

Public Meeting Regulatory and Non-Regulatory Fuels Activities

April 12, 2004

California Environmental Protection Agency



Air Resources Board

Agenda

- ✦ **Introductions**
- ✦ **Implementation Discussions**
 - Phase 3 RFG
 - Diesel Fuel Lubricity
- ✦ **Potential Regulatory Activities**
 - Potential for Modifications to the CaRFG Regulations
 - Diesel fuel for locomotive and marine diesel engines
 - Diesel fuel deposit control additives and diesel engine lubricating oils
 - Clean Fuels Outlets - Hydrogen
 - Biodiesel
- ✦ **Presentations by Others**
- ✦ **Open Discussion**
- ✦ **Closing Remarks**

Implementation Issues

Implementation of Phase 3 RFG Regulation

Phase 3 RFG Implementation Issues

- ✦ Documentation for transfer of denatured ethanol for use in California gasoline
- ✦ Blending small amounts of finished gasoline into CARBOB terminal tanks
- ✦ Blending small amounts of transmix into CARBOB terminal tanks
- ✦ Other issues may exist

Documentation for Transfer of Denatured Ethanol

- ✦ Importers and producers of ethanol must provide the following information with the product transfer documents:
 - Name, location and operator of the facilities at which the ethanol was produced or denatured
- ✦ Concerns about the practicality of this requirement
 - commingling of denatured ethanol
 - commingling of neat ethanol before it reaches a California production facility that adds the denaturant

Blending Finished Gasoline into CARBOB Terminal Tank

- ✦ Blending of CARBOB with California gasoline is prohibited except for specific situations that involve a changeover in service
- ✦ Address the blending of small amounts of finished gasoline into CARBOB terminal tanks
 - After calibration of ethanol meters
 - After pulling gasoline from service station tank
 - After aborted loading of ethanol and CARBOB to tanker truck

Blending Transmix into CARBOB Terminal Tanks

- ✦ CaRFG3 regulations include provisions for enforcement protocols for blending transmix with finished gasoline but none for blending transmix with CARBOB

CaRFG3 Implementation Refinements

- ✦ Plan proposed amendments for October 2004 hearing
 - Identify conditions under which returning small amounts of gasoline to CARBOB terminal tanks is allowed
 - Allow protocols for blending transmix into CARBOB terminal tank
 - Allow ethanol shipper to maintain all sources of ethanol instead of providing on each transfer document
- ✦ ARB staff to announce interim policy on website <http://www.arb.ca.gov/fuels>

Implementation of Diesel Regulation

Diesel Fuel Lubricity

ARB Diesel Fuel Lubricity Standard Phase I: Protect Existing Equipment

- ✦ 520 micron maximum WSD based on HFRR @60 deg C
- ✦ Time frame: 90 day phase-in commencing August 1, 2004
- ✦ Applies to all California vehicular diesel fuel with exception of fuel for use in locomotives or marine vessels

ARB Diesel Fuel Lubricity Standard Phase 2: Protect Advanced Technology Fuel Injection Systems

- ✦ Placeholder in regulation for 2006 lubricity standard
- ✦ Technology assessment by end of 2005
 - CRC Lubricity Panel testing to be initiated in 2004 and completed in 2005
 - Propose new lubricity standard to Board late 2005
- ✦ 2006 standard: 90 day phase-in commencing June 1, 2006

Deference to ASTM Lubricity Standard

- ✦ ARB lubricity standards will defer to ASTM standards if:
 - For 2004:
 - ASTM establishes a standard at least as protective as ARB adopted standard
 - For 2006:
 - ASTM establishes a standard that is protective of advanced technology fuel injection systems
 - Division of Measurement Standards adopts

Status of ASTM Ballot

- ✦ Lubricity ballot closed April 9, 2004
 - Standard identical to ARB 2004 standard
 - Effective date: January 1, 2005
- ✦ If negatives received:
 - Will attempt to vote not persuasive prior to June meeting

National Lubricity Standard for Diesel Fuel

- ✦ EPA is considering pursuit of lubricity regulation to align with ARB standard

Potential Regulatory Activities

Potential Modifications to the CaRFG Regulations

Potential Further Amendments to the CaRFG Regulations

- ✦ New SIP Commitments:
 - October 2003 SIP Hearing
 - Additional Emissions Reductions needed to meet ozone goal.
- ✦ Include examination of gasoline specifications

Potential Further Amendments to the CaRFG Regulations

With the development of advanced emission control technologies there may be opportunity to increase synergies between the California gasoline specification and the new emission control technologies.

Staff would also like to consider whether there are possible changes that could be made to the CaRFG regulations that could increase efficiencies within the California Refinery industry will preserve existing benefits and enforceability.

Potential Further Amendments to the CaRFG Regulations

- ✦ Strawman Concept - For discussion purpose only
 - Replace Flat Limits and Averaging Limits with new set of caps.
 - Predictive Model could be used to determine new caps
 - Distillation Temperatures limits could be replaced by a new Drivability Index

CARB DIESEL FUEL USE WITH INTRASTATE



MARINE

LOCOMOTIVE



ARB Evaluation

- ✦ Staff directed by Board to evaluate the potential use of CARB diesel fuel in intrastate locomotive and marine applications
 - Cost and feasibility will be considered
- ✦ Staff will also consider alternatives that can provide similar emission benefits

Status of ARB Evaluation

- ✦ Working with stakeholders to identify and gather information
 - Data on engines, fuel use, etc.
- ✦ Developed a list of potential information for locomotives for possible survey.
- ✦ Contacting marine fuel suppliers to determine types of fuel distributed.

“Tentative” Schedule for Evaluation

- ✦ Workshops through October 2004
- ✦ Tentative staff report
 - September 2004
- ✦ Tentative Board Meeting
 - November 2004

Diesel Fuel Deposit Control Additives

Diesel Deposit Control Additives

- ✦ SIP keep clean measure
- ✦ No current deposit control additive requirement for diesel fuel
- ✦ Issue may gain significance for 2007 engine designs

Deposit Control Additives Potential Benefits

- ✦ Could reduce potential deposit formation in fuel systems and engines
- ✦ Keep engines closer to factory tolerances
- ✦ Minimize deterioration rate of engine-out emission levels

Schedule

- ✦ Need to investigate feasibility of deposit control additives - effectiveness and cost
- ✦ Time frame: 2010+

Diesel Engine Lubricating Oils

Diesel Engine Lubricating Oils

- ✦ Diesel engines consume (combust) lubrication oils as part of their normal operation
- ✦ Need to consider lubricating oil sulfur and ash content
 - Emissions
 - Impact on after treatment control technology

Industry Efforts to Study Lubricant Effects on Aftertreatment Devices

- ✦ Government/Industry workgroup
 - DOE Advanced Petroleum-Based Fuels - Diesel Emissions Control (APBF-DEC) Program
- ✦ Private consortium
 - Southwest Research Institute Diesel Aftertreatment Sensitivity to Lubricants (DASL) / Non-Thermal Catalyst Deactivation (N-TCD)

ASTM Heavy Duty Engine Oil Classification Panel

- ✦ Industry developing HD engine oil specifications for use with aftertreatment technology
 - Proposed Category 10 (PC-10)
 - Lower sulfur, phosphorous, and sulfated ash
 - Engine durability issues to be addressed
- ✦ Target API licensing: late 2005/early 2006
- ✦ Oils in market 3rd quarter 2006
- ✦ Industry efforts may preclude regulatory need

Clean Fuel Outlets Program

Objective

- ✦ To ensure that clean fuels are available for alternative fueled vehicles to operate and achieve the emissions benefits attributed from these vehicles

Key Points of Program

- ✦ Require certain owners/lessors of gasoline stations to install clean fuel outlets
- ✦ Requirement is triggered when 20,000 vehicles are certified to California LEV standards on a specific fuel

Considering Program Updates

- ✦ Ensure program considers new fuel/ vehicle technologies
 - hydrogen fuel cells
 - hybrids
- ✦ Ensure program is implemented to realize air quality benefits
 - Vehicles use alternative fuels
 - Dedicated versus flexible-fueled vehicles

Possible Program Updates

- ✦ Short term & long term changes to incorporate Hydrogen
 - Definitions
 - Stations
 - Throughput
- ✦ Miscellaneous regulation clean up
 - renumbering
 - grammar
 - allow other data to be used when DMV data is unavailable.

Tentative Schedule

- ✦ Workshop held June 2004
- ✦ Board hearing September 2004

Biodiesel

Background

- ✦ Generally refers to methyl and ethyl esters of fatty acids that are derived from natural products
 - Vegetable, animal, and grease
- ✦ ASTM D6751 establishes fuel specification for biodiesel as a blending component.
 - Excludes fatty acids
 - Glycerol, moisture, cold flow, others
- ✦ US Production capacity: 150 million gallons/yr
- ✦ US Sales 2002: 20 million gallons/yr

Use of Biodiesel

- ✦ Pure Biodiesel B100
- ✦ Blends of Biodiesel
 - Common blends B2, B5, B20

Biodiesel Properties Compared to Diesel

| | Biodiesel | Average California Diesel |
|-----------------------------------|-----------------------------------|----------------------------------|
| Energy Content btu/gal | 119,000 (Soy) 116,000 (Animal) | 131,000 |
| Cetane No. | 53 | 50 |
| Sulfur ppm | <1 | ≤15 |
| Aromatics %vol. | Below detection limit | 19 %vol. |

Biodiesel Emissions Compared to Diesel (cont.)

- ✦ Lowers greenhouse gas emissions wells to wheel
 - 3.2 units of energy produced per unit of energy used to produce biodiesel as compared to 0.8 units energy produced per unit of energy used for diesel
- ✦ Generally reduces tail pipe emissions of PM, HC, CO
 - B100: reduces PM and CO 40%, THC 68%
 - B20 reduces PM and CO 12%, THC 20%

Biodiesel Emissions Compared to Diesel (cont.)

- ✦ Increase in NO_x emissions
 - B100 10% increase
 - B20(soybean) 2-4% increase in NO_x
 - Feedstock affect NO_x (soybean highest)

Issues with Biodiesel

- Engine durability and impact on lubrication oil
- Fuel quality
- Fuel stability
- Cold flow characteristics
- Seal and material compatibility
- NO_x

Topics to be Resolved

- ✦ Acceptance by Engine Manufacturers and Petroleum Industry
- ✦ Regulations
 - B100
 - Blends
 - NO_x

Purpose of ASTM D6751 is to Ensure Consistent Fuel Quality

- ✦ Free fatty acids D664 0.80 max mg KOH/g
- ✦ Residual unreacted glycerol D6584 0.02%
- ✦ Moisture content D2709 0.050 max % vol
- ✦ Cold flow properties D2500°C
 - Pour point cold filter plugging
- ✦ Extraneous oil
- ✦ Oxidative stability

Presentations by Others

Open Discussion

Closing Remarks