	9.72
March	8.27	0	10.99
April	7.87	0	8.92
May	8.86	0	6.78
June	8.65	0	6.59
July	8.44	0	6.08
August	8.96	0	6.30
September	8.61	0	7.29
October	8.73	0	8.05
November	8.23	0	8.74
December	7.61	0	10.98
Total	100.00	0	100.00

IX. Spatial Variation

Commercial liquid fuel consumption in 2006 for each county in the SJVAPCD was presented previously in Section V. Within each county, activity can be assigned to grid cells using commercial employment data as a surrogate.

X. Growth Factor

Growth factors are developed by either the District's Strategies and Incentives 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 Strategies and Incentives Department.

XI. Control Level

Control levels are developed by either the District's Strategies and Incentives 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. Emission units within this area source category may be subject to the following District Rules:

Table 8. District rules and control levels applicable to Commercial Liquid Fuel Combustion Processes

Rule No.	Rule Description
4701	Internal Combustion Engines - Phase 1
4702	Internal Combustion Engines - Phase 2
4703	Stationary Gas Turbines
4305	Boilers, Steam Generators, and Process Heaters - Phase 2
4306	Boilers, Steam Generators, and Process Heaters - Phase 3
4307	Boilers, Steam Generators, and Process Heaters - 2.0 MMBtu/hr to 5.0 MMBtu/hr
4308	Boilers, Steam Generators, and Process Heaters (0.075 MMBtu/hr to 2.0 MMBtu/hr)
4309	Dryers, Dehydrators and Ovens
4311	Flares
4313	Lime Kilns
4351	Boilers, Steam Generators, and Process Heaters - Phase 1

Control levels associated with this emissions category may be obtained from the District's Strategies and Incentives Department.

XII. 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 profiles for commercial liquid fuel processes are presented in Table 7. Organic gas profile #504 is applied to REICs 060-995-1500-0000 and 060-995-1220-000 (distillate or residual external combustion boilers). Organic gas profile #4 is applied to REIC 060-995-0120-0000 (LPG/propane external combustion boilers-process gas).

Table 9. CARB chemical speciation profiles for commercial liquid fuels.

Profile Description	ARB Organic Gas Profile#	Fractions	
		ROG	VOC
External Combustion Boilers - Distillate or Residual	504	0.835	0.835
External Combustion Boilers – Process Gas	4	0.660	0.660

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 (PM_{10}) 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 PM_{10} and $PM_{2.5}$ is given. The particulate matter (PM) profile codes can also be used to lookup associated toxics. PM profile #112 is applied to REICs 060-995-1500-0000 (distillate fuel combustion), profile #111 to REIC 060-995-1220-000 (residual fuel combustion), and profile #120 to REIC 060-995-0120-0000 (LPG/propane combustion.

Table 10. CARB PM chemical speciation profiles for commercial liquid fuels.

Profile Description	PM Speciation Profile#	Fractions	
		PM_{10}	$PM_{2.5}$
Fuel Combustion – Distillate Oil	112	0.976	0.967
Fuel Combustion – Residual Oil	111	0.87	0.76
Gaseous Material Combustion	120	1	1

XIII. Assessment Of Methodology

The emissions in this methodology have been estimated via a top-down approach, which involves a number of assumptions:

- The amount of liquid fuel consumed in California by the commercial sector is accurately estimated by the EIA.
- Commercial employment data is an appropriate surrogate for disaggregating statewide commercial liquid fuel use to the county level.
- The results of the EIA survey of end uses and combustion processes are representative of conditions within the District.
- All commercial engines greater then 50 horsepower are permitted by the District and represented in the point source inventory.
- All permit exempt LPG combustion units are small boilers.
- Within the commercial sector, distillate fuels are grade No. 2 and residual fuels are grade No. 6.

Due to the many assumptions required by this methodology, its quality and accuracy are subject to the quality and accuracy of its data sources. However based upon the current information available, the District feels that this methodology most accurately represents the area source emissions from the combustion of commercial liquid fuels within the San Joaquin Valley.

XIV. Emissions

Following is the 2006 area source emissions inventory for REIC 060-995-1220-000, 060-995-1500-0000, and 060-995-0120-0000 estimated by this methodology. Emissions are reported for each county in the District.

Table 11. Area source emissions for commercial liquid fuel combustion (distillate, residual, and LPG) in 2006.

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC[1]	PM_{10}	$PM_{2.5}$[2]
COMMERCIAL DISTILLATE OIL COMBUSTION (060-995-1220-0000)						
Fresno	6.09	1.52	2.16	0.10	1.00	N/A
Kern[3]	2.95	0.74	1.05	0.05	0.49	N/A
Kings	0.51	0.13	0.18	0.01	0.08	N/A
Madera	0.68	0.17	0.24	0.01	0.11	N/A
Merced	0.84	0.21	0.30	0.01	0.14	N/A
San Joaquin	3.36	0.84	1.19	0.06	0.56	N/A
Stanislaus	3.27	0.82	1.16	0.06	0.54	N/A
Tulare	2.04	0.51	0.73	0.03	0.34	N/A
TOTAL	**19.74**	**4.94**	**7.01**	**0.33**	**3.26**	**N/A**
COMMERCIAL RESIDUAL OIL COMBUSTION (060-995-1500-0000)						
Fresno	0.00	0.00	0.00	0.00	0.00	N/A
Kern[3]	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**
COMMMERCIAL L.P.G COMBUSTION (060-995-0120-0000)						
Fresno	6.67	3.85	0.77	0.51	0.36	N/A
Kern[3]	4.07	2.35	0.47	0.31	0.22	N/A
Kings	0.75	0.43	0.09	0.06	0.04	N/A
Madera	0.45	0.26	0.05	0.03	0.02	N/A
Merced	1.20	0.69	0.14	0.09	0.06	N/A
San Joaquin	4.62	2.66	0.53	0.36	0.25	N/A
Stanislaus	3.45	1.99	0.40	0.27	0.19	N/A
Tulare	2.25	1.30	0.26	0.17	0.12	N/A
TOTAL	**23.46**	**13.53**	**2.71**	**1.8**	**1.26**	**N/A**

(1) The District only reports ROG to ARB. As noted in Section XII, ROG is the same as VOC.
(2) At this time, the District does not calculate $PM_{2.5}$ emissions. $PM_{2.5}$ emissions can be estimated using the speciation profiles found in Section XII.
(3) Includes only Valley portions of Kern County.

Following is the 2006 point source emissions inventory for REIC 060-995-1220-000, 060-995-1500-0000, and 060-995-0120-0000 as reported to the District by our permit holders. Emissions are reported for each county in the District.

Table 12. Point source emissions for commercial liquid fuel combustion (distillate, residual, and LPG) in 2006

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC[1]	PM_{10}	$PM_{2.5}$[2]
COMMERCIAL DISTILLATE OIL COMBUSTION (060-995-1220-0000)						
Fresno	0.07	0.04	0.14	0.00	0.01	N/A
Kern[3]	0.01	0.00	0.04	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	0.62	0.16	0.88	0.01	0.06	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	**0.70**	**0.20**	**1.06**	**0.01**	**0.07**	**N/A**
COMMERCIAL RESIDUAL OIL COMBUSTION (060-995-1500-0000)						
Fresno	0.00	0.00	0.00	0.00	0.00	N/A
Kern[3]	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**
COMMMERCIAL L.P.G COMBUSTION (060-995-0120-0000)						
Fresno	1.70	7.29	0.18	0.44	0.06	N/A
Kern[3]	1.64	2.10	0.12	0.89	0.06	N/A
Kings	0.38	0.62	0.03	0.26	0.07	N/A
Madera	0.60	1.62	0.07	0.29	0.02	N/A
Merced	0.07	0.08	0.00	0.04	0.01	N/A
San Joaquin	0.33	0.38	0.00	0.16	0.01	N/A
Stanislaus	0.25	0.11	0.00	0.06	0.00	N/A
Tulare	1.62	1.43	0.24	0.12	0.01	N/A
TOTAL	**6.59**	**13.63**	**0.64**	**2.26**	**0.24**	**N/A**

(1) The District only reports ROG to ARB. As noted in Section XII, ROG is the same as VOC.
(2) At this time, the District does not calculate $PM_{2.5}$ emissions. PM2.5 emissions can be estimated using the speciation profiles found in Section XII.
(3) Includes only the Valley portion of Kern County.

Following is the 2006 total unreconciled (point source plus area source) emissions inventory for REIC 060-995-1220-000, 060-995-1500-0000, and 060-995-0120-0000. Emissions are reported for each county in the District.

Table 13. Total unreconciled emissions for commercial liquid fuel combustion (distillate, residual, and LPG) in 2006

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC[1]	PM_{10}	$PM_{2.5}$[2]
COMMERCIAL DISTILLATE OIL COMBUSTION (060-995-1220-0000)						
Fresno	6.16	1.56	2.30	0.11	1.01	N/A
Kern[3]	2.95	0.74	1.08	0.05	0.49	N/A
Kings	0.51	0.13	0.18	0.01	0.08	N/A
Madera	0.68	0.17	0.24	0.01	0.11	N/A
Merced	1.46	0.37	1.17	0.02	0.20	N/A
San Joaquin	3.36	0.84	1.19	0.06	0.56	N/A
Stanislaus	3.28	0.82	1.16	0.06	0.54	N/A
Tulare	2.04	0.51	0.73	0.03	0.34	N/A
TOTAL	**20.44**	**5.14**	**8.05**	**0.35**	**3.33**	**N/A**
COMMERCIAL RESIDUAL OIL COMBUSTION (060-995-1500-0000)						
Fresno	0.00	0.00	0.00	0.00	0.00	N/A
Kern[3]	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**
COMMMERCIAL L.P.G COMBUSTION (060-995-0120-0000)						
Fresno	8.38	11.14	0.95	0.95	0.41	N/A
Kern[3]	5.70	4.45	0.59	1.21	0.28	N/A
Kings	1.13	1.05	0.11	0.31	0.11	N/A
Madera	1.05	1.88	0.12	0.32	0.04	N/A
Merced	1.28	0.78	0.14	0.13	0.08	N/A
San Joaquin	4.95	3.04	0.53	0.51	0.26	N/A
Stanislaus	3.70	2.10	0.40	0.33	0.19	N/A
Tulare	3.88	2.73	0.50	0.29	0.13	N/A
TOTAL	**30.07**	**27.17**	**3.34**	**4.05**	**1.50**	**N/A**

(1) The District only reports ROG to ARB. As noted in Section XII, ROG is the same as VOC.
(2) At this time, the District does not calculate $PM_{2.5}$ emissions. PM2.5 emissions can be estimated using the speciation profiles found in Section XII.
(3) Includes only the Valley portions of Kern County.

Following is the net change in total unreconciled emissions between this update (2006 inventory year) and the previous (2005 CEIDARS inventory year) for REIC 060-995-1220-000, 060-995-1500-0000, and 060-995-0120-0000. The change in emissions is reported for each county in the District.

Table 14. Net change in emissions for commercial liquid fuel combustion (distillate, residual, and LPG) from 2006 – 2005.

County	Emissions (tons/year)					
	NOx	CO	SOx	VOC[1]	PM_{10}	$PM_{2.5}$[2]
COMMERCIAL DISTILLATE OIL COMBUSTION (060-995-1220-0000)						
Fresno	5.95	1.53	2.26	0.09	1.00	N/A
Kern	2.89	0.73	1.04	0.05	0.49	N/A
Kings	0.51	0.13	0.18	0.01	0.08	N/A
Madera	0.68	0.17	0.24	0.01	0.11	N/A
Merced	1.42	0.36	1.13	0.02	0.20	N/A
San Joaquin	3.36	0.84	1.19	0.06	0.56	N/A
Stanislaus	3.27	0.61	1.16	0.05	0.54	N/A
Tulare	0.01	0.06	-0.32	-0.12	0.19	N/A
TOTAL	**18.09**	**4.43**	**6.88**	**0.17**	**3.17**	**N/A**
COMMERCIAL RESIDUAL OIL COMBUSTION (060-995-1500-0000)						
Fresno	0.00	0.00	0.00	0.00	0.00	N/A
Kern	-101.64	-9.27	-291.58	-2.00	-20.66	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	-0.31	0.00	-0.41	0.00	0.00	N/A
TOTAL	**-101.95**	**-9.27**	**-291.99**	**-2.00**	**-20.66**	**N/A**
COMMMERCIAL L.P.G COMBUSTION (060-995-0120-0000)						
Fresno	-55.50	-2.07	0.80	-2.55	-13.67	N/A
Kern	-23.00	-2.18	-5.82	-0.46	-0.25	N/A
Kings	-17.10	-1.30	0.08	-0.16	-2.97	N/A
Madera	-10.45	-0.42	0.11	0.11	-1.94	N/A
Merced	-24.18	-3.20	0.14	-1.12	-3.80	N/A
San Joaquin	-55.92	-7.70	0.53	-1.97	-9.54	N/A
Stanislaus	-24.06	-2.49	0.40	-0.91	-4.19	N/A
Tulare	-43.88	-5.69	0.50	-1.70	-7.47	N/A
TOTAL	**-254.09**	**-25.05**	**-3.26**	**-8.76**	**-43.83**	**N/A**

(1) The District only reports ROG to ARB. As noted in Section XII, ROG is the same as VOC.
(2) At this time, the District does not calculate PM2.5 emissions. PM2.5 emissions can be estimated using the speciation profiles found in Section XII.

XV. Revision History

2006. This is a new methodology based upon one developed for the District by Sonoma Technology in October of 2003.

XVI. Update Schedule

In an effort to provide inventory information to CARB 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 15.

Table 15. 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 each source category in this methodology have emissions of less than one ton per day for any criteria pollutant, this area source estimate will be updated every four years.

Table 16. District methodology update frequency

EIC	Frequency (years)	Source of Emissions (Point Source Inventory / Data Gathering)
060-995-0120-0000	4	Point Source Inventory / Data Gathering
060-995-1220-0000	4	Point Source Inventory / Data Gathering
060-995-1500-0000	4	Point Source Inventory / Data Gathering

XVII. References

1. Emission Inventory Improvement Program (EIIP) (1996) Volumes III. Prepared by the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials.

2. Energy Information Administration (2001) State energy data report: Consumption estimates. Prepared by the Energy Information Administration, U.S Dept. of Energy, Washington, D.C, May.

3. Energy Information Administration (2006) Commercial Sector Energy Consumption Estimates 2007 http://www.eia.doe.gov/emeu/states/_seds.html

4. California Employment Development Department (2007) Labor Market Information http://www.labormarketinfo.edd.ca.gov/

5. Pacific Gas and Electric Company, 1999. Commercial Building Survey Report. http://www.pge.com/biz/energy_tools_resources/building_survey/

6. U.S. Census Bureau (2003) Censtats Databases – County Business Patterns data. http://censtats.census.gov/cbpnaic/cbpnaic.shtml

7. U.S. Environmental Protection Agency (1996) Liquefied petroleum gas combustion. In: Compilation of air pollution emission factors, Vol. 1: Stationary point and area emission units (AP-42), Fifth ed. (January 1995), Supplement B (November 1996), Chapter 1.4 Report prepared by Office of Air Quality Planning and Standards of the EPA, Research Triangle Park, NC.

8. U.S. Environmental Protection Agency (1999) Fuel Oil combustion. In: Compilation of air pollution emission factors, Vol. 1: Stationary point and area emission units (AP-42), Fifth ed. (January 1995), Supplement E (September 1999), Chapter 1.3 Report prepared by Office of Air Quality Planning and Standards of the EPA, Research Triangle Park, NC.

9. Sonoma Technology, Inc. (2003). Area source emission inventory methodology: Fuel combustion: Boilers. Prepared for San Joaquin Valley Air Pollution Control District. October 2003.

10. California Air Resources Board CEPAM: 2009 Almanac – Population and Vehicle Trends Tool. http://www.arb.ca.gov/app/emsinv/trends/ems_trends.php

XVIII. Appendices

Appendix A. Emission Inventory Codes

Appendix B. Commercial Employment Data

Appendix A. Emission Inventory Codes

Table 17. EIC, SCC and SIC codes in the District's 2006 point source inventory that reconciled to # 060-995-0120-0000

EIC	SCC	Point Source Type	SIC
52-005-0124-0000	10301002	EXTCOMB BOILER - COMMERCL-INSTUTNL - LIQ PETROLEUM GAS - PROPANE	723, 724
52-010-0120-0000	30290005	FOOD/AGRICULTURE - FUEL-FIRED EQPMNT - PROCESS HEATERS - LPG	5812
60-005-0122-0000	10301001	EXTCOMB BOILER - COMMERCL-INSTUTNL - LIQ PETROLEUM GAS - BUTANE	723
60-005-0124-0000	10301002	EXTCOMB BOILER - COMMERCL-INSTUTNL - LIQ PETROLEUM GAS - PROPANE	4952, 7359, 8062, 8744, 9199, 9223, 9711
60-995-0120-0000	20301001	INTERNLCOMBUSTION - COMMERCL-INSTUTNL - PROPANE - RECIPROCATING	4612, 4812, 4813, 4833, 4911, 4931, 4941, 4952, 5021, 5541, 7999, 8011, 8059, 8211, 8221, 8733, 8743, 9199, 9221, 9229, 9512, 9621

Table 18. EIC, SCC and SIC codes in the District's 2006 point source inventory that reconciled to # 060-995-1220-0000

EIC	SCC	Point Source Type	SIC
60-005-1220-0000	10100501	EXTCOMB BOILER - ELECTRIC GENERATN - DISTILLATE OIL - NO 1 AND NO 2 OIL	8062
60-005-1220-0000	10300501	EXTCOMB BOILER - COMMERCL-INSTUTNL - DISTILLATE OIL - NO 1 AND NO 2 OIL	8062, 8063, 8069, 9199, 9223, 9711
60-020-1220-0000	10500205	EXTCOMB BOILER - SPACE HEATER - COMMERCL-INSTUTNL - DISTILLATE OIL	4513

Table 19. EIC, SCC and SIC codes in the District's 2006 point source inventory that reconciled to # 060-995-1500-0000

EIC	SCC	Point Source Type	SIC
60-005-1510-0000	10300504	EXTCOMB BOILER - COMMERCL-INSTUTNL - DISTILLATE OIL - NO 4 OIL	5169
60-005-1530-0000	10300401	EXTCOMB BOILER - COMMERCL-INSTUTNL - RESIDUAL OIL - NO 6 OIL	9223

Appendix B. Commercial Employment Data

Table 20. Commercial and Service NAICS(North American Industry Classification System) Codes

Industry Type	NAICS Code	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare
Retail Trade	44-45	35,071	27,650	3,907	3,545	7,464	26,634	22,176	13,550
Transportation and warehousing	48	7,837	7,088	673	703	1,565	11,200	4,669	4,719
Information	51	4,468	2,516	323	586	1,583	2,531	2,519	1,242
Real estate and rental and leasing	53	4,405	3,031	500	378	681	3,193	2,289	1,170
Professional, scientific and technical services	54	10,655	8,579	484	1,006	880	4,945	5,203	2,154
Admin, support, waste management, remediation services	56	14,895	12,255	561	1,048	1,426	10,990	7,900	5,836
Educational services	61	2,869	1,408	271	87	74	3,761	886	650
Health care and social assistance	62	32,777	20,232	3,049	5,397	5,231	21,447	18,181	8,645
Arts, entertainment and recreation	71	2,890	2,088	230	206	480	2,017	1,647	687
Accommodation and food services	72	22,539	17,916	2,459	2,189	4,180	14,898	13,044	7,224
Other services (except public administration)	81	17,124	8,768	1,294	1,318	2,590	8,413	7,276	3,239
Public administration	92	67,000	55,800	13,700	9,900	14,100	39,600	25,600	29,900