

Workshop Regarding Regulatory Fuels Activities

July 16, 2002

California Environmental Protection Agency



Air Resources Board

Agenda

- ◆ Introductions
- ◆ Evaluation of Diesel Engine Lubrication Oils and Diesel Fuel Lubrication Properties
- ◆ Proposal to Delay the Phase-out of MTBE from California Gasoline
- ◆ Review of De Minimis Levels for MTBE and Other Oxygenates in CaRFG3
- ◆ Other Miscellaneous Changes for CaRFG3
- ◆ Presentations by Others
- ◆ Open Discussion
- ◆ Closing Remarks

**Evaluation of Diesel Engine
Lubrication Oils and Diesel Fuel
Lubrication Properties**

Sulfur Levels in Lubricating Oils

- ◆ Sulfur content of diesel engine lubricating oils range from 2,500 to 8,000 ppm
- ◆ Sulfur contributions to finished lubricating oils
 - Base stock: from essentially sulfur free up to 4,000 ppm
 - Additives: typically 2,500 ppm to 3,000 ppm sulfur
- ◆ Worst case estimate for sulfur contribution of lubricating oils to exhaust
 - 7 ppm maximum equivalent fuel sulfur contribution based on:
 - 8,000 ppm sulfur content in lubricating oil
 - nominal oil usage of 1 quart every 2,000 miles
 - heavy duty diesel engine fuel usage of 6 miles per gallon

APBF-DEC Lubricants Work Group

Phase 1 Testing Completed

◆ Objective

- Determine impact of lubricant properties and composition on engine-out/catalyst-in emissions
 - Evaluated matrix of additives with four different base stocks
 - Test engine: Navistar T444E with exhaust gas recirculation (retrofit)

◆ Data currently being analyzed and will be reported in late summer

◆ Preliminary Results:

- Calcium, zinc, phosphorous, and sulfur emissions all correlate with concentration in oil
 - Exception: sulfur and phosphorous emissions from two non-traditional oil formulations
- Recovery rates vary from 43% to 113%

APBF-DEC Lubricants Work Group

Phase 2 Testing is Underway

◆ Objective

- Evaluate impact of lubricant formulations on performance and durability of advanced diesel emission control systems
- Focus on development of rapid catalyst aging protocol

◆ Schedule:

- Testing to begin July 2002
- Testing to be complete ~ August 2003
- Data evaluation and reporting to be complete December 2003

DASL/N-TCD Consortium

- ◆ Southwest Research Institute held kick-off meeting for private consortium, Diesel Aftertreatment Sensitivity to Lubricants (DASL) / Non-Thermal Catalyst Deactivation (N-TCD) in late May
- ◆ Seven industry members
- ◆ DASL effort:
 - Study the effects of oil combustion by-products on diesel emission control systems
 - Measure deactivation of emissions-control systems
- ◆ Test plan under development

Related ASTM Activity

- ◆ New API Service Category CI-4 to begin licensing in September 2002
 - For severe duty diesel engine service
 - Specifically formulated to sustain engine durability where exhaust gas recirculation (EGR) is used
- ◆ Proposed category 10 (PC-10) initiated
 - For use with aftertreatment technology
 - Lower sulfur, phosphorous, and sulfated ash
 - Engine durability issues to be addressed

Regulatory Development Process

- ◆ Consider possible diesel engine lubricating oil specifications
- ◆ Expected scope: limit sulfur/ash content of lubricating oil with recognition of appropriate levels to ensure engine protection

Regulatory Development Process (cont.)

- ◆ Interim recommendations
 - Address early introduction of aftertreatment technology
 - Provide guidance to fleet operators on the use of existing engine oils with aftertreatment technology
 - Time frame: early 2003

Regulatory Development Process (cont.)

- ◆ Formal specifications
 - Support 2007 exhaust emissions standards
 - Recognize industry voluntary specifications
 - Consider results from the APBF-DEC testing
 - Time frame: Mid 2004

ASTM Moving Forward with Lubricity Standard

- ◆ ASTM lubricity standard proposal balloted at subcommittee level
 - Eight opposing votes
 - Multitude of constructive comments
- ◆ Working group aggressively on comments and crafting new proposal version
- ◆ Schedule:
 - Submit for ballot at subcommittee level in early fall
 - Address any opposing votes at December ASTM meeting
 - Depending on results, may be able to ballot at subcommittee and committee level after December meeting

Proposal to Delay the Phase-out of MTBE

Governor's Executive Order D-52-02

- ◆ Issued by Governor Davis on March 14, 2002
- ◆ Orders that “by July 31, 2002, the Board shall take the necessary actions to postpone for one year the prohibitions of the use of MTBE and other specified oxygenates in California gasoline, and the related requirements for California Phase 3 reformulated gasoline.”

Proposed Amendments to CaRFG3 Regulations for July Board Hearing

- ◆ Postpone for one year the prohibition on the use of MTBE in California gasoline
- ◆ Postpone for one year the current schedule for reducing allowable residual levels of MTBE
- ◆ Postpone for one year the prohibition on the use of non-MTBE oxygenates other than ethanol in California gasoline
- ◆ Postpone for one year the imposition of CaRFG3 standards

Additional Proposed Amendments

- ◆ Simplify testing provisions for determining whether CARBOB will comply with CaRFG standards after it is oxygenated with ethanol
- ◆ Correct error in the assignment of RVP regulatory control periods for the North Coast Air Basin and the North Central Coast Air Basin

Proposed Revision to Staff Proposal

- ◆ Wintertime Oxygen Requirement for South Coast
 - Propose to retain the requirement to remove the month of October from the wintertime oxygen season in the South Coast Air Basin as currently required by the Phase 3 regulations

Public Hearing to Consider Delay of MTBE Phase-out

- ◆ July 25, 2002, 9:00 a.m.
CalEPA Central Valley Auditorium
1001 “I” Street, Sacramento
- ◆ Staff Report available at:
<http://www.arb.ca.gov/regact/mtbepost/mtbepost.htm>
- ◆ Submit comments no later than 12:00 noon,
July 24, 2002
 - by postal mail to the Clerk of the Board
 - by fax to the Clerk of the Board at (916) 322-3928
 - by e-mail to mtbepost@listserv.arb.ca.ca.gov

**Review of MTBE De Minimis Levels
and Other Changes Proposed for
November Board Hearing**

CaRFG3 Basic Prohibition of MTBE after July Board Hearing

- ◆ Starting December 31, 2003, no California gasoline produced with the use of MTBE.
- ◆ Timetable for reducing residual MTBE levels revised to be consistent with delay of MTBE phase-out
 - Limits that must not be exceeded
 - Starting December 31, 2003: 0.3 volume %
 - Starting December 31, 2004: 0.15 volume %
 - Starting December 31, 2005: 0.05 volume %

Evaluation of Oxygenate Prohibitions

- ◆ Board Resolution 99-39 directed the Executive Officer to further evaluate the practicality of allowable MTBE residual limits for CaRFG3, and return with recommendations.

- ◆ Evaluate de minimis MTBE levels
 - Determine residual MTBE levels in retail non-MTBE gasoline
 - Determine MTBE levels in current blendstocks

Proposed Amendments to CaRFG3 Regulations for November Board Hearing

- ◆ Revise schedule for reducing de minimis MTBE levels
- ◆ Set de minimis levels for total oxygen provided by oxygenates other than MTBE and ethanol

Amendments of MTBE Prohibitions to be Proposed to Board in November

- ◆ Reduce de minimis levels in four steps instead of three and delay implementation dates for current levels
 - Initial 6-month phase with de minimis limit at 0.60 vol.% (same as labeling requirement for non-MTBE gasoline)
 - The de minimis level of 0.3 volume % would be effective starting July 1, 2004 instead of Dec. 31, 2003
 - Allow 18 months instead of 12 months to reduce level from 0.3 to 0.15 vol.%
 - Final prohibition level of 0.05 vol.% effective 12 months later

MTBE De Minimis Specifications for CaRFG3 to be Proposed in July and November

Allowable Residual MTBE Levels (volume %)	Date to be proposed to Board	
	July, '02	November, '02
0.60	--	Dec. 31, 2003
0.30	Dec. 31, 2003	July 1, 2004
0.15	Dec. 31, 2004	Dec. 31, 2005
0.05	Dec. 31, 2005	Dec. 31, 2006

New Draft Definition

- ◆ “Produced with the use of” a particular oxygenate means manufactured in part by adding the oxygenate to the fuel blend, or by using a blendstock to which the oxygenate has been added. Excluding:
 - Use of a blendstock in which limited amounts of the oxygenate have been generated as an unavoidable byproduct in the production of the blendstock; and
 - Incidental commingling of gasoline or gasoline blendstock with another product containing the oxygenate during transfer operations or changes in service of storage equipment.

Other Oxygenate Prohibitions

- ◆ De minimis levels for oxygenates other than ethanol and MTBE
 - Oxygenates in current blendstocks
 - Future blendstocks as sources of oxygenates
 - Akylate produced in converted MTBE plants
 - Alcohols and ethers as byproducts
 - Alcohols and ethers as transportation contaminants

CaRFG3 Basic Prohibition of Oxygenates Other Than MTBE and Ethanol

- ◆ Starting December 31, 2003, ethanol will be the only approved oxygenate for use in CaRFG3
- ◆ The prohibition applies unless:
 - Multimedia evaluation of oxygenate use, and
 - Approved by California Environmental Policy Council
- ◆ CaRFG3 did not set de minimis levels for oxygenates not approved by California Environmental Policy Council

Possible Amendments of Prohibitions for Oxygenates other than MTBE and Ethanol

- ◆ Set limit on total oxygen content in finished gasoline
- ◆ Oxygenates are defined by the U.S. EPA registration of oxygenates and Sub-Sim provisions.
- ◆ Use ASTM D 4815-99 to determine contribution of non-MTBE/ethanol oxygenates.
- ◆ Oxygen content will be calculated from sum of oxygenates other than MTBE or ethanol.
- ◆ Non-detects will be counted as zero.

Oxygenates Other than MTBE and Ethanol

Methanol

Isopropanol

n-propanol

n-Butanol

iso-Butanol

sec-Butanol

tert-Butanol

tert-pentanol (tert-amylalcohol)

Ethyl tert-butylether (ETBE)

Diisopropylether (DIPE)

Tert-amylmethylether (TAME)

Possible Amendments of Prohibitions of Oxygenates other than MTBE and Ethanol (cont.)

- ◆ Reduce residual oxygen levels in two stages
 - Initial 6-month phase with de minimis level of 0.1 wt.% for the total oxygen concentration of prohibited oxygenates. (this oxygen level is equivalent to the initial MTBE de minimis level)
 - Starting July 1, 2004, the total oxygen concentration from all of the prohibited oxygenates cannot exceed 0.06 percent by weight.

Other Miscellaneous Proposed Changes

Presentations by Others

Open Discussion

Closing Remarks