

# Workshop Regarding Regulatory Fuels Activities

May 18, 2001

California Environmental Protection Agency

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**Air Resources Board**

# Agenda

- ✦ Introductions
- ✦ Development of amendments to CARB Diesel Regulations
- ✦ Evaluation of Diesel Fuel Lubrication Oils, Lubricity, and Additives
- ✦ Review of MTBE and other ether De Minimus Levels in CaRFG3 Regulations
- ✦ Ongoing Work on Permeation from the Effects of Ethanol in Gasoline
- ✦ Ongoing Work on Commingling from the Effects of Ethanol in Gasoline
- ✦ Discussion of Legal/Enforcement Issues
- ✦ Open Discussion
- ✦ Closing Remarks

## Proposed Amendments Under Development California Diesel Fuel

- ✦ Lower CARB diesel sulfur limit to 15 ppm
- ✦ Applies to
  - On-road and off-road vehicle uses
  - Stationary sources (Air Toxic Control Measure)
- ✦ Necessary to implement diesel PM risk reduction plan

# Proposed Amendments Under Development California Diesel Fuel (Continued)

- ✦ No changes to aromatic hydrocarbon specifications

# Proposed Amendments Under Development California Diesel Fuel (Continued)

- ✦ Implementation concurrent with EPA rule - 2006
  - No phase-in
  - At this time, no provisions for small refiners

# Amendments Being Considered for California Diesel Fuel

- ✦ Replace test method for determining sulfur content
  - Current test method ASTM D2622-94 (x-ray fluorescence) has detection limit and repeatability values too high for 15 ppm sulfur level
    - detection limit of 10 ppm
    - at 15 ppm sulfur in diesel fuel repeatability is +/- 9 ppm
  - ASTM D5453-93 (ultraviolet fluorescence)
    - is an equivalent test method
    - detection limit of 1 ppm
    - at 15 ppm sulfur in diesel fuel repeatability is +/- 2.8 ppm

## Amendments Being Considered for California Diesel Fuel (cont.)

- ✦ Revise certified diesel fuel formulation procedures
  - Change sulfur specification in reference fuel (15 ppm)
  - Delete sulfate credit for candidate fuel
  - Add provisions to ensure candidate fuel and produced commercial fuels are comparable

## Amendments Being Considered for California Diesel Fuel (cont.)

- Add provisions to ensure candidate fuel and produced commercial fuels are comparable (cont.)
  - candidate fuel subject to same required specifications and ranges as the reference fuel (e.g., API gravity, viscosity, distillation temperatures)
  - candidate fuel could differ from reference fuel by no more than one half of the permitted ranges
  - applies to new and existing certifications
  - exception: candidate fuel in excess of reference fuel ranges can be certified if applicant agrees that the certified diesel fuel formulation includes specification limits based on the candidate fuel



# Diesel Engine Lubricating Oils

- ✦ Initiated study investigating sulfur, ash and other potentially harmful components in lubricating oils
- ✦ Following testing of industry/government work groups
- ✦ Two groups pursuing research:
  - Advanced Petroleum Based Fuels - Diesel Emission Control (APBF-DEC) Lubricants Work Group
    - Industry/government work group
  - Diesel Aftertreatment Sensitivity to Lubricant (DASL)
    - Consortium initiated by Southwest Research Institute (SwRI)

# Status of APBF-DEC Lubricants Work Group

- ✦ Contract for initial phase of 3 phase program awarded in April to Automotive Testing Laboratory (ATL)
- ✦ ATL preparing test engine
- ✦ National Renewable Energy Laboratory (NREL) blending test lubricants
  - 12 additive packages using 4 different base stocks
- ✦ Initial program to characterize effect on engine out emissions of :
  - Lubricant base stock
  - Lubricant additives

# APBF-DEC Lubricants Work Group

## Phase I Testing

- ✦ Testing estimated start date: mid June
- ✦ ~ 6 month test program
- ✦ Emissions to be measured over 5 mode steady state cycle:
  - Gaseous emissions: hydrocarbons, NO<sub>x</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub>
  - Particulate matter (PM) characterization: total PM mass, soluble organic fraction (SOF), including fuel/lubricant contribution, sulfate fraction, polycyclic aromatic hydrocarbon (PAH) content, metals
- ✦ Oil consumption determined for each evaluation operating mode and checked routinely throughout test program

## **Diesel Aftertreatment Sensitivity to Lubricant (DASL) Consortium**

- ✦ Formed by Southwest Research Institute to compliment APBF-DEC Lubricants program
- ✦ Objective: probe impact of sulfur and other lubricant/additive components (including zinc, calcium, barium, magnesium, boron, and anti-wear agents) on diesel emission control systems
- ✦ Being combined with SwRI Non-Thermal Catalyst Deactivation (N-TCD) research consortium - similar subject but different emphasis
  - N-TCD consortium to study catalyst poisoning mechanisms

# Future Activities

- ✦ Status report in November 2001
- ✦ Possible regulatory action in 2006
  - Limit sulfur and/or ash content of lubricating oils
  - Apply to diesel engine lubricating oils for both on-road and off-road vehicles

## Diesel Fuel Lubricity

- ✦ Refinery industry well versed in ensuring adequate lubricity for desulfurized fuel
  - Voluntarily maintaining 1994 Governor's Diesel Fuel Task Force minimum lubricity level
- ✦ ASTM Diesel Fuel Lubricity Task Force completing a major round robin program
  - Seeking to improve precision and response of lubricity measurement for additized fuel
  - Completed testing with 2 laboratory equipment test set-ups
    - Ball on two disks (BOTD)
    - Modified High Frequency Reciprocating Rig or Low Frequency Reciprocating Rig (LFRR)
  - Testing to continue with pump test set-up

# Expect ASTM Lubricity Standard Proposal in December 2001

- ✦ Lubricity forum scheduled for September SAE meeting in San Antonio
  - Introduce ideas for ASTM lubricity standard
  - Explain why standard necessary
- ✦ ASTM Diesel Fuel Lubricity Task Force to propose lubricity standard at December ASTM meeting

## Future Activities

- ✦ Status report in November 2001
- ✦ Possible regulatory action in 2002



# Diesel Deposit Control Additives

- ✦ No diesel fuel additive requirements currently in place
- ✦ Diesel deposit control additives could reduce potential deposit formation in fuel systems and engines
- ✦ Keep engines closer to factory tolerances
- ✦ Minimize deterioration rate of engine-out emission levels
- ✦ Effects both criteria pollutants and toxics (PM)

# Initiated Study of Diesel Fuel Additives

- ✦ Investigate the significance of diesel fuel system and engine deposits and the effect on emissions
- ✦ Investigate feasibility of deposit control additives - effectiveness and cost
- ✦ Possible regulatory action, if needed
  - Develop certification test procedure
  - Develop performance standard

# CaRFG3 Issues

# Gasoline Certification Fuel

- ✦ Plan regulatory update to the CaRFG2 certification fuel specifications
- ✦ Planning additional workshops in the near future
- ✦ Will work closely with auto, oil, and ethanol industries and the ARB Mobile Source Control Division
- ✦ Scheduled for consideration by the ARB Board in November 2001

## MTBE Deminimus Levels

- ✦ Review current CaRFG3 MTBE deminimus limits
- ✦ Change current MTBE deminimus limits to oxygen content equivalent

# Ongoing Permeation Emission Evaluation

- ✦ Contract awarded to investigate potential permeation emissions losses
  - Performed literature search for permeation rates with ethanol and non-ethanol gasolines
    - Confirms ethanol increases permeation emission losses
    - literature search results have been posted on our webpage
  - Gathering data on permeable fuel system materials in vehicle fleet to estimate statewide permeation emissions
  - Will design test program to evaluate permeation rates to increase available data
- ✦ Draft final report to be available near future

## Ongoing Work on Commingling

- ✦ Board prohibited use of MTBE beginning December 31, 2002
- ✦ Federal oxygen requirement still in place
  - Ethanol will be only allowable oxygenate
  - 70% of California fuel
- ✦ Board directed the staff to further evaluate real-world impacts of mixing (commingling) ethanol and non-ethanol gasoline

# Evaluation of Real-World Impacts

- ✦ ARB Commingling study
  - Establish ARB/Industry workgroup
  - Evaluate consumer refueling practices
  - Vehicle fuel sampling program



# ARB/Industry Commingling Study Workgroup

- ✦ First meeting held April 27, 2001
- ✦ Discussed staff's data needs regarding consumer refueling practices
  - Industry members to report on availability of information from industry marketing data
  - Possibility of conducting public survey

# ARB/Industry Commingling Study Workgroup (cont.)

- ✦ Discussed draft commingling study fuel sampling protocol
  - Draft protocol revised to incorporate use of cooling coil
  - Industry members to identify/recommend site locations
- ✦ Proposed Field Work
  - One week trial in Bay Area
  - One week of sampling in Bay Area, Los Angeles, and Lake Tahoe
- ✦ Next meeting later today

# **Legal/Enforcement Issues**

# Open Discussion

# Closing Remarks