**EMFAC98**

**Emissions Estimation Model**

Presented to:

Mobile Sources Technical Review
Subcommittee
October, 1998

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**How is the Inventory Calculated?**

- Process Rate (Emission Factor)*
  - ARB Vehicle Testing
- Number of Sources (Population)*
  - DVM Registration Data
- Activity (Miles or Hours of Use) =
  - CALTRANS/BAR/Activity Surveys
- Inventory (Tons/Day)

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**What’s in the Current Inventory?**

- Eight Broad Vehicle Classes
- Three Fuels (Gas/Diesel/Electric)
- Two Broad Tech Groups (Cat/Non-Cat)
- 50 Calendar Years (1970-2020)
- Two Exhaust Processes (Starts/Running)
- Four Evaporative Processes
- Six Pollutants (HC/CO/NOx/PM/Sox/Pb)
- Also Tracks CO2 and Fuel Consumption

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**MVEI7G Vs. EMFACX**

**Output**

- Tons/day
- gm/mi
- binary

**CALIMFAC**

**EMFAC**

**BURDEN**

**Weight**

- 8 Vehicle Classes
  - PC, LDT, MDT, LHDT, MHDT, HHDT, UB, MCY
  - By cat/non_cat and diesel
- 20 Technology Groups Categorize PC-MDT
  - Surveys 1-9, 2,600 vehicles covering 1968-86 MYs
  - Emission estimates from bags 1 and 2 of the FTP
- IM Simulation
  - 1984 ID/RR based on 1984 IM Eval data
  - 1990 Based on projected improvements in IM

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**Why Change the Inventory?**

- Incorporation of New Data
  - 7G Surveillances 1-9, 2,600 Vehicles
  - 98 Surveillances 1-12, 5,200 Vehicles
- Significant Changes to Methodology
  - New Emissions and Activity Estimates
- Reflect Recently Adopted Regulations
  - SFTP/AC, Wintertime Oxygenates
- Provide More Modeling Flexibility

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**EMFACX OBJECTIVES**

- Create a Seamless/Integrated Model for the prediction of on-road emissions and the effects of I/M.
- Project Began: September of 1992
- Contractor: Sierra Research - Coding
- Analysis/Research - Primarily In-House
- Costs to Date $400,000
EMFAC98 System Requirements
- WIN95/NT Operating System
- 16 MB RAM (32 Preferred)
- Pentium 100 Mhz (P2-200 Preferred)
- 50 MB Hard Disk Space
- 200 MB Free Disk Space of Execution
  - Graphical User Interface
  - Digital Visual Fortran Compiled

Significant Changes in Emission Factors
- Model to be run on a UC Basis
  - Elimination of Cycle Correction Factors
  - Incorporation of the Latest Data
  - Elimination of High Emitter Corrections
  - Redefinition of Evaporative Processes
  - Hot Soak (35 mins) / Running Loss by Time
  - Re-evaluation of I/M
  - Not as effective as previously modeled
  - Re-evaluation of OBDII

Significant Changes in Activity
- Hourly Activity Estimates
- County Specific Registration and Accrual
- Revised Temperature Profiles
- Addition of Humidity Profiles
- Calculation of VMT
- VMT Distribution by Trip vs. Link Speeds

Comparison With 7G

<table>
<thead>
<tr>
<th>MVEI7G</th>
<th>EMFAC98</th>
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<tbody>
<tr>
<td>Six Periods</td>
<td>24 Periods</td>
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<tr>
<td>Project to 2020</td>
<td>Project to 2040</td>
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<tr>
<td>Two Temp Profiles</td>
<td>Fifteen Temp Profiles</td>
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<tr>
<td>35 Model Years</td>
<td>45 Model Years</td>
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<tr>
<td>Statewide Accrual</td>
<td>County Specific</td>
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<td>Statewide Registration</td>
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<td>Speeds 5-65</td>
<td>Speeds 0-75</td>
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<tr>
<td>One Speed Distribution</td>
<td>Class Specific Speeds</td>
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Emission Regime Definitions
Sample calculation of one IM cycle

Analysis of I/M

1984 Program

1990 Program

Enhanced Program
• ID rates based on 600+ vehicles

Model Year Specific Emission Factors
TOG (with I/M)

Hydrocarbon Emission Distribution
Passenger Cars in 2010