

## EMFAC Modeling Change Technical Memo

**SUBJECT:** CODING MODIFICATIONS TO EVAPORATIVE EMISSIONS ALGORITHMS

**LEAD:** DILIP PATEL

### SUMMARY

The EMFAC2000 series of models are structured to allow the application of correction factors by emissions regime, and then calculate an emission rate by weighting by regime size. Since the official release of EMFAC2002<sup>1</sup> staff was made aware of a portion of the evaporative emissions code where emission factors and correction factors were each being weighted with respect to regime size, resulting in lower evaporative emissions. This modeling change deals with the way correction factors are applied to each emissions regime in the calculation of evaporative emissions. This change will be incorporated into the release of the working draft version of EMFAC2007 ver. 2.223.

Table 1 shows the incremental difference (ver. 2.223 – ver. 2.222<sup>2</sup>) in **summer episodic** inventories for calendar year 2002. Table 1 shows that this coding modification will change statewide ROG emissions from **all** on-road motor vehicles in 2002 calendar year by 22.58 tons per day. To put this in perspective, this will increase statewide ROG on-road motor vehicle emissions in 2002 by 2.04%. Similarly, Table 2 shows that in 2015 the statewide summer ROG emissions from **all** on-road motor vehicles will increase by 22.72 tons per day, which is equivalent to a 4.32% increase in the total ROG emissions.

**Table 1 Summary of Emissions Changes In Calendar Year 2002**

Area	Emission Changes by Pollutant (tons/day)				
	ROG	CO	NOx	CO2	PM10
Statewide	22.58	0.00	0.00	0	0
South Coast Air Basin	9.49	0.00	0.00	0	0
San Joaquin Valley AB	1.50	0.00	0.00	0	0
Sacramento Valley AB	1.33	0.00	0.00	0	0
San Diego Air Basin	1.66	0.00	0.00	0	0
San Francisco Bay Area	4.67	0.00	0.00	0	0

<sup>1</sup> EMFAC2002 April 23, version 2.206 posted on ARB's web site.

<sup>2</sup> Internal working draft of EMFAC2007 version 2.222 that has been updated with new fuel corrections factors, I&M changes, vehicle populations, and redistribution of heavy-duty vehicle VMT.

**Table 2 Summary of Emissions Changes In  
Calendar Year 2015**

Area	Emission Changes by Pollutant (tons/day)				
	ROG	CO	NOx	CO2	PM10
Statewide	22.72	0.00	0.00	0.00	0.00
South Coast	8.83	0.00	0.00	0.00	0.00
San Joaquin Valley AB	1.40	0.00	0.00	0.00	0.00
Sacramento Region AB	1.37	0.00	0.00	0.00	0.00
San Diego Air Basin	1.87	0.00	0.00	0.00	0.00
San Francisco Bay Area	5.08	0.00	0.00	0.00	0.00

**NEED FOR REVISION**

The upcoming SIP process requires that the model reflect regulations or measures that have been adopted since the last update. Consistent with this policy, change to the model should be made that allow for a more accurate assessment of emissions inventory in each area.

**AFFECTED SOURCE CODE/VERSION**

XBurden.for  
Commons.for

**METHODOLOGY**

The EMFAC2000 series of models are structured to allow the application of correction factors by emissions regime, and then calculate an emission rate by weighting by regime size. While researching ways to implement the effect that ethanol has on evaporative emissions, staff (though our contractor ERG<sup>3</sup>) were made aware of inconsistencies in how correction factors<sup>4</sup> were being applied on a regime basis during the calculation of evaporative emission.

For example, hot soak emissions (HS<sub>i</sub>) from any given technology group vary by emissions regime (where the subscript i refers to normal, moderate and high emitting regimes). A normal vehicle is one that typically maintains emissions at or below certification emission standard, a high emitting vehicle is one that has significantly high emissions such that in normal analysis it would be classified as outlier or one that has liquid leaks, and moderates are those vehicles that fall in-between the normal and high regimes. The regime specific emissions are then

<sup>3</sup> ERG – Eastern Research Group

<sup>4</sup> Correction Factors – Evaporative emissions, collected under standardized testing conditions, are adjusted to real world ambient temperatures and fuel Reid vapor pressures.

adjusted by regime specific correction factors ( $CF_i$ ), and then weighted with respect to regime size ( $RS_i$ ) to calculate a composite rate.

Equation 1 shows how the composite HS emission rate should be calculated for a given technology group.

$$\text{HS rate} = \sum_{i=normal}^{i=high} HSi * CFi * RSi \quad (1)$$

Instead, the EMFAC2000 series of models was calculating HS emissions in a two step process (Equation 2), which was incorrect.

$$\text{HS rate} = \text{Step 1} * \text{Step 2} \quad (2)$$

$$\text{Where: Step 1} = \sum_{i=normal}^{i=high} HSi * RSi$$

$$\text{Step 2} = \sum_{i=normal}^{i=high} CFi * RSi$$

Since the regime sizes are less than one, the older methodology used to artificially result in lower hot soak emissions since the HS rates were in effect corrected twice with regime size. By revising this methodology, staff noted significant increases in hot soak emissions (on the order of 40%) and slight increase in running loss emissions (around 2.5%), and no changes to either diurnal or resting loss emissions. The change is more significant for HS emissions because this process has correction factors for all three regimes, and the values range from 0.01 to 0.65. Meanwhile, running loss correction factors vary from 0.86 to 1.0<sup>5</sup>. There is no change to the diurnal and resting loss emissions because the basic emission rates are a function of temperature and fuel RVP, and hence there are no external correction factors for these processes. When the correction factors are 1, “Step 2” in equation 2 is 1.

## **INVENTORY EFFECTS**

Table 3 shows summaries of the statewide summer episodic on-road motor vehicle inventories calculated using internal working draft Emfac2007 version 2.223, which contains changes noted in this document. These inventories were calculated by running the model for **summer** on an area-average basis to determine the impact on a statewide basis. Table 3 shows that this change will increase statewide emissions of ROG from **all** on-road motor vehicles in the

<sup>5</sup> The CF for high emitting running loss vehicles is 1 on the assumption that these vehicles are already leaking fuel, and hence any changes in fuel RVP do not impact the emissions.

2002 calendar year by 22.58 tons per day, respectively. To put this in perspective, this will change statewide ROG on-road motor vehicle emissions in 2002 by 2.04%. Similarly, Table 3 shows that in 2015 the statewide on-road motor vehicle inventory of ROG will increase by 22.72 tons per day, which is equivalent to an increase of 4.32%.

Tables 4 through 8 show the impact of these changes on summer episodic inventories from Sacramento, San Diego, San Francisco, San Joaquin and the South Coast Air Basin, respectively.

**Table 3 Impact of Regime Specific Evaporative Calculations on Statewide Inventories**

Statewide Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2007 draft ver 2.222)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	14817641	497419840	3594.92	33242.95	2776.34	334666.40	58.53
1990	22515972	786020420	2505.02	26389.80	2925.35	486745.50	80.92
2000	26785744	897559680	1351.70	13472.36	2141.43	523115.70	60.27
2002	28178674	958260290	1105.50	10844.68	1907.85	554386.10	59.98
2005	30910260	1034734700	940.41	9008.88	1731.54	601749.20	63.91
2010	33960136	1121785100	703.24	6452.69	1240.23	652419.00	62.56
2015	36789816	1219000600	526.46	4482.87	825.49	723144.30	63.95
2020	39667496	1318458400	410.67	3194.08	563.10	790286.30	66.57
Statewide Summer Episodic On-Road Motor Vehicle Inventories With Corrections To Evap Regimes (Calculated Using EMFAC2007 draft ver 2.223)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	14817641	497419840	3593.73	33242.95	2776.34	334666.40	58.53
1990	22515972	786020420	2511.83	26389.80	2925.35	486745.50	80.92
2000	26785744	897559680	1378.52	13472.36	2141.43	523115.70	60.27
2002	28178674	958260290	1128.07	10844.68	1907.85	554386.10	59.98
2005	30910260	1034734700	961.55	9008.88	1731.54	601749.20	63.91
2010	33960136	1121785100	725.25	6452.69	1240.23	652419.00	62.56
2015	36789816	1219000600	549.18	4482.87	825.49	723144.30	63.95
2020	39667496	1318458400	431.99	3194.08	563.10	790286.30	66.57
Difference (Ver. 2.223 - Ver. 2.222) in Statewide Emission Inventories (tons per day)							
Cal. Year	Population	VMT(miles)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0	0	-1.19	0.00	0.00	0.00	0.00
1990	0	0	6.80	0.00	0.00	0.00	0.00
2000	0	0	26.82	0.00	0.00	0.00	0.00
2002	0	0	22.58	0.00	0.00	0.00	0.00
2005	0	0	21.15	0.00	0.00	0.00	0.00
2010	0	0	22.01	0.00	0.00	0.00	0.00
2015	0	0	22.72	0.00	0.00	0.00	0.00
2020	0	0	21.32	0.00	0.00	0.00	0.00
Percentage Change in Statewide Emission Inventories (relative to Ver. 2.222)							
Cal. Year	Population	VMT	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0.00%	0.00%	-0.03%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.98%	0.00%	0.00%	0.00%	0.00%
2002	0.00%	0.00%	2.04%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.25%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	3.13%	0.00%	0.00%	0.00%	0.00%
2015	0.00%	0.00%	4.32%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	5.19%	0.00%	0.00%	0.00%	0.00%
ROG_Tot <sup>1</sup> - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.							
PM10_Tot <sup>2</sup> - Total emissions from running, starting, idle processes, and from tire wear and brake wear.							

**Table 4 Impact of Regime Specific Evaporative Calculations on Sacramento Valley Air Basin Inventories**

Sacramento Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2007 draft ver 2.222)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	1189906	39432972	302.72	2851.30	230.57	26433.59	5.01
1990	1761329	61722384	205.12	2160.51	244.81	38686.56	7.19
2000	2069264	67513488	114.90	1114.70	177.62	40963.57	5.14
2002	2254476	74678744	97.89	928.26	162.31	44579.40	5.13
2005	2566627	82908240	87.23	797.00	151.48	49828.34	5.54
2010	2862687	91412848	67.54	578.74	108.06	54246.95	5.30
2015	3173468	103683790	50.09	394.28	70.94	61565.21	5.35
2020	3454848	113224970	38.60	276.85	47.08	68309.14	5.58

  

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Corrections To Evap Regimes (Calculated Using EMFAC2007 draft ver 2.223)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	1189906	39432972	302.10	2851.30	230.57	26433.59	5.01
1990	1761329	61722384	205.22	2160.51	244.81	38686.56	7.19
2000	2069264	67513488	116.43	1114.70	177.62	40963.57	5.14
2002	2254476	74678744	99.22	928.26	162.31	44579.40	5.13
2005	2566627	82908240	88.53	797.00	151.48	49828.34	5.54
2010	2862687	91412848	68.90	578.74	108.06	54246.95	5.30
2015	3173468	103683790	51.46	394.28	70.94	61565.21	5.35
2020	3454848	113224970	39.85	276.85	47.08	68309.14	5.58

  

Difference (Ver. 2.223 - Ver. 2.222) in Sacramento Emission Inventories (tons per day)							
Cal. Year	Population	VMT(miles)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0	0	-0.62	0.00	0.00	0.00	0.00
1990	0	0	0.10	0.00	0.00	0.00	0.00
2000	0	0	1.53	0.00	0.00	0.00	0.00
2002	0	0	1.33	0.00	0.00	0.00	0.00
2005	0	0	1.30	0.00	0.00	0.00	0.00
2010	0	0	1.37	0.00	0.00	0.00	0.00
2015	0	0	1.37	0.00	0.00	0.00	0.00
2020	0	0	1.25	0.00	0.00	0.00	0.00

  

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.222)							
Cal. Year	Population	VMT	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0.00%	0.00%	-0.21%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.33%	0.00%	0.00%	0.00%	0.00%
2002	0.00%	0.00%	1.36%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.50%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	2.03%	0.00%	0.00%	0.00%	0.00%
2015	0.00%	0.00%	2.73%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	3.24%	0.00%	0.00%	0.00%	0.00%

  

ROG\_Tot<sup>1</sup> - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.  
 PM10\_Tot<sup>2</sup> - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

**Table 5 Impact of Regime Specific Evaporative Calculations on San Diego Air Basin Inventories**

San Diego Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2007 draft ver 2.222)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	1097561	33909912	299.59	2718.84	177.68	23910.29	3.13
1990	1874269	65479140	201.85	2149.62	203.22	41219.40	4.91
2000	2227749	74069576	101.93	1024.99	139.72	42102.26	4.15
2002	2373918	80020584	84.92	842.12	123.56	45460.80	4.28
2005	2654406	87498144	73.75	720.32	110.63	49927.56	4.70
2010	2859402	92355784	54.75	504.38	81.37	52432.97	4.76
2015	3090088	99320864	42.02	351.54	57.14	56563.80	4.89
2020	3248809	103131030	34.36	258.71	41.74	59276.95	5.05

  

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Corrections To Evap Regimes (Calculated Using EMFAC2007 draft ver 2.223)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	1097561	33909912	299.45	2718.84	177.68	23910.29	3.13
1990	1874269	65479140	202.51	2149.62	203.22	41219.40	4.91
2000	2227749	74069576	103.89	1024.99	139.72	42102.26	4.15
2002	2373918	80020584	86.58	842.12	123.56	45460.80	4.28
2005	2654406	87498144	75.36	720.32	110.63	49927.56	4.70
2010	2859402	92355784	56.49	504.38	81.37	52432.97	4.76
2015	3090088	99320864	43.89	351.54	57.14	56563.80	4.89
2020	3248809	103131030	36.18	258.71	41.74	59276.95	5.05

  

Difference (Ver. 2.223 - Ver. 2.222) in San Diego Emission Inventories (tons per day)							
Cal. Year	Population	VMT(miles)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0	0	-0.14	0.00	0.00	0.00	0.00
1990	0	0	0.66	0.00	0.00	0.00	0.00
2000	0	0	1.96	0.00	0.00	0.00	0.00
2002	0	0	1.66	0.00	0.00	0.00	0.00
2005	0	0	1.60	0.00	0.00	0.00	0.00
2010	0	0	1.74	0.00	0.00	0.00	0.00
2015	0	0	1.87	0.00	0.00	0.00	0.00
2020	0	0	1.81	0.00	0.00	0.00	0.00

  

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.222)							
Cal. Year	Population	VMT	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0.00%	0.00%	-0.05%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	0.33%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.92%	0.00%	0.00%	0.00%	0.00%
2002	0.00%	0.00%	1.95%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.18%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	3.17%	0.00%	0.00%	0.00%	0.00%
2015	0.00%	0.00%	4.46%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	5.28%	0.00%	0.00%	0.00%	0.00%

  

ROG\_Tot<sup>1</sup> - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10\_Tot<sup>2</sup> - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

**Table 6 Impact of Regime Specific Evaporative Calculations on San Francisco Air Basin Inventories**

San Francisco Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2007 draft ver 2.222)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	3577805	113122960	852.86	7925.13	610.44	70639.92	9.41
1990	4628184	152582580	476.10	5046.66	515.78	86382.74	11.52
2000	5519282	177297100	253.17	2506.44	338.18	95585.23	9.61
2002	5644236	183115630	213.29	2120.94	309.03	98903.45	9.56
2005	6003726	191004560	172.02	1666.94	259.01	103449.60	10.09
2010	6757176	213706530	131.12	1237.67	191.46	122904.50	11.14
2015	7193950	227056960	94.35	847.25	128.97	133090.40	11.58
2020	7683764	243221520	70.50	587.56	89.22	143040.30	12.11
San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Corrections To Evap Regimes (Calculated Using EMFAC2007 draft ver 2.223)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	3577805	113122960	852.51	7925.13	610.44	70639.92	9.41
1990	4628184	152582580	478.15	5046.66	515.78	86382.74	11.52
2000	5519282	177297100	258.79	2506.44	338.18	95585.23	9.61
2002	5644236	183115630	217.97	2120.94	309.03	98903.45	9.56
2005	6003726	191004560	176.45	1666.94	259.01	103449.60	10.09
2010	6757176	213706530	136.01	1237.67	191.46	122904.50	11.14
2015	7193950	227056960	99.43	847.25	128.97	133090.40	11.58
2020	7683764	243221520	75.25	587.56	89.22	143040.30	12.11
Difference (Ver. 2.223 - Ver. 2.222) in San Francisco Emission Inventories (tons per day)							
Cal. Year	Population	VMT(miles)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0	0	-0.35	0.00	0.00	0.00	0.00
1990	0	0	2.05	0.00	0.00	0.00	0.00
2000	0	0	5.62	0.00	0.00	0.00	0.00
2002	0	0	4.67	0.00	0.00	0.00	0.00
2005	0	0	4.43	0.00	0.00	0.00	0.00
2010	0	0	4.88	0.00	0.00	0.00	0.00
2015	0	0	5.08	0.00	0.00	0.00	0.00
2020	0	0	4.74	0.00	0.00	0.00	0.00
Percentage Change in San Francisco Emission Inventories (relative to Ver. 2.222)							
Cal. Year	Population	VMT	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0.00%	0.00%	-0.04%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	0.43%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	2.22%	0.00%	0.00%	0.00%	0.00%
2002	0.00%	0.00%	2.19%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.57%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	3.72%	0.00%	0.00%	0.00%	0.00%
2015	0.00%	0.00%	5.39%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	6.73%	0.00%	0.00%	0.00%	0.00%
ROG_Tot <sup>1</sup> - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.							
PM10_Tot <sup>2</sup> - Total emissions from running, starting, idle processes, and from tire wear and brake wear.							



**Table 7 Impact of Regime Specific Evaporative Calculations on San Joaquin Valley Air Basin Inventories**

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2007 draft ver 2.222)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	1023520	38087232	268.68	2719.50	306.72	30834.62	10.43
1990	1679639	63364384	222.68	2391.78	372.62	48763.47	14.38
2000	2330556	82586816	144.56	1432.26	321.38	59599.26	9.85
2002	2487499	89559584	120.06	1158.41	298.17	63278.16	9.32
2005	2830626	99974768	107.63	996.98	286.62	70950.50	9.75
2010	3199563	112108190	82.11	712.55	200.17	77019.21	8.45
2015	3615226	130570590	61.22	487.70	130.91	90650.34	8.17
2020	4024302	146839180	47.81	349.00	86.83	103983.90	8.45
San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Corrections To Evap Regimes (Calculated Using EMFAC2007 draft ver 2.223)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	1023520	38087232	268.16	2719.50	306.72	30834.62	10.43
1990	1679639	63364384	222.74	2391.78	372.62	48763.47	14.38
2000	2330556	82586816	146.33	1432.26	321.38	59599.26	9.85
2002	2487499	89559584	121.56	1158.41	298.17	63278.16	9.32
2005	2830626	99974768	109.06	996.98	286.62	70950.50	9.75
2010	3199563	112108190	83.55	712.55	200.17	77019.21	8.45
2015	3615226	130570590	62.63	487.70	130.91	90650.34	8.17
2020	4024302	146839180	49.09	349.00	86.83	103983.90	8.45
Difference (Ver. 2.223 - Ver. 2.222) in San Joaquin Emission Inventories (tons per day)							
Cal. Year	Population	VMT(miles)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0	0	-0.52	0.00	0.00	0.00	0.00
1990	0	0	0.06	0.00	0.00	0.00	0.00
2000	0	0	1.78	0.00	0.00	0.00	0.00
2002	0	0	1.50	0.00	0.00	0.00	0.00
2005	0	0	1.43	0.00	0.00	0.00	0.00
2010	0	0	1.44	0.00	0.00	0.00	0.00
2015	0	0	1.40	0.00	0.00	0.00	0.00
2020	0	0	1.28	0.00	0.00	0.00	0.00
Percentage Change in San Joaquin Emission Inventories (relative to Ver. 2.222)							
Cal. Year	Population	VMT	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0.00%	0.00%	-0.19%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.23%	0.00%	0.00%	0.00%	0.00%
2002	0.00%	0.00%	1.25%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.33%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.75%	0.00%	0.00%	0.00%	0.00%
2015	0.00%	0.00%	2.29%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	2.68%	0.00%	0.00%	0.00%	0.00%
ROG_Tot <sup>1</sup> - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.							
PM10_Tot <sup>2</sup> - Total emissions from running, starting, idle processes, and from tire wear and brake wear.							

**Table 8 Impact of Regime Specific Evaporative Calculations on South Coast Air Basin Inventories**

South Coast Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2007 draft ver 2.222)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	6132212	212274660	1442.28	13067.34	1015.86	139265.00	18.49
1990	9485851	332536610	1046.33	10874.90	1052.31	198269.60	25.01
2000	11074958	374707840	546.28	5458.38	736.62	207370.30	20.39
2002	11606219	399479680	438.11	4328.28	638.18	219657.10	20.68
2005	12648745	431110880	361.83	3511.98	559.87	237493.20	22.36
2010	13569852	455681180	258.82	2412.90	400.99	248904.50	22.67
2015	14488934	482021280	195.22	1689.20	267.42	269658.70	23.76
2020	15463266	514247550	153.53	1209.03	184.07	288978.70	24.79

  

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Corrections To Evap Regimes (Calculated Using EMFAC2007 draft ver 2.223)							
Cal. Year	Population	VMT*(1000)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	6132212	212274660	1442.23	13067.34	1015.86	139265.00	18.49
1990	9485851	332536610	1048.27	10874.90	1052.31	198269.60	25.01
2000	11074958	374707840	557.68	5458.38	736.62	207370.30	20.39
2002	11606219	399479680	447.60	4328.28	638.18	219657.10	20.68
2005	12648745	431110880	370.44	3511.98	559.87	237493.20	22.36
2010	13569852	455681180	267.35	2412.90	400.99	248904.50	22.67
2015	14488934	482021280	204.05	1689.20	267.42	269658.70	23.76
2020	15463266	514247550	161.85	1209.03	184.07	288978.70	24.79

  

Difference (Ver. 2.223 - Ver. 2.222) in South Coast Emission Inventories (tons per day)							
Cal. Year	Population	VMT(miles)	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0	0	-0.05	0.00	0.00	0.00	0.00
1990	0	0	1.94	0.00	0.00	0.00	0.00
2000	0	0	11.40	0.00	0.00	0.00	0.00
2002	0	0	9.49	0.00	0.00	0.00	0.00
2005	0	0	8.61	0.00	0.00	0.00	0.00
2010	0	0	8.52	0.00	0.00	0.00	0.00
2015	0	0	8.83	0.00	0.00	0.00	0.00
2020	0	0	8.32	0.00	0.00	0.00	0.00

  

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.222)							
Cal. Year	Population	VMT	ROG_Tot <sup>1</sup>	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot <sup>2</sup>
1980	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1990	0.00%	0.00%	0.19%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	2.09%	0.00%	0.00%	0.00%	0.00%
2002	0.00%	0.00%	2.17%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.38%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	3.29%	0.00%	0.00%	0.00%	0.00%
2015	0.00%	0.00%	4.52%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	5.42%	0.00%	0.00%	0.00%	0.00%

  

ROG\_Tot<sup>1</sup> - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10\_Tot<sup>2</sup> - Total emissions from running, starting, idle processes, and from tire wear and brake wear.