

**Section 3.3 GEOGRAPHIC AREAS**

The EMFAC2000 model can generate emission inventories for fifteen air basins<sup>1</sup>, fifty-eight counties and thirty five-air pollution control districts. This section lists these geographic areas; the area-specific activity files, and details how the data are used in calculating area specific emissions.

**3.3.1 Introduction**

The MVEI7G model generates emission inventories for fourteen air basins and fifty-eight counties. Table 3.3-1 summarizes how the emission inventories are calculated by county, air basin, and the state.

**Table 3.3-1 How Emission Inventories Are Calculated In MVEI7G**

Area	Methodology
County	The model does not explicitly generate county specific emission inventories. Instead it calculates the portion of the county’s emissions within an air basin. The model contains county specific estimates of vehicle population and vehicle miles traveled (VMT) by vehicle class. The model also contains period specific temperature and speed distributions. The class specific population and registration distribution are used to calculate the model year specific population estimates. The model year specific population estimates are then used in calculating “per vehicle” emissions, i.e., hot soak, diurnal and resting loss emissions. The class specific VMT estimate is also disaggregated into a model year specific basis using travel fractions. The model year specific VMT estimates are then used in calculating emissions on a “per mile” basis, i.e., exhaust emissions.
Air Basin	The emissions inventory for an air basin is calculated by summing the emissions from counties or parts of counties that reside within an air basin. Emissions from counties that span two or more air basins (sub-counties) are estimated by applying appropriate VMT splits to county specific emission estimates.
Statewide	The statewide emissions inventory is calculated by summing the emission estimates from each air basin.

The EMFAC2000 model contains activity data for sixty-nine geographic areas. These sixty-nine areas include counties that overlap several air basins and air pollution control districts. Figure 3.3-1 shows the air basin and county boundaries. Table 3.3-2 lists the geographic areas modeled in EMFAC2000.

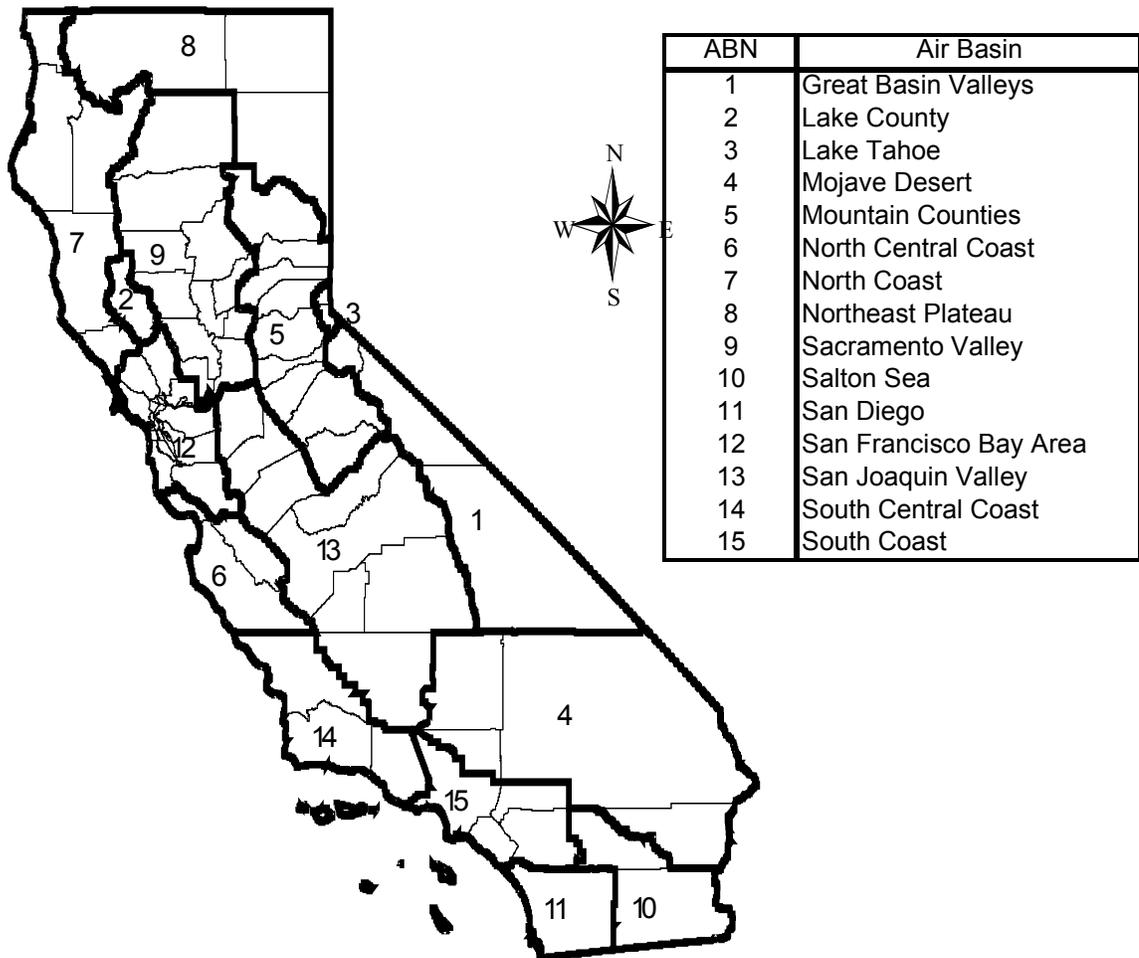
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<sup>1</sup> The South East Desert air basin was redesignated into the Salton Sea and Mojave Desert air basins.

The EMFAC2000 model contains the following area specific data files:

1. Poprdata.for This file contains the number of registered vehicles by age, vehicle class, fuel type and geographic area.
2. Cunrdata.for This file contains the number of chronically unregistered vehicles by age, vehicle class, fuel type and geographic area.
3. Popgdata.for This file contains the population growth rates by calendar year, vehicle class, fuel type, and geographic area.
4. Tempdata.for This file contains averaged monthly, summer and winter episodic diurnal temperatures for each geographic area.
5. Rh\_data.for This file contains averaged monthly relative humidities for each geographic area.
6. Accrdata.for This file contains accrual rates by age, vehicle class, fuel type and geographic area.
7. Rvp\_data.for This file contains the monthly, summer and winter gasoline fuel Reid Vapor Pressures for each geographic area and calendar year.
8. Area\_im.for This file contains default Inspection and Maintenance options for each geographic area.

The EMFAC2000 model more accurately estimates the emissions for each geographic area than the MVEI7G model primarily due to the usage of area specific activity data. However, this increase in accuracy results in longer execution times. To compensate for this, the user has an option of calculating the emissions using either the “Simple-Average” or “Do-each-sub-area” options. The “Simple-Average” option provides emission estimates faster than the “Do-each-sub-area” option however some simplifying assumptions are made resulting in less accuracy. The latter option provides the most accurate emission estimates. The “Simple-Average” option calculates emissions that are within 0.5% of the emission estimates obtained using the “Do-each-sub-area” option.



**Figure 3.3-1 Air Basin and County Boundaries**

**Table 3.3-2 List of Geographic Areas Modeled in EMFAC2000**

ABN	APCD	County	Area	AB_Code	Air Basin	Air Pollution District	County
1	10	2	1	GBV	Great Basin Valleys	Great Basin Unified APCD	Alpine
1	10	14	2	GBV	Great Basin Valleys	Great Basin Unified APCD	Inyo
1	10	26	3	GBV	Great Basin Valleys	Great Basin Unified APCD	Mono
2	13	17	4	LC	Lake County	Lake County APCD	Lake
3	7	9	5	LT	Lake Tahoe	El Dorado County APCD	El Dorado
3	23	31	6	LT	Lake Tahoe	Placer County APCD	Placer
5	1	3	7	MC	Mountain Counties	Amador County APCD	Amador
5	5	5	8	MC	Mountain Counties	Calaveras County APCD	Calaveras
5	7	9	9	MC	Mountain Counties	El Dorado County APCD	El Dorado
5	15	22	10	MC	Mountain Counties	Mariposa County APCD	Mariposa
5	21	29	11	MC	Mountain Counties	Northern Sierra AQMD	Nevada
5	23	31	12	MC	Mountain Counties	Placer County APCD	Placer
5	21	32	13	MC	Mountain Counties	Northern Sierra AQMD	Plumas
5	21	46	14	MC	Mountain Counties	Northern Sierra AQMD	Sierra
5	33	55	15	MC	Mountain Counties	Tuolumne County APCD	Tuolumne
6	19	27	16	NCC	North Central Coast	Monterey Bay Unified APCD	Monterey
6	19	35	17	NCC	North Central Coast	Monterey Bay Unified APCD	San Benito
6	19	44	18	NCC	North Central Coast	Monterey Bay Unified APCD	Santa Cruz
7	20	8	19	NC	North Coast	North Coast Unified AQMD	Del Norte
7	20	12	20	NC	North Coast	North Coast Unified AQMD	Humboldt
7	16	23	21	NC	North Coast	Mendocino County APCD	Mendocino
7	22	49	22	NC	North Coast	Northern Sonoma County APCD	Sonoma
7	20	53	23	NC	North Coast	North Coast Unified AQMD	Trinity
8	14	18	24	NEP	Northeast Plateau	Lassen County APCD	Lassen
8	17	25	25	NEP	Northeast Plateau	Modoc County APCD	Modoc
8	30	47	26	NEP	Northeast Plateau	Siskiyou County APCD	Siskiyou
9	4	4	27	SV	Sacramento Valley	Butte County AQMD	Butte
9	6	6	28	SV	Sacramento Valley	Colusa County APCD	Colusa
9	9	11	29	SV	Sacramento Valley	Glenn County APCD	Glenn
9	23	31	30	SV	Sacramento Valley	Placer County APCD	Placer
9	24	34	31	SV	Sacramento Valley	Sacramento Metropolitan AQMD	Sacramento
9	29	45	32	SV	Sacramento Valley	Shasta County AQMD	Shasta
9	35	48	33	SV	Sacramento Valley	Yolo/Solano AQMD	Solano
9	8	51	34	SV	Sacramento Valley	Feather River AQMD	Sutter
9	32	52	35	SV	Sacramento Valley	Tehama County APCD	Tehama
9	35	57	36	SV	Sacramento Valley	Yolo/Solano AQMD	Yolo
9	8	58	37	SV	Sacramento Valley	Feather River AQMD	Yuba
11	25	37	38	SD	San Diego	San Diego County APCD	San Diego
12	3	1	39	SF	San Francisco Bay Area	Bay Area AQMD	Alameda
12	3	7	40	SF	San Francisco Bay Area	Bay Area AQMD	Contra Costa
12	3	21	41	SF	San Francisco Bay Area	Bay Area AQMD	Marin
12	3	28	42	SF	San Francisco Bay Area	Bay Area AQMD	Napa
12	3	38	43	SF	San Francisco Bay Area	Bay Area AQMD	San Francisco
12	3	41	44	SF	San Francisco Bay Area	Bay Area AQMD	San Mateo
12	3	43	45	SF	San Francisco Bay Area	Bay Area AQMD	Santa Clara
12	3	48	46	SF	San Francisco Bay Area	Bay Area AQMD	Solano
12	3	49	47	SF	San Francisco Bay Area	Bay Area AQMD	Sonoma
13	26	10	48	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	Fresno
13	26	15	49	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	Kern
13	26	16	50	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	Kings
13	26	20	51	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	Madera
13	26	24	52	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	Merced
13	26	39	53	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	San Joaquin
13	26	50	54	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	Stanislaus
13	26	54	55	SJV	San Joaquin Valley	San Joaquin Valley Unified APCD	Tulare
14	27	40	56	SCC	South Central Coast	San Luis Obispo County APCD	San Luis Obispo
14	28	42	57	SCC	South Central Coast	Santa Barbara County APCD	Santa Barbara
14	34	56	58	SCC	South Central Coast	Ventura County APCD	Ventura
15	31	19	59	SC	South Coast	South Coast AQMD	Los Angeles
15	31	30	60	SC	South Coast	South Coast AQMD	Orange
15	31	33	61	SC	South Coast	South Coast AQMD	Riverside
15	31	36	62	SC	South Coast	South Coast AQMD	San Bernardino
10	11	13	63	SS	Salton Sea	Imperial County APCD	Imperial
10	31	33	64	SS	Salton Sea	South Coast AQMD	Riverside
4	12	15	65	MD	Mojave Desert	Kern County APCD	Kern
4	18	33	66	MD	Mojave Desert	Mojave Desert AQMD	Riverside
4	31	33	67	MD	Mojave Desert	South Coast AQMD	Riverside
4	2	19	68	MD	Mojave Desert	Antelope Valley APCD	Los Angeles
4	18	36	69	MD	Mojave Desert	Mojave Desert AQMD	San Bernardino

Where:

ABN = Air Basin Number                      APCD = Air Pollution Control District  
 County = County Specific Identification Number  
 Area = Geographic Area Index              AB\_Code = Air Basin Abbreviation

### 3.3.2 Emissions Estimated Using the Simple-Average Option

This section details how the county, air basin, air pollution control district and statewide inventories are calculated using the “Simple-Average” option. The methodology described below for calculating the emissions and activity for an air basin is also used in calculating emission inventories for the air pollution control districts and the state.

County: The EMFAC2000 model explicitly calculates emissions for any county using the “Simple-Average” option.

Air Basin: The model first calculates appropriate averages for: vehicle miles traveled, temperature, relative humidity, fuel RVP, Inspection and Maintenance and speed. For example, the model calculates the vehicle population in the air basin by summing the model year specific populations across all areas within the air basin (AB).

$$POPULATION_{AB} = \sum_{i=1}^{area} POP_{area} \quad (3.3-1)$$

The area specific VMT is calculated by multiplying the area specific population by the area specific cumulative mileage and then summing across all areas.

$$VMT_{AB} = \sum_{i=1}^{area} (POP_{area} * Cumulative\_Milage_{area}) \quad (3.3-2)$$

The averaged diurnal temperature profile is calculated by appropriately weighting the area specific temperatures by the area specific VMT.

$$TEMPERATURE_{AB} = \frac{\sum_{i=1}^{area} (VMT_{area} * Temp_{area})}{VMT_{AB}} \quad (3.3-3)$$

The basin specific relative humidity, fuel RVP and the percent of travel in each speed bin are also calculated by weighting with the area specific VMT.

The basin specific with and without I&M emissions are also weighted by the portion of travel that occurs in with I&M areas. The emissions (in tons per day) are weighted to account for areas that are and are not subject to an I&M program. The I&M weighting factor is a ratio of the (VMT in I&M Areas)/(Total VMT in AB). Equation 3.3-4 shows how the basin specific emissions are calculated.

$$Emissions_{AB} = \text{With\_IM\_tons\_per\_day} * \text{I\&M\_Weighting\_Factor} + \text{Without\_I\&M\_tons\_per\_day} * (1 - \text{I\&M\_Weighting\_Factor}) \quad (3.3-4)$$

### **3.3.3 Emissions Estimated Using the Sub-Area Option**

The following section details how the emissions are calculated by county, air basin, air pollution district and the state using the “Sub-Area” option. The methodology described below for calculating an inventory for the air basin is also used in calculating an inventory for the state, and air pollution control districts.

County: The EMFAC2000 model explicitly calculates emissions for any county using the “Simple-Average” option.

Air Basin The EMFAC2000 model first calculates the emissions for each area and sub-areas within the air basin. These emissions are then summed to calculate the emissions inventory for the air basin.

