

## EMFAC98 Emissions Estimation Model

Presented to:  
**Mobile Sources Technical Review  
 Subcommittee**  
 October, 1998

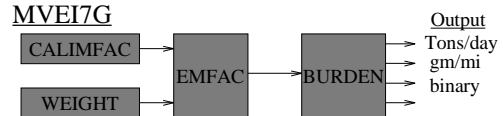
## How is the Inventory Calculated?

- ◆ 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)

## 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

## MVEI7G Vs. EMFACX



- 8 Vehicle Classes  
*-PC, LDT, MDT, LHDT, MHDT, HHDT, UB, MCY*  
*-By cat/non\_cat and diesel*
- 20 Technology Groups Categorize PC-MDT  
*-Surveillances 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*

## 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

## 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

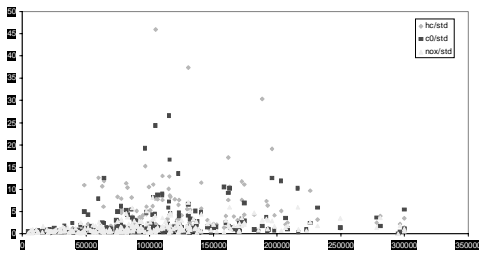
- ◆ Model to be run on a UC Basis
  - Elimination of Cycle Correction Factors
- ◆ Incorporation of the Latest Data
  - Elimination of High Emitter Corrections
- ◆ Redefinition of Evaporative Processes
  - Hot Soak (35 mins) / Running Loss by Time
- ◆ Re-evaluation of I/M
  - Not as effective as previously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

## Significant Changes in Activity

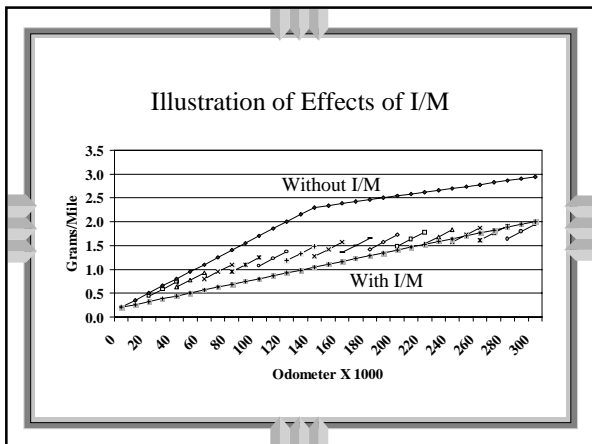
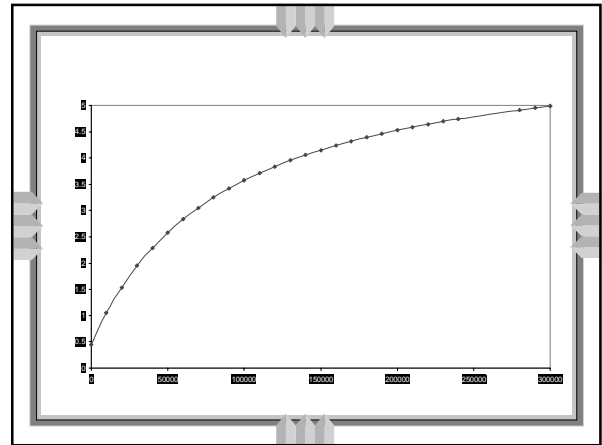
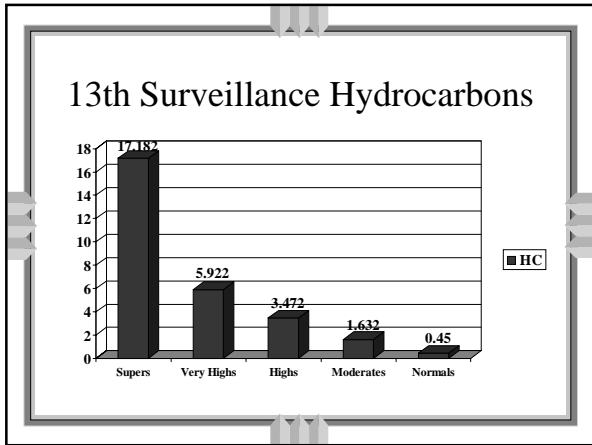
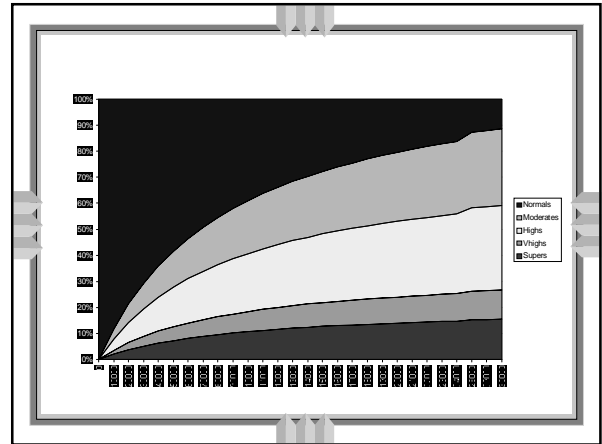
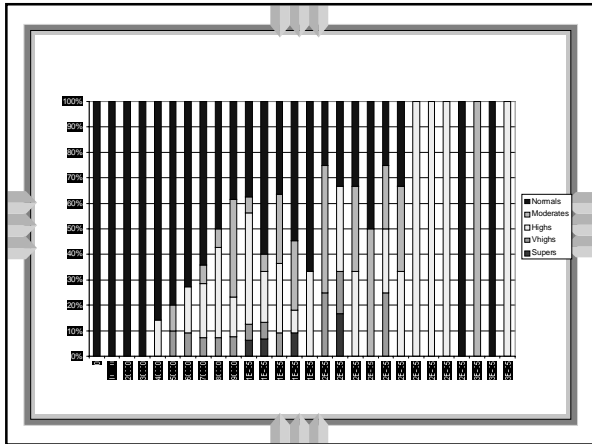
- ◆ Hourly Activity Estimates
- ◆ County Specific Registration and Accrual
- ◆ Revised Temperature Profiles
- ◆ Addition of Humidity Profiles
- ◆ Calculation of VMT
- ◆ VMT Distribution by Trip vs. Link Speeds

## Comparison With 7G

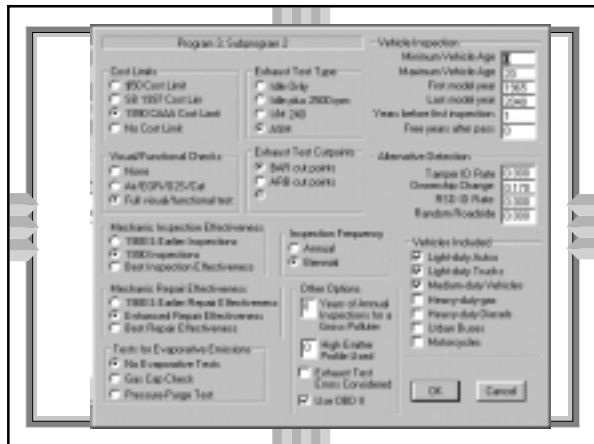
- | MVEI7G                   | EMFAC98                 |
|--------------------------|-------------------------|
| ◆ Six Periods            | ◆ 24 Periods            |
| ◆ Project to 2020        | ◆ Project to 2040       |
| ◆ Two Temp Profiles      | ◆ Fifteen Temp Profiles |
| ◆ 35 Model Years         | ◆ 45 Model Years        |
| ◆ Statewide Accrual      | ◆ County Specific       |
| ◆ Statewide Registration | ◆ County Specific       |
| ◆ Speeds 5-65            | ◆ Speeds 0-75           |
| ◆ One Speed Distribution | ◆ Class Specific Speeds |



## Emission Regime Definitions

- ### California Smog Check II
- ◆ 1994 to 1998
  - ◆ Pre - 1973
  - ◆ Enhanced Area
  - ◆ Basic Area
  - ◆ All Other Areas
  - ◆ Dedicated 4WD
  - ◆ Antilock Brakes
  - ◆ Heavy-Duty Gas
  - ◆ High Emitter Profile
  - ◆ All Other
  - ◆ Exempt - Vehicle Sold
  - ◆ Exempt
  - ◆ ASM 25/25 & 50/15
  - ◆ Two Speed Idle (TSI)
  - ◆ Change of Ownership
  - ◆ TSI
  - ◆ TSI
  - ◆ TSI
  - ◆ TSI
  - ◆ Test Only
  - ◆ Test Only/Test & Repair
  - ◆ Gold Shield/GSGR



Sample calculation of one IM cycle

**Analysis of I/M**

1984 Program                      1990 Program

**Enhanced Program**

- ID rates based on 600+ vehicles

