EPA's Proposal for MOBILE6

Modeling Evaporative Emissions Using RTD Data

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Real-Time Diurnal (RTD) Testing

- Previous Versions of MOBILE
  - Used an Accelerated One-Hour Test to Simulate 24-Hour Day's Evaporative Emissions.
- MOBILE6
  - Uses a 24-Hour Test to Simulate in "Real Time" the 24-Hour Day's Evaporative Emissions.

Available Data

- EPA Contracted Testing
  - 119 LDVs & LDTs -- most with multiple RVPs & multiple temperature cycles
- CRC Testing
  - 151 LDVs & LDTs -- single RVP & single temperature cycles

RTD Temperature Cycle

24-Hour Cycling of Temperatures Between 72º and 96º F

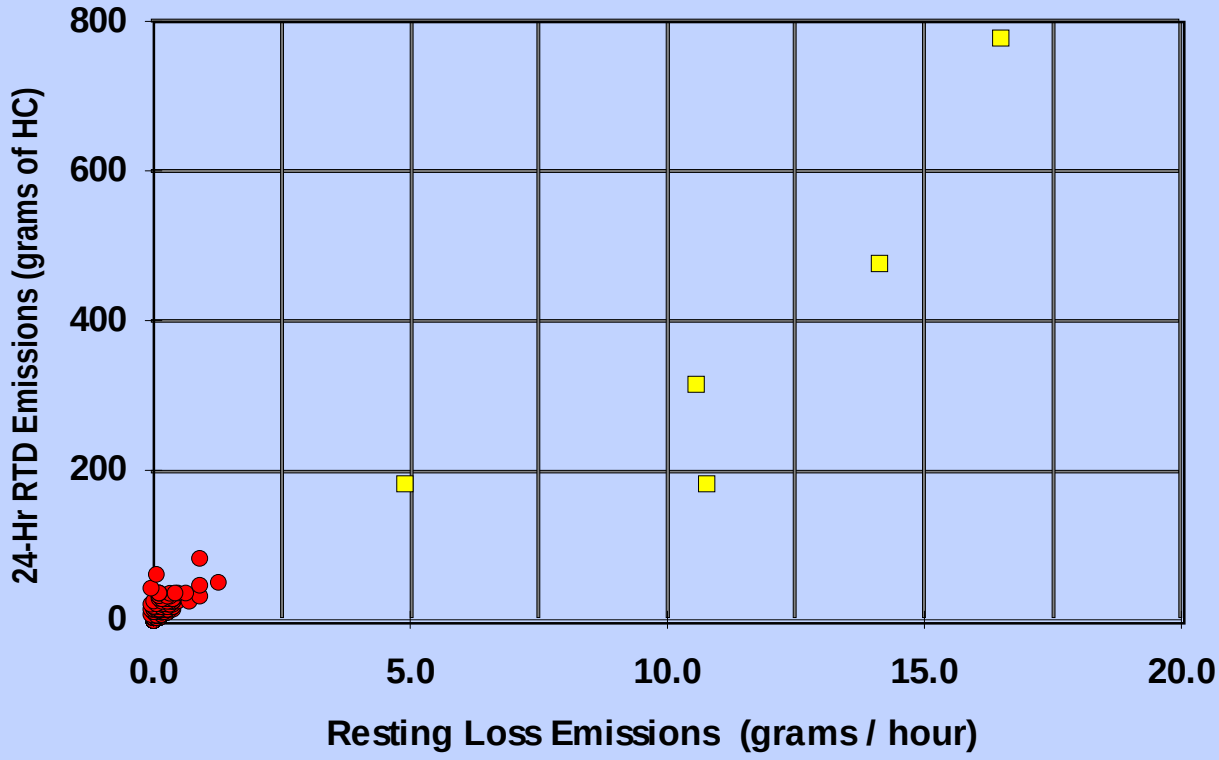
Modeling Evaporative Emissions Using RTD Data
(Items to Be Covered)

- Evaporative Mechanisms Represented
- Estimating Resting Loss and Diurnal Emissions
- Characterizing Liquid Leakers
- Outstanding Issues

Distinct Evaporative Mechanisms

- Pressure Driven Vapor Leaks
- Resting Losses
  - Primarily permeation losses and vapor leaks
  - Could include minor/undetected liquid leaks
  - Excludes vehicles with gross liquid leaks
- Gross Liquid Leaks

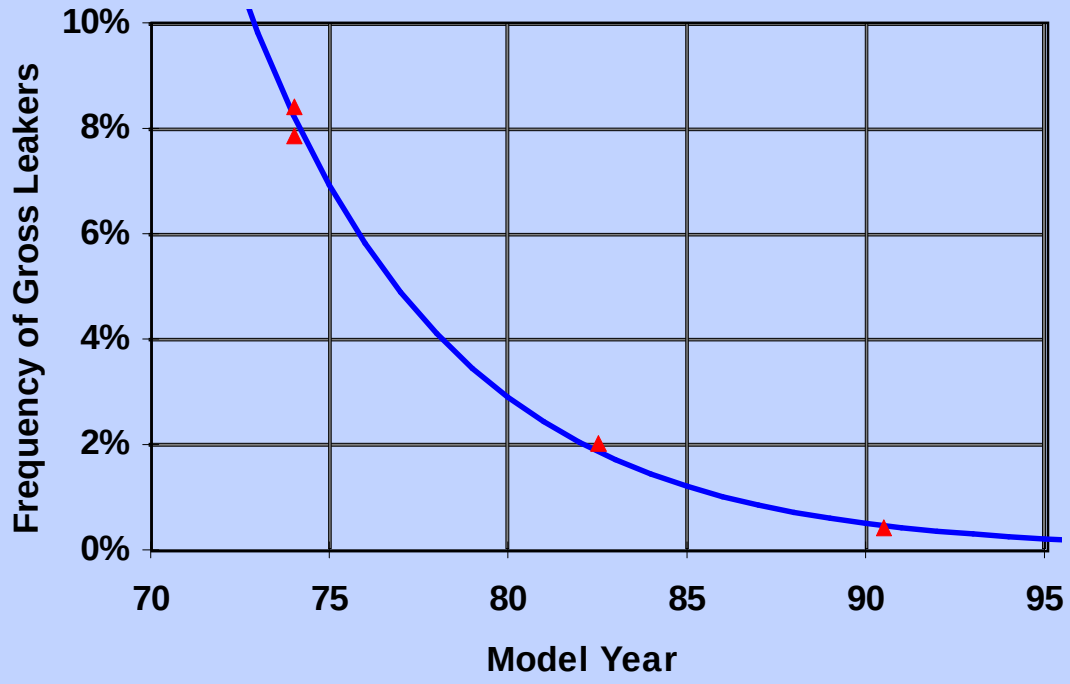
Identifying Vehicles with Gross Liquid Leaks
(At 72º F with 6.8 RVP Fuel)



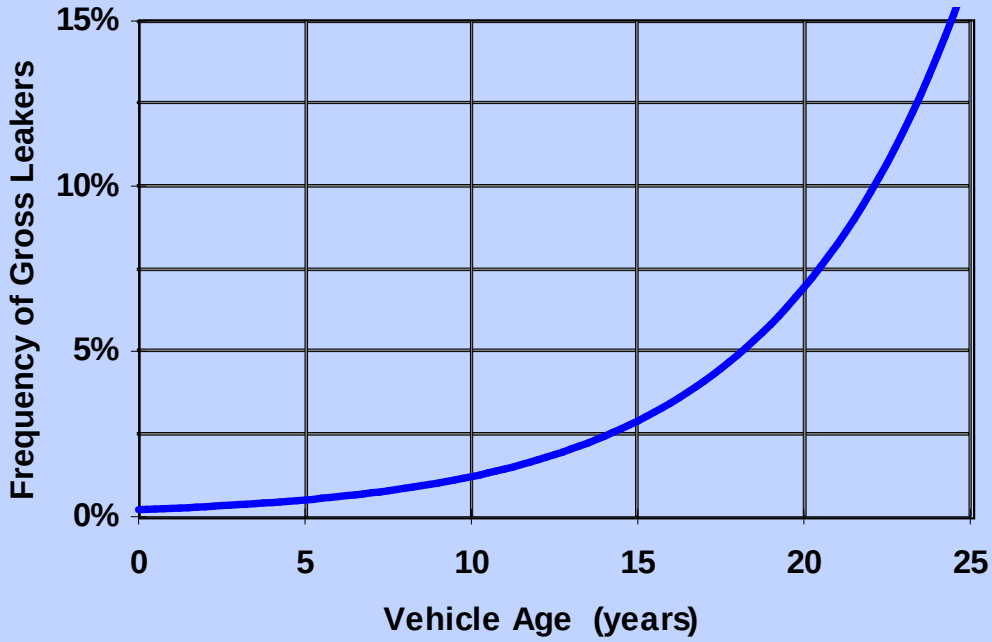
Vehicles with Gross Liquid Leaks

- Treat as a separate category
  (Similar to separating “Super Emitters” from other exhaust emitters)
- Significantly higher RTD emissions than vehicles not having gross liquid leaks
- Contain both:
  - Pressure Driven Vapor Leaks
  - Permeation Losses

Frequency of Gross Liquid Leakers
By Model Year
(Based on Sample Data)



Frequency of Gross Liquid Leakers
By Vehicle Age
(Based on Sample Data)



Emissions of Gross Liquid Leakers

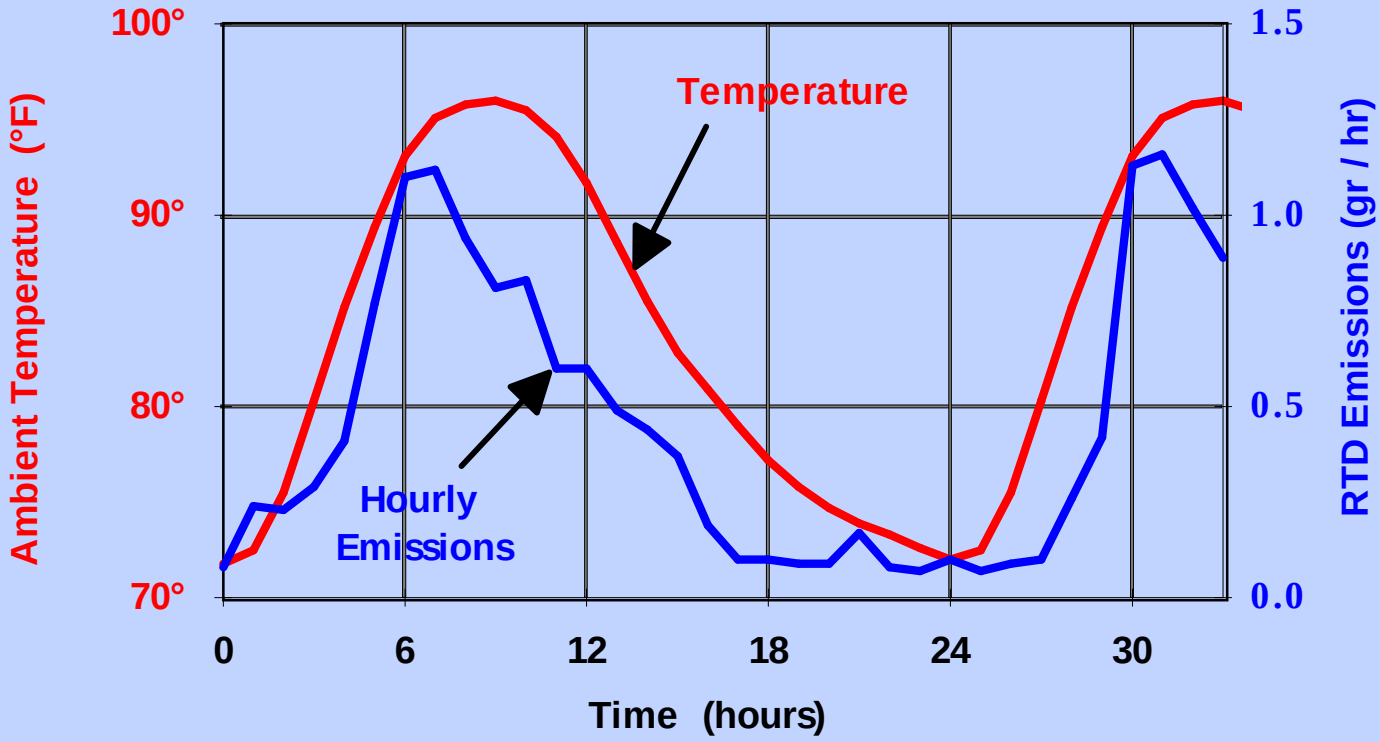
- 24-Hour RTD Emissions:
  - Range Between 80 and 777 grams
  - Mean of 326 grams per day
- Hourly Resting Loss Emissions:
  - Range Between 2.13 and 16.51 grams / hour
  - Mean of 8.83 grams / hour
- Daily (24-Hr) Resting Loss Emissions:
  - 211.9 grams per day
- Diurnal (24-Hr) Emissions:
  - 114.5 grams per day

Stratifying Parameters

- Results on Screening Tests
  - Pass / Fail on Purge Test and Pressure Test
- Fuel Delivery System
  - Carbureted versus Fuel Injected
- Model Year Ranges
  - Pre-1980
  - 1980-85
  - 1986-95
  - 1996 and newer (upcoming analysis)

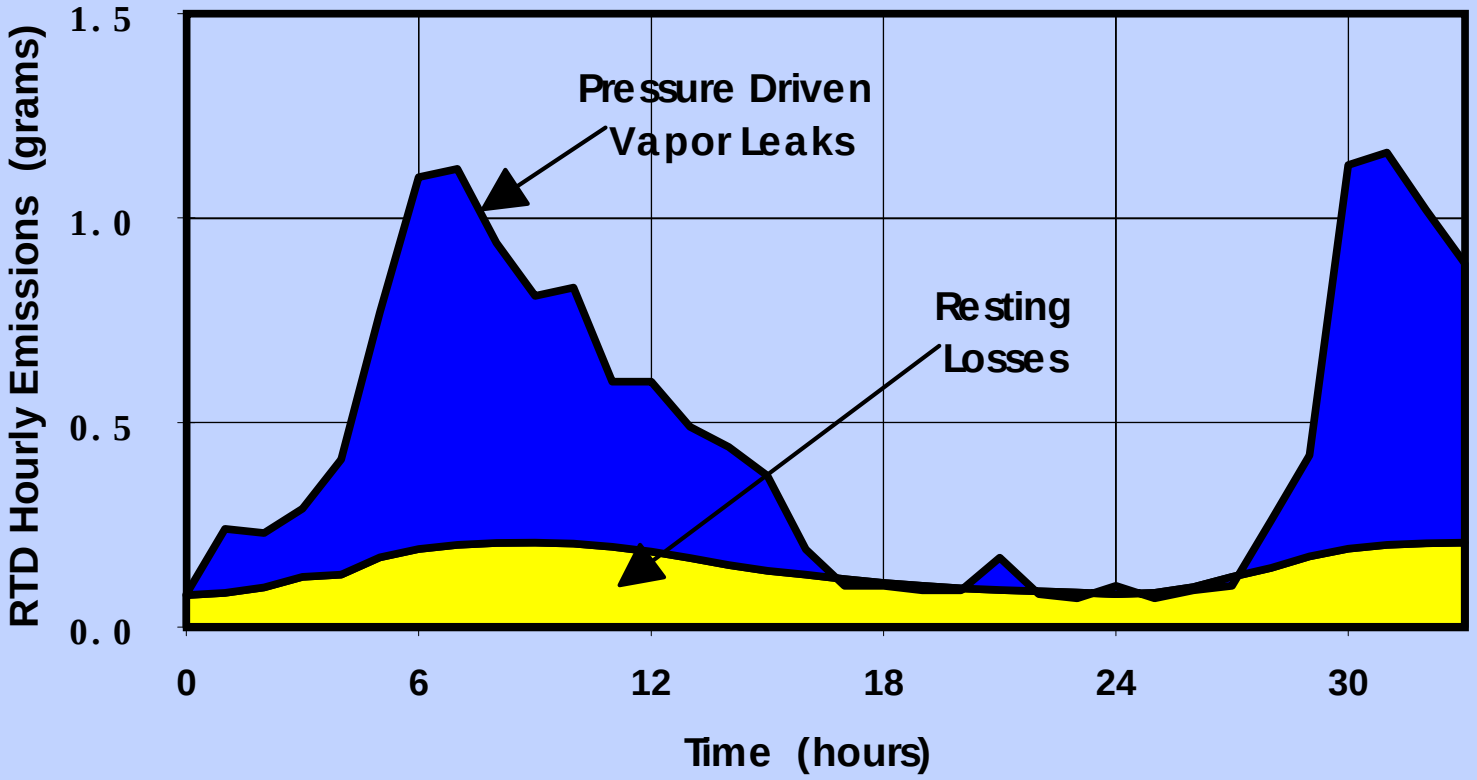
Identifying Resting Losses

Stable Portion of RTD Hourly Emissions

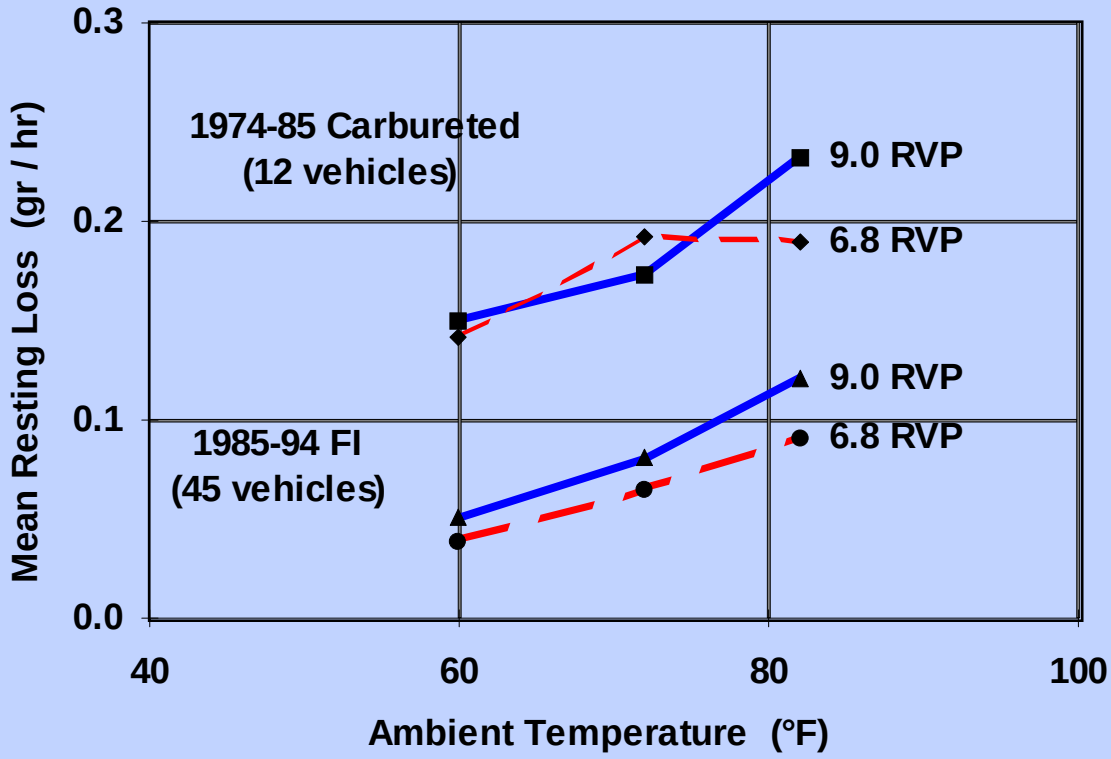


Calculating Pressure Driven Vapor Leaks

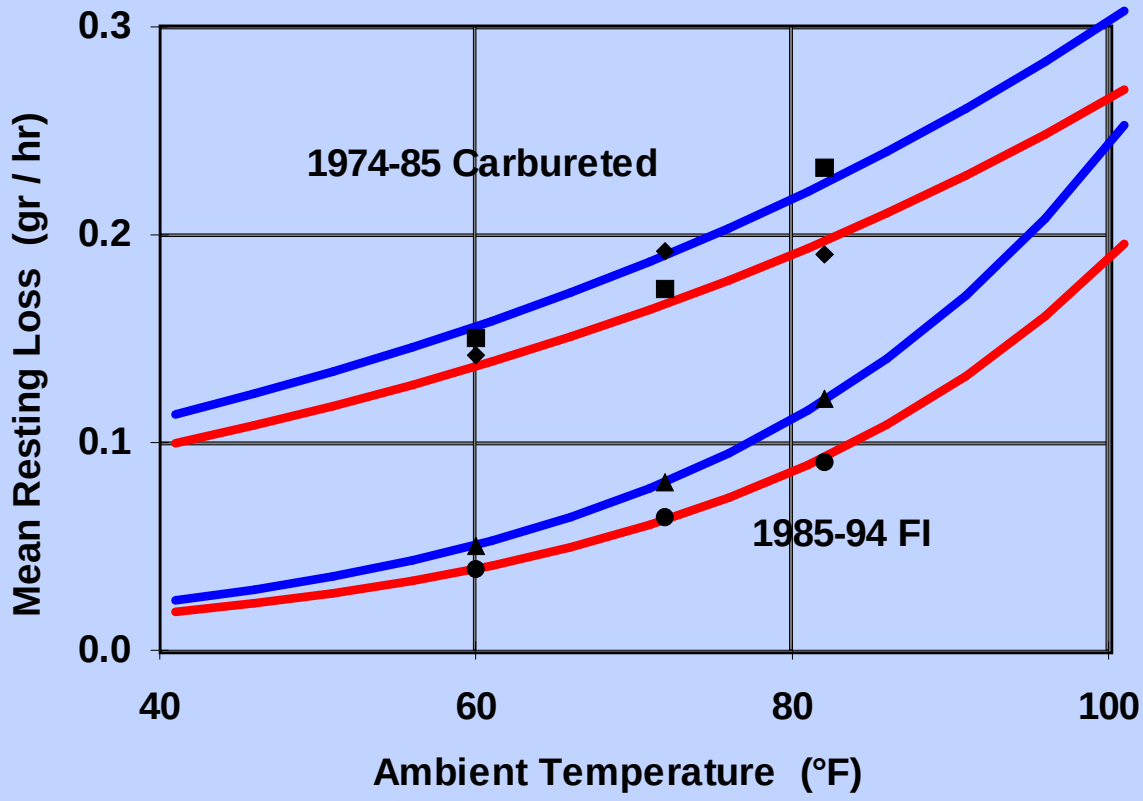
Subtracting Temperature Adjusted Resting Losses from RTD Hourly Results



Hourly Resting Losses versus Temperature
(means of 57 vehicles tested at each of these 6 combinations of temperature and RVP)



Mean Hourly Resting Losses versus Temperature (with regression)



Modeling Resting Loss Emissions

Fuel-Injected Vehicles:

Daily Resting Loss = 39.632 * Hourly Resting Loss

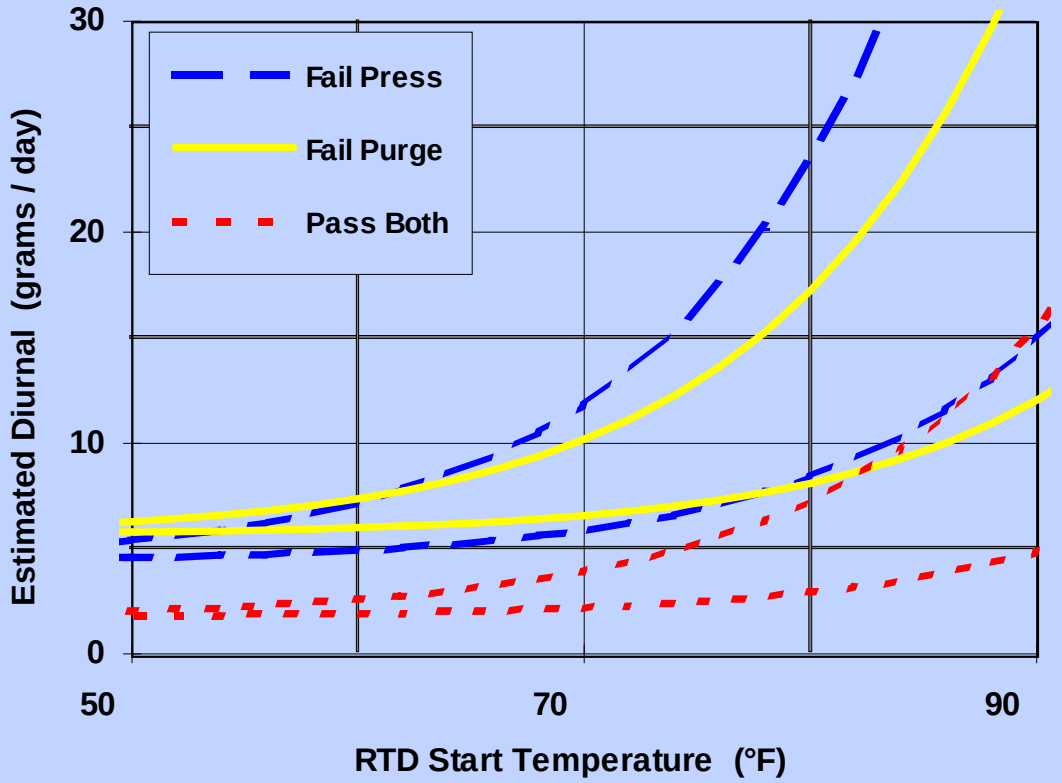
Carbureted Vehicles:

Daily Resting Loss = 29.275 * Hourly Resting Loss

Modeling Diurnal Emissions

- 24-Hr Diurnal = RTD - Daily Resting Loss
- Represented as function of the product of the mean vapor pressure (VP) times the change in vapor pressure
  - Either first or third power of product term

Modeled Diurnal Emissions (1986-95 Fuel Injected Vehicles)



Outstanding Issues

- Comparison with MOBILE5
- Diurnals with Different Temperature Cycles
- Multiple-Day and Partial Diurnals
- Vehicles Certified Using the 72-Hour RTD Test (1996 and newer model years)