California Environmental Protection Agency

Air Resources Board

Proposed Amendments to the California Diesel Fuel Regulations

FINAL STATEMENT OF REASONS

June 2004

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD
Stationary Source Division

FINAL STATEMENT OF REASONS FOR RULEMAKING
INCLUDING SUMMARY OF COMMENTS AND AGENCY RESPONSES

Public Hearing to Consider Amendments to the California Diesel Fuel Regulations Including Reduction of the Maximum Permissible Sulfur Content of Motor Vehicle Diesel Fuel

Public Hearing Date: July 24, 2003
Agenda Item No.: 03-6-2

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PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE CALIFORNIA DIESEL FUEL REGULATIONS

Public Hearing Date: July 24, 2003
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I. GENERAL

In this rulemaking the Air Resources Board (ARB or Board) is adopting amendments to the California diesel fuel regulations. The amendments will do the following: (1) reduce the maximum permissible sulfur content in vehicular diesel fuel from 500 ppm by weight (ppmw) to 15 ppmw starting in mid-2006; (2) revise the requirements for certification of alternative diesel fuel formulations; (3) adopt a new sulfur specification for certification diesel fuel for light- and medium-duty vehicles that is identical to the sulfur specification established by the U.S. Environmental Protection Agency (U.S. EPA); (4) improve the flexibility of the regulations by adopting new specifications for equivalency to the aromatic hydrocarbon limit for California diesel fuel; (5) establish standards for diesel fuel lubricity; (6) adopt an Air Toxics Control Measure (ATCM) requiring the use of vehicular diesel fuel in all nonvehicular diesel engines except engines used to power locomotives and marine vessels; (7) adopt a more suitable method for testing low sulfur diesel; and (8) make other changes that clarify the applicability of the diesel fuel regulations to allow more effective enforcement.

The rulemaking was initiated by the June 6, 2003 publication of a notice for a July 24, 2003 public hearing. A "Staff Report: Initial Statement of Reasons" (referred to as the Initial Statement of Reasons) was also made available for review and comment starting June 6, 2003. The Initial Statement of Reasons, which is incorporated by reference herein, contains an extensive description of the rationale for the proposal. Appendix A to the Initial Statement of Reasons contained the text of the proposed amendments to sections 2281, 2282, 2701(a), 1956.1, 1956.8(b), and 1961(d) and proposed new sections 2284 and 2285, title 13, California Code of Regulations (CCR), and the text of the proposed new airborne toxic control measure (ATCM) for nonvehicular diesel fuel, section 93114, title 17, CCR. Appendix B contained the proposed amendments to the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as last amended July 30, 2002, and incorporated by reference

in section 1961(d), title 13, CCR. These documents were also posted by June 6, 2003 on the ARB's Internet site for the rulemaking: *http://www.arb.ca.gov/regact/ulsd2003t/ulsd2003.htm.* As indicated in the Initial Statement of Reasons, the Internet site also contained the proposed amendments to the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines" as adopted December 12, 2002, and incorporated by reference in sections 1956.1(b) and 1956.8(b), title 13, CCR.

At the July 24, 2003 hearing, the Board received written and oral comments. At the conclusion of the hearing, the Board adopted Resolution 03-17, in which it approved the amendments to the California diesel fuel regulations, including modifications to the originally proposed amendments. These modifications were suggested by staff and were set forth in a six page document entitled "Staff's Suggested Modifications to the Original Proposal," distributed at the hearing and included as Attachment C to the Resolution. The Resolution directed the Executive Officer to incorporate the modifications into the proposed regulatory text, with such other conforming modifications as may be appropriate, and to make the modified text available for a supplemental comment period. The Executive Officer was then directed either to adopt the amendments with such additional modifications as may be appropriate in light of the comments received, or to present the regulations to the Board for further consideration if warranted in light of the comments.

The modifications approved by the Board included the five revisions described in the first paragraph of Section IV below. They also included the addition of criteria in the diesel fuel aromatics regulation for determining the validity of previously certified alternative formulations where the candidate fuel did not meet the newly proposed specification requirements. However, the Resolution stated that if the Executive Officer satisfactorily resolved with affected refiners issues regarding preexisting certified formulations that were to be addressed by the modification, she should delete that modification from the text distributed for supplemental public comment and from the Final Regulation Order.

Subsequent to the hearing, the Executive Officer continued discussions with affected refiners and satisfactorily resolved the issues regarding preexisting certified formulations that were to be addressed in the addition of subsection 2282(g)(2)(A)5, title 13, CCR. Accordingly, as directed by Resolution 03-17, staff deleted that subsection from the proposed modifications to be made available for supplemental comment. After the hearing, the staff also identified a few additional conforming modifications which are described in Section IV below.

The texts of the modifications to the originally proposed regulatory amendments were made available for a supplemental 15-day comment period by issuance of a "Notice of Public Availability of Modified Text." This Notice and its two attachments were mailed

by March 11, 2004 to all parties identified in section 44(a), title 1, CCR.[1] The Notice and its two attachments were also posted on the ARB's Internet site for the rulemaking on March 11, 2004, along with a separate document showing all of the proposed amendments and modifications. An email message announcing and linking to this posting was transmitted to the more than 200 parties that have subscribed to the ARB's "fuels-general" List Server for notification of postings pertaining to motor vehicle fuels. Four comments were received during the supplemental 15-day comment period.

In light of the supplemental comments received, the Executive Officer determined that additional modifications to proposed new sections 2284 (lubricity of diesel fuel) and 2285 (exemption for military fuels), title 13, CCR, were appropriate. A Second Notice of Public Availability of Modified Text (the second 15-day notice) and an attachment identifying the additional modifications were mailed to all parities identified in section 44(a), title 1, CCR by April 29, 2004. The Notice and its attachment were also posted April 29, 2004 on the ARB's Internet site for the rulemaking. The second supplemental comment period ended May 14, 2004, by which time 2 comments were received.

During the second 15-day comment period, the Executive Officer proceeded to issue Executive Order G-04-012, in which she adopted the amendments to two of the sections that were not covered by the second 15-day notice – sections 2281 (Sulfur content of diesel fuel) and 2282 (Aromatic hydrocarbon content of diesel fuel), title 13, CCR.[2] After considering the comments submitted during the second 15-day comment period, the Executive Officer issued Executive Order G-04-017, in which she adopted amendments to sections 2701(a) and 1961(d), and new sections 2284 and 2285, title 13, CCR, and the text of the proposed new ATCM for nonvehicular diesel fuel, section 93114, title 17, CCR.[3]

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[1] The mailout included 8 pages of excerpts from the complete regulations, showing the instances in which the modified text appeared. As explained in the 15-Day Notice, the complete text of the California diesel fuel regulations with the proposed modifications indicated was posted on the Internet site for the rulemaking on March 11, 2004.

[2] The adopted amendments contained two nonsubstantial modifications made after the first 15-day comment period, in response to comments submitted to during that period. The first modification eliminated an extraneous "as" from the definition in section 2281(b)(0.8). The second modification corrected a reference in section 2282(g)(5)(B) so that it referred to section 2282(g)(2)(B)(6) – the same text referred to in the preexisting regulation prior to the relettering of subsections.

[3] As adopted, section 93114, title 17, CCR reflected a nonsubstantial change to subsection (a)(1), which identifies the effective date. Section 93114 is an ATCM. Health & Safety Code section 39666(d) provides that "Not later than 120 days after the adoption or implementation by the [ARB] of an [ATCM] pursuant to this section or Section 39658, the districts shall implement and enforce the [ATCM] or shall propose regulations enacting" ATCMs meeting statutory requirements, including equally effective or more stringent ATCMs. An ARB ATCM is implemented when it becomes operative under California administrative law. As originally

This Final Statement of Reasons updates the Initial Statement of Reasons by identifying and providing the rationale for the modifications made to the originally proposed amendments. It also summarizes and responds to comments submitted during the rulemaking.

Documents Incorporated by Reference. Sections 2281(c), 2282(c), 2282(g)and 2285(a)(1) incorporate test methods of the American Society for Testing and Materials (ASTM) for determining various properties of diesel fuel, including sulfur content, aromatic hydrocarbon content, and lubricity. In addition, this rulemaking amends the California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as last amended July 30, 2002, which is incorporated by reference in section 1961(d), title 13, CCR. That Standards and Test Procedures document in turn incorporates various specified ASTM test methods. It also incorporates certification test procedures adopted by U.S. EPA and contained in title 40, Code of Federal Regulations (CFR) Part 86.

Each instance of incorporation identifies the incorporated document by title and date. All of the documents were made available in the context of this rulemaking in the manner specified in Government Code section 11346.5(b). The ARB document is readily available from the ARB upon request. The referenced ASTM test methods are published by ASTM, a well-established and prominent organization in the sampling and analysis field. The CFR is published by the Office of the Federal Registrar, National Archives and Records Administration. These documents are therefore reasonably available to the affected public from commonly known sources.

These documents are referenced and incorporated into the California Code of Regulations because it would be cumbersome, unduly expensive, and otherwise impractical to publish them in the Code. It has been a longstanding and accepted practice of the ARB to incorporate ASTM test methods into the CCR by reference. (see, e.g., section 2263, title 13, CCR.) Among other things, this enables interested parties to verify that the test methods have been adopted by a consensus-driven, authoritative source.

Because the ARB has never printed complete motor vehicle certification test procedures in the CCR, the affected public is accustomed to the incorporation format. The

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proposed, section 93114 provided that districts must take one of the actions identified in Health & Safety Code section 39666(d) no later than 120 days after the section is approved by the Office of Administrative Law. To assure consistency with Health & Safety Code section 39666(d), that date has been changed to the date that is 120 days after section 93114 becomes operative – in this instance 30 days after approval by OAL.

Executive Order G-04-017 also made two additional nonsubstantive corrections to section 2282, adding "C" to represent Celsius after "Viscosity at 40°" in the tables in subsections 2282(g)(2)(A)3.a. and (g)(3)(A).

Standards and Test Procedures document incorporates portions of the CFR because some of the ARB requirements are substantially based on the federal emission regulations. Manufacturers typically certify vehicles and engines to a version of the federal emission standards and test procedures which has been modified by state requirements. Incorporation of the federal regulations by reference makes it easier for manufacturers to know when the two sets of requirements are identical and when they differ. Each of the incorporated CFR provisions are identified by date in the ARB test procedure documents.

Fiscal Impacts. The ARB has determined that this regulatory action will not result in a mandate to any local agency or school district, the costs of which are or are not reimbursable by the state pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code.

Consideration of Alternatives. The ARB has determined that no alternative considered by the agency or that has otherwise been identified and brought to the attention of the agency would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective and less burdensome to affected private persons than the action taken by ARB.

The California Trucking Association proposed that along with adopting the ultra-low sulfur standard that was adopted by U.S. EPA in 2001, the ARB should repeal its aromatic hydrocarbon content standards that have applied to motor vehicle diesel fuel since 1993. This would mirror the federal fuels regulations, which do not include a comparable aromatic hydrocarbon content standard. The ARB rejected this alternative because it would not be as effective as the adopted amendments in carrying out the purposes of the rulemaking proposal – to reduce emissions from diesel engines. Instead, it would significantly increase emissions from diesel engines, as documented in Appendix D to the Initial Statement of Reasons. See also the response to Comment 1 below.

II. EXTERNAL PEER REVIEW

Health and Safety Code section 57004 requires an external scientific peer review of the scientific basis for any rule the ARB is considering for adoption. As required by this statute, the ARB initiated a request to the University of California Office of the President (UCOP) in May 2001, under Interagency Agreement #98-004 between the California Environmental Protection Agency (Cal-EPA) and the University of California (UC). In response to ARB's request, the UCOP selected the following four peer reviewers:

- Wayne Miller, Ph.D., Bourns College of Engineering, UC Riverside;
- Robert Sawyer, Ph.D., Mechanical Engineering Department, UC Berkeley;
- Donald Lucas, Ph.D., Environmental Energy Technologies Department, UC Berkeley and Lawrence Berkeley National Laboratory; and

- Laurence Caretto, Ph.D., College of Engineering and Science, California State University, Northridge.

The peer reviewers evaluated the June 6, 2003 staff report for the diesel fuel rulemaking and all submitted written reports of their findings. Dr. Miller also attended the July 24, 2003 Board hearing where he presented a summary of his comments. Overall, the reviewers agreed with the ARB's staff that the proposed amendments will have no significant adverse impact on public health and the environment. The specific comments of the reviewers are presented with ARB staff's responses in Section V.D of this FSOR.

The reviewers agreed in general with the ARB staff's evaluation of the scientific basis of the amendments and the staff's estimates of emissions benefits. They concluded that adequate technology exists to produce low sulfur reformulated diesel fuel and that the ARB's cost estimates are reasonable and consistent with other analyses of desulfurization costs. They found that the staff's approach to the alternative fuel specifications option was well founded and the specifications for the fuel properties should provide similar reductions to the 10 percent aromatics standard without the need for costly engine tests. The reviewers acknowledged the need to ensure adequate lubricity, but they tended to treat the decision to adopt a lubricity standard as a policy rather than a scientific issue.

The reviewers also reviewed Appendix D of the June 6, 2003 staff report which was a report of the staff's evaluation of the benefits of the current diesel fuel regulations. The reviewers observed that although the correlation among diesel fuel properties is strong, the published data reviewed by ARB staff generally show that reductions in density and aromatics and increases in cetane number will reduce emissions of oxides of nitrogen (NOx) and particulate matter (PM) in existing engines.

III. ACTION OF THE CALIFORNIA ENVIRONMENTAL POLICY COUNCIL

Health and Safety Code section 43830.8, (Stats. 1999, Ch. 813; Senate Bill 529, Bowen) generally prohibits the ARB from adopting a regulation establishing a specification for motor vehicle fuel unless the regulation is subject to a multimedia evaluation by the California Environmental Policy Council (Policy Council). Key components of the evaluation process are the identification and evaluation of significant adverse impacts on public health or the environment and the use of best available scientific data.

Multimedia evaluation means the identification and evaluation of any significant adverse impact on public health or the environment, including air, water, or soil, that may result from the production, use, or disposal of the motor vehicle fuel that may be used to meet the state board's motor vehicle fuel specifications.

The statute provides that the ARB may adopt a regulation that establishes a specification for motor vehicle fuel without the proposed regulation being subject to a

multimedia evaluation if the Policy Council, following an initial evaluation of the proposed regulation, conclusively determines that the regulation will not have any significant adverse impact on public health or the environment.

The ARB staff determined that the proposed amendments would not have any significant adverse impact on the public health and the environment. The staff's initial evaluation was reviewed by an interagency multimedia fuels workgroup that includes the staffs of the State Water Resources Control Board (SWRCB), the Office of Environmental Health Hazard Assessment (OEHHA), and the Department of Toxic Substances Control (DTSC). The members of the workgroup found that both the diesel fuel sulfur limit and lubricity standard should have no significant adverse impact on public health and the environment compared to diesel fuel meeting existing requirements and that no further multimedia evaluation is necessary.

ARB staff recommended that the Policy Council concur with these findings and determine that no further multimedia evaluation was necessary. A Staff Report: Recommendation on Need for a Multimedia Evaluation of Amendments to the California Diesel Fuel Regulations was available for review and comment starting March 28, 2004.

At a public meeting on April 30, 2004, the Policy Council considered the staff's recommendation on the need for a multimedia environmental impact assessment of the amendments. The Policy Council adopted a Resolution in which it conclusively determined that the regulation will not have any significant adverse impact on public health or the environment.

IV. MODIFICATIONS TO THE ORIGINAL PROPOSAL

As discussed above, the final amendments reflect a number of modifications to the original proposal. The modifications approved by the Board and ultimately incorporated do the following: (1) allow the extended phase-in of the 2006 sulfur standard at low-throughput purchaser-consumer facilities and retail outlets; (2) revise the proposed new definition of diesel fuel to clarify that a product that is sold as diesel fuel and is a mixture primarily of organic compounds consisting of carbon and hydrogen – in other words liquid hydrocarbons – would be subject to the diesel fuel standards; (3) delete the proposed restriction on downstream blending of vehicular diesel fuel with other distillates; (4) add a provision to sunset the proposed 2004 lubricity standard if it is adopted by the American Society for Testing and Materials, as it will then automatically be enforceable by the State Division of Measurement Standards under their regulations; and (5) delete the proposed amendment to heavy-duty engine test procedures.

After the hearing, the staff also identified a conforming modification that was needed in proposed section 2284(a)(5) of the lubricity regulation to make clear that multiple transfers of upstream unadditized diesel fuel by parties such as fuel brokers or traders are permitted before the diesel fuel is brought into compliance by the time it is supplied from the final distribution facility. The staff also has made conforming modifications to the test method references for the lubricity standard and sunset provisions. Both sets of

conforming modifications are specifically identified and explained in the attached regulatory text

In order to make the first supplemental 15-day comment process as meaningful as possible, the documents showing the proposed modified text of the regulations and incorporated documents contained “commentaries” explaining the rationale for each substantive modification and specifically noting modifications that had been developed after the July 25, 2002 hearing. Rather than having those commentaries repeated in this section of the Final Statement of Reasons, the modified regulatory text containing the commentaries has been appended as Attachment A.

The additional modifications released in connection with the second 15-day notice pertained to implementation of the lubricity standard and the exemption for specified military fuel. The modifications postponed the implementation date of the first phase of the lubricity standard from August 1, 2004 to January 1, 2005, aligning it with the proposed effective date of the lubricity standard that was recently balloted by the ASTM. This will allow fuel suppliers to coordinate their California and national implementation efforts. The five month delay occurs whether or not the ASTM ballot is successful. The downstream implementation dates would be postponed five months as well. In response to comments from the Department of the Navy, the modifications would refer to “military-specification fuel,” the military’s preferred terminology. They also modified the military exemption to include fuel used in all military vehicles exempted by ARB regulations from the California emission standards. Finally, they eliminate the signage requirement for exempt fuel dispensed by fueling trucks.

The regulatory text document released in connection with the second 15-day notice again included “commentaries” explaining the rationale for each additional modification. and specifically noting modifications that had been developed after the July 25, 2002 hearing. The modified regulatory text containing the commentaries for the second set of modifications has been appended as Attachment B.

V. SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

During the 45-day comment period, the Board received written comments from:

Doug Quetin	California Air Pollution Control Officers Association (CAPCOA)
John A. Jelaco	Golden Eagle Express, Inc.
Terry Klenske	Dalton Trucking, Inc
Dale McKinnon	Manufacturers of Emission Controls Association (MECA)
Robert A. Curry, Sr.	California Cartage Company
Senator Kevin Murray	California State Senate
Mike Covey	Covey Auto Express
Alan Osofsky (alano@rodgerstrucking.com)	Rodgers Trucking Co.
Jay McKeeman	California Independent Oil Marketers Association
Graham Balfour (Graham.BALFOUR@dds.delphiauto.com)	Delphi Diesel Systems
Ellen Shapiro (ESHAPIRO@autoalliance.org)	Alliance of Automobile Manufacturers
Shane A. Gusman	California Teamsters Public Affairs Council
Suxen Sommers	Rossi Transport Service
Conan Barker (cbarker@laflr.com)	Los Angeles Freightliner
Lyle Bassett (lyle@riverview-trucks.com)	Riverview International Trucks, Inc
Lee Quigley (lee.quigley@valleyintermodal.com)	Valley Intermodal / Imagine Transport
Barry R. Wallerstein	South Coast Air Quality Management District (SCAQMD)
Dave Cox, Tony Strickland, Guy Houston et al.	Members, Assembly Republican Caucus
Joseph Kubsh	MECA
David Smith	Western States Petroleum Association (WSPA)
Stephanie Williams	California Trucking Association (CTA)
Rick Freund	TRI - F Consolidators Inc.
Byron D. Sher	Senator / California State Senate
Lee Hobbs	Hobbs Trucking Co.
Tom Torlakson	Senator / California State Senate

At the July 2004 hearing, oral testimony was presented by:

Barry Wallerstein	SCAQMD
Gordon Schremp	California Energy Commission
Stephanie Williams	California Trucking Association
Wayne Miller	Peer Reviewer, U.C. Riverside
David Smith	Western States Petroleum Association
Joseph Kubsh	MECA
Jay McKeeman	California Independent Oil Marketers Association
Bonnie Holmes	American Lung Association
Ellen Shapiro	Alliance of Automobile Manufacturers
Tim Carmichael	Coalition for Clean Air
Graham Noyes	World Energy Alternatives
Patricia Monahan	Union of Concerned Scientists

During the first supplemental 15-day comment period, written comments were received from:

Arthur Howland, ahowl7mx@yahoo.com	
Gina Grey	WSPA
Michael Ingham	Chevron Products Company
Captain A.J. Gonzales	

During the second supplemental 15-day comment period, written comments were received from:

Gina D. Grey	WSPA
Craig A. Moyer	Oryxe Energy International, Inc.

Set forth below is a summary of each objection or recommendation specifically directed at the proposed amendments or to the procedures followed by the ARB in proposing or adopting the amendments, together with the agency response. The comments have been grouped by topic whenever possible. Comments that do not involve objections or recommendations specifically directed towards the rulemaking, are generally not summarized below.

The California Air Pollution Control Officers Association and the Manufacturers of Emission Controls Association generally supported adoption of the proposed regulatory actions. State Senator Byron Sher also wrote to support the Board's efforts to reduce diesel emissions and toxicity, and urged the Board to proceed with the adoption of the proposed diesel fuel regulations with all due speed. General comments of support are not separately summarized below.

A. COMMENTS PRESENTED PRIOR TO OR AT THE HEARING

1. Nationwide Diesel Fuel Standard

1. Comment: We urge the ARB to delay taking action to adopt a diesel fuel standard that is different from the standard adopted by the U.S. EPA. A delay will allow the Legislature time to evaluate the policy, economic, and environmental impacts of the proposed action, including the dramatic reduction of in-state truck registrations in California. Specifically, our state is down almost 250,000 truck registrations while the out of state fleet is up 356,000 truck registrations. The most desirable outcome is enactment of a uniform federal standard which at once addresses important environmental concerns without adversely affecting businesses and job creation in our state. (State Senators Kevin Murray and Tom Torlakson; 26 members of the Assembly Republican Caucus)

   We need you to adopt regulations that are a mirror of the federal standard for clean diesel, and oppose any fuel regulation that keeps California different from the rest of the United States. (Riverview International Trucks Inc., Valley Intermodal/Imagine Transport, Rossi Transport Service)

   Agency Response: The primary change proposed by ARB staff is a reduction of the maximum allowable sulfur content of California vehicular diesel fuel from 500 ppmw to 15 ppmw effective June 1, 2006. This is identical to the standard and effective date adopted by the U.S. EPA in 2001 for on-road diesel fuel. This harmonization with the U.S. EPA's regulation is intended to reduce possible disruptions to the supply and availability of diesel fuel for California consumers. This new sulfur standard was also adopted by the South Coast Air Quality Management District in 2000 for diesel fuel sold in the District. The 15-ppmw limit is applicable to fuel for stationary engines on or after June 1, 2004 and to all other diesel engine applications on or after January 1, 2005. The rule also allows for extension of the effective date for fuel for motor vehicle use to match a later compliance date adopted by the ARB, but no later than June 1, 2006.

   The proposed ARB amendments will also do the following:

   - Improve the flexibility of the regulations by adopting new specifications for equivalency to the aromatic hydrocarbon limit for "CARB diesel fuel" – diesel fuel meeting the ARB's standards. The aromatic hydrocarbon standards were adopted in a 1988-1989 rulemaking and have applied to California motor vehicle diesel fuel since October 1993.
   - Establish a diesel fuel lubricity standard that is identical to the standard that was recently balloted by the ASTM. This proposed standard is at least as stringent as the current voluntary standard that has been maintained since 1994.
   - Adopt an ATCM to require the use of vehicular diesel fuel in all nonvehicular diesel engines except engines used in locomotives and marine vessels.

- Make other changes that help ensure effective enforcement of the regulations and maintain the emission benefits of the current program.

The June 2003 Initial Statement of Reasons for this rulemaking presents a detailed analysis of the likely environmental and economic impacts of the staff's proposal and supporting technical documentation. The staff's analysis includes estimates of the economy-wide impacts of the production of low sulfur diesel fuel. The specific economic impacts on the petroleum, transportation, and agricultural sectors of the California economy were also evaluated.

We agree that a uniform federal standard that provides the needed environmental benefits is the most desirable outcome. California's diesel fuel regulation differs from the federal regulation for on-road diesel fuel in having a more stringent aromatic hydrocarbon standard that has been applicable for more than a decade. As a result of the aromatic hydrocarbon standard, California's diesel fuel is cleaner than the national average fuel and the emissions benefits from the California fuel are greater. Weakening California's standards would be neither effective nor desirable. It would be in the nation's and California's best interest that the U.S. EPA adopt a diesel rule that provides emission benefits that are comparable to those provided by California diesel fuel requirements.

The U.S. EPA understands and acknowledges the emission benefits of cleaner diesel fuel. The aromatics regulation has been part of California's federally enforceable State Implementation plan (SIP) for ozone since 1995 (60 Fed. Reg. 43379 (August 21, 1995).) In 2001, the U.S. EPA approved Texas' SIP revisions for its diesel fuel program patterned after California's. Federal law requires that any loss of the emission benefits provided by the aromatic hydrocarbon regulation be made up immediately through the implementation of another equally effective control measure. Such alternatives are not likely to be as cost-effective as the diesel fuel regulations.

2. Comment: It was my understanding that CARB was working with the trucking industry to obtain a national standard that was sufficient to enable after-treatment technology for the new 2007 engine standards. No comments were made at that time supporting a European fuel standard relating after-treatment technology for light duty vehicles. I have in my possession a letter dated July 13, 1999 affirming this position of the ARB. (Senator Kevin Murray)

We believe that by moving ahead in this proceeding without evaluating the aromatic hydrocarbon standard, everyone has seen the letter that CTA and the ARB signed to U.S. EPA. We spent two years getting the 30 ppm and then finally the 15 ppm sulfur standard with ARB at U.S. EPA. We did not do that so we can come back to this proceeding and see another aromatic standard in the rule and another supply issue. (CTA)

Is the diesel fuel proposed needed for heavy truck emissions or for enabling technology? (Senator Kevin Murray)

Agency Response: A copy of the July 13, 1999 letter to U.S. EPA from the Executive Officer of ARB and the Executive Vice President of CTA is appended as Attachment C. Staff did work closely with CTA in 1999 to support U.S. EPA's adoption of a nationwide 15 ppm sulfur standard for on-road motor vehicle diesel fuel. Those efforts were limited to the sulfur standard because the new sulfur limit of 15 ppm was needed to enable the effective performance of advanced emissions control technologies in heavy-duty engines and vehicles designed to meet the 2007 model-year emission standards. The 15-ppm sulfur diesel is also needed by new and retrofitted diesel engines that must meet the diesel PM reduction targets proposed in California's Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled engines. The ARB made no representations that adoption of a nationwide ultra-low sulfur standard would mean that the ARB's aromatic hydrocarbon standard would no longer be needed.

The ARB is not supporting the adoption of European Union diesel fuel standards to promote the introduction of light-duty vehicles. In a letter to CTA, staff offered the European diesel fuel standards – specifically the World-Wide Fuel Charter's cetane standard together with the U.S. EPA national sulfur standard – as an example of fuel specifications that could provide emissions benefits about the same as the ARB diesel fuel requirements with an ultra-low sulfur element. This statement is consistent with staff's position in support of a stronger nationwide diesel fuel standard with improved emissions benefits over what is currently achieved with federal fuel.

As stated in Resolution 03-17, reduction of the maximum allowable sulfur content of California diesel fuel from 500 ppmw to 15 ppmw "will enable the effective use of the emissions control technology that are needed by heavy-duty diesel vehicles and engines to ensure compliance with the new PM, NOx, and NMHC emission standards adopted by the U.S EPA and ARB, and will also enable the use of the exhaust gas treatment technologies that will be required by new and retrofitted diesel engines to meet the diesel PM reduction targets proposed in the [diesel particulate Risk Reduction Plan]."

3. Comment: CARB has exceeded its expressly granted authority and has left the trucking industry, the fuel user, no avenue to address the aromatic issue by not evaluating adopting a mirror image federal standard as an alternative.

Prior to adopting or amending any standard or regulation relating to motor vehicle fuel specifications, CARB must, after consultation with public and private entities that would be significantly impacted, do both of the following: (1) determine the cost-effectiveness of the adoption or amendment of the standard or regulations, and (2) based on a preponderance of scientific and energy data in the records, determine the technical feasibility of the adoption or amendment of the standard or

regulation. That determination shall include, but not be limited to, the availability, effectiveness, reliability and safety expected of the proposed technology in an application that is representative of the proposed use.

Further, prior to adopting or amending any motor vehicle fuel specification, CARB must do both of the following: (1) to the extent feasible, quantitatively document the significant impacts of the proposed standard or specification on affected segments of the state's economy. The economic analysis shall include, but not be limited to, the significant impacts of any change on motor vehicle fuel efficiency, the existing motor vehicle distribution system, the competitive position of the affected segment relative to border states, and the cost to consumers, and (2) consult with public or private entities that would be significantly impacted to identify those investigative or preventative actions that may be necessary to ensure consumer acceptance, product availability, acceptable performance, and equipment reliability.

The Legislature has granted specific authority to CARB to promulgate the diesel fuel regulations it presently has – sections 2281 and 2282, title 13, CCR. Section 2281 sets forth the maximum sulfur content for diesel fuel. Pursuant to section [2282(a)(1)], on or after October 1, 1993, no person shall sell, offer for sale, or supply any vehicular diesel fuel unless the aromatic hydrocarbon content does not exceed 10 percent by volume for a large refinery, or 20 percent by volume for a small refinery. Section 2282 also contains an alternative formulation standard that can be used instead of the 10 percent or 20 percent aromatic hydrocarbon standard.

In conclusion, California has presently set forth the standards for diesel fuel that have set California apart from the rest of the nation. Specifically, where the Federal Clean Air Act requires diesel fuel to have no more than 15 ppm of sulfur, California has added the additional requirement for the reduction of the aromatic hydrocarbon content and continues to maintain it without scientific information that proves that it is cost effective. Thus CARB should evaluate a mirror image federal standard and incorporate the required economic analysis on the trucking sector to include the opening of the borders in 2005. (CTA)

If CARB passed a stricter standard than the current "national standard" slated for implementation in 2006, CARB would abuse its discretion and fail to follow and/or reasonably interpret the standards set forth in Health and Safety Code section 43013. (CTA)

Agency Response: As noted above, the ARB's limits on the aromatic hydrocarbon content of diesel fuel have been applicable in California since 1993 and they are in the approved SIP. This rulemaking is designed primarily to adopt ultra-low sulfur standards starting in 2006 that are numerically identical to the U.S. EPA standards and that will enable the effective use of emissions control technologies that are needed by heavy-duty diesel engines to ensure compliance with the new PM, NOx

and NMHC emission standards adopted by U.S. EPA and ARB, and will also enable the use of exhaust gas treatment technologies that will be required by new and retrofitted diesel engines to meet the diesel PM reduction targets. In initiating the rulemaking, neither the APA nor the California Health and Safety Code obligated the ARB to evaluate whether in the same rulemaking it should also repeal the diesel fuel aromatic hydrocarbon limits with a resulting substantial *increase* in NOx emissions from motor vehicle diesel engines. This does not mean that the commenter has no avenue to address "the aromatic issue," since it has the option of filing a petition pursuant to Government Code section 11340.6 for repeal of the aromatics regulation. An analysis of the cost-effectiveness of the aromatic hydrocarbon standard was conducted with the original rulemaking.

The ARB has addressed both the cost-effectiveness and the technological feasibility of the amendments (see the Initial Statement of Reasons, pp. 79-84 and 107-122, and Appendix H.) The ARB's work in these areas was conducted in consultation with public and private entities the would be significantly impacted; the staff conducted several workshops and had numerous meetings and conference calls with stakeholders.

The ARB has also quantitatively documented the significant impacts of the proposed standards on affected segments of the state's economy. (see the Initial Statement of Reasons, pp. 123-131 and Appendices M and N.) In addition, the ARB has consulted with stakeholders about consumer acceptance, product availability, acceptable performance, and equipment reliability. One concern that arose was that diesel fuel lubricity levels are expected to be reduced as a result of the severe hydrotreating refiners are expected to use to met the 15 ppm sulfur limit. Adequate levels of lubricity are necessary to protect the internal contact points in fuel pumps and injection systems to maintain reliable performance. In light of these concerns, the ARB has adopted section 2285, which establishes a minimum lubricity standard to maintain current lubricity levels in order to protect fuel pumps and injection systems.

2. Aromatic Hydrocarbon Standard

4. Comment: CARB admits that the 10% aromatic standard is not offered for sale in California. The alternative fuel formulation (secret formula) is an "underground regulation." The California Administrative Procedure Act (APA) prohibits state agencies from utilizing any rule which is a regulation, unless the rule has been duly adopted as a regulation. A regulation is defined as "every rule, regulation, order, or standard (of) general application . . . adopted by any state agency to implement, interpret, or make specific the law enforced or administered by it, or to govern its procedure, except one which relates only to the internal management of the state agency." (Gov. Code section 11342.610.) The Office of Administrative Law (OAL) is authorized to make determinations whether an agency is administering an underground regulation, and it has issued a steady stream of such determinations which consistently make close calls in favor of broad coverage for the APA and narrow construction of its exceptions.

CARB's information regarding the alternative fuel formulations show that CARB is actually acting pursuant to the preset standards that have not been formally adopted as regulations. Specifically, we have been informed, in writing by Chairman Lloyd, that CARB may desire to have its diesel fuel meet the standards promulgated by the Worldwide Fuel Charter. It may be the case that CARB is actually presently using these standards under the guise of "alternative fuel formulations." CARB is actually acting and being directed by an "underground regulation." CARB utilizes preset specifications, methods, or procedures that are not specifically provided for in approved regulations, creating "underground regulations."

CARB is proceeding in certification of diesel fuel pursuant to standards that have not been formally adopted pursuant to the APA. The only issue in the proceeding is whether the guideline or standard meets the definition of "regulation." Clearly, since virtually all refiners use the alternative formulation, it is a de facto regulation. (CTA)

Agency Response: It is clear that the alternative diesel fuel formulation mechanism in the regulation limiting the aromatic hydrocarbon content of diesel fuel does not constitute or result in a prohibited "underground regulation." This mechanism, which is in section 2282(g), title 13, CCR, has been a feature of the regulation since it was originally adopted in a 1988-1989 rulemaking. The original regulation was approved by OAL, as have been at least three subsequent sets of amendments that have affected section 2282(g).

The regulation allows refiners to comply by selling a certified alternative formulation that has an aromatic hydrocarbon content greater than the basic aromatic hydrocarbon limits. Most refiners have taken advantage of the regulation's flexibility to produce alternative diesel formulations that provide the required air quality benefits at a lower cost. In order to be certified, an alternative formulation must be shown to result in the same emission benefits as the 10 percent aromatic standard (or in the case of small refiners, the 20 percent standard). The preexisting regulation has required the determination of the values of five properties – sulfur, aromatic hydrocarbon, polycyclic aromatic hydrocarbon, and nitrogen contents, and cetane number – of the candidate fuel submitted by a refiner for certification. The values for the candidate then become the required specifications for the alternative formulation if it ultimately qualifies. Candidate fuel formulations are tested in a laboratory engine for emission equivalency against a defined reference fuel. They must be shown to be equivalent or better than the reference fuel with respect to emissions of NOx, PM, and the soluble organic fraction of the PM.

All of the criteria for the candidate and reference fuels, for the engine testing, and for the comparison of emissions are spelled out in great detail in the regulation. Section 2282(g)(6) directs the Executive Officer to certify an alternative diesel fuel

formulation if she "finds that a candidate fuel has been properly tested in accordance with [section 2282(g)] and makes the determinations specified in subsection (g)(5)." The Executive Order certifying the alternative formulation is to identify the cetane number and the sulfur, aromatic hydrocarbon, polycyclic aromatic hydrocarbon, and nitrogen contents of the formulation, along with any other required properties. The regulation provides that a refiner or importer may then comply with respect to a particular batch of diesel fuel by notifying the Executive Officer of the name of the applicable certified alternative formulation at least 12 hours before the start of shipment.

The commenter's premise is that all of these duly adopted regulatory provisions are insufficient because the APA requires the ARB to adopt each certified alternative formulation as a regulation before it can be used. But the certified alternative formulation approach is closely analogous to other well-established programs in which the regulating agency establishes explicit regulatory criteria for issuing a certification or permit for an activity, and then implements the mechanism by issuing certifications or permits that are not in each instance preceded by the adoption of an entity- or activity-specific regulation. Thus an agency may adopt a regulation regarding the submittal and review of permit applications for the construction of a new facility. The agency evaluates the application pursuant to the regulatory requirements, and ultimately issues the permit consistent with its permit regulation. Such a mechanism is clearly appropriate for use in place of a system in which every individual permit is issued by the adoption of a new regulation. The alternative formulation mechanism is not an underground regulation because every necessary element regarding the process for certifying a formulation is in fact in the duly adopted regulation.

5. Comment: Presently CARB is refusing to provide the requisite information concerning the alternative diesel fuel formulations under the California Public Record Act (PRA). The PRA declares that "access to information concerning the conduct of the people's business is a fundamental and necessary right of every person in this state." (Gov. Code sec. 6250.) The PRA was passed "to ensure public access to vital information about the government's conduct of its business." (*CBS, Inc. v. Block* (1986) 42 Cal.3d 646.)

The PRA includes two exceptions to the general policy of disclosure of public records: (1) materials expressly exempt from disclosure pursuant to Gov. Code section 6254; and (2) the catchall exception – Gov. Code section 6255 – which allows a government agency to withhold records if it can demonstrate that, on the facts of a particular case, the public interest served by withholding the records clearly outweighs the public interest served by disclosure. None of the express exemptions found in the PRA would apply in this matter.

CTA finds that CARB, in keeping the actual standards from the regulated industry and others prohibits out-of-state refiners from marketing diesel fuel in California. This is a clear "clean overbalance" on the side of confidentiality.

CARB has asserted that it is not able to produce the records due to the fact that the alternative fuel formulations are tantamount to the individual refiner's "proprietary information." This line of reasoning is certainly suspect as it does not appear that any trade secret or proprietary information would be released by requiring CARB to produce the fuel formulation, testing, contract and assessment documents regarding approved fuels to the public.

The definition of a trade secret states that it may consist of a formula which is used in one's business which gives him a competitive advantage over his competitors who do not use it. The alternative fuel formation "formula" does not fall within this definition. While it may be true that protection of the alternative formulations provides the refiners presently under contract with CARB a competitive advantage over other refiners, it is CARB's approval of the formula that gives the refiners this competitive advantage. In fact, the very definition states that a trade secret is not "the amount or terms of a secret bid for a contract." The submission of the alternative fuel formations is exactly that, namely a secret bid for a contract between CARB and the oil refiners to produce diesel fuel for sale in California. As such, CARB must disclose the identity of the refiners and formations that are currently approved for sale in California.

Presumably CTA or any other party could test the alternative diesel fuel formulations independently and determine its properties. Since a party can independently determine the makeup of the diesel fuel, it does not appear to fit within the traditional notion of a trade secret. The diesel fuel's formulation itself is not the unique factor that makes it valuable, it is CARB's approval that gives it value.

It is difficult to imagine a court not finding that the disclosure of the alternative formulations, if it could possibly reduce the current price of diesel fuel and increase the supply, outweighs the nondisclosure of the information. It is not in the public's interest to have a state agency acting in secrecy behind closed doors approving certain standards under apparently no standards, or standards that are not public standards after all.

CTA is submitting its second and final request for information under the Public Records Act and asking for disclosure of all relevant information. (CTA)

Agency Response: Since 1992 the ARB has certified over 30 alternative diesel fuel formulations as equivalent to either the 10 percent or 20 percent aromatic hydrocarbon content standards. Five of the formulations were not claimed by the applicant to be confidential. The full Executive Orders certifying these formulations, including the list of specifications, have been posted on the ARB's website at www.arb.ca.gov/fuels/diesel/diesel.htm. All of the remaining formulations have been claimed to be confidential in accordance with the ARB's regulations on disclosure of records, sections 91000-91022, title 13, CCR.

Attachment D is a February 15, 1994 letter from the ARB to a party that had made a PRA request for the first two formulations claimed by the applicant – Texaco Refining and Marketing, Inc. (Texaco) – to be confidential. The ARB concluded that the formulations constituted trade secrets that were exempted from disclosure by Gov. Code section 6254.7(d). Texaco demonstrated that the certifications of the formulations by the ARB gave the company a competitive advantage in being able to produce complying diesel fuel and that disclosure of the formulations would harm Texaco's competitive position.

The fact that the competitive advantage associated with a formulation results from the ARB's certification of the formulation does not disqualify the formulation from being treated as trade secret. There is no basis for the claim that an application for certification is a "secret bid for a contract" between the ARB and refiners to produce diesel fuel for sale in California. When she certifies an alternative diesel fuel formulation, the Executive Officer is simply implementing the regulation by taking the specified certification action upon a determination that all of the regulatory requirements have been met. Neither the Executive Officer nor the refiner is entering into any agreement with the other party to take any specified action.

Similarly, the fact that a party could theoretically obtain a sample of diesel fuel being sold as an alternative formulation and analyze the properties of the fuel does not disqualify the formulation from treatment as a trade secret. Where a batch of diesel fuel is being marketed pursuant to a certified alternative formulation, the act of making the fuel available for public consumption and theoretical testing by a member of the public not constitute disclosure of the actual specifications that represent the certified formulation.

The ARB does not have a record of any Public Records Act request from the commenter expressly requesting disclosure of the certified alternative formulations that have been designated confidential by the applicant.

With respect to the claim that the ARB has certified alternative formulations "under apparently no standards, or standards that are not public standards after all," see the response to the preceding comment.

With respect to the claim that the ARB is in effect prohibiting out-of-state refiners from marketing diesel fuel in California, see the response to the next comment. The ARB recognizes the supply benefits that result from California sales of diesel fuel that has been imported from out of state. Such imports have occurred in the past and will occur in the future. Moreover, one of the elements of this rulemaking is the adoption of a slate of designated equivalent limits for six properties that are specified in section 2282(h) and can be used for diesel fuel both produced in California or imported from out of state. This will make it easier for an out-of-state

refiner without access to many of the certified formulations to produce diesel fuel for shipment to California.

6. Comment: CARB is violating the Interstate Commerce Clause of the United States Constitution. The principle of the dormant commerce clause is that state and local laws are unconstitutional if they place an undue burden on interstate commerce. The crucial initial question is whether a state law discriminates against out-of-staters, or whether it treats all alike regardless of residence. State or local laws that discriminate on their face rarely are upheld, while nondiscriminatory laws are infrequently invalidated.

   In reviewing the regulation in question setting forth the alternative fuel formulation procedure, the regulation discriminates against out-of-state producers and/or refiners. Specifically, the Executive Officer of CARB may certify any alternative diesel fuel formulations upon application of any "producer or importer." Producer is defined as "any person who produces vehicular diesel fuel in California." An importer is defined as any person who first accepts delivery in California of vehicular diesel fuel. According to these definitions, no entity outside of California has the standing to apply to CARB for approval on alternative diesel fuel formulation. However, the regulation does not provide that no diesel fuel from outside of California can be shipped to a California importer who in turn dispenses it in California. Therefore, the law is facially discriminatory against interstate commerce.

   The regulations are drafted to protect the economic interests of the oil refiners in California who supported the alternative diesel fuel program. There is not a legitimate basis for not allowing an out-of-state refiner to apply for approval of an alternative diesel fuel formulation. (CTA)

   Agency Response: The provision in section 2282(g)(1), title 13, CCR authorizing the Executive Officer to certify alternative diesel fuel formulations "upon application of any producer or importer" was never intended to prohibit an out-of-state refiner from seeking certification and has never been applied in that fashion. In order to be sold in California, any diesel fuel produced outside the state will have to be imported into the state. Section 2282(a)(10) defines "importer" as "any person who first accepts delivery in California of vehicular diesel fuel." An out-of-state refiner who wants to obtain certification in order for the refiner's diesel fuel to be marketed in California may advise the ARB that the refiner intends to be an importer of the fuel. Even if the refiner plans to serve as the actual importer only on a limited or even one-time basis, that will be sufficient to entitle the out-of-state refiner to apply for certification of an alternative diesel fuel formulation as an importer. Once the certification is issued, the out-of-state refiner would not have to be the importer of each batch of the refiner's out-of-state diesel fuel in order for the diesel fuel to come within the certification.

7. Comment: Southwest Research Institute, an independent research organization, has found that the alternative formulations approved by CARB do not reduce pollution and increase emissions in later model (1994+) engine technology. (CTA)

   Agency Response: We have reviewed the results of several of South Research Institute's (SWRI) research programs and we do not know of any SWRI study in which they made the finding referred to by CTA. Staff's analysis of the emissions benefits with pre-1994 and later engine technologies, as presented in Appendix D of the June 2003 Initial Statement of Reasons for this rulemaking, also shows that this assertion by CTA is incorrect. The ARB's original estimates continue to be valid, and are in close agreement with the estimates from currently available emission studies.

8. Comment: The alternative formula is not prescriptive. It is not fair. There's another way to go about getting these emission reductions. CARB should delay this hearing and work with the State legislature to replace the aromatic standard with an incentive-based program that collects state taxes or fees from fuel purchases or barrel fees to fund the Carl Moyer Program. This alternative would actually bring in more money to districts that have air pollution problems and put California's trucking industry back on track. (CTA)

   Agency Response: As noted in the response to Comment 1, the existing standard limiting the aromatic hydrocarbon content of diesel fuel was approved in 1995 by U.S. EPA as part of the California SIP for ozone, and it has been an integral part of various attainment plans that have been approved since that time. This includes the plans of the South Coast and San Joaquin Valley.

   Replacing the diesel fuel aromatic hydrocarbon regulation with a Carl Moyer-like program in the SIP requires that all of the emissions benefits of the current program be offset prior to the removal of the aromatics regulation from the SIP. If we did not have an equivalent measure that would give the same emissions benefits, then this would constitute an impermissible relaxation of the SIP.

3. Economic Impacts

9. Comment: Cost-effective alternatives were not evaluated. The Health and Safety Code sets forth specific standards by which CARB must determine the reformulation standards. Section 43013 states that CARB may adopt and implement motor vehicle fuel specifications for the control of air contaminants and sources of air pollution which CARB has found to be necessary, cost effective and technologically feasible, to carry out the purposes of this division, unless preempted by federal law. (CTA)

   Agency Response: Staff considered two alternatives to the proposed amendments. One would have not changed the existing CARB diesel fuel standard, and the other would have proposed a lower fuel sulfur content limit than is contained in staff's present proposal.

If the ARB did not amend the current regulation, the sulfur content of diesel in California would be limited by the requirements of the U.S. EPA's 2007 Final Rule and the SCAQMD's Rule 431.2. The SCAQMD's 15-ppmw sulfur limit applies to diesel used in on-road, off-road, and stationary engines, but the federal 15-ppmw sulfur limit applies only to on-road diesel fuel use. These two regulations could ensure that low sulfur diesel is available for on-road use regardless of California action. However, the SCAQMD rule is not sufficient to ensure the statewide availability of low-sulfur diesel needed for effective implementation of the proposed control measures to reduce diesel PM emissions.

The second alternative of a more stringent fuel sulfur content limit would result in significantly higher costs to refiners with very small additional air quality benefits. Reductions in diesel sulfur levels below 15 ppmw would require the installation of duplicate refinery desulfurization capacity with no increase in diesel fuel capacity over which to amortize the additional costs. This would mean that the capital costs to comply with a lower sulfur level would likely be in excess of $600 million, and would likely increase diesel fuel production costs by about 8 cents per gallon.

See also the "Consideration of alternatives" discussion in Section I above.

10. Comment: CARB failed to consider or quantify the economic impact of the 1 in 12 trucking related jobs and their small business employers in California. CARB staff found "no additional adverse effect on small businesses because of the cost impacts of the regulations." The proposed European Diesel Fuel standard fails to incorporate an economic impact analysis related to trucking and warehousing jobs and incorrectly assumes no economic impact. Even the South Coast AQMD rule 431.2 assumed between a .074 and .187 job loss in 2005. (CTA)

CARB's finding that there is no economic impact is unfair based on the real harm this fuel standard has and continues to have on small businesses. This incorrect and insufficient assessment is far from meeting the state law regarding the assessment of economic costs to small business, the lion share of trucking companies located in California. (CTA)

Agency Response: Staff has evaluated the economic impact of the proposed amendments across several industries including the potential economic impacts on the trucking industry as well as small businesses and the independent owner/operator. The economy-wide impacts of the production of low sulfur diesel fuel were estimated using a computable general equilibrium (CGE) model of the California economy. This model is a modified version of the California Department of Finance's Dynamic Revenue Analysis Model (DRAM) developed by researchers at the University of California, Berkeley. The ARB model called E-DRAM describes the economic relationships between California producers, consumers, government, and rest of the world. The model uses the capital requirements of

$70 to $250 million, and a worst case diesel fuel production cost increase of 4 cents per gallon to estimate economic impacts.

A macroeconomic impact analysis of the use of low sulfur diesel fuel on the California transportation sector was also conducted using E-DRAM. The model projects that the use of low sulfur diesel fuel would reduce output in the California transportation sector by approximately $26 million and employment by 258 jobs. This translates into a decline of less than 0.06 percent in the output value of the California transportation sector and its employment, and is consistent with the assessment by the South Coast Air Quality Management District.

Staff also estimated the costs of the use of low sulfur diesel fuel to a heavy-duty truck owner/operator. Based on information from the American Trucking Association (ATA), fuel, equipment, and other costs, account for nearly 63 percent of total operating costs based on a typical heavy-duty 18 wheel tractor-trailer traveling 100,000 miles per year and earning $110,000 per year for a typical trucking company.[4] Using these figures for operating cost estimates, staff estimated that the use of low sulfur diesel fuel could increase total operating costs for a typical truck driver by 0.6 percent, based on a potential 3-cent diesel fuel production cost increase and the assumption that this increased cost of production is passed on to the consumers.

11. Comment: Failure to consider the alternative of a national fuel standard and the economic opportunity costs of registration, state and federal taxes forgone to bordering states fails to meet the minimum requirements of state law. (CTA)

    Agency Response: CTA has incorrectly indicated that non-California based interstate truck operators are able to avoid paying California registration fees and excise and sales taxes. Because of both an interstate fuel (IFTA) and a registration agreement (IRP), taxes and registration fees for interstate trucks are properly apportioned based on the California operations of these trucks. Under IFTA, an interstate truck operator is responsible for paying California excise and sales tax for fuel consumed within the state, regardless of whether it was purchased in California. Similarly, the IRP ensures that a prorated amount of California weight and registration fees are paid to the State in proportion to the number of miles a vehicle travels within the State. Under the IRP, it is irrelevant what the base plate, or home state, of the vehicle is. These two programs "level the playing field" and require that the appropriate revenues be paid, regardless of whether a truck is base plated in California or not.

    Also, a similar methodology is used by the federal government in disbursing money to the states from the federal Highway Trust Fund. All diesel fuel

[4] American Trucking Association, Information Center, Government's Cash Cow: The Trucking Industry (http://www.truckline.com/infocenter/position_papers/cashcow.html); Reference 103.

consumed in the country is assessed a federal excise tax. This money is collected from the states by the Internal Revenue Service, and disbursed by the federal Highway Administration using statutorily prescribed formulae. These formulae consider such data as vehicle miles traveled in each state, the amount of lane miles of highway in each state, and fuel consumption in each state. Since consumption, not sales, is the input used, it makes no difference where the fuel was purchased, only where it is ultimately consumed. As such, out-of-state fueling does not impact California's share of federal money from the federal Highway Trust Fund.

12. Comment: The trend is clear – when fuel prices escalate in California, fuel purchases move to bordering states along interstate corridors. We lose not just full fee registrations (a total of 233,000 for this case study from 1999-2002), but more significantly, state sales and excise tax of diesel and federal excise taxes. Instead of full fee registrations and taxes, we are getting a marginal percentage toward the state coffers. Flight of trucks to other states has and will continue to displace revenue during tight supplies. CARB should work with the state legislature to collectively solve the truck registration problem caused by diesel price spikes. (CTA)

    Agency Response: See the response to Comment 11.

13. Comment: CTA evaluates the weekly retail price, which is what we pay in real time for fuel, against the retail price of the cities in bordering states. CARB takes a quarterly average of the PADD 5, which includes 7 states specifically: Hawaii, Alaska, Washington, California, Arizona, Nevada, and Oregon. Using California, Alaska and Hawaii in the average is mathematically incorrect. Using the arithmetic quarterly mean (also known as the average) is also incorrect. The sum of all PADD 5 quarterly averages divided by the number of quarterly averages does not provide valuable data.

    The mean is a good measure of central tendency for roughly symmetric distributions but can be greatly misleading in evaluating extent of dispersion from the mean. The full explanation is to provide the range of values (spread) that compose the mean. If the range is from 1 cent to 50 cents per gallon (when a CARB-secret formula refinery shuts down) you begin to understand the economic crisis faced by truckers. The trucker can never price his service to recover the short, but powerfully impacting 50 cent price spike.

    Our way of looking at it shows a 25-cent increase overall in prices in California. The Air Resources Board shows a 2 cent increase. This is the discrepancy between the industry retail spikes and CARB's quarterly average of a seven year average. CARB's extended smoothing of the prices repeatedly masks the severity of the price spikes and the real volatility at the pump. Hiding behind an average value without giving full information as to range of price spikes over time does not

accurately reflect the real costs to the trucking company who has to purchase the fuel weekly.

Agency Response: Using an average price is not an improper method to account for diesel fuel costs. As is practiced in many businesses, companies account for fuel costs by totaling the dollars spent on fuel. Calculating a per gallon cost, say on a monthly or quarterly basis, is done by dividing the fuel costs over that period by the number of gallons purchased. This ratio can then be utilized to project future fuel costs and adjust, if necessary, other facets of their business. The ARB's analysis of fuel prices uses this same methodology, as it allows for both price spikes and price drops to be included in the analysis, and provides an average price over the period of interest.

As is discussed in more detail in response to Comment 15, significant variability in retail prices occurs in the marketplace. While price spikes can have a short-term economic impact on diesel fuel users, drops in price can have a corresponding economic benefit. It is inappropriate to only evaluate the economic effects of price spikes on diesel fuel users. We believe that an analysis that captures the variability of the retail marketplace, as is provided in evaluating average diesel fuel prices, is the appropriate analysis.

14. Comment: CARB's Economic Model does not reflect the price volatility in the market and has failed to consider the economic theory of supply and demand. Average Cost estimates hide the price spikes making the model output incorrect with regard to trucking companies located in California.

Recommendation: The State should incorporate standard economic models of supply and demand in a market interaction created by further limiting California's fuel market. This will determine how much diesel is sold and bought, and what the price would be if one of the few refineries selected for alternative formulation approval were to perform scheduled maintenance or experience an accident or explosion. (CTA)

Agency Response: ARB staff evaluated the potential impacts the proposed amendments could have on supply and demand. The amendments should not impact the ability of California refiners to supply sufficient quantities of diesel fuel to the California market, nor will they preclude complying diesel fuel from being imported into the state. A recent ARB refinery survey suggests that sufficient diesel refinery capacity to meet California demand already exists within the State. With the implementation of the federal on-road low sulfur diesel regulations, adoption of the CARB diesel fuel regulations by the state of Texas, and the ability of out-of-state refiners to produce diesel fuel meeting California standards, a greater supply of diesel fuel should be available to the State in the future. Overall, the diesel production system should be no more subject to supply disruptions than today. In fact, 2006 market conditions may be better able to readily adjust to any CARB diesel production requirements that occur in the future.

15. Comment: CARB's incorrect depiction of the taxes in California is incorrectly blaming the sales tax for the price spikes. California fuel taxes are in line with the bordering states. In fact, when the sales tax is added in, California's state excise and sales tax are still less than Arizona's and Nevada's state excise tax even though these bordering states do not assess sales tax on fuel. So the sales tax has zero impact on why our prices are different. One hundred percent of the volatility is the alternative formulas and the cartel created by not having prescriptive standards. (CTA)

    Agency Response: The commenter is incorrect in assuming that staff has placed the variability of retail diesel prices solely on California's sales tax. As discussed in the Initial Statement of Reasons, state and federal excise taxes, transportation costs, retailer's operating costs, supply and demand, as well as other competitive market considerations create a market environment in which all have a large influence on the retail price. These retail price components can create significant variability in retail prices, not only between California and other states, but between cities within California as well.

    In addition, while California's unique application of the sales tax on motor vehicle fuel purchases comprises only one component of retail diesel fuel prices, it can have an escalating effect on retail fuel prices. Because the sales tax – which is based on a percentage of the retail price of the fuel – has an impact on the final retail price, retail prices can increase at a greater rate in California than in other states where sales tax is not levied on fuel purchases. However, as stated, this is only one component in the retail price of fuel in California.

16. Comment: Are trucks driving more miles through congested non-attainment areas to avoid higher fuel prices in California?

    Are commercial software companies selling products to interstate truckers to show them where to fuel to avoid California fuel? (Senator Kevin Murray)

    Agency Response: Staff is aware of software that has been created and marketed to enable users to identify fueling locations with the lowest fuel prices along a given route. However, the software evaluated by staff was not sufficiently sophisticated nor designed to specifically allow users to avoid California fueling. In fact, staff's evaluation of a number of frequently traveled routes indicate that the software frequently "recommended" California fueling stops.

    Since drivers and transportation companies are under a significant number of operational pressures, including daily legal drive time limits, the costs associated with increased fuel consumption for out of the way fueling locations, increased operating costs for "extra" miles driven, and potential lost profit opportunities due to delayed route completion, it is unlikely that they will avoid California fueling as a matter of practice.

17. Comment: Interstate trucks can travel nearly 1,700 miles on a single fueling and can choose where they will fill up or to where they will dispatch vehicles based on competitive freight pricing. Since 1993, trucks drive more miles to purchase cheaper federal fuel. Fueling activities are booming at California's borders as more and more trucks operate from just outside the state. More trucks come from out of state because they can offer cheaper service, even after they drive a few extra hundred miles to enter the markets. A recent survey of intermodal carriers shows that companies will drive an average of 42.7 miles out of their way for cheaper fuel. (CTA)

    I urge you not adopt any fuel regulations that are different from the Federal standards in any way. Most of our customers are now based out of state. What does that mean? It means that trucks based in Arizona, that fuel in Arizona, or Vegas or Salt Lake City, are operating within Southern California. These trucks can run upwards of 2000 miles without refueling. Fuel purchased out of state is currently much cheaper than CA fuel and this gives them an advantage. (Los Angeles Freightliner)

    Agency Response: Staff has evaluated whether diesel fueling practices have been changing with time in regards to taxable diesel fuel sales. The United States Energy Information Agency tracks taxable fuel sales volumes amongst the states. Their data show that the increase in taxable diesel fuel sales in California is consistent with changes in VMT and population. According to the United States Census Bureau (2000), California's population increased by an annual average rate of nearly one and a half percent since the last census in 1990. At the same time, the number of vehicle miles traveled (VMT) has been increasing by more than 4 percent per year. Consistent with this growth in population and VMT, taxable diesel fuel sales have increased by about 4 percent annually. There is no evidence from fuel sales data of a mass shift to other states in taxable diesel fuel purchases over the last several years.

18. Comment: Every day hundreds of trucks enter this state from Oregon, Nevada, Arizona, and Mexico and they all come into this state with a minimum of 500 gallons of diesel fuel they have acquired prior to entering California. To have a separate fuel for the trucking companies that are strictly based and operate solely in California makes no sense. We need one standard diesel fuel for the entire United States. (California Cartage Company, Inc.).

    By cutting us off from the national fuel supply, we will not be able to continue to compete with out-of-state companies that do business in California, but don't buy fuel in California. It makes sense to have one fuel formulation for the whole country. We are tired of paying higher prices and not being able to access national fuel supplies. (Dalton Trucking, Inc.).

We cannot continue to compete with out-of-state companies that do not have to buy California's special fuel formulations or retrofit their trucks to CA standards. (Covey Auto Express, Inc.)

I find it very difficult to price our services competitively when our company is faced with an unbalanced fuel standard from carriers that are not California carriers. My companies on the East Coast are reluctant to allow us to price above their National Pricing Standards. (Rodgers Trucking Company)

A California only fuel will be used by only those California carriers locked into purchasing fuel within the state, because they serve only local shippers. All others will get fuel outside the state when they can. Your noble effort will be defeated, the air will not be any cleaner, fuel prices will increase above the extortion type prices currently being charged. Only if all carriers, regardless of terminal location, burn the same fuel will you have a chance to achieve your goal. (Hobbs Trucking Co.)

A national fuel standard is the answer to breaking up this government sanctioned and protected mature oligopoly. A national standard and open market would bring fuel price parity to California truckers and eliminate the threat of boutique fuels in other states for interstate carriers. It is in the best interest of the public and trucking industry nationwide to advocate for a single national diesel fuel standard. (CTA)

Agency Response: As stated in our response to Comment 1, we support harmonization of the U.S. EPA's and California's diesel fuel standards. We maintain that it would be in the nation's and California's best interest that the U.S. EPA adopt a diesel rule that provides emission benefits that are comparable to those provided by the CARB diesel requirements.

Staff does not believe that a national fuel standard would result in uniform diesel fuel pricing across the country. Even today there is significant regional price variation outside of California for federal diesel fuel. An examination of diesel fuel prices across the nation shows wide variability. Recent data from the United States Department of Energy, Energy Information Administration indicate diesel prices in Petroleum Administration for Defense Districts (PADD) 3 (Gulf Coast) were $1.59 while in PADD4 (Rocky Mountain) diesel prices were $1.70 per gallon. The East Coast region or PADD1 shows an average price of $1.64 per gallon of diesel fuel, but even within the region, price variability is present. A 17-cent per gallon difference exists between PADD1A or the New England area at $1.76 and PADD1C the Lower Atlantic region at $1.59 per gallon.

19. Comment: In their failure to conduct an Environmental Impact Assessment and CEQA Analysis, CARB has failed to consider increased costs of fuels that can't be passed on to shippers, the relocation of companies outside the state, the

increasing truck miles and the slow down or elimination of new truck purchases. (CTA)

Agency Response: Please refer to Comment 10.

20. Comment: Intrastate truck turnover is declining. Is this due to lower profit margins from CA carriers? (Senator Kevin Murray)

Agency Response: The decision to purchase new trucks could be affected by a number of factors including the improved durability of engines and the types of business costs identified in Comment 21. The only cost impact on the California trucking industry that was pertinent to this rulemaking was the impact of the use of low sulfur diesel fuel. As we discussed in our response to Comment 10, staff estimated that the proposed regulation could increase total operating costs for a typical truck operator by about 0.6 percent.

21. Comment: This fuel issue coupled with workers' comp, health insurance, truck insurance, and 42 percent increase in weight fees on trucks, will certainly drive many in our industry out of business. Please reconsider. (Tri-F Consolidators Inc.)

Agency Response: Staff agrees with the commenter that the major issues regarding the economic viability of the trucking industry include worker's compensation, increases in health insurance and other employee benefits, as well as increases in truck insurance and related weight fees. Increased diesel fuel prices will also have an economic impact, but as discussed in response to Comment 10, the impact of low sulfur diesel fuel on the operating costs of a typical truck operator should be an increase of about 0.6 percent.

22. Comment: Fuel price was up to 40 cents higher on interstate (I-5, I-10, I-15, I-80) routes during 1999-2002. Did this cause intrastate registrations to decrease and interstate non-CA carriers to domicile outside the state? (Senator Kevin Murray)

Agency Response: Interstate trucking firms can register (or baseplate) in virtually any state they wish, so long as they have some in-state operations, and maintain an office location in that state where they keep records and other central business operations. The baseplate location is chosen for a variety of business reasons not related to California fuel prices. The response to Comment 11, identifies the taxes and fees that cannot be avoided by changing the baseplate, while the response to Comment 21 identifies some of the business costs that can influence the choice of a baseplate location.

23. Comment: When the North American Free Trade Agreement (NAFTA) is fully implemented, which will fall closely to this proposed 2006 CA-only fuel implementation, trucks from Mexico and Canada will be using the federal fuel

formulation. What effect will this have on the trucking industry and the state highway account? (Senator Kevin Murray)

Agency Response: We recognize that the implementation of NAFTA could have an impact on the California trucking industry. However, NAFTA is an international treaty ratified by Congress. As such, the State of California has no ability to influence its impacts on California industry and businesses.

4. Emission Benefits

24. Comment: CARB models a modest 7% reduction in oxides of nitrogen (NOx) emissions from diesel sources statewide as a result of the California-only fuel standard, but does not consider the increase in vehicle miles traveled to avoid fueling in California. CARB's model is not designed to capture the market behavior of what competitive trucking companies will do to avoid high and volatile pricing inherent to California only diesel fuel. (CTA)

We have asked the U.S. EPA to deny SIP credit for the aromatics portion until they look at the increased vehicle miles traveled for interstate trucks and the fleet turnover. (CTA)

Agency Response: California's mobile source emission inventory model (EMFAC) accounts for vehicle miles traveled (VMT). The model uses VMT estimates provided by a variety of sources including California's Department of Transportation (CALTRANS), local air quality or planning organizations, and fleet monitoring projects where vehicle activity is recorded through driver surveys or counting mechanisms such as the Weight in Motion stations maintained by CALTRANS. These are reliable VMT estimates but they do not provide information about the driving habits of truckers. The response to Comment 16 addressed the question of whether or not truckers increase their VMT to avoid CARB diesel. The conclusion was that it is unlikely that drivers will avoid California fueling as a matter of practice.

Two sources were used to estimate heavy-duty truck (HDT) VMT for EMFAC – The yearly CALTRANS report, "Truck Miles of Travel on the California State Highway System" and Pacific Environmental Services' (PES) "Assessment of Heavy-Duty Gasoline and Diesel Vehicles in California: Population and Use Patterns." The PES report contains data regarding travel on local roads. The VMT for all HDTs were then divided between gasoline and diesel HDTs using data from the PES report.

The emission reductions associated with the use of CARB diesel were incorporated into the 1994 SIP amendments and approved by the U.S. EPA in 1995 (see the response to Comment 1).

25. Comment: CARB must conduct the necessary Environmental Impact Statement and CEQA analysis with respect to on-road truck emissions to reflect interstate

users fueling with federal fuel, California-based trucks re-registering and fueling outside the State, increased VMT due to relocation of fleets outside the State boundaries, delay of truck purchases and maintenance intervals and the inevitable traffic from Mexico planned for 2005.

Agency Response: The current version of the EMFAC emissions inventory model attributes 25% of on-road heavy-duty truck activity in California to out-of-state trucks. The current estimate is based on the 1997 results of a national survey that is conducted every 5 years by the Bureau of Census. When the 2002 survey results become available, staff will update the inventory's estimate as necessary.

While the model accounts for the activity of out-of-state trucks, it does not account for diesel fuel purchased out of state and consumed in California. Staff is working with interested stakeholders to acquire the data needed to make the appropriate emissions inventory adjustments. Staff's preliminary estimate is that 10 to 15 percent of the diesel fuel consumed in California is out-of-state fuel.

26. Comment: What emission reductions has U.S. EPA determined for 2010 and beyond based on the proposed California standard and how are increased mileage from interstate trucks and reduced older truck turnover for intrastate trucks accounted for in those reductions? (Senator Kevin Murray)

Agency Response: The U.S. EPA has accepted the ARB's estimate of the emissions benefits of the diesel fuel program as part of the State 1994 SIP and updates. ARB staff estimates the NOx benefit of the California diesel fuel program to be about 7 percent greater than the benefits of the federal fuel program. This NOx benefit is in the range of 70 to 100 tons per day, depending on the inventory year and the version of the EMFAC model used. See also the response to Comment 24.

27. Comment: By keeping a "California-only" fuel formulation and retrofit plans, you are encouraging drivers to fuel up out of state with dirtier diesel, encouraging drivers to drive further and longer to get cheaper fuel, and encouraging business owners to hold on to older dirtier trucks that can not be retrofitted, because suddenly they are much more valuable. (Golden Eagle Express, Inc.)

Agency Response: The responses to Comments 16 and 17 discuss why it is unlikely that drivers will significantly increase their VMT to avoid fueling in California as a matter of practice. The responses to Comments 20 and 24 address the issue of fleet turnover.

5. Implementation Date

28. Comment: As we understand the currently worded requirements, ALL diesel tanks will have to be "turned" – that is completely replaced with the new sulfur fuel – no later than 90 days of after the fuel is available at the distribution racks. *THIS IS NOT POSSIBLE*.

Unlike gasoline, diesel is distributed to many small-bulk customers such as farms and ranches, construction sites, small fleets, local governments, emergency services, industrial locations, backup generators, etc. Many of these tanks do not "turn" in 90 days. The most logical and practical way to implement this requirement is to allow tanks to "naturally" turn as they are replenished. Since ULS diesel will be the only product legally available this will happen – it is just a matter of time. The great expense of draining and refilling all diesel tanks 90 days after the fuel becomes available will overwhelm the limited air quality benefit of this enforcement provision and may create an artificial supply shortage. (CIOMA)

Agency Response: In response to this comment, we have added regulatory language in section 2281(a)(4) to allow an extended phase-in of the 15-ppm sulfur standard at low through-put facilities. The added provision will protect facilities that receive deliveries of diesel fuel so infrequently that no delivery after the upstream phase-in dates has reduced the sulfur content of the facility's diesel fuel.

6. Lubricity Standard

29. Comment: We ask CARB, going forward, to monitor and evaluate the marginal price that the unique lubricity and aromatics standards are imposing on the fuel (i.e. making it a California exclusive fuel) and what are the related air quality benefit those requirements bring to the state. In that way we can all better understand the cost-effectiveness of these regulations as they are implemented. (CIOMA)

Agency Response: We concur that fuel prices should be monitored in an effort to evaluate the price impact of our regulations. The staff does monitor fuel prices on an on-going basis with this end in mind. The staff has found, however, that other market dynamics can significantly influence fuel prices.

The amendments adopted in this Board action do not alter the basic requirements of the aromatic hydrocarbon regulation. Therefore the amendments will not change the existing air quality benefits provided by the aromatic hydrocarbon standard. Consequently, any increase in the cost of production related to these amendments can not be linked to the emissions benefits of the CARB diesel aromatics standard.

The lubricity standard established by these amendments is a technology enabling measure and does not have specific emissions reductions associated with it. Air quality will benefit by the use of this standard due to reduced equipment wear. Reduced equipment wear results in more optimal equipment performance and less degradation in emission levels.

Additionally, ASTM is currently balloting a lubricity standard identical to the adopted ARB 2005 lubricity standard. The ballot contains an effective date of January 1, 2005. There is much optimism that this ballot will be passed and

become in effect a national standard. If this should happen, section 2284(1)(B) as modified provides that the ARB'S 2005 lubricity standard will not apply since California diesel fuel will be required to meet the ASTM lubricity standard under the regulations of the Division of Measurement Standards.

30. Comment: We also ask that the lubricity standard be closely monitored. From discussions with CARB staff, we understand that the lubricity additive will be injected at the rack once the 2006 standard fuel comes into supply. This is especially important to the potential of fuel imports, as they can be imported and distributed before the "finishing touch" is conveniently applied at the rack distribution point. If this turns out not to be the case we ask CARB to eliminate this requirement. A review of how this requirement will be implemented in early 2006 would be prudent, with the understanding that the rule could be adjusted to eliminate the requirement. (CIOMA)

    Agency Response: Further discussion with the commenter clarified that CIOMA is requesting that the 2006 fuel lubricity standard be eliminated if fuel additization for lubricity does not occur at the rack distribution point.

    While the amendments provide a place holder for the 2006 lubricity standard, a specific standard has not been established. Consequently, the necessity of additizing at the rack distribution point cannot be assessed at this time. The 2006 lubricity standard, to be implemented on the same schedule as the 15-ppmw sulfur limit for diesel fuel, is to be a level sufficient to protect advanced technology fuel systems. Staff will conduct a technical assessment to determine this level and report to the Board, with a recommendation, in 2005. Implementation issues, such as the effect on the multi-use pipeline, additization at the distribution rack, and imports, will be considered and addressed as part of this assessment. These issues would also be considered in any subsequent rulemaking establishing a more stringent 2006 standard.

31. Comment: We welcome the ASTM efforts to include a lubricity specification in ASTM D-975, and are especially pleased that they have decided to ballot the HFRR method, which we strongly believe to be the most appropriate for rotary fuel pumps and Common Rail high pressure pumps. We do not however support the limit value of 520 microns wear scar diameter, and our position remains as stated in the joint FIE manufacturers statement on fuel quality issued in June 2000, a copy of which is attached to this e-mail. The stated requirement is meeting the limit defined in ISO 12156-2, namely 460 microns wear scar diameter at 60^{o}C. Many years experience in the European market has confirmed this to be a level which will provide adequate protection. (Delphi Diesel Systems)

    Agency Response: The Board has directed the Executive Officer to conduct a technical assessment to determine whether a standard more stringent than the 2005 standard should be implemented to protect advanced technology fuel

systems on the same schedule as the 15-ppmw sulfur limit for diesel fuel. A report and recommendations are due to the board in 2005.

The Coordinating Research Council (CRC) Lubricity Panel, part of the CRC Diesel Performance Work Group, is currently planning the testing of several light duty diesel (LDD) equipment types from LDD vehicles either currently available in the United States or to be available in the near future. This testing is to characterize fuel injection system wear with fuels with a range of lubricity levels. Staff is optimistic that results from the CRC Lubricity Panel testing will be available early enough in 2005 to provide data on which to base the recommended 2006 standard. While Staff understands that European experience has shown that the 460 micron wear scar diameter is protective of advanced technology fuel systems, this CRC testing should indicate the lubricity level that is required for protection of this type of equipment.

32. Comment: We are supporting CARB's proposed 520 HFRR limit starting in 2004 because we want to see this method become the standard across the U.S. as it is in Europe. We are disappointed, however, that CARB staff have decided not to propose a sufficiently protective standard for implementation by 2006, choosing instead to postpone the decision.

We urge the Board to take a more protective stand and adopt a standard today that is known to protect new engines. We note that fuel injection equipment suppliers, while supporting the recent ASTM ballot, do not believe that 520 microns is protective enough for the newest technologies.

We urge the Board to adopt a standard for 2006 at least as protective as the 460 HFRR used in Europe. This position, actually, is our compromise to help move the process forward. We would much rather see California adopt the World Wide Fuel Charter limit of 400 HFRR, which automakers selected as being the most certain to protect expensive new diesel technologies. (Alliance of Automobile Manufacturers)

Agency Response: See the response to Comment 31.

7. Biodiesel

33. Comment: World Energy Alternatives is the largest supplier of biodiesel in the country. I'm also speaking today on behalf of the National Biodiesel Board. I am requesting clarification of the definition of diesel fuel. A product that is more than 50 percent biodiesel, that is B51 or above, would not be within the definition of diesel fuel. We request clarification of the reasoning behind that and the likely impacts of that. There is a distinct ASTM standard for biodiesel, and we would welcome the opportunity to work with the ARB staff on the subject. (World Energy Alternatives)

Agency Response: As discussed in the response to peer review Comment 67, the primary reason for the revision of the definitions of diesel fuel in the sulfur and aromatics regulations is to make clear that the sulfur and aromatics standards apply to a broader group of fuels and fuel blends for compression ignition engines, including biodiesel blends. This revision reflects our historic interpretation that the regulations have applied to such fuels.

The amendments do not adversely affect biodiesel blends. If a blend contains 50 percent biodiesel or less, the blend is subject to the sulfur and aromatics standards. But since B100 contains essentially no sulfur or aromatic hydrocarbons, the biodiesel blend would comply with the sulfur and aromatic hydrocarbon standards any time the traditional diesel in the blend meets the CARB standards. If a blend contains more than 50 percent biodiesel, then it becomes so different from traditional diesel fuel that it should appropriately be excluded from the regulations governing diesel fuel.

The amendments do not disadvantage blends containing more than 50 percent biodiesel. Such blends are simply not subject to our sulfur and aromatic hydrocarbon requirements for diesel fuel, and are accordingly not regulated by the ARB's current regulations. In our response to the following comment, we discuss the other requirements for diesel fuel offered for sale in California.

34. Comment: As proposed and with the further modifications presented by ARB staff at the hearing, it is the intent of the staff at this time that the final rule would not apply to biodiesel blends above 50 percent biodiesel up to and including 100 percent biodiesel. As a result, use of biodiesel blends above 50 percent biodiesel is still unregulated in California by ARB and can be used in diesel engines that are otherwise required to only use regulated and certified CARB diesel. We believe that this is, unfortunately, an unfair regulatory policy that ARB currently has.

We recognize that biodiesel does offer some improvements in lubricity, particulate matter, and carbon monoxide emissions, but we're also aware that generally it's felt that the use of biodiesel blends, especially B100, may result in increased NOx emissions. I also just recently became aware that the California Department of Agriculture is actually proposing new standards for biodiesel and B100 and the comments are due on that at the end of August.

We recommend that the Board direct staff to return within six months with a proposal to ensure that all bio-diesel used in California diesel engines is regulated consistently with CARB diesel and its use does not allow an increase in NOx emissions. (WSPA)

Agency Response: Commercial diesel fuel regulated by the ARB must meet the aromatic hydrocarbon and sulfur specifications adopted by the ARB. WSPA is correct that under the amendments, products that are more than 50 percent

biodiesel will not fall within the definition of diesel fuel and thus will not be subject to the diesel fuel standards. These products including 100 percent biodiesel (B100) would in any event meet the aromatic hydrocarbon and sulfur content specifications for diesel fuel, so imposition of the aromatic hydrocarbon and sulfur standards would not constrain their sale. However, the commercial sale of diesel fuel in California is also regulated by the Division of Measurement Standards (DMS) in the Department of Food and Agriculture for consumer protection.

The current DMS regulation only allows the sale of diesel fuel that meets the latest version of the ASTM D-975 specification for diesel fuel oil. (section 4143, title 4, CCR.) Under the DMS regulations, biodiesel fuels that do not meet ASTM D-975 specifications can only be marketed in California as a developmental fuel pursuant to section 4144, title 4, CCR. However, DMS is currently completing a rulemaking that will establish specifications for B100 blend stock and finished biodiesel fuel blends.

We agree that biodiesel use should not adversely impact air quality. ARB staff has started a working group to evaluate the need for amendments to the diesel fuel regulations to address biodiesel use. The issue of NOx emissions increases with biodiesel use will be addressed in any recommendations made by ARB staff to the Board.

8. Equivalent Limits

35. Comment: Before any Designated Equivalent Fuel Limits (DELs) are adopted, the Board needs to direct staff to find out what are the real world average fuel properties in the market place, and to report back to the Board on their findings and the potential for environmental backsliding from the proposed DELs. (WSPA)

    Agency Response: ARB staff collects and analyzes fuel samples from refineries, terminals, and service stations as part of their routine inspection activities. However our limited data set is not appropriate for determining the "real-world average fuel properties in the market place" suggested by WSPA in their comment. Therefore, staff requested WSPA's help in compiling the appropriate information to respond to their comment, but WSPA has declined to provide the information at this time. ARB staff will continue to work with WSPA to address this issue.

    The proposed equivalent limits will maintain the emissions benefits of the diesel regulations. In our response to peer review Comment 49, we explain why we believe there will not be any "environmental backsliding" from the proposed alternative equivalent limits.

36. Comment: We recommend that once the DELs are adopted, the Board request a staff report within a year's time that provides the number of refiners and importers using them, the volume of fuel sold, and an estimated impact on emissions. (WSPA)

Agency Response: In Resolution 03-17 the Board directed the Executive Officer to report to the Board, within one year of the effective date of the amendments, on the number of refiners and importers using the designated equivalent limits, the volume of fuel sold subject to those limits, and the estimated impact of the use of those limits on emissions.

9. SCAQMD Diesel Fuel Rule

37. Comment: We cannot support the CARB proposal as currently written. Adoption of your staff's proposal will delay implementation of the 15-ppm sulfur limit by 17 months in our air basin by nullifying the January 1, 2005 implementation date set by AQMD Rule 431.2 (c)(3). Moreover, this occurs during the year 2006, which is our attainment year for PM_{10}. So we lose the emission reduction benefits from January through June 2006, which is a critical year for us. (SCAQMD)

Agency Response: We appreciate that the South Coast would like to implement their low sulfur fuel requirement as expeditiously as possible. We supported the District's efforts to require the early use of this fuel in limited fleet applications and in stationary source applications. However, it was clear to the District when they adopted the rule in 2001 that it was our position that any widespread requirements within California for low sulfur diesel fuel should be developed on a statewide basis to ensure adequate supply and availability of fuel for California consumers. They understood that we would align our rule with the federal rule which had not yet been adopted. In recognition of the importance of reconciling the timelines and requirements of the district regulation with statewide regulations, the South Coast rule included an extension of the implementation date of January 1, 2005 to match a later compliance date adopted by ARB for statewide motor vehicle diesel fuel requirements but no later than June 1, 2006. A similar clause was included in the ARB Executive Order approving the district rule.

The South Coast is a net importer of diesel fuel, receiving a significant portion of its supply from outside the air basin – from Northern California, the Pacific Northwest, and foreign locations. The SCAQMD's regulation is applicable to approximately half of the state's diesel fuel. To maintain adequate fuel supplies in the District, refiners outside of southern California would have to start producing 15-ppm sulfur fuel far in advance of the effective date for the rest of the state and nation. In their staff report, the District's response to comments on the rule indicate that they are counting on timely completion of refinery modifications in the District and on imports from refineries in Northern California to satisfy fuel demand and avoid "periodic supply disruptions leading to shortages and price spikes." However, based on information provided by refiners, the CEC staff does not expect refiners outside of Southern California to be able to meet demand for low sulfur fuel in the District. Refiners outside of the District are on schedule to comply with the California and federal implementation date of June 2006. The CEC's expectation of supply problems is consistent with the ARB's position.

See the following comment for our response to the District's estimate of lost emissions credits during the 17-month delay from January 1, 2005 through June 2006 and the impact of this delay on attainment.

38. Comment: Delays beyond the January 1, 2005 date for Southern California could have an impact on our progress toward attainment demonstrations for both ozone and PM_{10}. In fact CARB's staff recommendation will increase primary and secondary PM emissions by about 6 tons/day over a 17-month period. The proposed deadline could also unnecessarily delay widespread implementation of several key NOx and particulate control technologies that depend upon low sulfur fuel to operate. (SCAQMD)

Agency Response: We agree that the district will forgo a small amount of additional PM_{10} emissions reductions that might have been achieved with the use of low sulfur diesel fuel in the existing vehicle fleet during the 17-month period. Because we are concerned about the impact of these lost credits on the SIP, we examined the District's SIP obligations. There are no ozone and PM_{10} reductions credited in the District's SIP prior to 2006 and the same is true for attainment demonstration. Nevertheless, the issue of the lost PM_{10} emissions credits is important with respect to diesel PM risk reduction.

The statewide implementation date does not affect the June 2004 implementation of the District's requirements for low sulfur diesel fuel use in stationary engines. Also, availability of low sulfur fuel for current retrofit needs should not be a concern as adequate quantities are being produced.

The ARB's rulemaking will not cause unnecessary delays in the widespread implementation of NOx and PM control technologies that require low sulfur diesel fuel. Widespread need for this fuel will occur in the district only with the widespread introduction of diesel vehicles equipped with NOx and PM emissions control technologies that are enabled by low sulfur diesel fuel. The U.S. EPA and California exhaust emission standards that will require the use of these emissions control technologies will apply to 2007 and subsequent model-year heavy-duty diesel engines.

39. Comment: The air quality consequences of delaying the low-sulfur requirement beyond January 1, 2005 were not analyzed in the CARB staff report or CEQA documentation. If CARB intends to adopt the June 1, 2006 deadline, CARB staff should provide a comprehensive air quality analysis that identifies the emission reduction shortfalls that will occur in South Coast, analyze the air quality impacts of the delay, and propose mitigation measures. An associated CEQA analysis is also required.

We think it is unfortunate that the staff report and the CEQA analysis before you do not address the issues that I'm bringing to your attention this morning. For example, if you look at the alternatives analysis, it doesn't have an analysis of

what is clearly a deserving alternative, which is earlier implementation as indicated by our adopted rule. (SCAQMD)

Agency Response: ARB staff's environmental impact assessment of the amendments to the California diesel fuel regulations complied with California Environmental Quality Act (CEQA) requirements. Staff found that the amendments would not have any significant adverse impact on public health and the environment. These findings were supported by external scientific peer reviews conducted pursuant to Health and Safety section 57004. The scientific basis of the regulation was evaluated by four peer reviewers selected by the University of California Office of the President.

In Resolution 03-17, the Board determined that the fact that SCAQMD Rule 431.2 will impose a June 1, 2006 compliance date rather than a January 1, 2005 compliance date for its 15-ppmw sulfur content standard for motor vehicle diesel fuel supplied within the SCAQMD when this ARB rulemaking is completed is fundamentally attributable to the SCAQMD Board's decisions regarding the terms of its Rule 431.2 and not to this ARB rulemaking. In adopting subsection (c)(4) of its Rule 431.2 on September 15, 2000, the SCAQMD Board expected that the ARB would align the state compliance deadline for the 15-ppmw sulfur content standard for vehicular diesel fuel with the deadline to be established by U.S. EPA, no later than June 1, 2006. Thus the SCAQMD did not intend its action to have the effect of precluding the ARB from aligning the state compliance deadline with a federal June 1, 2006 deadline unless the ARB adopted all feasible measures mitigating adverse environmental impacts resulting from the 17-month delay in the SCAQMD's standard. It therefore follows that the results of the operation of SCAQMD Rule 431.2(c)(4) in postponing implementation of the SCAQMD 15-ppmw sulfur content standard for motor vehicle diesel fuel from January 1, 2004 to June 1, 2006 upon enactment of the ARB amendments do not constitute significant adverse environmental impacts associated with the ARB amendments being adopted in this rulemaking.

Nevertheless, ARB staff has evaluated the SCAQMD's claim that the district stands to lose emissions reductions of primary and secondary particulate matter of about 6.6 tons per day during the 17-month period between the January 1, 2005 date adopted in the SCAQMD Rule 431.2 and the later effective date for the ARB regulation.

Staff reviewed the SCAQMD's analysis of the emissions benefits described in their staff report: "Proposed Amended Rule 431.2 – Sulfur Content of Liquid Fuels. September 6, 2000." The district assumed that reducing sulfur content from the district average of 133 ppm to 15 ppm would result in emissions reductions of 2.7 ton/day of sulfur oxides or 5.5 tons of particulate matter. They also assumed that improved combustion efficiency with reduced fuel sulfur would reduce PM emissions by 1.1 tons per day giving a total PM reduction of 6.6 tons per day. ARB staff believes that the District's estimate of the conversion of sulfur oxides to

give about 5.5 tons per day of particulate sulfates is reasonable. However, the District's assumption concerning the effect of fuel sulfur on engine-out PM is not accepted at this time by either the ARB or the U.S. EPA.

The primary objective of the low sulfur diesel rulemaking is to enable the effectiveness of diesel PM and NOx emissions control technologies that will be needed to comply with the 2007 heavy-duty diesel engine emissions standards. The current supply of low sulfur diesel is adequate to meet the needs of new and retrofitted diesel engines in the District that require this fuel. An implementation date that is earlier by 17 months is not a reasonable alternative and would not be more effective in achieving the objective of the low sulfur diesel rulemaking. Staff analyzed the impact of this alternative when the SCAQMD adopted its rule. The clause to ensure a single statewide implementation date is the result of that analysis. As the CEC's more recent information indicates, that analysis is still valid. An earlier implementation date is likely to be more burdensome than the June 2006 date because of the strong likelihood of supply disruptions and increased fuel prices.

40. Comment: I would respectfully disagree with your staff in response to your question, Dr. Lloyd, about environmental justice. Many of the communities that are most severely impacted in an environmental justice context are impacted by diesel-related emissions. So, having the cleaner fuel earlier will serve to benefit environmental justice. (SCAQMD)

Agency Response: The amendment to the CARB diesel sulfur standard will be a benefit to communities because the low sulfur diesel will enable the use of advanced emissions control systems on diesel powered vehicles to greatly reduce the exposure to diesel particulate matter and the associated cancer risks. This amendment will not require a relaxation of any emissions standards previously adopted to protect severely impacted communities. The amendment will not affect existing programs – such as the ARB's Urban Transit Bus Rule – that require the use of low sulfur fuel to enable the use of exhaust after-treatment devices currently in place. We agree that some small additional PM benefits will be lost due to the later implementation date of the statewide low-sulfur standard. However, an offsetting consideration is the potential for shortfalls in the fuel supply and associated increases in fuel costs with a bifurcated fuel distribution system.

41. Comment: My request of the Board today is that you go ahead and implement your package elsewhere in the state as you deem appropriate, but relative to the South Coast Air Quality Management District, take another 120 days. Continue the hearing, ask your staff to come back before the Board with a full analysis of the implications of moving forward in the South Coast and, and then fully consider the item with that information before you and give the public an opportunity to review that analysis. (SCAQMD)

Agency Response: We do not believe it is necessary to take 120 days to conduct another analysis. Our responses to Comments 37 and 38 explain why the Board's position has not changed from the time that the District's rule was approved with the clause allowing for extension of the District's implementation date to match a statewide implementation date.

42. Comment: We strongly support moving forward with adoption of the low sulfur diesel rule and we're pleased it includes both on- and off-road vehicles. We are also concerned about the changes that this regulation would bring to the South Coast rules, both low sulfur diesel and the emission reductions that would be lost by the delay imposed on the South Coast rule. We urge you to consider allowing the South Coast to continue with their 2005 time frame for implementation or at least study this issue further. (American Lung Association)

We are also representing the National Resources Defense Council. We support the proposed regulation, especially the fact that it has been extended to apply to off highway vehicles. We think there are two ways the rule should be improved, one being allowing the South Coast to move forward with the earlier implementation. (Union of Concerned Scientists)

We also have an issue regarding the South Coast. We don't think that the ARB preventing them from moving forward with an earlier implementation is justifiable. We believe the staff's arguments against letting South Coast go forward are weak at best. The points made by staff are cost to the industry, disruption to supply, and alignment with the U.S. EPA. It is wholly inappropriate for this Board to hold the South Coast back. What you should be doing is aligning your program with the South Coast. (Coalition for Clean Air)

In light of the exceedance days this summer, in light of the huge hole in the state implementation plan, and in light of the your own staff presentation today about the health impacts of continuing our dependence on diesel, it is unconscionable to us that the Air Resources Board would hold back the South Coast from going forward with an earlier implementation of a more protective standard. (Coalition for Clean Air)

Agency Response: See the responses to Comments 37 to 41 for the staff's discussion of the impacts of a SCAQMD implementation date that is earlier than the statewide implementation date adopted by the ARB.

43. Comment: We disagree that the ARB has done all it could be doing to protect public health and reduce emissions. We encourage the ARB to read the plan that is going to be presented this summer and look at it as proof of our position. A second point is that we didn't intend to give anybody the impression that the justification for the South Coast move ahead was the ozone SIP, we meant it was particulates. We believe that a six-ton-per-day reduction in particulate will have greater benefits for public health than a six-ton-per-day reduction in smog or

ozone. One last point – even if the ARB believes that the state doesn't have enough time left to push the industry to comply in 17 months, the South Coast believes they do, and the ARB shouldn't hold them back. (Coalition for Clean Air)

Agency Response: The South Coast is counting on supplies from outside the District to avoid fuel supply shortages and burdensome price increases that might result from early implementation of their rule. As we explain in responses to Comments 37 to 41, it is highly unlikely that refiners outside the District, on their current refinery modification schedule, will be able to meet the South Coast's need.

10. Locomotives and Marine Vessels

44. Comment: We would urge the Board to consider expanding the regulation to include locomotives and marine vehicles. These are two key areas where further controls are absolutely necessary for making air quality improvements. (American Lung Association)

We think the rule should be improved with regards to locomotives and marine vessels. It is unclear why extending the rule to also address these sources when they are already using CARB diesel would be a matter of conflict. The argument the California Trucking Association is making is a fair point. California has this opportunity to lead the nation and we urge the Board to do so. (Union of Concerned Scientists)

I am also speaking on behalf of the Natural Resources Defense Council and Environment California. In general, all of our organizations support the proposal and the move toward doing more to address emissions from diesel. However, we are concerned about the marine and locomotive issue. I don't feel the ARB staff's response [to the American Lung Association] was adequate. If in fact those industries already are using CARB diesel, then why shouldn't we be requiring them to use low sulfur diesel on the same time frame as the rest of the diesel users in California? It is unfair to the trucking industry to have to go to a low sulfur diesel, and arguably a more expensive diesel and not require these other two segments of our transportation system to do the same. As we reduce emissions from trucks and other sources of pollution in our society, we can see the proportional increase in emissions coming from the marine sector and locomotives. To wait for the U.S. EPA to take action is not appropriate, even if it's just a year. (Coalition for Clean Air)

Agency Response: We agree that opportunities exist for the use of cleaner diesel fuel in locomotive and marine applications. At the July 24, 2003 hearing, the Board directed staff to evaluate the appropriateness and feasibility of the State of California imposing a 15 ppmw sulfur content standard on diesel fuel supplied to locomotives and marine vessels. Staff has begun this evaluation in response to the Board's directive.

B. COMMENTS RECEIVED DURING THE FIRST 15-DAY COMMENT PERIOD

45. Comment: As you may be aware, the ASTM currently has a ballot out to its members to include a lubricity requirement in the diesel specification (ASTM D975). The standard and test method in the ASTM ballot are the same as the CARB specification and method. The one change to this ballot from the previous ballot is that it contains an implementation date of January 1, 2005. If the current ASTM ballot on lubricity is successful, the CARB lubricity requirement would only be in place for 4 months for refineries, 2.5 months for "terminals" and 1 month for retail facilities. We propose the CARB specification be "sunset" immediately upon adoption of an ASTM specification with a reasonable implementation date. (WSPA)

    Agency Response: Based on the comment, staff proposed additional modifications to the regulation language regarding implementation of the lubricity standard. These proposed modifications initiated a second 15-day comment period.

    The modifications postpone the implementation date of the first phase of the lubricity standard from August 1, 2004 to January 1, 2005, aligning it with the proposed effective date of the lubricity standard that was recently balloted by ASTM. The downstream phase-in dates have also been postponed by five months. The alignment of the ARB implementation date with the proposed ASTM lubricity standard effective date allows fuel suppliers to coordinate their California and national implementation efforts.

    The modification imposes a five-month delay in implementation whether or not the ASTM ballot is successful. If the ASTM standard is not adopted, the ARB lubricity standard goes into effect January 1, 2005, administered by the ARB until an ASTM standard of 520 microns maximum wear scar diameter HFFR becomes enforceable by the Division of Measurement Standards.

    We have not modified the sunset provision due to the ambiguity of the commenter's term "reasonable" in reference to the implementation date and the uncertainty in predicting the outcome of the ASTM ballot and possible modifications to the effective date. Instead, we chose to modify the ARB implementation date to be consistent with the proposed ASTM lubricity standard effective date.

46. Comment: The Department of Defense's (DoD) military-specification (milspec) fuels are not diesel fuels. The milspec fuels used in our aircraft, tanks and combat support equipment are kerosene-based fuels very similar in formulation to commonly used commercial international aviation fuel Jet A1. We request that the title of section 2285 and subsection (a) be modified to refer to these fuels as military specification fuels rather than diesel fuels.

The difference in formulation between milspec and diesel fuels makes it difficult for our tactical vehicles and equipment to meet the same emission requirements as required of commercial diesel vehicles. The use of milspec fuels precludes the use of pollution control devices on these tactical vehicles. Even if pollution control devices were available to meet California emission requirements, inclusion of such equipment would adversely impact our ability to conduct worldwide deployment of this equipment. In light of this fact we request that § 2285(a)(1) be modified to include "military tactical vehicles which are not required to meet state emission standards."

For the most part, private and military vehicles are fueled at different locations on the installation. DoD contractor, employees, and uniformed service members who use these government-fueling facilities are instructed on the fuel requirements for their particular vehicles. In addition, much of the milspec fuels used are delivered to remotely located vehicles by military tanker trucks. To account for the limited circumstances where there are joint fueling facilities, we suggest that the labeling requirements of §2285(a)(2)(C) be modified to apply only to dispensing locations where both diesel and military specification fuels are available. Additionally we suggest that the labeling requirements not apply to fueling trucks.

Agency Response: Based on these comments, staff proposed additional modifications to the regulation language which were available for comment during the second 15-day comment period.

The originally proposed text of section 2285 was patterned very closely after the comparable U.S. EPA regulation, 40 CFR §80.602. The request by the Department of the Navy for a terminology change in the reference to the fuel covered by the regulation is appropriate since unlike sections 2281, 2282 and 2284, section 2285 does not include its own definition of "diesel fuel." We have replaced the term "diesel fuel" with "military specification fuels" or "military specification fuel," as appropriate, in section 2285.

We have modified section 2285(a)(1) to include military tactical vehicles that are exempt from the California motor vehicle emission standards, pursuant to section 1905, title 13, CCR. Our reference to this section is appropriate given that it provides an exemption from the California motor vehicle emission standards for specified military vehicles.

We have modified section 2285(a)(2)(C) to exempt fueling trucks from the labeling requirement. However, we have not included the requested modification making the labeling requirements applicable only at dispensing locations where both diesel and military specification fuels are available. Like the U.S. EPA regulation (40 CFR § 80.602(b)(4)), the ARB regulation would apply in both circumstances. We are not persuaded there is only a de minimis possibility that misfueling could occur where only military-spec fuel is being offered.

C. COMMENTS RECEIVED DURING THE SECOND 15-DAY COMMENT PERIOD

47. Comment: Based on the comments received during the supplemental comment period, Board staff is proposing to postpone the implementation date of the first phase of the lubricity standard in section 2284(a)(1), title 13, CCR, from August 1, 2004 to January 1, 2003 in order to align it with the effective date of the lubricity standard recently balloted by the ASTM. However, the date for certification with 15 ppm sulfur content for Alternative Diesel Formulations remains at August 1, 2004. (section 2282(g)(2)(B), title 13, CCR.) This discrepancy results in a situation where diesel fuels will be required to comply with lubricity standards beginning January 1, 2005, while the Alternative Diesel Formulations will be required to be certified with a 15 ppm sulfur content but not a lubricity additive between August 1, 2004 and January 1, 2005. In short, it creates an unnecessarily cumbersome and inconsistent process for companies that provide Alternative Diesel Formulations. This deficiency arguably violates the standards for approval of a regulation established by OAL. Under section 16(a)(1), title 1, CCR, a regulation shall be presumed not to comply with the "clarity" requirement if it can be reasonably and logically interpreted to have more than one meaning.

Having one date for certification with 15 ppm sulfur, and another date for a required additive creates an inconsistency in that section 2282(g) requires a list of all additives in the candidate fuel. In order to simplify the process of compliance for those subject to the amended regulations, Oryxe requests that the Board revise the compliance date for sulfur content of Alternative Fuel Formulations to be consistent with that of lubricity. To accomplish this request, Section 2282(g)(2)(B)(1)(a) of the revised proposed Regulations would be modified by submitting January 1, 2005 in place of August 1, 2004. (Oryxe)

Agency Response: There is no clarity problem in the referenced sections. Section 2282(g)(2)(B)1. refers to diesel fuel formulations "certified prior to August 1, 2004" and formulations "certified on or after August 1, 2004." No ambiguity exists and the text cannot logically be interpreted as having more than one meaning. The meaning is in no way affected by the fact that in another regulation, the lubricity standard for commercial diesel fuel will now be effective January 1, 2005 rather than August 1, 2004 as previously proposed.

The August 1, 2004 date for implementation of the approved specification changes to laboratory-tested candidate fuels and the test procedure was chosen to expeditiously put into place the amendments necessary to ensure that future formulations certified as an alternative formulation would preserve the emission benefits of the program.

The new lubricity standard for commercial diesel fuels is not directly an emission reduction strategy, but rather will provide continuing protection of vehicle fuel systems to prevent long-term degradation. The level of lubricity required by the new standard is roughly equivalent to the lubricity levels now being achieved voluntarily by refiners. The adopted standard is based on a test method that we

believe is more reliable than the test method refiners are generally using now to meet their lubricity targets. By delaying implementation of the lubricity standard, enforcement of the standard would become the responsibility of DMS if ASTM approves the standard it is now balloting.

Candidate fuels tested for equivalency as part of the process for certifying alternative formulations under section 2282(g) are not required to meet a lubricity standard. It is left up to the applicant whether a candidate fuel should contain lubricity additives and, if so, how much. If a lubricity additive were to be used in a candidate fuel (section 2282(g)(2)(B)6.), and the fuel were to qualify as equivalent, then the formulation would include a specification for the minimum amount of the additive required (section 2282(g)(6)). In addition to meeting the specifications of the certified formulation, diesel fuel produced as complying with the formulation would also have to meet the standards of sections 2281 (sulfur content) and 2284 (lubricity) applicable to commercial diesel fuel at the time of sales. There is no need to synchronize the implementation dates of the proposed lubricity standard for vehicular diesel sold in California and the proposed sulfur specification for candidate fuels tested in the laboratory.

D. PEER REVIEWERS' COMMENTS

48. Comment: "The report seems to indicate that there will be no problem with producing the required quantities of California diesel fuel; however, two concerns come to mind: (1) this balance will only last a few years without additional refining capacity, and (2) the contradiction between the use of 'on-road" on pages 86-87 and the description of 'on-road and off-road' on page 110 should be clarified and expanded to include the production of diesel fuel for use in stationary and portable engines." (Caretto)

Agency Response: Historically, the demand for CARB diesel fuel has included diesel fuel for on-road and off-road motor vehicles, as is required by the ARB's diesel fuel regulations, and most of the diesel fuel demand from stationary, portable, and transportation refrigeration unit (TRU) engines fueled in California. The demand for CARB diesel fuel by nonvehicular engines is due somewhat to local rules and permitting requirements for stationary engines, and a state regulation for registration of portable equipment, but primarily to the availability of CARB diesel fuel over other diesel fuel grades in California. Even with all stationary, portable, and TRU engines fueling with CARB diesel fuel, as required by the proposed new ATCM, refining capacity for CARB diesel fuel should exceed demand well into the future.

The proposed amendments should not impact the ability of California refiners to supply sufficient quantities of diesel fuel to the California market. The ARB's recent refinery survey suggests that sufficient diesel refinery capacity already exists. In addition, the implementation of the federal on-road low sulfur diesel regulations, adoption of the California diesel fuel regulations by the state of Texas, and the ability of out-of-state refiners to produce diesel fuel meeting California

standards should provide even greater diesel fuel availability to the State. As a result, the overall diesel production system – consisting of California refineries and imports – should be no more subject to supply disruptions than today. In fact, 2006 market conditions may be better able to readily adjust to any CARB diesel production requirements that occur in the future.

49. Comment: "Since the proposed equivalency levels correspond to average properties for California diesel fuels, a fuel meeting all these levels should have equivalent emissions benefits. However, there is no demonstration that this will be the case. It is also interesting to note that only one of the five fuels shown in Table XI-1 would meet the equivalency limits. (This is a fuel that meets the requirements specified by executive order G-714-001; all others have a polycyclic aromatic content that is larger than the one specified in the proposed new equivalent limits.)" (Caretto)

    Agency Response: We agree that a fuel having average properties of California diesel fuels should preserve the emission benefits of the program. Actually, it has been demonstrated that the proposed equivalent limits would maintain the emission benefits of the program. There exists at least one certified alternative formulation that does meet the proposed new equivalent alternative limits. Therefore, the proposed equivalent limits are a subset of at least one certified formulation. Producers or importers may use one of the public formulations, one of their own confidential formulations, the equivalent limits after they become applicable, or the 10-percent-by-volume standard to comply with the aromatic hydrocarbon content regulation.

50. Comment: "The (1+ ε) term is designed to provide a margin of safety to the company proposing the candidate fuel. In the present regulation ε = 2% for NOx, 4% for particulate matter (PM) and 12% for the soluble organic fraction (SOF) of particulate matter. The proposed regulations would cut these ε values in half (1% for NOx, 2% for PM and 6% for SOF)…The analysis evaluated the minimum values of ε that would be required to qualify the average fuel; these were 0.45% for NOx, 1.2% for PM and 5.2% for SOF…There is no analysis of how the proposed ε values were determined from the calculations. It would be interesting to show how many of the fuels that qualified with the previous ε values would not qualify with the new ones…the quantitative effects of the proposed changes on emissions or on the likelihood of accepting a candidate fuel are not clear." (Caretto)

    Agency Response: As the testing laboratory conducting most of the testing has become experienced in performing the fuel-equivalency test procedure, the variation in the emission data has been found to be less than originally thought at the time the procedure was developed. As a consequence, over time, the uncertainty of the results has been less and the calculated margins of safety for determining equivalency have been lower than originally expected.

To determine the proposed tolerances, we calculated the average margins of safety for the three pollutants, then rounded up to the nearest single digits. If we were to set the tolerances equal to the average margins of safety, then a fuel tested against itself would qualify as equivalent only about 85 percent of the time on each pollutant and about 61 percent of the time on all three pollutants. The proposed tolerances are coincidentally equal to one half of the tolerances currently allowed by the regulation.

It is appropriate to reduce the tolerances applied to the emissions from the candidate fuel for future testing. The purpose of reducing the tolerances is to preserve the emission benefits of the 10-percent aromatic hydrocarbon standard. With the proposed tolerances, a future candidate fuel would have to be lower emitting to barely qualify as equivalent than with the current tolerances. It would be inappropriate to reevaluate existing formulations using the new tolerances and old test data. However, under section 2282(g)(9)(A), the ARB may evaluate commercial diesel fuel blends with the proposed amended test procedures of (g)(4) subject to the proposed amended criteria of (g)(5), including the proposed new tolerances. If the Executive Officer finds that the commercial fuel blend does not meet the equivalency criteria, she shall modify the certification specifications under which the fuel blend was produced.

51. Comment: With respect to the proposed changes that "expand the reporting requirements for candidate fuels to include all the properties that must be reported for reference fuels, and require candidate fuels to have properties within certain ranges . . . there is no discussion of any problems that it may cause in actual production of the alternative fuel formulations." (Caretto)

    Agency Response: There is no reason that there would be production problems, so long as the candidate fuels are real production fuels. There is no justification for a producer or importer to test a candidate fuel that would not be produced for the fuel market. The fuel property ranges are very wide and encompass typical No. 2-D fuels. Once a formulation is certified, it could also be produced and sold as No. 1-D fuel, if it met the ASTM standard specifications for No. 1-D.

52. Comment: "The analysis of CO_2 emissions was done by examining the increase in CO_2 emissions due to the production of the lower sulfur fuel…One item of concern is the natural gas composition used in the analysis: CH_4, C_2H_6, and CO_2 with molar concentrations of 77.5%, 16.0% and 6.5%, respectively. This natural gas composition is not typical of natural gases in California. In addition, the heat of combustion of 18,300 Btu/lb_m used for this natural gas composition does not appear to be correct." (Caretto)

    Agency Response: The gas composition may not be typical of gas delivered to the consumer; however, a life-cycle analysis must begin at the well. The lower heating value (LHV) of the gas is 971 Btu/ft^3 at 60 °F and the density of the gas is 0.05298 lb/ft^3 at 60 °F, so the net heat of combustion is 18,300 Btu/lb.

53. Comment: "The construction of new facilities to produce the 15 ppmw diesel fuel may cause environmental impacts. The report notes that such construction may be exempted from the need to obtain offsets, resulting in a permanent increase in emissions from stationary sources…On a regional basis, these increases, if any, should be less than the emission reductions from diesel engines that can be accomplished because of the use of the 15 ppmw diesel fuel. However, the potential increases in refinery emissions may be concentrated in local areas, raising concerns about ARB's environmental justice policies." (Caretto)

    Agency Response: Construction of new refineries are subject to local permitting requirements and the CEQA process. Any increases in emissions may occur only to the extent allowed. Also, even if temporary increases occur, there should be a net reduction in the lifetime exposure of local residents to diesel particulate matter. Since diesel particulate matter represents the major risk to residents living near refineries, there should be a net reduction in risk due to the proposed reduction in fuel sulfur, new engine emission standards, and diesel particulate matter ATCMs.

54. Comment: "The interrelationship among properties of diesel fuel can be shown by consideration of the correlation among the different fuel properties. Table 2 below was developed by EPA to show this correlation for the fuels in its database[5]…Because of these correlations, it is not possible to unambiguously assign a particular emissions effect to a particular fuel property…The correlation among fuel properties can lead to different conclusions regarding the fuel property that has the most significant effect on emissions…The collection of studies on the effects of diesel fuel properties on emissions raises an important question. How representative are these studies of actual in-use engines and fuels? Often special diesel fuel blends are used in these studies to minimize the correlation effects noted in Table 2. In addition, there are only limited data on (prototype) engines designed to operate with low NOx levels required by the 2004 standards." (Caretto)

    Agency Response: There is very little uncertainty about the benefits of reducing the total and polynuclear aromatic contents, reducing the nitrogen and sulfur contents, and increasing the cetane number of diesel fuel. The emissions of diesel PM and NOx will decrease. The specific effect with each engine category and each individual engine is variable and is cycle dependent. The specific effects with engines not yet in production are unknown. We are very confident, based on all available studies, that the California diesel fuel regulations are providing emission benefits in the current diesel engine population very close to 25 percent for PM and 7 percent for NOx, as originally estimated.

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[5] U. S. Environmental Protection Agency, "The Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines," Final Technical Report, EPA420-R-03-002, Office of Transportation and Air Quality, February, 2003.

55. Comment: "The report does not explicitly show the calculation of the sulfur-oxide benefits…This reduction from 2800 to 130 ppmw corresponds to a 95.4% reduction in fuel sulfur, which should translate to a similar reduction in sulfur compounds in the exhaust. This is apparently the basis for the conclusion that sulfur compound reductions are estimated to be at least 95%…" (Caretto)

    Agency Response: The peer reviewer's assumption is correct.

56. Comment: "Presumably, the results of the '"mixed-modeling" statistical analysis' used for Table 7 was one in which the fuel effects were treated as fixed effects and the effects of different engines were treated as random effects. This approach is commonly used in the analysis of fuel effects to account for differences in engines (which can often have a larger effect than differences in fuels). In addition, treating the engine as a random effect allows one to estimate the variance caused by different engines in the engine population from which the engines used in the study are taken.

    The results in Table 9 are presented in terms of standardized regression coefficients. According to the description of the results in this table, ARB staff used 'the log of the data' and a modeling 'approach similar to the one used in the HDEWG study.' The HDEWG statistical analysis did not use log transformations. The study did various analyses to check for outliers, determine the significance of individual variables, and to see how well the results of the regression satisfied the assumptions for regression analysis.[6] There is no indication that similar data checks were done in the Table 9 analysis.

    Because very little information is given about the details of the regression analyses that give the results in Tables 7 and 9, one can ask several questions about the way these were done. For example, were log transformations used for the emissions or fuel property variables? Were the fuel properties used directly in the equations or were they centered or normalized before the analysis? Were all three distillation temperatures used in the analyses? No values are given for the distillation temperatures in the before and after fuel properties; what values were used in the analysis? What was the significance level of the fuel-property regression coefficients in the various studies? What was done in the fuel property data that were not available for one study or for one or more fuels in a study? How were the data for repeat experiments on individual fuels and engines grouped for the final regression results on individual studies? How were the overall reductions determined from the data on individual studies? Were the data from the different studies weighted to account for the distribution of engines in the on-road fleet?

[6] Robert L. Mason *et al.*, "EPA HDEWG Program – Statistical Analysis," SAE Paper 2000-01-1859, presented at International Spring Fuel and Lubricants Meeting, Paris, France, June 19-22, 2000.

Because of all these questions, the ARB staff should post the data that they used, with a longer description of the exact methods, on the ARB web site so that they are publicly available for individuals to review and confirm the analyses.

A simplified analysis of two studies, ACEA and SAE 1999-01-1478, was done as part of this review, using the simple linear regression functions of Excel. The data were taken from the EPA database.[7] Each study used only one engine and the regressions used only cetane number, specific gravity and aromatics content as the variables in the regression equation…the estimated PM reductions from the ACEA study [11.1%] are not close to those shown in Table 7 [43.4%]. The reason for this is not clear. ARB staff may have used data from the original study, which are different from those in the EPA database. Also, Table 7 states that distillation temperatures and sulfur were used in addition to cetane, aromatics and specific gravity as regression variables. This was not done here because the sulfur level and distillation temperature data were not available for all the data in the ACEA study." (Caretto)

Agency Response: The data used by the ARB staff for the analysis were taken from the U.S. EPA database and are available from the ARB. The ARB staff did not use data for which not all of the chosen fuel properties were known or for which the properties were not varied. For example, it would not be very useful to try to correlate emissions with fuel properties, if sulfur content was not known or if aromatic hydrocarbon content was not varied. Specifically, a correlation predicting PM emissions, developed from data for which the sulfur contents of the fuels were unknown, would not be useful.

Using a simple regression in Excel is likely to generate least-squares regression coefficients. The staff relied on a different procedure to estimate the benefit associated with a change in fuel properties. They used the ProcMixed procedure provided by the SAS Institute. This procedure is an iterative, restricted maximum-likelihood procedure. It generates maximum-likelihood estimates within each engine test configuration and across all engine test configurations. It is very likely that these two different modeling methods would generate different estimates within the expected range of uncertainty associated with using different models. Without further knowledge regarding the reviewer's analysis, it is not possible to be more specific on the reasons for the apparent differences in emission reduction estimates.

57. Comment: "Staff justified the need for the [diesel-engine, emission-] certification fuel to reflect the properties of the commercial fuel, thus the sulfur content was adjusted. Using that approach raises the question why the nitrogen content [for

[7] This database is in the Excel file hdd-db7.xls, available at the EPA diesel-analysis web site, http://www.epa.gov/otaq/models/analysis.htm. This is version seven of the database, dated June 12, 2001, which contains all the repeat data and cycle data that EPA rejected in previous analyses.

the designated equivalent limits] is set between 100 to 500 ppmw, given that data in Table XI-2 show that the nitrogen content of commercial fuels can be less than 100 ppmw." (Miller)

Agency Response: In the case of sulfur, 15 ppmw is the proposed maximum for both the certification and the production fuel. There may be certified diesel formulations with nitrogen specifications below 100 ppmw, but this is not a general requirement and is not very common. Almost any CARB diesel fuel with the cetane improvement additive, 2-ethyl hexyl nitrate, has a nitrogen content above 100 ppmw. In fact, our proposed equivalent limit for nitrogen is 500 ppmw, so the 100- to 500-ppmw range is compatible with equivalent-limit fuel.

58. Comment: "All of the changes were clear and technically defensible in order to assure that there is emission equivalency and benefits between the candidate and the in-use fuels. What was less clear was a discussion of the process used for fuels with properties that fuel fell outside the allowed range. In such cases, the fuel properties would be modified before issuing the executive order by some undefined process. More detail on the processes used to modify the executive order would be helpful." (Miller)

Agency Response: The proposed amendments to the regulation require that property values outside of the allowable ranges be included in the executive order as additional specifications of the certified formulation to the five minimum property specifications. (section 2282(g)(2)(A)3.b.) For example, an API gravity of 40.0 and a 90-percent distillation temperature of 540 °F would become additional specifications, if the candidate fuel had those properties.

59. Comment: "Not covered in the amendments for this section is a discussion of the current testing protocol, including the selection of engine. The current regulation allows the Executive Officer to select another engine if the DDC Series 60 with electronically controls is no longer representative of the post-1990 heavy-duty engines. Clearly most of the current in-use emissions come from engines that look like the DDC Series 60. However, it seems that a discussion would have been helpful as to why staff believed this was still the best test engine given that newer engine technology has been introduced in the past decade. Such discussion would provide some insight as to how ARB will deal with the low-NOx engines for 2004 and the fully controlled engines that are introduced to meet the EPA rule." (Miller)

Agency Response: The staff believes that the DDC Series-60 engine is still representative of a large portion of the current fleet, and that fleet-wide emissions will be dominated by engine technology reasonably represented by the DDC Series-60 for at least another decade.

60. Comment: "Table X1-1 shows individual properties for five certified formulations and average properties of eleven certified formulations…most in-use diesel fuel

does not resemble the first five individual fuels. Thus one should discount the weight of the five fuels in subsequent averaging, as it is apparent that over the past decade, the manufacturers have optimized the production of a lower-cost, low-pollution ARB diesel…If emissions vary non-linearly with fuel properties then the weighting must accommodate those properties accordingly. However, at least the publication by Lee (1998) suggests that emissions vary linearly over the range of properties for normal commercial fuels. Staff must show that emissions are maintained over the range of commercial fuel properties as well as the average of that property…A better approach would be the use of property averages weighted by the fraction of that fuel that is consumed in the California. Possibly the variation in fuel properties is small and within the measurement error, then such averages might not be needed. For example if the aromatic content was 19.9 ± 0.5, one might not need such weighted averages. However, it is difficult to tell based on the information presented in the report and staff might want to report range and averages in order to gauge the need for market-weighted averages…My opinion is that only the properties of the in-use fuels from Table X1-2 should be averaged. Therefore the average aromatic content of 20.3 vol.% or 20.7 wt% should be the average shown in Table X1-3 – unless there is staff rationale for a different number. In that case then staff must present the reasons for a different number…The one property average that raised some concern was the nitrogen level in that the average was 110 ppmw and the proposed limit was </= 500 ppmw. Earlier in Table III-1, the average nitrogen level is shown as 150 ppmw. The staff report needs further development to justify the 500 ppmw and the manufacturing data suggest that a lower limit might be an acceptable commercial fuel…" (Miller)

Agency Response: See the response to Comment 49. The staff's averaging method was not based solely on the composition of in-use fuels, because in-use fuels are produced with a compliance margin to ensure that the fuel is not found to be out of compliance with specifications. Also, staff did not have in-use information about all of the fuel being produced and sold throughout the state. The nitrogen limit was set at 500 in recognition that the equivalent-limit fuel could be used by out-of-state refiners. They would likely use nitrate-based cetane improvers to comply with cetane number requirement, and they would not be able to cost-effectively produce a fuel to a lower nitrogen specification.

61. Comment: "…I believe the report could have included more information about the critical nature of preventing wear to the fuel injectors and fuel pump in order to maintain the factory emission levels. For example, ARB provides estimates in EMFAC 2000 that PM emissions for a heavy-duty vehicle will increase from about 50% from a minor injector problem to >700% for severe injector problem. The same table shows PM emissions will increase about 25% for a high fuel rate for a heavy-duty vehicle. While these figures are based on limited data and the malfunction may not have been caused by wear, the numbers convey the magnitude of the issue when the fuel system equipment is compromised and not maintained at the factory specifications…" (Miller)

Agency Response: We agree that this information could have been used to support the need for a lubricity standard for the maintenance of emissions closer to factory levels. These data are presented in the EMFAC 2000 technical support documentation, which can be found on the ARB web site at http://www.arb.ca.gov/msei/on-road/doctable_test.htm, see Chapter 10, Section 7. It appears that the injector problems were primarily associated with leaking injectors which is a problem that is generally associated with wear. Additionally, in Chapter 10, Section 8, the statement is made that most of the emissions deterioration seen in one of their sources could be attributed to wear.

62. Comment: "The report could have been clearer as to the urgency of the 2004 implementation date, given that most fuels today are sold under the voluntary SCBOCLE test that is equivalent to the HFRR method that is recommended." (Miller)

Agency Response: As indicated in Section IV, we have postponed the implementation date for the initial lubricity standard until January 1, 2005.

While the first-phase lubricity standard – 520 micron maximum wear scar (WSD) diameter, is at least as protective as the voluntary minimum SLBOCLE standard, 3100 gram minimum scuffing load, these two standards are not equivalent. The wear mechanisms that these two tests simulate are different. The SLBOCLE wear mechanism is an adhesive wear and the HFRR test is an oxidative/adhesive wear. The HFRR test was chosen for the lubricity standard because the HFRR test wear mechanisms better represent the wear mechanisms present in the advanced technology fuel systems, such as common rail.

Figure XII-1, presented in Chapter XII of the staff report, shows a comparison of measured HFRR wear scar diameters with SLBOCLE loads for a large number of diesel fuels. All of the fuels that met a maximum WSD of 520 microns resulted in measured scuffing loads greater than the minimum 3,100 grams. However, there were a large number of fuels that met the minimum 3,100 grams SLBOCLE standard that produced WSDs significantly greater than the maximum allowable 520 microns. This indicates that the voluntary SLBOCLE standard allows for fuels that have a less protective level of lubricity than the 2004 HFRR standard.

Equipment manufacturers have told us that advanced technology fuel systems, such as common rail, are currently in operation in the United States in both light duty, and some heavy duty vehicles. With the early introduction of 15-ppmw sulfur diesel fuel, it is necessary to institute this standard in a timely fashion to protect these vehicles.

63. Comment: "…Research on the demonstration of successful control technologies for the nonvehicular units is still in its infancy and information is just being developed about effective control strategies for the nonvehicular units…

…Given that research is so active in this area and definite solutions have not been demonstrated; it seems presumptive for staff to require diesel fuel with <15ppm sulfur for all nonvehicular units [except locomotive and marine diesel engines]. Some units, like stationary generators, have demonstrated that the control devices require <15ppm sulfur for the DPFs to control PM to >85%. However, other control technology is being tested in ARB's verification program and may not require <15ppm sulfur. Therefore, my suggestion is that this area be identified as a technology study area and that staff would make a recommendation to the Board in the 2005 timeframe, the same as for the diesel lubricity specification." (Miller)

Agency Response: The ARB's Risk Reduction Plan for diesel particulate matter calls for 15-ppmw-sulfur diesel fuel statewide for all applications. State regulations have been approved which require the use of 15-ppmw-sulfur California diesel fuel. The SCAQMD has already implemented their 15-ppmw-sulfur rule for all stationary engines within the district. It makes no practical sense to have different fuel specifications for nonvehicular applications, either from a fuel-distribution perspective or an emission-control perspective. Many of the nonvehicular applications use the same engines as those used in vehicular applications. Emission control development for vehicular applications will in most cases also apply to nonvehicular applications. It is true that some control technologies may be more practical for stationary applications than motive applications, but there will always be some emission benefits to using a lower sulfur fuel.

64. Comment: "In reviewing a number of papers, I was struck by the fact that these engines were being tested using certification cycles. However, it is well established that emissions from engines are compliant under certain operating conditions and non-compliant under other operating conditions…Engines with electronic controls can operate in multiple modes as the computer attempts to optimize fuel consumption and advances the engine. Thus the fuel effects should be measured following in-use conditions rather than the certification cycles since the latter conditions may no longer represent the actual operating modes. As shown by earlier authors, engine timing does affect the fuel sensitivity so testing for electronically controlled engines should be undertaken with the engine advanced in order to gain more insight into the true effect of aromatics on nitric oxide emissions." (Miller)

    Agency Response: The ARB has addressed, and continues to address, the issue of the better-fuel-economy, higher-NOx-emitting mode of operation through other regulatory means. This issue does not have a negative effect on the estimated benefits of CARB diesel fuel.

65. Comment: "Table X1-3 specifies a change from volume percent aromatics to weight percent. My preference would be to maintain the volume percent given that the original rule was a 10 vol% aromatic rule and that the proposed certification fuel still uses volume percent. Furthermore, volume percent is the current metric

used in the commercial world and in most literature so it will simplify communication. For example, it is interesting that the World-Wide Fuel Charter suggests weight percent and then uses data based on volume percent to justify the need for such a specification. Also the ARB Fact Sheet on the California Low Sulfur Diesel Fuel (6/27/03) uses both volume and weight percent interchangeably and this can be confusing. The ASTM method allows an easy conversion equation from the measured weight percent to volume percent and that equation should be included in the front of the staff report as well as in the appendix." (Miller)

Agency Response: The specified test method for enforcing total aromatic hydrocarbon content and polynuclear aromatic hydrocarbon content, ASTM D5186-96, determines the contents by weight. There is a correlation provided in the aromatic hydrocarbon content regulation for converting the total aromatic hydrocarbon content to percent by volume. The purpose of the conversion is for comparison to a standard that is expressed as percent by volume (e.g., the basic aromatic hydrocarbon standard of 10 percent by volume). The original test method for determining compliance with the percent-by-volume standard is now obsolete. This is why we chose to express the proposed equivalent limit for total aromatic hydrocarbon content as percent by weight.

66. Comment: "The report uses the term low-sulfur diesel fuel. However, that is already an item of commerce indicating < 500ppmw and one that will continue for some time based on the EPA's new rule for nonroad equipment. Thus I would suggest a new name for the diesel fuel with <15 ppmw." (Miller)

Agency Response: To the ARB staff "low-sulfur diesel fuel" means diesel fuel with sulfur content of 15 ppmw or less. We understand the confusion, because ASTM D975-04, *Standard Specification for Diesel Fuel Oils*, uses "Low Sulfur" to designate diesel fuel with sulfur content of 500 ppmw or less. ASTM has proposed to use the designations "S15," "S500," and "S5000" in the future to be more specific on diesel fuel grades. We think that the proposed designations would work well.

67. Comment: "It would seem that continuing to use the ASTM definition [of diesel fuel] would be preferred since items of commerce look to ASTM. Also issues with alternative diesel formulations, including biodiesel are arranging for their own ASTM designation." (Miller)

Agency Response: The amendments to the definitions of diesel fuel are intended to clarify the broad applicability of the sulfur and aromatic hydrocarbon standards to fuels that are burned in diesel engines and are primarily hydrocarbons. Under the amendments, a fuel that is sold or represented as suitable for use in internal combustion, compression-ignition (diesel) engines, and is a blend of more than 50 percent by volume hydrocarbon fuel with some other non-hydrocarbon

component or components, is subject to the sulfur and aromatic hydrocarbon standards.

The current regulations define "diesel fuel" as "any fuel that is commonly or commercially known, sold or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specifications in ASTM Standard Specification for Diesel Fuel Oils D 975-81." There have been instances where parties have marketed products characterized as kerosene or "Jet A" to consumers of diesel fuel for use in vehicular diesel engines, and have claimed that the fuel is not subject to the sulfur and aromatic hydrocarbon content standards because the fuel does not – or has not been represented as – meeting the ASTM D 975-81 specifications. It has been the position of ARB counsel that the sale or supply of a fuel in these circumstances *is* subject to the standards as long as the fuel is a petroleum distillate that is suitable for use in the vehicular diesel engines for which the common grades No. 1-D or 2-D are specified. Similarly, if a vendor is explicitly or implicitly offering a fuel as suitable for use in those engines, it meets the definition of diesel fuel. This includes circumstances in which the vendor of a petroleum distillate knows or reasonably should know that the fuel being provided will be used by the customer as a fuel for diesel engines in motor vehicles. The amendments remove any ambiguity that might exist regarding the applicability of the sulfur and aromatics regulations.

68. Comment: "The role of oxygenate additives in diesel fuel formulation; the impact of the regulations on oxygenate additives; the distinction among diesel, alternative diesel fuels, and their blends; and the impact of all of these on emissions needs further clarification and exposition…

…The proposed definition of diesel fuel is not clearly stated. This is a much bigger issue than might at first be perceived or than is indicated by the very limited discussion. One might argue that any fuel used in a compression ignition engine is a diesel fuel. The ARB does not intend that this regulations should apply to alternative diesel fuels…Unfortunately the distinction between diesel fuels and alternative diesel fuels is vague, especially when it comes to blends of alternative and petroleum based diesel fuels. The description "any liquid fuel that is predominantly a mixture of hydrocarbons" leaves uncertainties about the inclusion of biodiesel, esters of biodiesel, and their blends with petroleum diesel and/or liquid diesel fuels derived from natural gas, coal, or biofeedstocks. The addition of a variety of oxygenates to diesel is an effective way to reduce particulate emissions and this possibility should not be eliminated or discouraged by the definition of diesel fuel or the specifications…

…Again, it is not clearly stated that alternative diesel fuels are to be excluded from this regulation and, if so, what level of blending divides alternative diesel fuels from the regulated diesel fuels. This issue needs to be clarified least the use of biodiesel, biodiesel-diesel blends, oxygenate additives, and other 'unconventional'

diesel fuels that have emissions reduction and renewable advantages be excluded by this regulation." (Sawyer)

Agency Response: We believe the definitions of diesel fuel in the sulfur and aromatics are clear and appropriate. As discussed in the response to the previous comment, the objective of the amendments is to make clear that the sulfur and aromatics standards apply to a broad category of fuels that are used in diesel engines and consist primarily of hydrocarbons. To assure the expected emission benefits, this range of fuels should be subject to the same standards as those applicable to diesel fuel meeting the ASTM specifications for No. 1-D or 2-D. Thus the sulfur and aromatics standards apply to any of the nonconventional fuels identified by the reviewer, as long as more than 50 percent of the blend is liquid hydrocarbons – organic compounds consisting exclusively of the elements carbon and hydrogen.

This does not mean that any fuel meeting the broad definition cannot be considered to be an alternative diesel fuel. This is made clear by the ARB's amendments to section 2701(a)(2), title 13, CCR – the definition of "alternative diesel fuel" in the ARB's regulations on the procedures for verifying in-use strategies to control emissions from diesel engines. That definition had previously excluded "reformulated diesel fuel as defined in" the sulfur and aromatics regulations. The amendments eliminate the reference to those regulations, and refer instead to the ASTM specifications for No. 1-D or No. 2-D diesel fuel. The definition of "alternative diesel fuel" in the verification regulations goes on to cite biodiesel, Fischer Tropsch fuels, and emulsions of water in diesel fuel as examples of alternative diesel fuels. Thus it is clear that a fuel can be subject to the sulfur and aromatics standards but still qualify as an alternative diesel fuel under the verification procedures; this includes various biodiesel blends containing less than 50 percent biodiesel. See also the responses to Comments 33 and 34.

69. Comment: "The adequacy of the equivalency specification to provide comparable or better emissions reductions across the range of diesel engine applications is questioned because its derivation is not clearly explained and that data set upon which it is based is judged inadequate…

…How the equivalent limits for the five properties were derived from the emissions data base is not clear. The first four properties are interdependent and most of the tests were not designed to extract the effect the change of a single property. The effect of Cetane Number can be examined over a limited range through the use of Cetane Number improver additive. The effect of fifth property, nitrogen content, which in practice is primarily associated with the Cetane Number improver additive, can also be varied independently of other fuel properties. It is impossible to assure that all fuels within the specified equivalent limits would match of exceed the emissions reductions of the reference fuel. Additionally, there is no basis for confidence that the emissions reductions also apply to off-road diesel engines or to 2007 and later on-road diesel technology. Note that the 2007 and later issue is

not of practical significance since the emissions should be so low that fuel effects for this segment will have a minor affect on the inventory.

There is some evidence for concern that the data used by the ARB to establish fuel property—emissions relations are not applicable to off-road engine and duty cycles. The EPA report *Strategies and Issues in Correlating Diesel Fuel Properties with Emissions—Staff Discussion Document*, EPA420-P-01-00, July 2001, which is based largely on non-road diesel engines, shows a lower impact of CFD on particulate matter reduction than reported by the ARB which is based largely on on-road diesel engine tests." (Sawyer)

Agency Response: See the responses to Comments 49 and 60. The proposed equivalent limits are consistent with the staff's view that a mixture of complying California diesel fuels is still a complying diesel fuel.

70. Comment: "The accuracy of relating the lung cancer health benefits from reformulation to particulate mass reduction when reformulation is likely to have greater or lesser effect on reducing the specific carcinogenic compounds is questioned…The uncertainty in predicting risk of death from lung cancer from diesel particulate exposure is high. While reporting such risks, Table IV-1, may be useful in supporting regulations, it is improper to do so without quantifying or at least mentioning the uncertainty." (Sawyer)

Agency Response: Risk and its uncertainty were addressed in the risk assessment for diesel PM and the ARB's identification of diesel particulate matter as a toxic air contaminant in 1998. Since then, the ARB staff has undertaken a comprehensive a risk management program for diesel PM. In 2000, the ARB approved a Risk Reduction Plan for diesel PM. We are now involved in the process of implementing the Risk Reduction Plan through the development of regulations.

71. Comment: "The lubricity standard may not be needed. It might be better policy to leave responsibility for adequate lubricity with the refiners, where it is now…

…The basic issue of a lubricity standard is whether or not it is needed. The alternative is to trust that the refiners as part of their product quality control and customer satisfaction concerns would assure an adequate level of lubricity in their product…A secondary issue is whether the proposed test, the High Frequency Reciprocating Rig test (ASTM standard D6079-02) and wear scar diameter limit of 520 microns is appropriately protective, or even the right test. Since level of protection provided by the proposed lubricity standard approximates the industry's current voluntary standard, the practical impact may be negligible. By adopting such a standard will the ARB be assuming responsibility for a quality control issue that is properly the responsibility of the refining industry?" (Sawyer)

Agency Response: Fuel lubricity levels are expected to be reduced as a result of the severe hydrotreating refiners are anticipated to use to meet the 15-ppmw sulfur limit for diesel fuel. Both equipment users and equipment manufacturers have expressed concern that the low sulfur diesel will not have adequate lubricity to prevent excessive fuel injection system wear.

The ASTM has been working for over ten years to produce an industry standard to be incorporated in the ASTM diesel fuel standard, D975. We agree that an industry standard is preferable to a government regulated standard. However, with the advent of 15-ppmw sulfur limit diesel fuel, and the lack of ASTM resolution on a standard, we believe that it is necessary for an enforceable standard to be in place. The sunset provision included in our regulation allows the ASTM standard to take precedence once it is adopted.

The ASTM standard currently being balloted uses the HFRR test that is specified in our new lubricity regulation. Additionally, the stakeholder groups are in agreement that it is the right test for assuring adequate lubricity for current and future fuel injection equipment. While some stakeholders believe that the 520 micron maximum WSD standard is not sufficiently stringent, there does not appear to be data to support a more stringent standard for the current California fleet. However, the CRC Lubricity Panel, part of the CRC Diesel Performance Work Group, is currently planning the testing of several light duty diesel (LDD) equipment types from LDD vehicles either currently available in the United States or to be available in the near future. This testing is to characterize fuel injection system wear with fuels with a range of lubricity levels. Staff is optimistic that results from the CRC Lubricity Panel testing will be available early enough in 2005 to provide data on which to base a recommended 2006 standard.

72. Comment: "The discussion of diesel NO_x and ozone ignores the increased understanding that much of the state is and is becoming hydrocarbon limited. In some areas additional NO_x reduction will make attainment of ozone standards more difficult, that is, will require even greater VOC reduction. Additionally, Figure IV-1 would benefit from some clarification. I believe that this figure is for the 1-hour ozone standard and should be so stated. Mention of the 8-hr ozone standard and its implication to California should be made. Also, the designations are by air basins whereas presenting the maps by counties, while correct in a regulatory context, gives the wrong implication for the air quality of various regions of the state." (Sawyer)

Agency Response: Throughout the state there are areas which have serious, or worse, ozone problems, which are far downwind of areas of high vehicle traffic and high NOx emissions. The downwind areas have no chance of achieving attainment for ozone without NOx emission reductions statewide from diesel engines. The ARB staff continues to work on the development of control measures to reduce reactive organic compound emissions statewide. The ARB has a long and successful history of controlling both hydrocarbon and NOx

emissions as an ozone control strategy. Also, NOx emission reductions and the associated secondary particulate matter reductions are clearly part of the state's efforts to attain the PM_{10} and $PM_{2.5}$ standards.

73. Comment: "The pending $PM_{2.5}$ designations and the increased relative contribution and importance of diesel particulate emissions should be mentioned." (Sawyer)

    Agency Response: The reviewer is correct; the successful implementation of the low-sulfur diesel fuel requirement and the Risk Reduction Plan will significantly reduce emissions of diesel PM, which are predominantly less than 2.5-microns in size.

74. Comment: "The discussion of diesel particulate health effects (page 28) lacks any explicit mention of ultrafines and the increasing understanding of the mechanism of their adverse health effects, and increasing concerns. The known relation between fuel properties and particulate emissions is primarily for particulate as PM_{10} or TPM…Data are largely lacking, but needed, that relate fuel properties to $PM_{0.1}$. Reducing sulfur content will reduce ultrafine, some of which result from the condensation of sulfuric acid." (Sawyer)

    Agency Response: The commenter is correct. Direct particulate emissions from diesel engines, as well as secondary particulate emissions formed in the atmosphere from gaseous emissions, do include "ultrafine" particles. Reducing the sulfur content of diesel fuel, and reducing PM and NOx emissions from diesel engines, reduces "ultrafine" particle emissions and "ultrafine" particle formation. The proposed amendments to the California diesel fuel regulations and the Risk Reduction Plan, in general, do not overlook or exclude any diesel-engine-originated particles from control.

75. Comment: "The statement (page 42) that current sulfur levels prevent effective operating of NO_x control technology is not strictly true if the possibility of selective catalytic reduction (SCR) is included. I agree that NO_x adsorption control technology is preferable and likely. However, this technology is not fully demonstrated and the competing SCR technology is seeing widespread application in Europe. There should be some mention of SCR and assessment of its sulfur tolerance." (Sawyer)

    Agency Response: This point is well-taken from a completeness perspective; however, considering the parallel need for particulate emission control and that more than one NOx emission control technology is likely to be employed, the sulfur tolerance of SCR is not extremely relevant. The U.S. EPA has already adopted a 15-ppmw-sulfur standard to be implemented in 2006 for on-road diesel fuel. The U.S. EPA staff believes that SCR will likely not be the predominant NOx control technology employed for heavy-duty vehicles.

76. Comment: "One issue that is not made clear in the staff report is just how emissions equivalency is to be demonstrated beginning in 2007 when on-road engines with new aftertreatment systems start to appear and the use of RFD-2006 in off-road engines begins. Ideally emissions equivalency would be obtained and demonstrated across the range of applications. Practically, emissions equivalency demonstration is important for three categories of engines, 1) pre-2007 on-road heavy-duty engines, 2) 2007 and later on-road heavy-duty engines, and 3) off-road engines. Essentially all of the data relating emissions to fuel properties are for pre-2002 on-road heavy-duty engines. Presumably the details of working out just how emissions equivalency is to be demonstrated is left to the staff and approval of the ARB Executive Officer. This issue needs to be addressed." (Sawyer)

    Agency Response: The commenter is correct. Unfortunately, there are no model year 2007 engines available for testing and very few engines in the 2004 – 2007 range. As information becomes available, ARB staff will update the attributable emissions in the mobile source emissions inventory. It should be noted that due to the low emissions levels attributable to model year 2007 and later engines, the emissions from these engines will not be the majority of emissions until at least the model years 2015 to 2020 timeframe.

77. Comment: "The ARB review identifies no barriers to providing the required diesel fuel. Since similar low sulfur on-road diesel fuels will be required nationally at the same time, differences between California and Federal reformulated diesel fuels will be small. The ARB may want to consider allowing the temporary use of diesel fuel meeting Federal specifications should an unforeseen shortage arise." (Sawyer)

    Agency Response: Section 2282(i), as amended, outlines how a person may apply for a variance from the aromatic hydrocarbon content regulation and the procedures and limitations to be followed by the Executive Officer of the ARB in granting a variance.

78. Comment: "Exemptions for small refiners have always been a problematic but expedient policy. While exemption from the aromatic content limits is not a big deal, exemption from the sulfur limit is because of its affect on aftertreatment technology, including both increased emissions and possible damage to emissions control equipment. The ARB may want to consider as a possible relief measure, if necessary, the diversion of diesel fuel with greater than 15 ppmw sulfur to off-road applications where new exhaust aftertreatment technology has not been applied." (Sawyer)

    Agency Response: Section 2281(e), as amended, outlines how a person may apply for a variance from the sulfur content regulation and the procedures and limitations to be followed by the Executive Officer of the ARB in granting a variance. The diversion of diesel fuel with greater than 15 ppmw sulfur to off-road applications under a sulfur content variance makes sense in theory, but may be

very difficult to implement in practice due to the limitations of the fuel distribution system. Confinement to rural areas of the state may be something to consider if a variance on sulfur content ever becomes necessary.

79. Comment: "The role of lubricant and concern for sulfur and additives on emissions is outlined in the report. This issue is being studied and understanding improved. The ARB should commit to participating in these studies and working for the national adoption of lubricant standards, if necessary, to treat emission system and emission effects." (Sawyer)

    Agency Response: ARB is participating in the government/industry Advanced Pretroleum-Based Fuel - Diesel Emission Control (APBF-DEC) Lubricants workgroup. This work group is conducting testing for the effects of lubricant constituents on engine out emissions and the performance and durability of diesel emission control exhaust after treatment technology. ARB staff are also following the progress of the ASTM Heavy Duty Engine Oil Classification Panel (HDEOCP). This panel is currently working on developing heavy duty engine oil specifications for use with after treatment technology. The HDEOPC schedule predicts that oils meeting the specifications of this new engine oil category will be licensed and in the market by the third quarter of 2006.

80. Comment: "It might be noted that Fischer-Tropsch diesel can be derived from coal, biowastes, cellulose, and other feedstocks—not only natural gas." (Sawyer)

    Agency Response: We agree. Also, different grades of Fischer-Tropsch fuel can be produced using different procedures and different catalysts.

81. Comment: "The report does not discuss the future possibility of a zero sulfur diesel fuel as called for in the World-Wide Fuel Charter. If and how the ARB will address this issue in the future should be included…

    …One statement that needs qualification or removal appears on page 122 is 'Staff's evaluation of this proposal [to reduce sulfur levels below the current proposed regulation] concluded that the reductions in fuel sulfur below 15 ppmw would result in significant cost increase with little or no increase in benefits.' This statement would seem to close the door on future consideration of the proposals of the World Wide Fuel Charter's call for a sulfur-free fuel. If the statement is to remain then it must be justified with a documentation of the referenced analysis. There are issues of engine and aftertreatment durability that are affected by fuel sulfur level. The understanding of these effects is currently is judged insufficient for a reliable cost benefit analysis. A more conservative approach, considering the uncertainties, would be to eliminate the statement." (Sawyer)

    Agency Response: When the Risk Reduction Plan was adopted by the ARB in 2000, this issue was discussed extensively. The Board found that 15-ppmw-sulfur fuel was necessary and adequate for the successful implementation of the Risk

Reduction Plan for diesel PM. The proposed 15-ppmw-sulfur limit has been proven through demonstration with control equipment to be adequate for achieving the PM standards for on-road, heavy-duty diesel engines. As far as we know, the NOx standard of 0.2 g/bhp-hr that 2010 model year engines must meet has not been demonstrated. If the fuel sulfur content becomes a deterrent to meeting future NOx emission standards – and it is found, for example, that future standards could be achieved with a 5-ppmw or lower-sulfur fuel – then, we would reevaluate the proposed fuel standard.

82. Comment: "Both the catalyzed trap technology and NO_x adsorption technology have the potential to convert NO to NO_2. While NO_x is reduced in the process it is possible that NO_2 emissions could increase. Sulfur inhibits this conversion, probably in both technologies, hence the lower the sulfur the higher the NO_2. While the effect may negligible, the possibility needs to be discussed." (Sawyer)

    Agency Response: This is really a control technology issue, not a fuel sulfur issue. With particulate control only, NO_2 emissions can increase, because the NO_2 fraction of the NOx emissions can increase due to catalytic oxidation of NO. Also, the Risk Reduction Plan calls for retrofitting for particulate control only. However, the ARB has already adopted regulations which require manufacturers to demonstrate minimum control effectiveness and maximum NO_2 fraction of NOx emissions in order to qualify a control device as ARB-verified. For new engines with lower total NOx emissions, NO_2 emissions are not as significant an issue.

83. Comment: "The new technology also is likely to increase the conversion of sulfur to SO_3 and sulfate. With the large proposed reduction of fuel sulfur the net result should be a lowering of SO_3 and sulfate. This needs to be discussed and confirmed." (Sawyer)

    Agency Response: The fuel effects on catalyzed after-treatment have been studied and were reviewed by the ARB staff during the development of the Risk Reduction Plan (Appendix IV). Our emission control program for diesel engines is staged to introduce the lower-sulfur fuel standard before the catalyzed after-treatment. The staff report includes a discussion of the fuel-only effects and the combined fuel and equipment effects on emissions, not the fuel effects on the after-treated emissions.

84. Comment: "The issue of greenhouse gas emissions is a bit more complex than indicated in the ARB analysis. It is possible that N_2O emissions will be increased by one or both of the exhaust treatment devices and that the conversion of NO to N_2O may be affected by fuel composition. Little or no data exist on this subject but the possibility should be noted. Also, black carbon is thought to contribute to global climate change. Since RFD-2006 reduces particulate matter and diesel particulate matter is largely black carbon, the effect will reduce climate change effects. This should be noted in this section (it is acknowledged later)." (Sawyer)

Agency Response: Again, we do not discuss the fuel effects on after-treated emissions, because the fuel change will occur before after-treatments are introduced. The rest of the information is discussed in Appendix J.

85. Comment: "Effects on water quality are judged to be insignificant. One possibility is any use of an additive to assist in meeting emissions equivalency that in turn might have an adverse effect on water quality. There is no indication that this is planned." (Sawyer)

Agency Response: We expect that the applicant for certification of an alternative formulation requiring an emission control additive will produce a multimedia environmental impact assessment, which would be reviewed by the Policy Council. The Policy Council would make a determination as to whether the additive would have adverse environmental impacts or whether the additive would be approved for use in CARB diesel fuel.

86. Comment: "The ARB staff ties the need for non-vehicular diesel-engine fuel regulations to a proposed Airborne Toxicant Control Measure (ACTM). This sector consists of stationary, portable, and transportation refrigeration unit (TRU) diesel engines. Considering the uncertainty and controversy related to diesel emission toxicity, justification through their contribution to the criteria pollutants, NO_x and PM would seem useful in addition. The PM emission inventory of Table XX-1 lumps the three elements above with locomotive and marine contributions. It would seem reasonable to break non-vehicular sources into the five separate categories: stationary, portable, TRU, locomotive, and marine diesel.

This in turn raises the question of why locomotives and marine diesels are not included in the 2006 reformulated diesel fuel (RDF-2006) regulation. If there are policy or legal reasons for their exemption, they should be explained as part of the report. If such reasons do not exist, then not including locomotives and marine diesels is a major shortcoming." (Sawyer)

Agency Response: As stated earlier, the risk of diesel PM has been established in the risk assessment phase, and diesel PM has been identified as a toxic air contaminant by the ARB. The development of ACTMs, including the proposed fuel regulations, is part of the risk management phase. The PM inventory for nonvehicular diesel engines is broken out in the appendices to the Risk Reduction Plan. At the public hearing on the proposed regulation, the ARB directed the ARB staff to work on bringing locomotive and marine engine fuel under the proposed fuel regulations. There are legal, technical, and practical issues that the staff must work through, but the staff is aware of the potential emission and health benefits of regulating locomotive and marine engine fuels.

87. Comment: "APPENDIX D: This appendix presents a key document, *Staff Review of the Emissions Benefits of California's Diesel Fuel Program* , which was discussed earlier. The primary conclusion of this reviewer is that the data base is

insufficient to characterize the effect of fuel changes on emissions from new technology (not an important component in the inventory), on-road engines, non-road vehicles, and non-vehicular diesel engines. This is a major shortcoming in the assessment of the effects of RDF-2006 on emissions. I also question whether the interdependence of MAHCs, PAHCs, specific gravity, and Cetane Number allow determination of the emissions effect of changes in individual properties." (Sawyer)

Agency Response: See the response to Comment 54. The staff believes that reducing the aromatic hydrocarbon content, sulfur content, and density while increasing the cetane number of diesel fuel reduces emissions from on-road and non-road diesel engines. As far as estimating individual fuel property effects on emissions, it was not the staff's intention to do that. Staff agrees that the correlations among some of the properties make interpretation of an individual property effect difficult. However, these correlations do not affect staff's estimates of the overall emission benefits of the program.

88. Comment: "APPENDIX E: Baseline and future year inventories from the EMFAC emissions model contain the uncertainties inherent in the model. Particularly troublesome are predictions for years in which the numbers of diesel vehicles with aftertreatment devices become significant. There is no way to project durability of emission systems, deterioration in emissions control, or the effect of fuel composition on emissions from in-use engines. It is highly likely that the EMFAC projections are optimistic." (Sawyer)

Agency Response: EMFAC is in a constant state of update and improvement. Should the assumptions in EMFAC be demonstrated to be overly optimistic, then EMFAC will be updated to reflect the new information.

89. Comment: "APPENDIX F: The results of an EPA regression analysis of the relation between emissions and fuel properties are presented. The signs of the coefficients (slopes) are consistent with understanding of physical processes. The presentation is limited to effects on NO_x emissions. Effects on PM emissions should also be presented." (Sawyer)

Agency Response: The primary focus of the report was on NOx.

90. Comment: "The alternative of even lower sulfur stands was addressed. For the exhaust technologies, lower sulfur levels are not cost-effective, but newer treatment methods may require even lower sulfur levels. A zero sulfur level diesel fuel may be desirable in the future, and the ARB should continue to consider this as a future alternative." (Lucas)

Agency Response: See the response to Comment 81. The ARB's approach to emission control is to treat the vehicle and fuel as a system. Should future

emission control technologies require a change in fuel specifications, then changes will be considered.

91. Comment: "As noted in the report, U.S. EPA regulations are needed to reduce emissions from locomotives, aircraft, heavy-duty vehicles used in interstate commerce, and other sources that are preempted from state control. The ARB should continue to work with the U.S. EPA and others to develop control measures for these engines." (Lucas)

    Agency Response: We agree. In Resolution 03-17 approving the amendments, the Board directed the staff to work with the U.S. EPA and other interested parties to reduce emissions from these sources.

92. Comment: "I agree with the conclusions of Profs. Sawyer and Caretto that the interdependence of fuel parameters such as aromatics, specific gravity, and Cetane number make it difficult to quantify the effect of varying a single property.

    This being said, there is considerable evidence from the 31 studies reviewed that emissions of NOx and PM are reduced when sulfur and aromatics are limited…the vast majority of the engines are 1996 model year or earlier. The addition of new engines and engines retrofitted with advanced exhaust treatment systems is another factor that has a large uncertainty that is not clearly covered." (Lucas)

    Agency Response: See the responses to Comments 54 and 87. The aromatic hydrocarbon content regulation specifies a basic standard of 10 percent by volume; however, most CARB diesel fuel complies with the regulation as a certified formulation, with reduced aromatic and polynuclear aromatic contents and increased cetane number. Also, reducing aromatic content normally reduces specific gravity and reducing specific gravity normally increases cetane number. All properties change beneficially due to the sulfur and aromatic content regulations. Fuel property benefits may change in magnitude from engine to engine, but a high quality diesel fuel will not become a poor quality diesel fuel with a new engine. There is one exception of which staff is aware, but it would not have a very significant effect. If a nitrogen-bearing cetane improvement additive, such as 2-ethyl hexyl nitrate, is used to boost cetane number, a small increase in NOx emissions may result. The increase may be as high as a few percent relative to the future on-road engine standard of 0.2 g/bhp-hr. As mentioned earlier in regard to sulfur content, if fuel composition is found to be a deterrent to achieving the future emission standard, the ARB would re-evaluate the California diesel fuel requirements. For this case, a cap on total nitrogen content may be an appropriate standard to consider at some future date.

93. Comment: "While it appears that lubricity additives will be used by refiners, the nature of the additive is not specified. If the ARB wants to specify a lubricity standard, they might want to also ban certain types of additives, such as acidic additives that can form harmful salts." (Lucas)

Agency Response: The staff found in discussions with additive manufacturers and fuel producers that the acidic additives, which can form harmful salts, are no longer being used. Consequently, we do not believe that it is necessary to ban these additives.

94. Comment: "There is a statement on page 73 that 'fuels with insufficient lubricity contribute to excessive wear that results in reduced equipment life and performance. Excessive wear in these systems is also expected to increase emissions due to compromised pump performance.' While that is a reasonable conclusion to reach, there are no references or test data given to support that statement." (Lucas)

Agency Response: These statements were based on discussions with both automobile and equipment manufacturers. Please see the response to Comment 61 for more substantive data on which to draw these conclusions.

95. Comment: "In light of the lack of U.S. standards, it might be better to allow the industry to continue with the current practice, and wait until a consensus is reached by ASTM, as suggested as an alternative in the staff report. This would also bring the California regulations more into alignment with the U.S. standards." (Lucas)

Agency Response: The ASTM has been working for over ten years to produce an industry standard to be incorporated in the ASTM diesel fuel standard, D975. We agree that an industry standard is preferable to a government standard. However, with the advent of 15-ppmw sulfur limit diesel fuel, and the lack of ASTM resolution, we believe that it is necessary for an enforceable standard to be in place. The sunset provision included in our regulation allows the ASTM standard to take precedence once it is adopted. Additionally, on a national level, U.S. EPA is considering pursuit of a lubricity regulation to align with the ARB standard.

96. Comment: "The definition of a diesel fuel as any predominantly hydrocarbon liquid fuel without specifying or clarifying what "predominantly" means can be a problem for diesel fuels that might contain significant amounts of a non-hydrocarbon, such as oxygenated species. However, if oxygenated fuels are considered, then additional problems with other issues such as water quality (some oxygenated compounds are soluble in water) and the cost of producing these fuels would change." (Lucas)

Agency Response: See the responses to Comments 67 and 68.

97. Comment: "In Section V, Health Benefits Of Diesel Emissions Reductions (page 27), the complexity of the chemical composition is mentioned, but there is little discussion of the effects of particle size on health, especially the role of ultrafine particles. While 94% of the mass of diesel particles are contained in particles

smaller than 2.5 microns, diesel particles produced by modern engines are better characterized by sizes in the hundreds of nanometers and smaller. Reducing the sulfur content should reduce the formation of particles formed from the condensation of sulfuric acid, but their role in the health effects is unclear." (Lucas)

Agency Response: See the responses to Comments 70, 73, and 74.

98. Comment: "The discussion on page 25 assumes that a reduction in diesel PM will lead to a proportional reduction in cancer risk. Some caution should be taken here since the changes proposed here will certainly not only change the mass of diesel PM, but will probably change the chemical composition of the resulting particles, and it is not clear that all of the possible carcinogenic compounds in the exhaust will be reduced by the same fraction." (Lucas)

Agency Response: See the response to Comment 70.

99. Comment: "The ARB staff estimates that the costs of reducing the sulfur content of diesel fuel and adding required lubricity additives as between 2 and 4 cents per gallon of diesel. It is noted, but not emphasized, that most of the costs to refiners would occur as a result of adopted U.S. EPA and SCAQMD regulations. The real cost of the amendments is thus the cost of extending the regulations to the 25% of the total diesel fuel consumed by off-road diesel vehicles outside the SCAQMD. Staff estimates that as much as 90% of the cost can be attributed to the other regulations. The real cost of the proposed changes thus appears to be 0.2 to 0.4 cents per gallon of diesel fuel." (Lucas)

Agency Response: The staff agrees, but wanted to present the cost as if the others had not been adopted because most of the requirements have not become effective yet. Also, staff wanted to look at the California situation independently, for reference, and in case the other regulations are rescinded.

100. Comment: "The assessment in Appendix K concludes that there would be no impacts on ground water associated with proposed low-sulfur diesel fuel. This is correct for the hydrocarbon portion of the fuel. However, the proposed redefining of "diesel fuel" to be any mixture of primarily liquid hydrocarbons raises the issue of the impact of non-hydrocarbon compounds, such as oxygenated compounds, that could be more water soluble. The effects of oxygenates in gasoline has been studied by the ARB previously, and could be cited here. The report also states that alternative diesel fuels generally contain more than [trace] amounts of oxygenated fuel constituents or are emulsified with water." (Lucas)

Agency Response: See the responses to Comments 67 and 68. The expansion of applicability is not a blanket allowance for fuel blends with nonstandard components. The expansion of applicability simply prevents the sale and use of these fuel blends unless they comply with the California diesel fuel regulations.

101. Comment: "As the emissions from burning diesel fuel decrease, the fraction of the emissions that arise from lubricating oils can increase. There are two ongoing research efforts that are examining the impact of lubricating oils and oil additives on emissions and emission control devices. Preliminary results from Advanced Petroleum-Based Fuels Program Diesel Emission Control – Sulfur Effects (APBF – DECSE) suggest that some oil formulations produce higher levels of sulfur emissions. These results are an indication that staff needs to follow and support this and related work, especially in the effects of oils and oil additives on advanced aftertreatment technologies." (Lucas)

Agency Response: We agree.

Attachment A

MODIFIED REGULATORY TEXT WITH COMMENTARIES ACCOMPANYING THE FIRST 15-DAY NOTICE

Final Regulation Order, Title 13, California Code of Regulations

Attachment B

MODIFIED REGULATORY TEXT WITH COMMENTARIES ACCOMPANYING THE SECOND 15-DAY NOTICE

Final Regulation Order, Title 13, California Code of Regulations

Attachment C

JULY 13, 1999 LETTER FROM ARB EXECUTIVE OFFICER MICHAEL P. KENNY AND CTA EXECUTIVE VICE PRESIDENT JOEL D. ANDERSON TO U.S. EPA

Attachment D

FEBRUARY 15, 1994 LETTER FROM ARB SENIOR STAFF COUNSEL W. THOMAS JENNINGS TO MICHAEL D. GAYDA, ASSISTANT GENERAL COUNSEL OF TOSCO REFINING COMPANY