

# Technical Developments in the NONROAD Model: *Code Modifications*

Draft NONROAD2002 Workshop  
Ann Arbor, Michigan  
November 5, 2002

# Code Modifications/Corrections

## *PM Calculation Equation*

The equation was:

$$PM = PM_{base} - \left[ BSFC \times 453.6 \times 0.157 \times 0.01 \times (0.0033 - S_{fuel}) \right]$$

g/hr (pointing to PM)  
 g/lb (pointing to 453.6)  
 Converts S percent to weight fraction (pointing to 0.157)  
 In-use S level (%) (pointing to  $S_{fuel}$ )

*Fraction of fuel sulfur converted to PM for engines without traps*

**Add rated power and load factor**

**Correct base fuel sulfur (3300 ppm)**

Now corrected to:

$$PM = PM_{base} - \left[ BSFC \times 453.6 \times P \times L \times 0.157 \times 0.01 \times (0.33 - S_{fuel}) \right]$$

# Code Modifications/Corrections

- **PM** Calculation Equation -- Effect of Corrections:
  - Depends on equipment Hp
  - Net fleet inventory effect is substantial decrease in PM

# Code Modifications/Corrections

- **PM Calculation: New /Base PM Sulfur/ Input Packet**
  - Model assumed 3300-ppm sulfur for input PM EF's when adjusting to in-use sulfur.
  - OPT file now provides more accurate base sulfur for Tier 2 & Tier 3 certification PM EF's.
  - Users should not modify these inputs.

# Code Modifications/Corrections

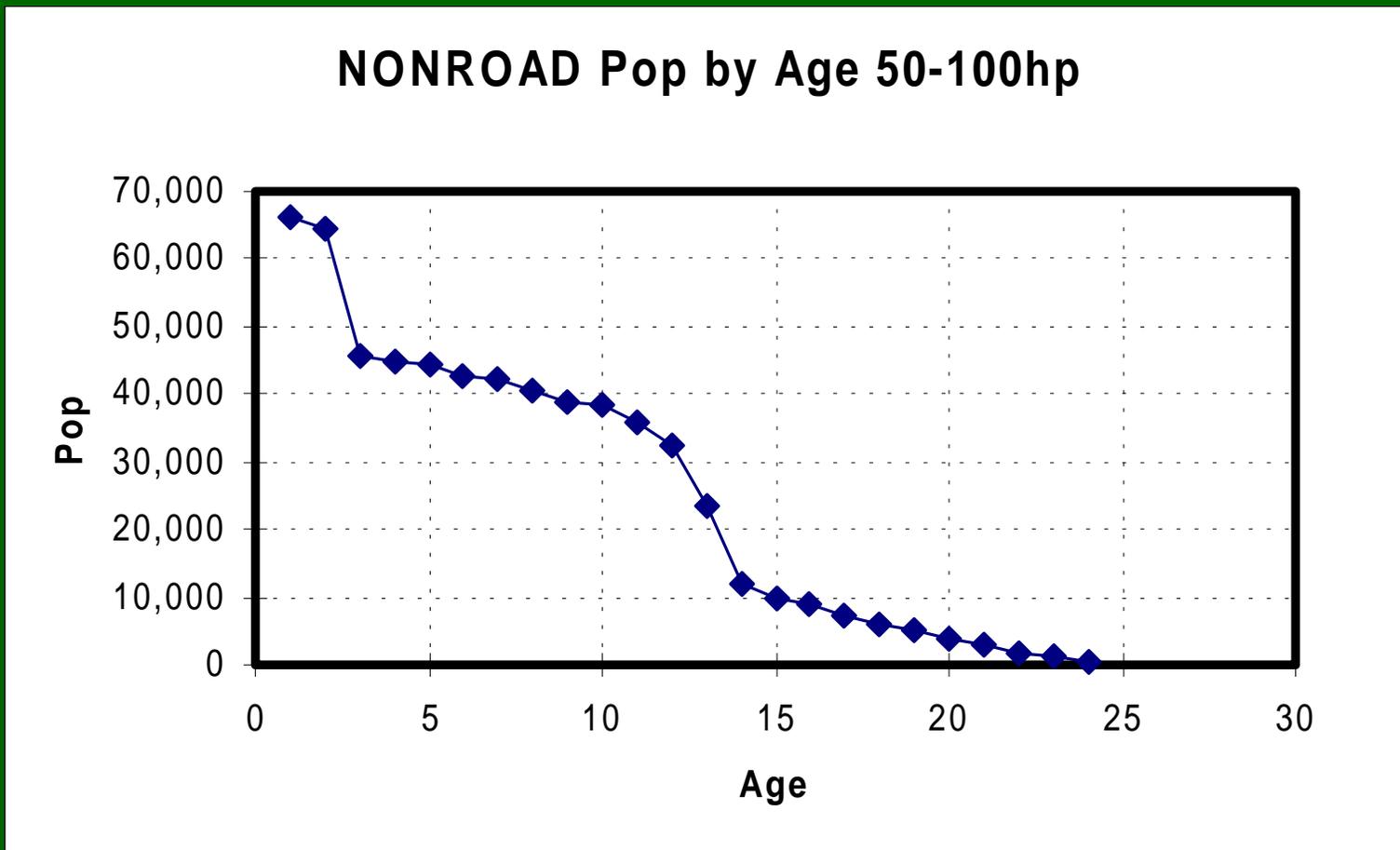
- **SO<sub>2</sub>** Calculation Equation
  - Was missing Load Factor
  - Net effect of correction is to decrease SO<sub>2</sub> by roughly 40%

# Code Modifications/Corrections

- Scrappage & Age Distribution
  - Prior method (year-by-year growth, scrappage, sales calculation) yielded “funny” age distributions
    - Age distribution of base population did not account for growth
    - A high growth rate yielded an unrealistic spike in sales (age distribution)

# Scrappage / Age Distribution

HDD 2007 version (Ag tractors, 3% growth)



# Code Modifications/Corrections

- Scrappage & Age Distribution, con'd
  - New simplified method:
    1. Use growth to determine target calendar year population
    2. Apply default age distribution based on scrappage curve shape and no growth
    3. Adjust for assumed growth rate

# Scrappage / Age Distribution

NR2002 (Agricultural tractors, 3% growth)

NONROAD Pop by Age 50-100hp

