State of California
AIR RESOURCES BOARD

# Final Statement of Reasons for Rulemaking Including Summary of Comments and Agency Response

PUBLIC HEARING TO CONSIDER THE 2007 AMENDMENTS TO THE PHASE 3 CALIFORNIA REFORMULATED GASOLINE REGULATIONS

Public Hearing Date: June 14, 2007
Agenda Item No.: 07-6-3

## I. GENERAL

In this rulemaking, the Air Resources Board (ARB or Board) is adopting amendments to the Phase 3 California Reformulated Gasoline Regulations (CaRFG3). The amendments will do the following:

1. Amend the California Predictive Model to ensure that emissions associated with permeation caused by ethanol use are mitigated and incorporate new data;
2. Decrease the sulfur cap limit from 30 parts per million by weight (ppmw) to 20 ppmw (21 ppmw for California reformulated gasoline blendstock for oxygenate blending [CARBOB]) to improve enforceability and facilitate new motor vehicle emissions control technology;
3. Allow emissions averaging beginning December 31, 2009, for low level sulfur blends to provide additional flexibility for producers and importers that produce gasoline;
4. Apply the 7.00 pounds per square inch (psi) Reid vapor pressure (RVP) limit to oxygenated gasoline when the evaporative emissions portion of the Predictive Model is used to certify ethanol blends to reflect that virtually all gasoline will be oxygenated and commingling emissions are not a problem for these fuels;
5. Retain the 6.90 RVP limit for non-oxygenated gasoline to ensure that no increase in hydrocarbon emissions from commingling with oxygenated gasoline will occur;
6. Allow flexibility in setting oxygen content in the Predictive Model to account for variability in test methods;
7. Increase the maximum allowable amount of denaturant in ethanol to be consistent with the current standards of the American Society of Testing and Materials (ASTM);
8. Update the test method for oxygenate content of gasoline;
9. Require producers to use the revised Predictive Model starting December 31, 2009;
10. Add an option to use an alternative emissions reduction plan (AERP) beginning December 31, 2009 through December 31, 2011 to help mitigate emissions associated with permeation; and
11. Require the production of CaRFG compliant with the revised Predictive Model after December 31, 2011.

The rulemaking was formally initiated by the April 27, 2007 publication of a Notice and release of the Initial Statement of Reasons ("Staff Report"). The Staff Report is entitled "Proposed 2007 Amendments to Phase 3 Reformulated Gasoline Regulations." The Board considered the regulations at a June 14, 2007, public hearing. The Staff Report which is incorporated by reference herein, describes the rationale for the proposal. Appendix A to the Staff Report contains the text of the proposed amendments.[1] Appendix A also contains the following two amended procedures:

- California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model; and
- Procedures for Using the California Model for California Reformulated Gasoline Blendstocks for Oxygenated Blending (CARBOB).

Appendix B contains the permeation and emissions inventory used in the Predictive Model. Appendix C contains emissions from off-road applications and a discussion of the emission impacts from permeation due to ethanol blending. Appendix D contains the new emission data added to the Predictive Model, as well as the statistical models used in the Predictive Model. Appendix E contains the reactivity calculations used in the Predictive Model. These documents were also posted on ARB's Internet website for the rulemaking: http://www.arb.ca.gov/regact/2007/carfg07/carfg07.htm.

This Final Statement of Reasons (FSOR) provides an update to the Staff Report.

## A. Description of Board Action

On June 14, 2007, ARB conducted a public hearing to consider adoption of the Proposed 2007 Amendments to Phase 3 Reformulated Gasoline Regulations. At the June 14, 2007 hearing, the Board received written and oral comments. At the conclusion of the hearing, the Board adopted Resolution 07-21. As part of its action, the Board approved amendments to the phase 3 California reformulated gasoline regulations (CaRFG3), including modifications to the originally proposed amendments which were discussed and presented at the hearing. These modifications were suggested by staff and were set forth in a two page document entitled "Staff's Suggested Modifications to the Original Proposal," distributed at the hearing and included as Attachment B to the Resolution. In accordance with section 11346.8 of the Government Code, 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 of at least 15 days. The Executive Officer was then directed either to adopt the amendments with such additional modification 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.

[1] Appendix A contains amended sections 2261, 2262, 2262.3, 2262.4, 2262.5, 2262.9, 2263, 2263.7, 2264.2, 2265 (and the incorporated "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model"), 2266, 2266.5, 2270, 2271, and 2273, and proposed new sections 2260(a)(0.5), (0.7), (7.5), (8.5), (10.5), (10.7), (19.7), (23.5), and (23.7), 2262.3(d), 2264.2(a)(3), (b)(5), and (d), 2265(c)(4), 2265.1, 2265.5, and 2266(b)(3), (4), and (5) of Title 13, California Code of Regulations (CCR).

Written and oral comments were received on the proposed amendments to the CaRFG3 regulations during the April 27, 2007 to June 14, 2007 comment period and at the public hearing. Section II of this FSOR summarizes the written and oral comments received and provides ARB's responses to those comments.

## B. Modifications to the Original Proposal

### 1. Availability of Modified Text.

In response to comments received during the 45-day comment period, at the hearing staff presented suggested conceptual modifications to (a) allow third parties to enter into an AERP, (b) change the effective date for lowering the sulfur content cap from 30 parts per million by weight (ppmw) to 20 ppmw (21 ppmw for CARBOB) from December 31, 2009 to December 31, 2011, (c) allow early blending of ethanol up to 10 percent by volume with appropriate mitigation of any increase in emissions caused by the increased ethanol content, (d) modify the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model" to be consistent with the originally proposed amendments, and (e) implement any new 2007 legislation that explicitly provides for alternative funds to mitigate emission increases associated with early blending of ethanol up to 10 percent by volume. The Board approved the modifications subject to a supplemental 15-day comment period.

The modified text, with changes to the originally published text clearly indicated, and all other documentation relied upon in the regulatory action were made available for a supplemental 15-day comment period by issuance of a "Notice of Public Availability of Modified Text" (15-day Notice). The 15-day Notice, a copy of Resolution 07-21, the document entitled "Proposed Modifications to the Proposed Regulation Order," and the amended California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model were mailed on March 7, 2008 to all parties identified in section 44(a), title 1, CCR,[2] and to other persons generally interested in ARB's rulemaking concerning the CaRFG3 regulations. These documents were also posted on the ARB's Internet site for the rulemaking on March 7, 2008. An email message announcing and linking to this posting was transmitted to the more than 4,000 parties that have subscribed to the ARB's "fuels-general" List Serve for notification of postings pertaining to motor vehicle fuels. The comment period ended on March 24, 2008. Five comments were received during the supplemental 15-day comment period, and the Executive Officer issued Executive Order R-08-003 adopting the amended CaRFG3 regulations with modifications as approved by the Board.

### 2. Modified Text.

The following is a summary of the proposed substantive modifications subject to the 15-day Notice and the reasons for making or not making them.

[2] The mailout included 42 pages of excerpts from the complete regulations, showing the instances in which the modified text appeared.

**a. Third Party AERP.** Add a provision that:

1) allows third parties who are not producers or importers that produce gasoline to enter into an alternative emissions reduction plan;
2) defines how they may enter into an alternative emissions reduction plan. (See sections 2260(a)(37) and 2265.5);
3) allows certain third parties who are not producers or importers that produce gasoline to participate in an alternative emissions reduction plan by obtaining emission reduction offsets on behalf of producers or importers that produce gasoline; and
4) improve consistency, flexibility, and enforceability (See section 2265.5).

These additions were made to provide additional flexibility for the producers and importers.

**b. Effective date of the lower sulfur content cap.** Amend provisions to change the date for lowering the sulfur content cap from 30 ppmw to 20 ppmw (21 ppmw for CARBOB) from December 31, 2009 to December 31, 2011. (See sections 2261, 2262, and 2266.5) This amendment was made to align the revised sulfur regulatory requirements with the expected schedule needed for refinery modifications at some facilities.

**c. Early blending of ethanol up to 10 percent by volume.** Add new provisions and clarifying language that:

1) defines which compliance options are available relative to the use of the California Predictive Model before December 31, 2009;
2) specifies that anyone wishing to use an alternative emission reduction plan must notify the Executive Officer (See section 2261(b)(4)); and
3) allows for early use of the revised predictive model and other provisions of the proposed amendments to allow earlier flexibility to increase ethanol blending provided there is full mitigation of any increase in emissions caused by the increase in ethanol content. (See sections 2261(b)(6) and 2261(b)(7)).

These early compliance sections provide two alternatives. The first alternative, provided in section 2261(b)(6), allows a producer or importer to mitigate emissions increases associated with early use (before December 31, 2009) of higher levels of ethanol through the use of alternative emission reductions. The emission reductions required are determined using the California Predictive Model. This section is generally patterned after the AERP presented in section 2265.5. As with the AERP, these emissions reductions may come from vehicle scrappage programs, offsetting emissions with lower emitting diesel fuel batches, or incentive grants for cleaner-than-required engines, equipment, and other sources of pollution providing early or extra emission reductions. The emission reductions must be achieved before the early blending can occur.

The second alternative, provided in section 2261(b)(7), allows a producer or importer to blend percentages of ethanol into CARBOB that are higher than the common carrier pipeline specifications for oxygen and ethanol. To use this alternative, a producer or importer must first demonstrate that all emissions reduction requirements are met at the desired level of oxygenate blending, and that any fuel to be shipped in a common carrier pipeline also meets the specifications established by that carrier.

In both alternatives, there are reporting and recordkeeping requirements to ensure that there is a high level of accountability. Both of these alternatives sunset on December 31, 2009, the date after which fuels are generally regulated through use of the revised predictive model.

**d. Modifications to the Predictive Model Procedures Guide.** Staff modified the Predictive Model to reflect the changes in the Final Regulation Order.

There are five aspects of the Predictive Model that the staff added or updated as shown below:

1) Add permeation emissions and require they be mitigated;
2) Update the motor vehicle emissions inventory vehicle mix;
3) Update the reactivity adjustment factors;
4) Add new motor vehicle exhaust emissions test data; and
5) Update the effect of carbon monoxide on ozone-forming potential.

The Board approved staff's proposal to generally use a 2015 statewide ozone planning inventory as the baseline, including passenger vehicles to light heavy-duty trucks with gross vehicle weight (GVW) less than 10,000 pounds (lbs).

**e. New legislation for alternative funds to mitigate emission increases associated with early ethanol blending.** At the time the Board considered this rulemaking, the California legislature was considering, and industry anticipated, legislation that would allow funding to offset emissions associated with permeation. The Board directed the Executive Officer to adopt the proposed amendments including, inter alia, "provisions, as appropriate, to implement any new legislation signed by the Governor in the 2007 Legislative regular session that explicitly provides for alternative funds to mitigate any emissions increases associated with the introduction of higher blends of ethanol up to 10 percent by volume, the alternative emissions reduction plan option, or both, including provisions to enable refiners and importers to take advantage of the amended CaRFG3 rules to introduce higher ethanol blends as early as feasible." (emphasis added) (Resolution 07-21, Attachment B.)

However, during the 2007 Legislative regular session, no legislation meeting the above criteria was signed by the Governor. As such, no additional changes were required.

**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.** A discussion of alternatives to the initial regulatory proposal is found in Chapter VI of the Staff Report. For the reasons set forth in the Staff Report, staff's comments and responses at the hearings, and this FSOR, 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.

## II. EXTERNAL PEER REVIEW

Health and Safety Code section 57004 requires an external scientific peer review of the scientific basis for those rules, based on empirical data and scientific findings, 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), 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 (please note that the abbreviations in parentheses next to the following names are used in the comments to identify who submitted the peer reviewers' comments):

- Dr. Joost de Gouw (JDG), NOAA Earth System Research Laboratory
- Professor Allen Robinson (AR), Carnegie Mellon University
- Professor William R. Stockwell (WRS), Howard University
- David D. Geddes (DDG), PREP Consulting, Inc.

The peer reviewers evaluated the April 27, 2007, staff report for the reformulated gasoline rulemaking and all submitted written reports of their findings. Overall, the reviewers agreed with ARB staff that the proposed amendments will have no significant adverse impact on public health and the environment.

The reviewers agreed in general with ARB staff's discussion of the scientific basis supporting the proposed amendments and the staff's estimates of emission impacts. They concluded that the implementation plan allows flexibility for producers to comply in a cost-effective manner depending on their particular circumstances. They found that the staff's goal to replace methyl-tert-butyl-ether (MTBE) is worthy because of its appearance in ground water and will require that the effects of alternatives to be evaluated. The reviewers acknowledged the need of using a Predictive Model, but they believed that the model uncertainties must be quantified and tested with a top-down approach.

The specific comments of the reviewers are presented with ARB staff's responses in Section C of the FSOR.

## III. 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.

A multi-media evaluation was completed in January 2000 for California reformulated gasoline containing up to 10 percent ethanol. The 2007 amendments to the CaRFG3 regulations allow ethanol in gasoline up to 10 percent. ARB staff determined that the proposed amendments do not substantially change specifications of CaRFG3 gasoline and will not require a gasoline ingredient to be added or removed beyond what is allowed by the existing regulations or is currently already used to produce gasoline for sale in California. Therefore, staff believes that the proposed amendments to the CaRFG3 regulations are not subject to the requirement for a multimedia evaluation.

## IV. Differences Between State and Federal Regulations

In accordance with Government Code section 11346.2(b)(5)(B), the Executive Officer has determined that the differing state regulations are authorized by law and that the cost of differing state regulations is justified by the benefit to human health, public safety, public welfare, or the environment.

Health and Safety Code section 43013.1(b) requires that ARB ensure the CaRFG3 regulations maintain or improve upon emissions benefits achieved by the CaRFG2 regulations. Therefore, the 2007 amendments are mandated by law.

The proposed amendments are specifically designed to mitigate the increase of permeation emissions from on-road sources. The estimated emissions increase of permeation emissions is estimated to be 28.8 tpd in 2005, 18.4 tpd in 2010, 12.1 tpd in 2015, and 8.1 tpd in 2020. Therefore, benefits to human health, public safety, public welfare, and/or the environment is expected through the 2007 amendments.

## V. Incorporation by Reference in the Regulation

Sections 2260(a)(8.5), 2260(a)(19.7), and 2265(a)(2) incorporate the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model" (CaRFG3 Predictive Model Procedures) by reference. Sections 2266.5(a)(2)(B)1. and 2266.5(a)(5)(C) incorporate the "Procedures for Using the California Model for California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB)" (CARBOB Procedures) by reference. The regulation identifies the incorporated documents by title and date. The incorporated documents are readily available from the ARB upon request, was made available in the context of this rulemaking in the manner specified in Government Code section 11346.5(b).

The CaRFG3 Predictive Model Procedures and CARBOB Procedures are incorporated by reference because it would be cumbersome and impractical to print the 96- and 14-page, respectively, documents in the CCR. Existing ARB administrative practice has been to have the Predictive Model procedures and CARBOB Procedures incorporated by reference rather than printed in the CCR because these procedures are highly technical and complex, have pages of equations and numerous tables, include various worksheets, and have a very

limited audience. The affected public is accustomed to the incorporation format used for these procedures.

## IV. SUMMARY OF COMMENTS AND AGENCY RESPONSES[5]

During the 45-day comment period, the Board received written comments from:
*Note: The abbreviations of each name are included in parentheses and will be used to identify who submitted the comments.*

| Name | Representing |
|---|---|
| Gina Grey (GG) | Western States Petroleum Association (WSPA) |
| David A. Smith (DAS) | B.P. America Inc. |
| Gary Herwick (GH) | Transportation Fuels Consulting Inc. |
| Steve Charlesworth (SC) | Citizen |
| Brooke Coleman (BC) | Renewable Energy Action Project Coalition |
| Ellen L. Shapiro (ELS) | Alliance of Automobile Manufacturers (AAM) |
| Barry R. Wallerstein (BRW) | South Coast Air Quality Management District (SCAQMD) |
| James P. Uihlein (JPU) | Chevron |
| Luke Tonachel (LT) | Natural Resource Defense Council (NRDC) |
| Bonnie Holmes-Gen (BH) | American Lung Association of California |
| John Shears (JS) | Center for Energy Efficiency and Renewable Technologies |
| Patricia Monohan (PM) | Union of Concerned Scientists |

At the June 14, 2007 hearing, oral testimony was presented by:

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| Gordon Schremp (GS) | California Energy Commission (CEC) |
| David S. Hirshfeld (DSH) | Math Pro |
| Paul Wuebben (PW) | SCAQMD |
| Cathy Reheis-Boyd (CR) | WSPA |
| Albert M. Hochhauser (AMH) | WSPA |
| Dave A. Smith (DAS) | B.P. America Inc. |
| James P. Uihlein (JPU) | Chevron |
| Gary Herwick (GH) | Transportation Fuels Consulting Inc. |
| Darren W. Stroud (DWS) | Valero Energy Corporation |
| Bill Jones (BJ) | Pacific Ethanol |
| Ellen L. Shapiro (ELS) | AAM |
| David N. Patterson (DNP) | Mitsubishi |
| Bill Davis (BD) | Construction Industry Air Quality Coalition |

[5] Section 11346.9(a)(3) of the Government Code (APA) provides that the FSOR shall contain a "summary of each objection or recommendation made regarding the specific adoption, amendment, or repeal proposed, together with an explanation of how the propose action has been changed to accommodate each objection or recommendation, or the reasons for making no change. This requirement applies only to objections or recommendations specifically directed at the agency's proposed action or to the procedures followed by the agency in proposing or adopting the action. The agency may aggregate and summarize repetitive or irrelevant comments as a group, and may respond to repetitive comments or summarily dismiss irrelevant comments as a group. For the purpose of this paragraph, a comment is "irrelevant" if it is not specifically directed at the agency's proposed action or to the procedures followed by the agency in proposing or adopting the action.

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

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|---|---|
| Christopher Calder (CC) | Citizen (Calder) |
| James P. Uihlein (JPU) | Chevron (Chevron) |
| Catherine Reheis-Boyd (CR) | WSPA (WSPA) |
| Darren W. Stroud (DWS) | Valero Energy Corporation (Valero) |
| Barry R. Wallerstein, D.Env. (BRW) | SCAQMD |

Set forth below is a summary of each objection or recommendation specifically directed at the proposed amendments or to the procedures followed by 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.

## A. COMMENTS PRESENTED PRIOR TO OR AT THE HEARING

Oral testimony that was presented at the June 14, 2007 hearing is presented in quotation marks. All written comments are presented without quotation marks.

### *1. Implementation Timing*

1. Comment: It is common practice in implementing regulations for ARB to leave adequate time after the regulations are finalized for the affected industry to carry out the necessary changes: conduct engineering studies, obtain permits, construct new facilities, and modify existing facilities. Historically, the lead time for the petroleum industry has been four years after the regulations are reviewed, approved by the Office of Administrative Law (OAL), and published. Our experience has been that the full amount of available lead time may be necessary. In addition to the historical timing constraints, implementation of these regulations will require a determination of future ethanol content levels by common-carrier pipeline operators to insure that the proper CARBOB is used as a design basis for refinery modifications. Furthermore, adequate lead time is necessary because of the potential for the unavailability of necessary specialized contractor resources to carry out implementing projects; tightening the compliance timing will increase the competition for such resources.

   Instead of providing adequate lead time, staff has proposed the AERP that imposes a penalty on refiners simply based on the fact that refinery projects require more time to complete than has been provided in the proposed regulations. The AERP is not an acceptable substitute for adequate lead time for refineries to comply. (JPU)

   Agency Response: The Phase 2 California Reformulated Gasoline (CaRFG2) regulations, approved in 1992, set specifications for eight fuel properties: sulfur, aromatics, oxygen, benzene, 50 percent distillation temperature, 90 percent distillation temperature, olefins, and Reid vapor pressure. To comply with the oxygen content requirement, producers chose to use MTBE. Soon after CaRFG2 implementation, the presence of MTBE in groundwater began to be reported. An investigation and public hearings were conducted resulting in the issuance of Executive Order D-5-99 on March 25, 1999. The Executive Order directed the phase-out of MTBE in California's gasoline.

During the December 1999 hearing, the Board recognized that permeation emissions from the use of ethanol in gasoline may be an issue and directed the staff to investigate the effects, with the understanding that additional modifications to the CaRFG3 regulations may be required. The modifications would be required in order to ensure that regulations adopted pursuant to Executive Order D-5-99 maintain or improve upon emissions and air quality benefits achieved by the CaRFG2 regulations as of January 1, 1999 (Health and Safety Code [H&SC] section 43013.1). H&SC section 43013.1 (SB 989) was approved by the Governor in October 1999.

Based on meetings with producers, pipeline distributors, CEC staff, and other stakeholders, ARB staff learned that some producers can already produce complying gasoline and some producers can make complying gasoline by the December 31, 2009 deadline with slight to no refinery modifications and virtually no change in production volumes. Without refinery modifications, staff estimates that production could decrease four to seven percent. With the refinery modifications, staff estimates that production could increase 3 to 10 percent. For the producers that could not make complying gasoline by December 31, 2009 without significant production loss, staff was able to determine it would take up to four years to complete refinery modifications necessary to offset production loss that could come from meeting the requirements of these amendments. These refinery modifications include permitting, engineering, resources, and construction.

The ARB has longstanding legislative authority to "endeavor to achieve the maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish the attainment of the state standards at the earliest practicable date." (Health and Safety Code [H&SC] section 43018(a).) As such, it is the Board's responsibility to determine the most effective approach to achieving this mandate. Relative to methyl tertiary-butyl ether (MTBE), ethanol increases oxides of nitrogen emissions as well as permeation emissions. The 2007 CaRFG3 amendments require refiners to mitigate permeation emissions beginning January 1, 2010, with an option for an alternative emissions reduction plan (AERP) that sunsets December 31, 2011. This action recognizes the need to expeditiously mitigate the permeation emissions and allows refiners adequate time to make necessary refinery modifications. It should also be noted that the 2007 CaRFG3 amendments allow a one year extension to the AERP.

Moreover, the CaRFG2 program is a major component of the California State Implementation Plan (SIP), which is a comprehensive strategy designed to attain federal air quality standards as quickly as possible. The implementation schedule of the updated Predictive Model (with the use of an AERP) facilitates expeditious attainment of those standards.

The CEC and MathPro, Inc., CEC's consultant, both concluded refiners will need to make modifications to their refineries to meet requirements of amendments. The Math Pro modeling report estimated that the modifications would take approximately 45 to 59 months to complete. ARB staff estimated that the refinery modifications could take up to 48 moths and allowed for a 12 moth extension to the AERP (the use of alternative emission mitigations), if conditions were necessary. Some refiners could already meet the amended regulations or would be able to meet the standard by December 31, 2009. Therefore, in order to obtain maximum feasible reductions

as expeditiously as possible, requiring producers and importers that produce gasoline to use the revised Predictive Model starting December 31, 2009 (allowing for the use of alternative emission mitigations) and requiring the production of CaRFG compliant fuel with the revised Predictive Model by December 11, 2011 are appropriate.

ARB has not established a precedent for a four-year compliance period. WSPA prepared a summary showing 12.5 – 51 months for various CaRFG rulemakings. Therefore, the commenter is incorrect in stating that the historical lead time for the petroleum industry is four years. To adopt a four-year implementation period here based on any perceived historical lead time, as opposed to a technical basis, would be arbitrary and capricious. As discussed above, some producers can already produce complying gasoline, others can use the AERP to comply in a cost-effective manner, and full compliance by 2012 is technologically feasible.

The commenter further suggests that the common-carrier pipeline future ethanol content requirements should be determined. However, any future changes to the common-carrier pipeline specifications are speculative and cannot be relied upon for the development of the current amendments.

The AERP is a flexibility option to ensure that emission increases caused by the addition of ethanol to gasoline are mitigated completely and expeditiously-consistent with State law requirements (Health and Safety Code section 43013.1(b)(1)). Health and Safety Code section 43013.1 requires that CaRFG3 preserve the emission benefits of CaRFG2. These benefits include emission reductions for pollutants, including precursors, identified in the State Implementation Plan for ozone, and emission reductions in potency-weighted air toxics compounds. The intent of the AERP is to serve as a flexibility option for producers that choose to incorporate it to offset some of the loss of production while refinery modifications are being made to offset losses in production. Producers are not required to use an AERP to come into compliance with the new regulatory requirements. There are several options that producers can choose to come into compliance with the 2007 CaRFG3 regulations without using the AERP. Another option would be to use the Predictive Model to adjust the eight regulated fuel properties to offset the permeation emissions and make a complying blend. In addition, the 2007 CaRFG3 amendments do not require ethanol use in gasoline. Producers have the option of putting from zero to ten percent by volume oxygen in gasoline. A fully compliant non-oxygenated gasoline blend is a viable option for producers. As the AERP is an option intended to offset emissions associated with permeation due to the use of ethanol in gasoline, an AERP is not necessary, and therefore not a penalty, for fuel blends that don't include ethanol.

2. Comment: "The AERP is really linked to staff's two-year implementation date, and it's a penalty approach. It's a stick approach. We need some more carrot approaches. WSPA doesn't agree with this principle. Set a realistic implementation date. The alternative funding mechanism that Cathy mentioned will be able to offset emissions including those from off-road sources well in advance of the implementation date." (AMH)

Agency Response: See response to comment #1. The implementation period is necessary to achieve the maximum degree of emission reduction possible in order to

accomplish the attainment of the state standards at the earliest practicable date and fulfill the requirements of H&SC section 43018(a). The ARB does not have authority to provide incentive funding to offset emissions associated with permeation from the use of ethanol in gasoline. Absent statutory authority, ARB may not offer "carrot approaches." Several individuals/organizations unsuccessfully attempted to gain new legislation in the 2007 Legislative regular session that provides for alternative funds to mitigate any emissions increases associated with the introduction of higher blends of ethanol up to 10 percent by volume, the alternative emissions reduction plan option, or both, including provisions to enable refiners and importers to take advantage of the amended CaRFG3 rules to introduce higher ethanol blends as early as feasible.

3. Comment: "At the same time, we do see that the implementation of the objectives of these changes is less than perfect. In particular, we support WSPA's position on the timing in the AERP. And it's important to note that the real compliance date for these regulations is 12-31-09. After that, we're forced to pay a penalty simply for our inability to perform the impossible."

"After that, not only is that two-and-a-half years that we roughly have to comply with the regulations fundamentally unworkable, we've also already seen resources constraints both in terms of people, availability in engineering contractors and materials and fabrication ability that have resulted already in six-month delays in executing projects just in our normal operations. And being forced to operate in accelerated compliance deadline is just going to increase the competition for the available resources and make the problem worse." (JPU)

Agency Response: See responses to comments #1 and 2.

4. Comment: ARB has proposed a new approach to meeting the regulations called an Alternative Emissions Reduction Plan (AERP). WSPA believes the AERP, as proposed in the staff report, is inappropriate and is a bad precedent for emissions reduction policy. We believe the AERP is a poor substitute for setting a realistic compliance date. It is a separate regulatory proposal that represents a substantial deviation from past policies and should receive full public review. The AERP should not be sequestered within a proposal that ARB characterizes as merely 'amendments' which "do not change the specifications of CaRFG3 (ISOR, page 52). (GG)

Agency Response: See responses to comments #1 and 2. The AERP did receive full public review. It was included in the 45-day notice, Staff Report, and 2007 proposed amendments which were released on April 27, 2007. The AERP is not a separate regulatory proposal. It is an option available to offset emissions from gasoline. Accordingly, it is associated with the gasoline amendments and is included in the CaRFG3 amendments. It does not deviate from past policies since ARB does, to the extent possible, provide flexibility to industry.

5. Comment: Current requirements for CaRFG3 ethanol blending and the use of the fuel in motor vehicles produce significant evaporative permeation emissions. According to the ARB staff report, permeation was responsible for 29 tons per day of smog-forming emissions in 2005. Any delay in implementing new fuels regulations would allow the continued release of harmful air pollution. Therefore, ARB should

implement and enforce new requirements that account for these emissions as soon as possible.

While mitigation is needed today, ARB does not require full mitigation of permeation emissions until 2010 and complete compliance with new fuel formulation requirements until 2012. ARB expects that some refiners can blend ethanol using the proposed Predictive Model today, but has given more than four years of lead time for those refiners that require equipment modifications. Since permeation emissions are already polluting today's air, further extension of the compliance date is unacceptable. (BH, JS, LT, PM)

Agency Response: After discussions with producers, importers, and other stakeholders, staff believes that we have set forth an aggressive, yet fair and reasonable implementation schedule that allows for earlier implementation and also gives producers reasonable time and flexibility to make any refinery modifications, if needed, to meet the regulations. The implementation schedule also takes into consideration the potential impact of the amendments on fuel supply in California. There is an option for producers to apply for a one year extension for the AERP. Producers would have to justify the need for this extension, and this extension would have to be approved by the Executive Officer. An extension of the AERP does not allow refiners to come into compliance a year later; it allows them the use of the AERP as a flexibility option to mitigate permeation emissions while refinery modifications are completed. Permeation emissions will still be mitigated if a one year extension is granted, but instead of being mitigated strictly through fuel formulation changes, it will be mitigated through the AERP.

6. Comment: "You heard CEC saying that based on their analysis they see us needing about five years. We see that we need between four and six years. The reason for that is right now trying to permit major refinery modifications in California it takes two-and-a-half to three years to get through that process. You've got CEQA to deal with. You have the local permitting as far as air districts. You've got your local cities. You have your counties. You have our Coastal Commissions and so forth. So even if we could do the construction and install the equipment we need in order to comply with these regulations within two years, the permitting would put us outside that window in the first place. So that's a major consideration that needs to be taken into consideration here.

Also what we're seeing is that right now it's taking almost three years for project design, funding, procurement and construction even on an aggressive basis. And the reason for that is due to high work backlogs and engineering and construction firms, a very tight labor market, and land availability issues particularly in Southern California. So we see that each refinery is going to need at least until 2013 in order to make the modifications necessary to comply with these regulations." (DWS)

Agency Response: See responses to comments #1 and 2. Based on meetings with producers, pipeline distributors, CEC staff, and other stakeholders, staff learned that most producers can meet the changes in regulations with only limited reduction in production. However, to offset this reduction in production some producers would have to do refinery modifications. In these meetings, many producers indicated that the refinery modifications would take approximately four years. Therefore, staff set a full implementation date of December 31, 2011 with a provision that producers could

apply for a one year extension of the AERP if there were some unexpected circumstances that prevented them from coming into compliance by that date.

7. Comment: "So I think what the Energy staff recommendation is your consideration is to amend the full compliance date of December 31, 2011, to January 31, 2013, a 13-month extension to minimize the risk that some of the refineries will not be fully complying by the December 31, 2011 date." (GS)

   Agency Response: See response to comment #6.

8. Comment: "So I'd like to just summarize our three main recommendations. The first being that we recommend the Board revise the implementation date. Because as you know, the staff has proposed a two-year year-end 2009 time frame without this AERP. We believe you need the full four-year plus time frame. And I think as you heard from the Energy Commission possibly five from the time the regulation's deemed final." (CR)

   Agency Response: See response to comment #6.

9. Comment: "On the other hand, WSPA request the Board direct staff to revise the currently proposed two-year implementation date to an allowance of at least four years, preferably five, from the time the regulations are finalized. Staff has agreed that we'll need four years. CEC recommended five years to the end of January 2013." (AMH)

   "We need the historical time period after rule finalization in order to ensure we can comply with the regulations. We've got planning, design, permitting, and construction in refineries and the infrastructure we need to carry out. Don't choose implementation dates that are based on unrealistic expectations." (AMH)

   Agency Response: See response to comment #6.

10. Comment: WSPA therefore recommends ARB set an implementation timeline of four years after the regulations are approved by OAL and published. After 1 year, or in concert with the Low Carbon Fuels Standard (LCFS) work, it would be appropriate for ARB to conduct a formal review, and decide whether four years is adequate, too long, or too short, and to therefore maintain or modify the implementation date accordingly. (GG)

    Agency Response: The 2007 CaRFG3 amendments were intended to implement H&SC section 43013.1 and are independent from the future LCFS. However, if there are any inconsistencies between the two programs, ARB will rectify them. Also see response to comment #6.

11. Comment: "What you are looking at there on that slide number 11 for the results that were returned by this aggregate model that I talked about that considers all the refineries taken together so they were one super colossal, big refinery.

    However, in fact, these represent a likely overstatement of what would actually happen absent investment. The emissions reductions that are returned by the

amended PM 3 are actually highly sensitive to small changes in gasoline properties. More so I believe than the mass versions.

Working in the same arena is the inherent nature of the kind of refinery remodeling one does where all the models are lumped together to sort of over-optimize the combination of the refineries inside the little box. All working in unison, leads to results being returned that are better than they can really do in practice.

And this is heightened by the fact that there are actually significant differences from refinery to refinery. And their capital stock, their technical capabilities, and the properties of the gasoline that are now producing.

This shows the dispersion in the average properties, two of the eight predictive model properties of the gasoline produced by the individual refineries in California in 2006. The red circle represents the industry average. This is the volume weighted average of all the refineries in 2006. That represented a compliant gasoline in 2006 under the old model.

The point of all this is that the refiners who find themselves in the northeast corner of that diagram are the ones that are going to be disadvantaged initially and find it most difficult to produce under the new amended model without making capital investments. The refiners who are operating more in the southwestern corner will be able to respond more quickly. And so we conduct some side analyses to estimate what investment will be required of these refineries that would be unable to comply early. And the results that we found were generally consistent with what you've already heard. Additional refining investment probably in excess of 500 to 700 million. Increasing refining costs ranging from a penny to a penny and a half. And a loss in fuel economy consistent again with what you've heard on the order of one to one-and-a-half percent as a result of ethanol's fuel.

In the longer term, what we find is that given sufficient time to invest, all the refineries will have relatively little difficulty in meeting the CARB standard. They will put in new capital equipment primarily. In additional, desulfurization. Ethanol use will indeed approach 10 percent in most cases. And the standard looks attainable under the new sustaining core production under the new standard looks like a quite reasonable expectation." (DSH)

Agency Response: These results are consistent with the information that staff was able to determine from individual meetings with stakeholders.

12. Comment: "Now the project time lines associated with this work we've broken up into four major components. Based on meetings we attended with ARB technical staff and a survey that was conducted of the industry in early June, we've obtained information and ranges for these various aspects of a typical project to make refinery modifications.

And taken this information, we put it into a graphic. And it shows on the upper the green bars the lower end of the range or the shorter time period to fully comply. And that does coincide with staff's proposal of December 31st, 2011. And looking at the upper range of the various aspects of a project, you see that the full compliance date is beyond that of December 11, 2011. It's actually 13 months beyond.

So I think what the Energy staff recommendation is your consideration is to amend the full compliance date of December 31, 2011, to January 31, 2013, a 13-month extension to minimize the risk that some of the refineries will not be fully complying by the December 31, 2011, date." (GS)

Agency Response: Producers and importers that are having trouble coming into compliance by the full compliance date of December 31, 2011, may apply for a one year extension to an AERP if conditions are warranted. This would extend the full compliance deadline until December 31, 2012. Also see response to comment #6.

***2. Sulfur Cap***

13. Comment: The proposed sulfur cap limit of 20 ppm is an important step forward over the existing specification. We appreciate ARB opening up this rulemaking to adjust this important parameter. However, the AQMD strongly recommends that sulfur levels be further tightened to 10 ppm. This lower sulfur level would fully align California gasoline requirements with those of numbers governments around the world. We know with certainty that a maximum sulfur fuel level of 10 ppm at retail dispensing sites is very feasible, as the average levels today are 9 to 11 ppm. Now that the California average fuel quality exceeds the ARB's proposed sulfur cap by a large margin, it is very reasonable – and in fact most responsible – to adjust this level downward as a matter of state policy. Japan has already implemented this standard in use, and it has been adopted by European Union countries. California should not concede any ground with respect to its world leadership on gasoline specifications. (BRW)

    Agency Response: Sulfur levels in CaRFG3 currently average about 10 ppmw, with 95 percent of production being below 18 ppmw. Staff believes that producers will significantly further reduce the sulfur content of California gasoline to certify gasoline if the proposed revisions are adopted. However, staff believes that although sulfur levels will be well below 20 ppmw, lowering the cap to 10 ppmw would have an adverse effect on production by limiting flexibility, especially during the non-regulatory RVP season. Staff believes that setting the sulfur cap at 20 ppmw sufficiently prevents excessive sulfur in CaRFG while providing adequate flexibility for producers.

14. Comment: "Regarding the sulfur cap, we do strongly support the staff's recommendation as far as it goes. We certainly could not propose any relaxation of the 20 ppm. But we recommend that you take the next additional opportunity for emission reductions, mainly to tighten that 20 ppm sulfur cap down to 10 parts per million. That reduction is an essential enabler of higher fuel efficiency vehicles. The average level of sulfur today is 9 to 11 ppm, so there is already a large compliance margin in the marketplace." (PW)

    Agency Response: See response to comment #13.

15. Comment: Regarding specification changes, ARB has proposed only to lower the sulfur cap from 30 ppm to 20 ppm. Frankly, we were very surprised at this decision, because we were expecting ARB to instead propose capping sulfur at 10 ppm (considered "ultra-low" sulfur). This is the best time for California to adopt ultra-low

sulfur gasoline (ULSG): Europe is doing it, Japan is doing it, and even California refiners are doing it, today. In fact, the refiners have been doing it for several years. According to the Alliance's North American Summer Fuel Survey, with samples taken from retail locations in San Francisco and Los Angeles, the average sulfur levels from the two cities combined was less than 10 ppm in 2003, 2005 and 2006. Reducing the cap to 20 ppm isn't even a stretch; since 2004, 100% of the survey's samples have been below 20 ppm. The average sulfur levels have hovered around 10 ppm since 2000, with some years slightly above that level and some years below it. We suspect the federal implementation of the national Tier 2 sulfur regulation is making lower sulfur easier for California refiners to produce because more low sulfur gasoline product is now available from outside the state. In any case, keeping the sulfur cap where it is now, at 30 ppm, as requested by the oil industry, just makes no sense at all.

Capping sulfur at 10 ppm would be important not just from an emissions perspective but also to enable improved fuel economy. We all know lower sulfur means consistently lower tailpipe emissions and enables new diesel technology, but some may be unaware that ULSG would enable lean burn gasoline engines. These engines, which are significantly more fuel efficient than conventional spark ignited engines, have been on the market for several years in Europe and Japan, where ULSG is required. However, due to higher engine-out NOx emissions, lean-burn gasoline engines require the same type of advanced NOx controls as diesel engines to meet California's stringent emission standards. These control technologies are highly sensitive to sulfur, which is the main reason why the country now has ultra-low sulfur diesel fuel. Gasoline sulfur would need to be reduced across the U.S. to fully enable this technology, but California could and should be leading the way and telling Washington to remove this key barrier to a promising new technology. (ELS)

Agency Response: As a result of the requirement to mitigate permeation, producers and importers will likely have to increase the use of ethanol in gasoline to offset hydrocarbon emissions. With the addition of ethanol, NOx emissions increase and the easiest way for producers to reduce NOx emissions is to lower sulfur in gasoline. ARB staff estimates that the sulfur levels in California gasoline are expected to be well below 10 ppm, as a result of the amendments, which is more than adequate for lean burn engines. Also see response to comment #13.

16. Comment: "I want to address the issue of enabling fuel efficiency which is one of our key reasons for recommending 10 ppm. I think it was a misunderstanding by the staff in some comments we made. We need sulfur in the single digits. But we do not say that lean burn is enabled by up to 20 ppm sulfur. It's very similar to diesel technology. We need the ultra low sulfur levels.

I'd like to propose an alternative program to the extent that a regulatory cap cannot be put in. We think incentives will help reward the progressive refiners instead of penalizing them under a regulatory system. We want to suggest that they could – ARB could authorize a label for ultra clean gasoline in exchange for certifying under 10 ppm consistently that they would have to forgo some of that flexibility above 10 ppm, but we think they can do it. The data show that they're pretty much there." (ELS)

Agency Response: ARB will consider action on the suggested alternative program at a later date. See also responses to comments #13 and #15.

17. Comment: "I'm going to follow along with what Ellen Shapiro was talking about with lean burn gasoline injected engines. We are one of the industry leaders in this technology. And that is what we slightly disagree with staff a little bit. Lower sulfur will gain us new technology. It won't gain us tons in the model. It will gain us new technology."

"And I go along with what Ellen was just discussing about the proposing an ultra-low sulfur gasoline similar to what the auto makers now do with the top tier gasoline, to be able to propose that is a voluntary program for superior fuel.

This can be an example where ARB can lead the country into the future with a clean high technology fleets. This isn't something that we're going to be able to – even if California does have this lower sulfur gasoline, until it is adopted across the country, we will not enable to use these low lean burn engines to be able to get those NOx benefits. That will only be allowed in captive fleets for the time being. But we need to take a step forward into the future. And I hope this Board can look at this as a first step towards that future." (DNP)

Agency Response: See responses to comments #13 and #15.

18. Comment: lf the ARB Board can't quite see its way forward to requiring ULSG across the state, we would propose it consider developing an incentive program to induce refiners to market the ULSG we know they can make. It might be something as simple as allowing these companies to use a label that declares their fuel to be "ultra-clean," in exchange for certifying their fuel will always meet the 10 ppm limit. In a state like California, this could provide just the market incentive that would make this fuel widely and predictably available. Perhaps industry itself can devise a program that would encourage refiners to market ULSG. Such a program would convert the current race to a lowest common denominator, minimally compliant fuel to a race to sell the cleanest possible fuel, to the ultimate benefit of California citizens. (ELS)

Agency Response: See responses to comments #13. #15, and #16.

19. Comment: WSPA strongly opposes the staff proposal to lower the sulfur cap from 30 ppm to 20 ppm. There are no emissions benefits to be gained, and it will not make enforcement any easier. There is no evidence it will result in the introduction of advanced vehicles by the auto/truck manufacturers. Finally, there may be significant negative producibility consequences for this step. (GG)

Agency Response: Cap limits provide an upper limit for fuel properties for all compliance options and allow enforcement of the requirements through the gasoline distribution system. Sulfur levels in CaRFG3 currently average about 10 ppmw, with 95 percent of production being below 18 ppmw. Staff believes that producers will significantly further reduce the sulfur content of California gasoline to certify gasoline if the proposed revisions are adopted. With the recent implementation of the federal Tier II sulfur rules for gasoline, nationwide gasoline sulfur levels must average less than 20 ppmw with a cap of 80 ppmw. The implementation of the federal Tier II

sulfur rules will significantly reduce the historical difference between sulfur levels in California and those seen outside the State.

Lowering the sulfur cap to 20 ppmw is not expected to significantly affect flexibility to make complying fuels but will increase the enforceability of the program and help to protect the sulfur-sensitive emissions control components. Staff believes that it will not be practical for producers to certify alternative formulations with sulfur levels above 20 ppmw. Staff believes that the sulfur cap should be set at the lowest level possible that does not significantly reduce production flexibility. From this perspective, the current cap of 30 ppmw is much higher than necessary.

In order to provide added flexibility to refiners, the 2007 CaRFG3 amendments include an option for the producers and importers to address the expected ongoing difficulties in meeting the very low sulfur content requirements. This option allows producers and importers to specifically offset a batch of gasoline that does not meet CaRFG3 standards due to an unintentionally high sulfur content. In this case, the producer or importer would be permitted to offset any increased emissions by producing a series of subsequent batches that are cleaner than the Phase 3 CaRFG standards. In no event could any batch exceed the cap limit for sulfur. This option would apply beginning December 31, 2009.

### *3. Vehicle Certification Fuel*

20. Comment: Given the potential for an increase in permeation evaporative emissions from ethanol blended gasoline, there is cause to reexamine the regulations under which most vehicles sold in California today are certified using an MTBE containing fuel. The regulations should be changed to require certification on E10 as soon as possible. (JPU)

Agency Response: The current certification fuel is an MTBE blended fuel. Staff agrees that the certification fuel needs to be updated to reflect the fuel that is currently in-use in California. Staff will work with our Mobile Source Control Division, automobile manufacturers, and other stakeholders to establish a new appropriate certification fuel.

21. Comment: It is important to recognize that the PM {predictive model} reflects Tech 5 vehicles which have not been certified with in-use fuels since the phase out of MTBE. Instead, all new gasoline vehicles are allowed to certify with inherently cleaner Phase 2 gasoline rather than commercially dispensed ethanol-containing gasoline. The use of such a non-representative fuel represents a de facto relaxation of vehicle emission standards. For example, it is possible that higher catalyst loading and higher conversion efficiency formulations would be needed to certify Tech 5 and later vehicles on Phase 3 in-use fuel. The gross disparity between certification test fuel and the in-use fuel specification is a major weakness which directly affects the validity of the proposed update of the Predictive Model. Ideally, the certification test fuel would simply track whatever fuel formulation was authorized by the Predictive Model. In the absence of an immediate harmonization in this regard, the AQMD staff strongly recommend that the ARB Board direct staff to move expeditiously to update certification fuel specifications such that all new gasoline vehicles certify on in-use Phase 3 gasoline as soon as possible. (BRW)

Agency Response: See response to comment #20.

22. Comment: WSPA, among possibly others, is asking the ARB to require the use of ethanol in the test fuel used to certify new vehicles, so the fuel will more closely represent market quality fuel. Without taking a position on this issue today because it is outside the scope of this hearing, the Alliance notes that the request represents a much bigger challenge than many people understand or appreciate. In particular, changing the certification fuel would change not just the vehicle emission standards but also all the test protocols and regulations used to support those standards. This would impose an enormous burden on the ARB, not to mention our industry. Given the resources needed to simply examine this issue, the Board should view the proposal with great caution. (ELS)

Agency Response: See response to comment #20.

23. Comment: WSPA urges ARB to redefine the fuel that manufacturers of automobiles, off-road equipment and gasoline storage devices use for certifying their equipment to emissions standards. In general, certification fuel should represent the fuel that is being used by the consuming public. In this case, it is critical that equipment pass the relevant standards with gasoline containing ethanol. Much of the need for this current rulemaking came about because ethanol was not part of the certification fuel in the past. WSPA recommends the Board direct ARB staff to evaluate and take appropriate action on this issue.

In addition, ARB should continue to test whether fuel containing ethanol has different emissions performance than fuel without ethanol. (GG)

Agency Response: See response to comment #20.

24. Comment: "Lastly, just want to turn to the question of certification fuel harmonization to underscore its very important relevance. As you I'm sure know, gasoline vehicles today are allowed to certify on cleaner Phase II gasoline, even though MTBE has been fully phased out and is no longer available. That represents in fact a de facto relaxation of the standards. And we consider that a major weakness of the current predictive model.

So we recommend that the staff be directed by your Board, as I think they reflected in their request, that they be directed as soon as possible to bring a harmonization recommendation." (PW)

Agency Response: See response to comment #20.

25. Comment: "Finally, we also support the previous statements about the need for fixing the certification fuel. Eight years ago, this Board approved the regulations that phased out MTBE from the fuel, and yet today we still see the bulk of the cars that are being sold in California are certified using an MTBE containing fuel." (JPU)

Agency Response: See response to comment #20.

26. Comment: "I'd also like to look to regarding E10 and cert fuel, I'd like to agree with Mr. Cackette. You know, as you know, ARB standards are the most stringent in the

world on vehicles. And we do it by mandating E10 as a cert fuel, it will effectively tighten the current emission standards. And again, I agree that we need to carefully evaluate the procedures." (DNP)

Agency Response: See response to comment #20.

***4. Exhaust Model***

27. Comment: We are concerned that the proposed model does not reflect the best available science. We disagree with staff's decision to exclude the bulk of the available data on the sulfur impact on emissions for the most recent vehicle technology class. This decision has the greatest impact on the proposed $NO_X$ model, greatly increasing the predicted sensitivity of $NO_X$ emissions to changes in sulfur content. The practical impact is that the $NO_X$ increase observed for E10 can be offset by decreasing sulfur to very low levels; however, this offset depends on the modeled $NO_X$ impact to truly represent what actually occurs in the vehicle fleet. We are concerned that the proposed model over-predicts the benefits of low sulfur fuels and that $NO_X$ increases will result in the real world. (JPU)

Agency Response: In the CaRFG3 Predictive Model, the emissions response of Tech 5 vehicles to sulfur was based on a limited data set. The modeled emissions response to changing sulfur concentrations for the Tech 5 vehicles was based on the two studies available at that time: "AAMA/AIAM Study on the Effects of Fuel Sulfur on Low Emission Vehicle Criteria Pollutants (1997)" and "CRC Sulfur/LEV Program (CRC E-42, 1997)". In the current update, two more sulfur studies have been added to the Predictive Model database: "Sulfur Oxygen Vehicle Emissions Test Program (AAM/AIAM, 2001)" and "The Effect of Fuel Sulfur on NH3 and Other Emissions from 2000-2001 Model Year Vehicles (CRC E-60, 2003)."

Staff believes these two later studies are much more relevant to both the actual California vehicle mix and in-use fuels and is, therefore, proposing to only use these two studies to estimate the average Tech 5 vehicle response to changes in fuel sulfur concentrations in 2015. Our rationale is based on several considerations. Staff believes that using all four datasets to calculate the Tech 5 portion of the Predictive Model would significantly over represent the LEV I and earlier vehicle emissions control technologies.

Staff has addressed the Tech 5 NOx-sulfur response in great detail in the Initial Statement of Reasons, pages 23-27.

28. Comment: In the ISOR, ARB presented its rationale for including data from two studies in the determination of the Tech 5 NOx-sulfur response while excluding data from two other studies. WSPA continues to disagree with staff's decision. WSPA is also very disappointed that our submissions to ARB on this subject (two workshop presentations, a statistical workgroup presentation, a private presentation to ARB, and private teleconference conversations with ARB) were not included in the staff report. (GG)

Agency Response: The information on the Tech 5 NOx-sulfur response presented by WSPA at the two workshops and the statistical workgroup were carefully studied and analyzed by ARB staff. Although WSPA pointed out interesting facts in the

omitted studies, ultimately ARB staff disagreed with their assessment on a technical basis. Please also see response to comment #27.

29. Comment: As WSPA has indicated in workshop presentations, there are several examples of exhaust model responses that are not the result of data used in developing the model, but rather an artifact of a quadratic function being extrapolated beyond the range of the data. In these cases, the model response should be held constant beyond the range of the data in order to avoid the inclusion of such inappropriate responses in the model. (GG)

Agency Response: Staff agrees that in earlier drafts of the Predictive Model that this was true. The latest version of the model, which was included in the 45-day notice package, was refined to account for those effects.

***5. Evaporative Model***

30. Comment: The "Procedures for Using the Predictive Model" (ISOR, Appendix A-2) provide the option to choose whether or not the evaporative and CO models are used. However, the impact of ethanol on permeation emissions is included only in the evaporative model. Therefore, making the evaporative model optional constitutes a serious loophole relative to ensuring that permeation emissions are offset within the model. This option should be removed.

However, it should be noted the above change will require other changes to make the Predictive Model compatible with the non-RVP control season. In the current regulations, the option to use the evaporative model exists only during the RVP control season. Therefore, the evaporative model was eliminated from the non-RVP control season by default. Making the evaporative model mandatory for the RVP control season will require specific language directing blenders to not use the evaporative model during the non-RVP control season.

Finally, it should be noted the spreadsheet version of the Predictive Model includes the evaporative model in both summer and winter calculations. It is therefore inconsistent with both the existing proposal and the changes recommended above. While WSPA recognizes that the spreadsheet is not an official part of the rulemaking package, we urge ARB to make it consistent with the regulatory package to avoid confusion among the various stakeholders who seek to evaluate the new model. (GG)

Agency Response: The "Procedures for Using the Predictive Model" has been updated such that the evaporative model is no longer optional during the RVP regulatory control period and is now required. The evaporative model also is now optional outside of the RVP regulatory control period. The Predictive Model spreadsheet was also updated to reflect those changes. This updated Predictive Model was released during the 15-day comment period for public review.

***6. Offsetting Emissions Associate with Higher Sulfur Levels***

31. Comment: BP disagrees with the Western States Petroleum Association (WSPA) support of ARB's proposed Section 2265.1 "Offsetting Emissions Associated with Higher Sulfur Levels". This amendment provides a new, additional, and likely

unneeded "flexibility" for batches of CARB gasoline that have too high of a sulfur content to certify due to some “unexpected problem".

We consider the added flexibility both “free” and “secret”, and recommend it be deleted for the following reasons:

- To our knowledge, the added flexibility was not originally requested by the oil industry, and
- It will allow the sale of gasoline that would otherwise be considered noncompliant, and
- It reduces the enforceability of the rules, and
- It does nothing to encourage fuel providers to make the necessary investment and operational changes to avoid the use of this flexibility – one reason why we consider it “free”, and
- It provides no opportunity for the public to be informed of the use of the provision – why we consider it a “secret”, and
- It will likely be "gamed" and misused since there is no way to determine whether the higher sulfur level was unexpected or not, and
- It will increase emissions of at least SO2 and secondary particulates upon its immediate use, and
- There is no limit on how high the sulfur is allowed to go, and
- It will penalize those that have or will make the necessary investments to prevent such “unexpected problems”. (DAS)

Agency Response: Regardless of who requested this provision, staff believes it is practical, reasonable, and necessary. At low sulfur levels, the compliance margin for refiners is small, and slight unexpected deviations in the refinery process could result in a non-compliant batch due to slightly elevated sulfur. Staff anticipates that it will be very difficult to blend a slightly higher than needed sulfur level batch to a compliant blend using the existing sulfur averaging provisions because it becomes increasingly more and more difficult to average out sulfur when the levels are very near the bottom of the range. Therefore, for a producer that experiences a problem with the sulfur content when blending a particular batch of gasoline, staff decided to add a compliance option that would permit that producer to use an averaging option that is based on emissions.

Without such a flexibility provision, such batches would likely need to be shipped out-of-state at significant expense and reduction in supplies of available product in California. Unlike most other fuel properties governed by the CaRFG3 rules, increases in sulfur levels in individual batches do not result in immediate emission increases in vehicles using the batch. Sulfur degrades catalyst performance, but the effect is reversible. Given this situation, staff believe it is reasonable to infrequently allow batches with slightly higher sulfur levels to be used, so long as the emission impacts of the higher sulfur batch are fully mitigated in the near future through subsequent batches. While one batch may have a slightly elevated level of sulfur, that increase would be fully offset by a subsequent batch. Thus, the net effect would be a combination of compliant blends, resulting in no net increase in SO2 and secondary particulates.

In order to maintain the enforceability of the regulations, staff has included significant notification requirements. These requirements will ensure that staff is apprised of who is blending fuels with elevated sulfur levels, how much is being blended, the impacts of the elevated sulfur level, and whether the elevated sulfur has been fully offset. In addition, since staff is notified of the date and time of the completion of physical transfer from the production facility or the import facility within 24 hours after the completion of the physical transfer, staff has the ability to check and track the batches for enforcement purposes.

This option is not expected to be used routinely. Any elevated sulfur in one batch must be fully offset in subsequent batch(es), and the net effect is no increase in sulfur. Therefore, public notice of the use of this option is not necessary.

Although it is feasible that the emissions offsetting provision could be "gamed", it is highly unlikely. While refiners could potentially make multiple non-compliant batches and have to have many different offsetting batches, staff believes that the recordkeeping and the constant changes in refinery production to offset high sulfur batches would be cost ineffective. Therefore, it would be more efficient for all refiners to be compliant without having to use the emissions offsetting provision.

While this option allows for elevated levels of sulfur in certain situations, in no event could any batch exceed the cap limit for sulfur. Thus, there is a limit to how high the sulfur is allowed to go.

This option does not penalize those companies who have made investments to prevent elevated levels of sulfur in gasoline because at such low sulfur levels, minor deviations in the refinery process could easily result in unacceptable sulfur levels. These minor deviations are unforseen and could arise even if investments toward facility modifications were made. As a result, this option is available to all refineries, regardless of whether they made any such investments.

32. Comment: "You've heard today that due to the model changes that the rule includes some new flexibility, a new 90-day averaging period for unexpected programs that come up in the refineries.

BP differs from the rest of the industry in that we don't think this flexibility is really needed. And more importantly, it diverges from policies that past Boards have taken when giving refineries additional flexibility by requiring them to pay some additional cost. And I'll get into that later. I might add that to our best knowledge the oil industry didn't originally request this flexibility, but it came from staff.

Currently, the rule does have a 90-day averaging period in it that refiners can take advantage of. It also has a variance provision in it that we can take advantage of for such situations. And they are both designed to deal with unexpected problems.

The important difference is that the current flexibility comes with a cost. In the case of a variance, you have to pay 15 cents a gallon. In the case of an averaging provision, the current one, you have to actually meet a lower set of specifications. It's a tighter specification for the fuels. This new flexibility that's being proposed doesn't contain any of that. There is no fee. There is no public reporting, no public hearing. And for the averaging, it doesn't require the refine to a lower set of limits."

"In the past, earlier Boards decided that before they gave refineries this flexibility they needed to have, charge them a cost. And especially for averaging, with averaging, it's harder to enforce an averaging standard. So you're less certain you're going to actually get the emission reductions that you would otherwise get if you didn't use that averaging. And so because of their emphasis on making sure they get those environmental qualities they require and the current averaging standard requires you to meet a lower emission limit. For sulfur, it's actually 25 percent lower. So previous Boards said we really want to make sure if we're going to give these people flexibility, we want to make sure to get the emission reductions.

So in summary, our solution would be that you delete this new flexibility. But if you think it's necessary, we think you should follow the practice of previous Boards and assign some cost to this new flexibility so that we'll ensure that the environmental benefits will be achieved." (DAS)

Agency Response: See response to comment #29. The Board has not always required refiners to pay a fee for additional flexibility. For example, the history of the gasoline regulations reveals that ARB allowed early compliance with the CaRFG3 standards before December 31, 2003 (California Code of Regulations, Title 13, section 2261(b)(3)), optional compliance with the averaging limits (Cal. Code Regs., tit. 13, section 2262.3(c)), phase-in of the MTBE prohibitions (Cal. Code Regs., tit. 13, section 2262.6(b)), alternative test methods (Cal. Code Regs., tit. 13, section 2263(c)), combination of notifications (Cal. Code Regs., tit. 13, section 2263.7), optional compliance with the PM alternative specifications (Cal. Code Regs., tit. 13, section 2265), optional compliance with test-certified alternative gasoline formulations (Cal. Code Regs., tit. 13, section 2266), exemptions for test programs (Cal. Code Regs., tit. 13, section 2267), optional standards for small refiners (Cal. Code Regs., tit. 13, section 2272), and various protocols without the requirement that the refiner pay a fee to ARB.

Much like the current averaging provision, this option requires that the refiner offset a batch of gasoline that does not meet CaRFG3 standards due to an unintentionally high sulfur content. In this case, the producer or importer would be permitted to offset any increased emissions by producing a series of subsequent batches that are cleaner than the Phase 3 CaRFG standards. Both the averaging provision and the sulfur offsetting provision result in no net detrimental effect to the environment. Hence, no public reporting or public hearing is required. However, the variance provision is substantially distinguishable from the sulfur offsetting provision. For the variance, any exceedance is not offset. There are or could be net detrimental environmental effects. There are fees, public notices and hearings, and public participation. With the sulfur offsetting option, the refiner must offset the effects of any elevated sulfur with subsequent batches. There are no net detrimental environmental effects, fees, public notices and hearings, and public participation.

While the current averaging provision might cause an additional enforceability risk, that risk is mitigated by imposing strict notification, reporting, and recordkeeping requirements. Likewise, any enforceability risk associated with the sulfur offsetting provision is mitigated by similar strict notification, reporting, and recordkeeping requirements.

33. Comment: If ARB believes that added flexibility is needed, ARB is encouraged to consider two alternative approaches that would not produce most of the above negative impacts. They are:

- Increase the current Averaging Limit for sulfur from its current 15 ppm to something closer to the 20 ppm Flat Limit and/or
- Reduce the variance fee for this specific situation from the current 15 cents per gallon (cpg).

Besides reblending the batch of gasoline, the existing rules already provide for dealing with "unexpected problems". One is the current averaging provisions that allow the fuel properties to be averaged over 90 days, but require the fuel producer to meet a stricter set of averaging fuel specifications. For example, the sulfur averaging limit is 15 ppm while the so-called Flat Limit is 20 ppm thereby requiring the producer to pay for the use of increased flexibility. The proposed additional flexibility in Section 2265.1 requires no such payment – it is "free".

The permeation changes to the predictive model will make it more difficult to use the existing averaging provisions, but not impossible. By reducing the "price" of using the current averaging provisions by increasing the sulfur limit for the averaging option, it will provide refiners greater flexibility, but not make it "free". Therefore, BP suggests ARB consider increasing the averaging limit above 15 ppm as a more effective alternative to providing additional flexibility in limited circumstances.

The second option currently allowed is a variance for unexpected problems that are caused by factors outside of the producer's control. With a variance the producer is charged a flat 15 cpg which is used to offset the increased emissions allowed under the variance. The current variance process can be completed quickly and includes a public notice and hearing. In comparison, the proposed added flexibility is given free with no public notice or hearing for unexpected problems that are much more under the producer's control than those situations covered by a variance (e.g. earthquake). To increase refiner's flexibility BP would suggest ARB consider initially reduce the variance fee for limited and specified situations. This would then ensure the added flexibility is not "free" and allows for public notice and comment. (DAS)

Agency Response: Pursuant to Health and Safety Code section 43013.1(b)(1), the ARB must ensure that CaRFG3 maintains or improves upon the emissions and air quality benefits achieved by CaRFG2. Increasing the sulfur Averaging Limit or allowing variances (without offsets) would be in direct violation of Health and Safety Code section 43013.1(b)(1). It would allow backsliding from the air quality benefits achieved by CaRFG2.

In terms of reducing the variance fee, ARB is committed to cleaner air for California. Staff believes that reducing the variance fee might encourage producers to produce non-compliant gasoline if the fee is lowered enough. This is not an option. ARB would like to see cleaner air through strict yet fair reformulated gasoline regulations. Staff feels that we have achieved this through this regulation. See also response to comment #30.

34. Comment: "We also encourage the Board to include T-50 as a trigger for what emissions averaging similar to the treatment that's currently being given for sulfur due to sensitivity for T-50 in an E10 type of environment." (JPU)

Agency Response: Staff will consider this at a future rulemaking. This issue was not within the scope of the hearing notice to enable action on this item.

***7. Permeation***

35. Comment: With regard to permeation emissions, it is central to recognize that such HC emissions are exponentially– not just linearly - related to temperature. The maximum temperature assumed in the PM methodology is therefore a defining parameter and effectively establishes the degree of stringency required by the PM model. ARB staff proposes a temperature profile with a peak temperature of only 87° F for the Los Angeles County portion of the ozo ne planning inventory used in the model. This temperature assumption is used despite the fact that last year the South Coast Air Basin experienced the highest number of consecutive days above 100 degrees on record. While we appreciate that the staff had limited time and resources to make adjustments on a statewide basis to reflect worse case higher temperature conditions, it is clear that an undercount of HC permeation emissions exists for Los Angeles County due to the disproportionate effect of the cooler coastal sub-region compared to the San Fernando and San Gabriel Valleys.

Although the staff note that the average temperature used in the California 8-hour ozone profile is 3 degrees higher than the default inventory, this does not fully account for the full permeation impacts from the use of Phase 3 gasoline. Maximum temperature days do not typically achieve the highest ozone levels. However, high temperature conditions in the high 90's to over 100 also directly impact ozone concentrations before the Basin's inversion layer is broken by especially high temperatures, especially in the more urbanized portion of the Basin. ARB's permeation emission rate assumptions reflect temperature profiles which occur on the highest ozone day.

As ARB staff has acknowledged, this is certainly not the highest emission rate scenario. As a matter of public health policy, we believe that ARB is obligated to address the full range of possible adverse ozone air quality effects and not solely the peak ozone meteorological day. A more robust temperature assumption is crucial in order that the PM adequately meet the full range of real world scenarios anticipated under SB 989. Temperatures significantly above 87° F should therefore be modeled to ensure that the maximum emissions condition is fully mitigated under the PM, rather than just the peak ozone modeling scenario. To ensure that permeation emissions are fully accounted for in the PM inventory, the AQMD staff therefore recommends that ARB adjust the Los Angeles County portion of the statewide inventory used in the PM model by raising its maximum temperature to at least 95 degrees. (BRW)

Agency Response: The South Coast air basin temperature profile covers not only the inland areas, but also the coastal areas. This temperature reflects the average temperature in all those areas. The EMFAC2007 model is designed to show a temperature profile across the entire South Coast Air Basin of which Los Angeles County is one region. While on some hotter days the peak temperature of 87

degrees used in the model might be low compared to the actual temperature in Los Angeles County, it will most likely be higher than the actual temperature in the coastal regions.

36. Comment: "I just want to say quickly we know very clearly that permeation is an exponential function relative to temperature, not linear; that the staff have proposed a maximum temperature of 87 degrees for the L.A. County portion. If we applied the temperatures they assumed for Fresno, for example, today, there would be a significant shortfall in the inventory. Similarly, in Los Angeles, last year, we had the highest number of consecutive days above 100 degrees. 87 degrees is not a realistic appropriate temperature.

We appreciate the hard work the staff have done and understand some of the complexities of the modeling inventory. But we do seriously recommend that you consider – in fact, we recommend that you adjust the temperature exogenously for L.A. County to at least 95 degrees to address that fundamental under-count of permeation emissions." (PW)

Agency Response: See response to comment #35.

37. Comment: The proposed equations for evaporative benzene emissions do not include the impact of permeation on benzene emissions. The equations are composed of an estimate of the total hydrocarbon evaporative emissions for each process in mg/mi, multiplied by an estimate of benzene emissions as a fraction of the total hydrocarbons. Both of these components appear to be direct carry-overs from the previous Predictive Model. In the absence of new data, this is appropriate for the component that deals with the benzene fraction. However, the component that deals with g/mi hydrocarbon emissions has not been updated to include the impact of ethanol on permeation and is thus inconsistent with the evaporative models used elsewhere. WSPA recommends this inconsistency be removed to ensure that the impact of permeation on benzene emissions is characterized accurately. (GG)

Agency Response: The final version of the 2007 Predictive Model includes the impact of permeation on benzene emissions. The equations used to estimate evaporative benzene emissions are consistent with the rest of the hydrocarbon evaporative models elsewhere. Staff has also updated the benzene fraction of the total hydrocarbon emissions. This updated Predictive Model was released during the 15-day comment period for public review.

### *8. Inventory Year*

38. Comment: A key policy decision embodied in the proposed update to the predictive model is the choice of inventory year from which to calculate the mitigation obligations needed to meet the SB 989 criteria. The SCAQMD staff strongly believes that the 2010 inventory year is the appropriate baseline from which to implement requirements, rather than the proposed 2015 Inventory year. First, it must be noted that at least five years of unmitigated HC emission increases have occurred already. By moving the inventory baseline year back to 2010, there would be more underlying equity, as the majority of the unmitigated emissions will occur during the current decade. Second, since the Alternative Emissions Reduction Plan (AERP) goes into effect in 2010, it is logical to establish the same year as the Predictive Model

baseline year. Using the 2015 inventory for this portion of the PM is clearly inconsistent with the 2010 start date for the AERP. Third, full gasoline compliance commences in 2012. The closest inventory year is therefore 2010, not 2015. Fourth, the start date for the implementation of the Low Carbon Fuel Standard (LCFS) is 2010. Aligning the Predictive Model inventory with the LCFS is therefore the most logical and direct policy. Ethanol blends of 10% are likely to be a key means of compliance with the LCFS, especially in the early years. Aligning the inventory year to the LCFS is especially appropriate since the LCFS standard is the major reason that E10 blends will be produced and such higher levels of ethanol blending are the immediate cause of the permeation issues at issue in this proceeding.

Lastly, the 2010 inventory is a much closer approximation to today's emissions. The 2015 inventory is inherently lower, and in effect provides a less stringent level of control. Given the air pollution public health emergency status of the South Coast Air Basin, ARB should take all feasible steps to expedite emission reductions, rather than delay them. From our perspective, the choice of the inventory date is a straight forward policy judgment which should be heavily weighted toward the near-term public health impacts of ozone exposure. SB 989 did not envision that there would be a 13 year lag between the phase out of MTBE (starting in 2002) and the full mitigation of ethanol-induced permeation emissions as implied by the use of a 2015 inventory year. For all of these reasons, the SCAQMD staff strongly recommends the use of the 2010 inventory rather than the current staff proposal of 2015. (BRW)

Agency Response: The proposed amendments will not be fully implemented until 2012. The very earliest the predictive model would be updated again would be 2015. Even if the Predictive Model is updated at this earlier time frame, it would most likely take several years for full implementation to occur. The vehicle fleet would be represented by a 2010 inventory all the way up until 2019. That is a nine year difference between the inventory and the actual on-road fleet. There would be a great discrepancy between the estimated emissions and the actual on-road emissions. The 2015 inventory provides a better emissions estimate throughout the entire time range, as it is a central year. Whereas, the 2010 estimate more closely estimates the earlier years more accurately and the latter years very poorly.

39. Comment: "We would strongly recommend that you use a 2010 inventory and not 2015. There are several reasons for that. The last five years, we have seen unmitigated – fully unmitigated hydrocarbon permeation emissions. So we've already accrued that disbenefit." (PW)

"The start date of the low carbon fuel standard as you know is in 2010, not 2015. The 2010 inventory is much more closely approximate to the current inventory. So given the public health emergency status of the South Coast air basin – and I use that phrase very carefully, because our Board just several weeks ago adopted formally an emergency petition to the Governor and to the President to declare the South Coast air basin an air pollution emergency.

For that reason, we think a strict inventory year is a very important opportunity to expedite emission controls. When SB 989 was adopted, there was not any expectation at that time there be in effect a 13-year lag implied by this 2015 inventory portion of this question." (PW)

Agency Response: See response to comment #38.

***9. Ozone Reactivity***

40. Comment: Although the ARB's latest proposed PM ozone reactivity adjustments reflect the best science available at this time, it would be very constructive for ARB to conduct additional air quality modeling and atmospheric sampling to update the state's MIR factors for ethanol and other species where appropriate. This is especially important in light of the likely transition from E5.7 to E10 blends driven by the intersection of the updated Predictive Model and the upcoming Low Carbon Fuel Standard. An updated MIR assessment is also important to help address concerns raised by certain researchers about the potential for ethanol emissions to convert to acetaldehyde in the atmosphere over multiple day ozone episodes. Because the Carter factors essentially are derived from a single day EKMA box model assessment, there may be multi-day carryover effects associated with added ethanol reactivity which are under-accounted for in the current version of the PM analysis. (BRW)

Agency Response: ARB staff determined that the current Board-approved MIR factors were more than adequate for this rulemaking and determined that additional air quality modeling and atmospheric sampling were not necessary at his time. ARB staff works closely with the Reactivity Science Advisory Committee on updating California's MIR factors and will consider action on this item during the next update of the MIR factors.

***10. Increase Flexibility of Biofuel Use***

41. Comment: On April 25, 2006, Governor Schwarzenegger provided guidance to ARB staff to maximize flexibility in the CaRFG3 regulation to utilize biofuels. The order (Executive Order S-06-06) stated, "the California Air Resources Board is urged to consider as part of its rulemaking the most flexible possible use of biofuels through its Rulemaking to Update the Predictive Model and Specification for Reformulated Gasoline, while preserving the full environmental benefits of California's Reformulated Gasoline Programs." Several months later, Governor Schwarzenegger announced a plan to reduce California petroleum dependence, during which he directly referenced the intent of S-06-06 to "maintain current [biofuel] levels while enabling production and consumption growth." Governor Schwarzenegger's Executive Order is not mentioned in the ISOR as an organizing principle for conducting the rulemaking. The ISOR does not identify measures it considered in the context of S-06-06. In addition, getting to 10 percent ethanol blends (E10) is a widely recognized first step to meeting the Governor's low carbon fuel standard (LCFS) requirements. The ability for the state to get to E10 blends depends, first and foremost, on the CaRFG3 regulation, and more specifically, on the Predictive Model. Yet this state policy goal is not identified in the ISOR as a driver for the amendments recommended by the state board.

REAP believes that ARB staff could go farther with regard to meeting the goals set forth by Governor Schwarzenegger.

During the rulemaking process, there was very little (if any) discussion about flexibility in the context of S-06-06. For example, we are not aware of any serious

discussions about a minimum oxygen content requirement that would have maintained current levels of ethanol in gasoline (~6 percent). Also, there was no sub-committee group gathered to consider how to maximize flexibility in the regulation while protecting air quality. The California gasoline regulation is often referred to as one that facilitates market flexibility, with the implication being that ARB prefers not to require specific fuel recipes. However, beneath the exterior the regulation does enforce a framework of fuel controls for several fuel components such as sulfur, distillation temperature, aromatics, benzene, etc. While California clearly enforces a fuel regulation that is totally different and technically more advanced than other states, it is useful to note that Minnesota jumpstarted its fuel ethanol industry by enforcing a minimum oxygen requirement. California may prefer to diversify the fuels market via a carbon metric (re: the proposed LCFS). But at this point the LCFS is a concept, and could take years to develop and enforce. (BC)

REAP recommends delaying final implementation until ARB staff considers a wider set of strategies to increase flexibility in the regulation. A "flexibility working group" could be pulled together in a relatively short time frame, as there are experts already working on these issues. (BC)

Agency Response: One of the principal purposes of the 2007 CaRFG3 amendments was to fulfill the requirements of SB 989, i.e., to ensure the Phase 3 CaRFG regulations preserve the emissions and air quality benefits of the Phase 2 CaRFG program. To this end, emissions associated with permeation must be fully mitigated and an AERP is an alternative option to accomplish this. Therefore, Executive Order S-06-06 is not mentioned in the Staff Report and provisions to accomplish the goals of S-06-06 are not included in the 2007 CaRFG3 amendments. Executive Order S-06-06 is not within the scope of this rulemaking.

Staff incorporated the maximum flexibility possible to include the widest range of ethanol use in CaRFG possible. Staff also added the alternative emissions reduction plan and the emissions averaging provisions to provide producers additional flexibility to blend higher levels of ethanol in CaRFG. In addition to the amendments, staff suggested additional modifications to the original proposal in response to comments received since the Staff Report was published. These modifications were released for a 15 day public comment period. The most significant modification was adding flexibility for early blending of higher levels of ethanol before 2010. Two early ethanol blending options were provided. The first option is called an ethanol emissions reduction plan that would have refiners mitigate emissions associated with increased ethanol use through alternative measures. This option was generally patterned after the AERP. The second option allows a refiner to add more ethanol into California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB) than the common carrier pipeline specifications (5.7% ethanol) allow. See also response to comment #10.

***11. Dual Model Approach***

42. Comment: Early in the public workshop process, RFA presented a Dual Model approach to more accurately represent the response of the vehicle fleet to fuel properties. However, the staff seemed to reject the concept due to a misunderstanding of the response of higher emitters to changes in fuel properties

compared to low emitters, and a narrow focus on the effects of ethanol on NOx emissions.

RFA feels that the Dual Model proposal has not been given adequate consideration, and has prepared the attached report entitled "The Case for a Dual Tech 4 Model Within the California Predictive Model" that fully describes the Dual Model and why the authors believe that such a model would be more technically correct for all vehicles, and would simultaneously provide greater flexibility for the oil industry to meet the Predictive Model requirements. (GH)

Agency Response: During the workshop process, several stakeholders requested that the staff consider dividing the Tech 4 dataset into a higher and lower emitter group to be modeled separately, and presented the results of an analysis of dividing the datasets. The basic concept was that a Tech 4 NOx model would provide an overall higher statistical fit if the dataset were divided into two distinct vehicle groups. The cut point would be at 0.6 times the NOx emissions standard and each portion modeled separately. Proponents believe that this approach produces a much lower response of NOx to oxygen content and it would require less adjustment to other fuel properties to be able to increase the amount of ethanol into CARFG.

Staff discussed this issue with the ARB's vehicle experts and consulted representatives of the Alliance of Automobile Manufacturers and the Association of International Automobile Manufacturers. These discussions focused on determining if there was some physical design factor in vehicle emission control systems that change how they respond to fuel property changes at the levels indicated by the stakeholder analysis. Staff learned that while many manufacturers do calibrate their emission control systems to emit at levels below the actual standard, there is no physical response differences between vehicles emitting just below 0.6 times the standard and those emitting just above 0.6 times the standard. This was important because the alternative statistical method did not produce consistent results at other cut points. Lacking a technical reason for using the suggested 0.6, staff was concerned that the result was more the product of a statistical anomaly than a meaningful point that defines vehicle emission performance. Staff also is concerned that the rational for the cutoff point of 0.6, applied specifically to NOx to produce an optimal statistical model, is not applicable to hydrocarbons and CO. The cutoff points that maximize the likelihood function for THC and CO are 1.0 and 1.6 times their tailpipe standard, respectively.

Staff also consulted with Dr. David Rocke of the University of California, Davis to provide comments and guidance regarding the validity of the Tech 4 NOx modeling approach proposed by the stakeholders. He concurred with staff that while the alternative approach might provide some improvement in statistical performance, other factors should be considered. In this case, it is essential that emissions modeling be consistent with sound engineering judgment and good science and have a sound basis relative to vehicle control system design and combustion chemistry. Relying on statistics as the sole guide to model construction could lead to misleading results. As a result, staff believes the suggested alternative is not appropriate and the approach taken to model Tech 4 vehicles in the previous Predictive Model modeling efforts should be maintained. This current approach was subject to independent scientific peer reviewed by appointees from the University of

California in 1994 and 1999 and found to be reasonable and scientifically supportable.

43. Comment: Early in the public workshop process, REAP took interest in the Dual Model approach recommended then by Dr. Jonathan Cohen from ICF International, and now by a wider set of experts (recently resubmitted by the Renewable Fuels Association as "The Case for a Dual Tech 4 Model Within the California Predictive Model"). The Dual Model approach was first discussed with ARB as far back as 1999. This approach would increase regulatory flexibility for refiners to utilize E10 while protecting air quality.

During the course of more than a dozen public workshops, ARB staff made a commitment to provide a formal, technical and written response to the Cohen report in advance of the release of the ISOR, so that the technical arguments could be reviewed and discussed in a workshop setting. This commitment was made in part because the Dual Model proposal appeared to more accurately represent the response of the vehicle fleet to fuel property changes on a statistical basis. ARB did not furnish this response (significantly) prior to the ISOR, and the response it did submit (prepared by Dr. David M. Rocke of the University of California, Davis) includes very little technical analysis (the entire letter is ~ 2 pages). The critical question was whether there is an engineering justification for splitting the Model (a vehicle question), yet a vehicle expert was not retained by the state to look at the issue (an engineering justification for the Dual Model was submitted to ARB by Gary Herwick of Transportation Fuels Consulting, Inc.).

Given that stakeholders have not been given a chance to review ARB's technical position with regard to the issues detailed in Dr. Rocke's response, REAP recommends delaying final implementation until ARB staff provides a more thorough analysis of the work submitted by ICF International, Gary Herwick and Tom Darlington (AIR, Inc.), which could be conducted as part of the "flexibility working group" referenced above. (BC)

Agency Response: Staff not only consulted with Dr. David Rocke of the University of California, Davis to provide comments and guidance regarding the validity of the Tech 4 NOx modeling approach proposed by the stakeholders, but also consulted with representatives of the Alliance of Automobile Manufacturers and the Association of International Automobile Manufacturers in regards to this approach. ARB staff believes it has provided enough detail and analysis to provide adequate grounds for rejection the dual model approach proposal. See also response to comment #42.

44. Comment: "The dual model proposed by RFA models Tech 4 vehicles – that is, 1986 to 1995 higher emitters – differently than normal vehicles that are complying with the applicable standards." (GH)

"What we learned from the analysis that is the dual model is not only a more accurate model that preserves the emission benefits of the California reformulated gasoline program, but it also would provide increased refining flexibility and help enable 10 percent ethanol. We believe the increase in refining flexibility provided by the dual model would result in increased fuel supply by facilitating the blending of 10 percent ethanol sooner. The staff proposal would make it more difficult to blend 10 percent ethanol and might even keep it at either 5.7 percent or at 7.7 percent." (GH)

"Several important changes have been proposed such as a lower sulfur cap, revising the sulfur NOx, curb, and the dual model. All of these deserve further consideration.

We would recommend allowing additional time to properly consider these changes, perhaps an extra couple or three months, another workshop, before the Board gets the opportunity to approve. Making the model as accurate as possible is in everyone's best interest to preserve the benefits of the RFG program." (GH)

Agency Response: Staff did a complete analysis of the dual model approach and consulted with Dr. David Rocke of the University of California, Davis to provide comments and guidance regarding the validity of the approach. Staff did not feel any more time was necessary to analyze the dual model approach. See also responses to comments #42 and #43.

***12. Off Road Emissions***

45. Comment: Currently, ARB's obligation to comply with Section 43013.1(b)(1) remains open because ARB has determined that CaRFG3 emissions from on and off-road sources exceed those from CaRFG2. Extensive studies have established that evaporative permeation emissions increase significantly with CaRFG3 when used in on-road vehicles. Off-road vehicles such as pleasure craft and lawnmowers also result in increased emissions when using CaRFG3. According to initial estimates by ARB, off-road vehicles will emit over 10 tons per day of evaporative reactive organic gases (ROG) in the South Coast Air Basin in 2010, surpassing on-road evaporative emissions in that year. ARB's staff report estimates that off-road evaporative emissions could be as high as 39 tons per day statewide and may only be partially offset by reductions in exhaust hydrocarbon emissions with the addition of more ethanol. Until all on-road and off-road emissions and air quality benefits of CaRFG2 are achieved, ARB's obligations specified in Section 43013.1(b)(1) remain unfulfilled. Again, we urge you to resist any attempts by fuel providers to shift their current responsibilities under the law to public funds or programs.

We urge staff to move quickly to collect necessary data and propose further amendments to CaRFG3 and/or initiate other ARB regulations to fully mitigate the impacts of ethanol on off-road sources. ARB staff should return to the Board with a proposal for mitigation actions no later than 18 months from the June 14, 2007 board hearing. (BH, JS, LT, PM)

Agency Response: To improve the data and enable the design of an effective off-road mitigation strategy, staff is developing an emissions test program to provide enough information to reasonably quantify the impacts of ethanol on the emissions from off-road sources. This will allow a mitigation program, if appropriate, to be developed. Different off-road categories likely have different ethanol permeation rates. Staff is proposing to significantly expand the existing database of evaporative and exhaust emissions data for the off-road equipment. Impacts on permeation due to ethanol blending, engine exhaust emissions, changes due to increased oxygenates, and benefits of catalysts on reducing engine emissions will be studied.

The proposed program will be conducted in two phases. The first phase will be conducted at a Southwest Research Institute with a report made available within a

year. The second phase will be conducted in-house by ARB staff and is expected to be completed in a longer time frame (2-3 years). This project will expand the number and types of engines being tested.

The suggested 18 month time period is very ambitious. Staff feels that such an ambitious time frame could impact the quality of the research necessary to do a complete and thorough investigation into off-road emissions. While staff agrees that it is important to quantify and mitigate off-road emissions as soon as possible, we also believe that it is important to take the time to ensure that the test program is thorough.

***13. Alternative Emissions Reduction Program***

46. Comment: We urge you to insure that the AERP is a temporary measure that is narrowly prescribed to only apply in limited situations and not a general compliance method. We support ARB's recommendation that the proposed AERP sunset on December 31, 2011. The AERP should provide refiners only temporary relief from meeting the full fuel formulation requirements of the proposed Predictive Model while refinery modifications are made.

We agree that emission reductions sought under the AERP must come from sources related to the combustion of gasoline. The reductions should be quantifiable, verifiable and in excess of reductions created from different sources, required under other programs or part of on-going business practices. Furthermore, the emission reductions should occur in the same region in which the producer would normally distribute fuel. Banking of emission reductions under the AERP should be prohibited. (BH, JS, LT, PM)

Agency Response: The AERP provides producers with a temporary option that allows them to obtain emission reductions from other sources while they make refinery modifications to meet the full implementation date. The AERP will be required to be quantifiable and verifiable. The AERP option was designed to ensure that emission reductions occur in the same region in which the producer would normally distribute the fuel. Banking of emission reductions under the AERP is not allowed.

47. Comment: If ARB wants to mitigate the effects of permeation by reducing other sources of emissions, it should be the subject of a separate program and rulemaking, not part of the RFG regulations. The obligation to address ethanol permeation should be shared by not only our industry but the ethanol production industry and the automotive industry, so perhaps all parties could engage in the development of a program to reduce permeation emissions. WSPA is willing to work with ARB staff to define such a separate alternative program. (GG)

Agency Response: The mitigation of permeation by reducing other sources of emissions is a flexibility option that was incorporated into the regulation, i.e., as part of the AERP. As the AERP is an alternative to a fully compliant fuel formulation, inclusion in the CaRFG3 regulations is appropriate. The flexibility option is a temporary option that sunsets at the end of 2011 and is not intended to be a permanent part of the CaRFG3 regulations. Regulations to reduce other sources' emissions not associated with the fuel formulation have been and will continue to be

handled separately. However, where the AERP is integrally tied to the fuel formulation as it is here, it is proper to include them in the CaRFG3 regulations.

The automotive industry is held to strict standards to reduce evaporative emissions. ARB staff will be reviewing these standards and pushing forward to reduce evaporative emissions from vehicles even further. The reduction of evaporative emissions from vehicles is wholly dependent upon the vehicle fleet turnover. The newer cars are equipped to reduce evaporative emissions better than older cars. Forcing the automotive industry to retrofit the older cars would be cost ineffective.

Producers have the option of putting from zero to ten percent by volume oxygen in gasoline. Producers can control the amount of emissions from their blends by adjusting their fuel formulations. Producers have the option of incorporating or not incorporating ethanol into their gasoline during this transition period. A fully compliant non-oxygenated gasoline blend is a viable option for producers.

As part of the 15-day changes, the Board directed staff to allow third party AERPs. Under the third party AERP provisions, the ethanol production industry and the automotive industry can enter into an AERP allowing fuel producers to offset their emissions associated with permeation.

48. Comment: "Secondly, regarding the AERP. The AERP in our opinion is very punitive, and it's a penalty. And when you look at the numbers associated with that, it's quite striking.

I did a rough back-of-the-envelope calculation based on the testimony of one of the CARB staff members where he mentioned that if you consider 10 percent of refinery production in California, that would amount to under a car scrapping scheme of 29,000 cars and a cost of $22 million. For our refineries, if we were to go that route which Benicia is 25 percent of the market, that would amount to 72,500 cars that would need to be scrapped a at cost of $55 million. And for our Wilmington refinery, 14 percent of the market, that would amount to about 40,600 cars at a cost of $31 million." (DWS)

"In conclusion, I would just request respectfully that the Board not approve the proposal before you today, that you would send it back to staff to review the issues associated with length needed in order to comply, and to eliminate the AERP and to work with a more flexible approach as mentioned by WSPA and other commentors. (DWS)

Agency Response: See responses to comments #1 and 2. The AERP is a flexibility option incorporated as part of the amendments to the CaRFG3 regulations. The AERP was designed to provide producers an alternative way to offset emissions from permeation while refinery modifications are being made to allow the production of fully compliant fuel formulations. Producers have the option of not using it. ARB staff believe in providing producers as much flexibility as possible and removing the AERP would reduce flexibility.

49. Comment: "WSPA also requests that the Board direct staff to delete the alternative emission reductions plan and instead include the potential for identifying alternative funding mechanisms." (AMH)

Agency Response: See response to comment #48.

50. Comment: "Second, we recommend the AERP which is designed in our opinion as really a penalty for companies that can't comply with the two-year implementation date. That it's not really a fair mechanism and that it be replaced with language that would allow for the development of an alternative mechanism for achieving these emission reductions. And we recommend that because we are all involved in what we think are very productive discussions in the Legislature on this topic. And we're hopeful that will be a better mechanism for us to utilize offsetting the ethanol permeation." (CR)

Agency Response: See response to comment #48.

***14. Refinery Modeling Work***

51. Comment: "And then lastly, as we've just seen some of the preliminary findings from what we think is very important work the CEC has done on refining, modeling, and industry impact studies that we know that you will be considering this as an important part of the rulemaking when we get the full report. Because as you know, we've just seen these preliminary results. But this CEC work has been traditionally with this Board has played a critical role in making sure that you analyze the real impacts to supply, fungibility, and cost from these types of reformulations, and certainly this regulatory proposal. So again, we think you should continue to carefully consider that in this package." (CR)

Agency Response: At the hearing, Math Pro, CEC's refinery modeling consultant, presented its refinery modeling results, and they were consistent with staff's cost and implementation estimates. In general, Math Pro found that: Gasoline will shift from 6 percent ethanol by volume to 10 percent ethanol by volume; Refiners will need to make modifications to their refineries to meet requirements of amendments; Modifications will take approximately 45 to 59 months to complete; and cost to consumers and businesses will be about 4.2 to 6.5 cents per gallon or $716 million to $1.1 billion per year.

Many of these same results were determined by staff through individual meetings with refiners and other stakeholders. Staff presented many of the determinations from these individual meetings to the Board during the hearing. In general staff found that: Gasoline will shift from 6 percent ethanol by volume to 10 percent ethanol by volume; Refiners will need to make modifications to their refineries to meet requirements of amendments; Refinery modifications will take up to four years to complete (48 months); and cost to consumers will be about 4.8 to 5.4 cents per gallon (production cost + fuel economy penalty cost) or approximately $716 million to $864 million.

In general, Math Pro's refinery modeling conclusions were in line with staff's conclusions about the impacts of the amendments on economics, supply, and timing. Staff added an additional twelve month extension to the AERP option if refiners needed additional time to complete their modifications. This would allow up to 60 months for refiners to complete their refinery modifications, which is in line with the upper range of Math Pro's implementation estimate.

52. Comment: ARB has allowed the statutory length of 45 days for review and comment on the staff report and proposed regulations. Unfortunately, other pertinent documents will not receive the same length of time for review. The CEC refinery modeling report is an important component of the regulatory decision making process and has not been published at the time of submission of these comments. In addition, certain expert reports have not been made available for review and the required multimedia assessment has not been carried out. While we have reviewed early versions of the Predictive Model, the final version has not yet been issued. WSPA urges ARB to allow time for adequate review of all components of the regulations. (GG)

Agency Response: Staff determined supply, economic effects, and implementation timing from meetings with stakeholders. This regulation was not determined by the CEC modeling report. However, the results presented by CEC and Math Pro were not significantly different from what staff presented to the Board. The CEC modeling report validated the findings staff gleaned from meetings with stakeholders about the effects of the amendments. See also response to comment #51.

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.

A multi-media evaluation was completed in January 2000 for California reformulated gasoline containing up to 10 percent ethanol. The 2007 amendments to the CaRFG3 regulations allow ethanol in gasoline up to 10 percent. ARB staff determined that the proposed amendments do not substantially change specifications of CaRFG3 gasoline and will not require a gasoline ingredient to be added or removed beyond what is allowed by the existing regulations or is currently already used to produce gasoline for sale in California. Therefore, staff believes that the proposed amendments to the CaRFG3 regulations are not subject to the requirement for a multimedia evaluation.

The Predictive Model has been an iterative process and stakeholders have been a vital part of that process, as staff has been working very intimately with stakeholders

on the model. The final Predictive Model was released with the 15 day package for review.

53. Comment: "Finally, we request that the Board take into consideration CEC's modeling of refinery costs and supply. The Commission and Math Pro have provided some initial results this week, and they have not yet received peer review. However, we do see the results support WSPA's position for additional implementation time. (AMH)

Agency Response: See response to comment #51.

54. Comment: "I just want to say that ethanol as renewable fuel is important to America. It is a national security issue. It is a problem not being able to be a net exporter of refined fuels out of California like we once were. Now we are net importer. No solution is perfect.

I would argue that refineries – we are building the first refineries, new refineries built in California in a generation, I would argue not because the oil companies do not have an interest, but it is easier to build some of the ones that we build than some of the ones they have to build. I will not debate their time frames. But I will say this. That signals sent today are important in order to keep the flow of renewable fuels coming. This is not going to change. Oil went to 67-plus-dollars a barrel today. Gasoline is up again. We have the opportunity to add five percent by volume to the fuels in California.

And we have gone through summer after summer where the refinery capacity has been eliminated or reduced by one occurrence or another. Many out of the total control of refineries. So it is incumbent on us, and having been a former policy maker, having sat where you sit, it's incumbent of us to not let, you know, the perfect become the enemy of the good.

I would argue that in this case, we have an alternative that will provide some choices, some options, and some guidance, along with, of course, the guidance that the Governor has given us which was not really an issue actually years ago which is the low carbon fuel standard and the greenhouse gas reduction. It has become an urgency. It has set the agenda beyond what normally historically CARB has had to look at. I understand that adds complexity.

I would argue this adds a solution. I realize maybe not all the time frames may line up exactly. But as I say, it's been my experience in public life they usually don't line up totally exactly all the time.

But we are supportive, our company. We want to work with the Air Board to try to resolve what other outstanding issues there are. And we want to move forward, because the signals sent today will be important and the volume will increase.

I do not believe there will be either distribution issues. Those arguments were made a few years ago that did not materialize as far as delivery. And we are currently investing large quantities of dollars to build refineries in California, because this is where the business is. And this is where we believe the future is for renewable fuels in this country." (BJ)

Agency Response: ARB staff looks forward to working with Pacific Ethanol on these issues.

55. Comment: "I have to stick my oar into this because CIAQC, Construction Industry Air Quality Coalition, and the mobile crane operators group here in California are both actually quite concerned about our ability to meet the demands for refinery construction. Cranes are integral to the refining construction process.

And you have two rules now that affect us. Once is the portable engine rules which will be prohibiting Tier 0 engine operation effective January 1st, I believe, 2010. And the second, of course, is the off-road diesel regulation that is your consideration.

We've had conversations with Mr. Cross and his staff regarding the crane industry, and we, I think, are having some more this week; is that correct? Well, that's what I was told. So hopefully we'll be able to move forward and help the crane industry, because they're absolutely critical to being able to do the work at the refinery. Every single refinery project requires mass amount of cranes.

We are doing additional research on the topic of environmental construction. The construction industry is part of the solution to may of the problems that you all are weighing. And we just want to make you aware this is going to be a problem for our industry if we can't get some relief in this area.

And then, secondly, we want to thank you for giving us some more business from the refiners. And we'll do our very best to make them happy.

You guys need to know about these other rules, because they are really seriously going to impact the construction industry." (BD)

Agency Response: ARB staff encourages you to continue to participate in rulemakings because stakeholder feedback is very important to us.

56. Comment: "Now I'll talk about those refinery modifications. We believe that because the ethanol content will increase, there will be additional NOx emissions that would have to be offset by decreasing sulfur.

We believe refiners will have to target certain streams in their refineries. As this graphic illustrates, on the bottom scale you see sulfur content of the typical gasoline used to make gasoline. And most of them are under six parts per million sulfur already. So they are very low in sulfur. What they are going to be targeting are these last three columns that are associated with one of the major gas producing processing units of fluidized catalytic cracking. We believe that's where the refiners will be spending upwards of a billion dollars to make modifications to achieve lower sulfur levels." (GS)

Agency Response: Staff has made a similar determination through individual stakeholder meetings.

57. Comment: "Our main findings are we agree with the Air Resources Board that we believe the ethanol content in gasoline as a result of these proposed modifications will increase from E6 to 10.

We believe there will be sufficient ethanol capacity in the United States and in California to meet this incremental demand for ethanol in this state. And we're looking at an additional 750 million gallons of ethanol on top of the 950 million gallons we currently use.

The cost to consumers is in that range consistent with the Air Resources Board staff proposal you just heard today.

And to illustrate that graphically, we're pointing out the lower two pieces are the lowest pieces, the amount of the increased refinery production cost estimate consistent with what the Board staff has concluded, and the very small component of modifications in the distribution infrastructure to be able to receive additional amounts of ethanol at more than 50 distribution terminals.

And the final component of which you've asked several questions is the change in the energy density of the resulted fuel and the increased amount of gallons that consumers will purchase to travel the same distance. We've just represented that in terms of cents per gallon, even though that wouldn't change the price of fuel, to illustrate it is a larger component of the total cost to the end user, the consumers and businesses." (GS)

Agency Response: ARB staff agrees with these comments with the CEC.

### *15. Comments by Expert Reviewers*

58. Comment: It should be noted that there was no mention of ARB's decision to exclude data from the Tech 5 model development (see item A in this section) included in the expert reviewers' comments. ARB staff apparently failed to ask the reviewers for comments on this topic, despite WSPA's objections to staff's decision and the major impact the resulting model will have on the direction of gasoline production and vehicle emissions in California. Staff should ask for independent review of their decision immediately. (GG)

Agency Response: Staff's analysis was provided in the staff report including David Rocke's work. Reviewers were asked to review staff's analysis as well as the independent analysis provided by David Rocke. Expert reviewers were silent on this subject.

### *16. Economic Evaluations*

59. Comment: In the Initial Statement of Reasons, ARB discusses economic evaluations and provides estimates on the capital investment required to meet the new regulations (200-400 $M or 0.3 to 0.8 cpg) and the expected increase in cost of gasoline to the end users (3-6 cpg). These estimates provide too little detail to enable WSPA or other commenter's to evaluate their basis or accuracy and deprive WSPA and other commenter's of the ability to comment adequately at the current time. For instance, ARB states that the majority of the capital expenditures will go

toward removal of sulfur from gasoline. If, as ARB also predicts, ethanol use increases by many millions of gallons per year across the state, it is reasonable to expect that substantial additional capital expenditures will be needed in the blending, distribution and storage systems statewide. Given ARB's lack of any supporting analysis, we do not and cannot know whether ARB considered these costs, as it is obligated to do under Health & Safety Code § 43013 (e)(1). ARB must publish a detailed breakdown of how it calculated the 3-6 cpg to enable review and comment on ARB's cost estimates. (GG)

Agency Response: Staff surveyed producers, importers, and other stakeholders, including Kinder Morgan, operator of the non-proprietary pipeline system, about the potential impacts of the amendments on the distribution system. Kinder Morgan estimated that many of the distribution terminals may need to invest in additional pump dispensers, reprogramming of equipment, and some additional storage. This cost is estimated to be between $2 million and $10 million. This is about 0.01 to 0.06 cents per gallon. This cost is small relative to the refinery modification costs and the fuel economy penalty that it becomes insignificant when added to the overall cost of this regulation. All of the significant cost calculations are detailed in the Initial Statement of Reasons. The distribution costs were not considered significant enough to be detailed in the overall cost analysis.

### *17. Multimedia Evaluation*

60. Comment: Health and Safety Code Section 43830.8 requires that ARB may not adopt any regulation that establishes a specification for motor vehicle fuel unless that regulation and a multimedia evaluation are reviewed by the California Environmental Policy Council. ARB claims in the ISOR, page 52 the "proposed amendments do not change specifications of CaRFG3 gasoline" and thus do not trigger the multimedia evaluation.

The characterization that the "proposed amendments do not change specifications" is not accurate. Currently, the regulations stipulate that the primary means of compliance in CaRFG3 are the (flat) specifications listed in Section 2262 of the regulations. Use of the Predictive Model and the vehicle test option are identified as alternative methods of compliance. This will change under the new regulations. The (flat) specifications can only be used in combination with an AERP, which will sunset on 12/31/11. As a result, the primary means of compliance with the regulations will no longer be available, and the Predictive Model will become the only means of compliance. This change has occurred because significant new requirements to offset permeation emissions due to ethanol have been added to the Predictive Model, but the specifications (i.e. flat and average limits) have not been changed to reflect these additional requirements.

WSPA believes the multimedia evaluation is required because:

1) the existing (flat and average) specifications will no longer be a valid compliance option for CaRFG3, and,

2) the new specifications represented in the Predictive Model are significantly more stringent than the current specifications. (GG)

Agency Response: See response to comment #50. Historically, use of the Predictive Model and the vehicle test options did not trigger the requirement for a multi-media evaluation even though refiners could, and probably did, use different formulations for their respective Predictive Model formulations and vehicle test formulations. The multi-media evaluation was not required for these options because the Predictive Model and vehicle test options are not "specification[s] for motor vehicle fuels." (H&SC section 43730.8(a).)

The Predictive Model is a set of mathematical equations that relate emission rates of exhaust hydrocarbons, oxides of nitrogen (NOx), and combined exhaust toxic species to the values of the eight regulated gasoline properties. Emissions of each pollutant type are predicted by equations formulated separately for vehicles of different technology classes. The CaRFG3 Predictive Model constrains exhaust emissions of NOX, VOCs, and cancer-potency-weighted toxic air contaminants (that is, acetaldehyde, benzene, 1,3-butadiene, and formaldehyde), and evaporative emissions of VOCs and benzene. Thus, numerous different fuel formulations are possible, but each is manufactured to have similar emissions through the adjustment of various fuel properties, such as sulfur content, aromatic content, etc.

Under the emission testing option, a gasoline producer applies for certification of an alternative gasoline formulation found through emission testing to result in emissions equivalent to gasoline meeting the CaRFG2 flat limits. The test fuel is compared directly to the reference fuel which meets the CaRFG2 flat limits. The comparison is made by testing a group of vehicles, in vehicle categories that reflect the on-road fleet mix, on both the test and the reference fuel. To be certified, a test fuel must result in exhaust emissions of carbon monoxide, oxides of nitrogen, non-methane organic gases (NMOG) on a mass basis, NMOG on an ozone-forming potential basis and the potency-weighted sum of toxic pollutants that do not individually exceed the emissions of the same pollutants when the reference fuel is used. Like the Predictive Model option, numerous different fuel formulations are possible. Whether validated by the Predictive Model or by emission testing, no alternative limit may exceed the cap limit for the property.

The proposed amendments do not change the flat or averaging specifications of CaRFG3 gasoline and will not require a gasoline ingredient to be added or removed beyond what is already used to produce gasoline for sale in California. The amendments only change the certification criteria and the range of fuels likely to be produced fall into the range covered by the multimedia evaluation done in 1999.

### *18. Ethanol Flexibility*

61. Comment: Flexibility for gasoline producers to vary the amount of ethanol they add to gasoline is beneficial since it allows the industry to respond to shifts in supply and demand in a timely manner. Currently there is a substantial barrier to such flexibility in Section 2266.5(f)(1)(C) which virtually prohibits changes in ethanol content. We believe significant flexibility could be added without environmental harm by making the following modifications to the regulations.

1. Eliminate 2266.5(f)(1)(C)(1). This requirement is too vague to be useful.

2. Modify 2266.5(f)(1)(C)(2) to limit changes in oxygen content to 1.4 mass % oxygen. This would allow up to a 4% change in ethanol content at any one time. For example, a blender could change from 6% ethanol to 10% ethanol in one step by following these procedures.

3. Modify 2266.5(f)(1)(C)(3) to require a volume addition of at least three times the heel, not four times the heel. The original requirement is too burdensome and the difference between three and four is not large enough to make a difference.

4. Eliminate 2266.5(f)(1)(C)(4). This requires CARBOB to have a sulfur level of less than 12 ppm. The level of sulfur in a complying CARBOB is irrelevant and should not be included. If the CARBOB passes the Predictive Model test, then any level of sulfur should be acceptable. Concerns about excess emissions caused by mixing CARBOBs will not be addressed by this step, but by controlling the size of the heel as in subparagraph (3). (GG)

Agency Response: The CaRFG3 regulations in effect prior to the adoption of section 2266.5(f)(1)(C) prohibited the blending of CARBOB that is downstream from a production or import facility with other CARBOB, gasoline, blendstock or oxygenate. (2266.5(h)). Downstream CARBOB could only be combined with other CARBOB that has been designed to have the same type and amount (or range of amounts) of oxygenate added and with the type and amount of oxygenate for which it is designed. Generally, when ethanol is added to gasoline, the RVP of the gasoline is increased, and this will result in increased evaporative emissions. Two CARBOBs that are to be blended with different amounts of ethanol cannot be mixed because it becomes difficult to determine the appropriate amount of ethanol to add to the resulting blend of CARBOBs; consequently, the final blend may not comply with the regulations, resulting in increased emissions.

The regulations also recognize that there could be operational business reasons for mixing CARBOB with California gasoline or other CARBOB during a changeover in service of a storage tank. Consequently, section 2266.5(f)(2) allows the Executive Officer to enter into a written protocol with any person to identify conditions under which such mixing would be permitted. However, to simplify the transition from one gasoline oxygen content to another, it is preferable to have the regulations identify the conditions under which the mixing of two products will always be permitted. Staff conducted an analysis and determined that the regulations could be modified to allow transitions at the storage tank under specific conditions and constraints that would preserve emissions benefits. Therefore, staff narrowly defined those situations in which mixing of different CARBOBs would be allowed. Elimination or modification of 2266.5(f)(1)(C)1-4 would result in uncontrolled mixing of different CARBOBs and ultimately, increases in emissions.

Specifically, 2266.5(f)(1)(C)1 allows the mixing of different CARBOBs if the change in service of the tank is for legitimate operational reasons and is not for the purpose of combining the different types of CARBOB. Deletion of this provision would allow refiners and producers to mix different CARBOBs for any reason. As 2266.5(f)(1)(C) was intended to “permit the mixing of CARBOBs designed for different oxygen levels

as part of a change of service of a terminal tank," (ISOR released on September 29, 2000, page 18) deletion would thwart the purposes of this provision. Staff disagrees that this provision is too vague. Throughout the 2000 rulemaking on follow up amendments to the CaRFG3 regulations, there were no questions or comments on the vagueness of 2266.5(f)(1)(C) (see Final Statement of Reasons, Public Hearing To Consider Follow-Up Amendments To The California Phase 3 Reformulated Gasoline Regulations, Public Hearing Date: November 16, 2000.

The Initial Statement of Reasons (ISOR) which was issued when this rule was originally adopted in 2000 states, "The staff is proposing amendments that would permit the mixing of CARBOBs designed for different oxygen levels as part of a change of service of a terminal tank, as long as certain conditions are met… Staff has conducted an emissions analysis indicating no significant emission increases in these circumstances."

With respect to 2266.5(f)(1)(C)2, which provides, "The initial and new CARBOBs are designated for blending with different amounts (or ranges of amounts) of oxygen, and the change in oxygen content will not exceed 1.1 weight percent of the oxygenated gasoline blend," staff believes that allowing 1.4 wt% oxygen content would result in an emission increase.

With respect to 2266.5(f)(1)(C)3, which provides, "The volume of the new CARBOB that is added to the tank is at least four times as large as the volume of the initial CARBOB in the tank," staff believes that allowing a volume addition of at least three times the heel will also result in an emission increase. In the 2000 rulemaking, staff originally proposed a 9 to 1 dilution. Following a comment on the restrictiveness of this requirement, staff then performed additional analyses and found that the tank heel requirement of 10 percent can be changed to 20 percent (4 to 1 dilution) for a transition from a CARBOB formulated for one oxygen content to a CARBOB formulated for another oxygen content, without adverse emissions impacts. A further dilution would result in an emission increase.

Finally, 2266.5(f)(1)(C)4 provides, "The sulfur content of the new CARBOB added to the tank is no more than 12 parts per million." Staff disagrees with the recommendation that this limit be eliminated and further disagrees with the notion that the level of sulfur in CARBOB is irrelevant and any level of sulfur should be acceptable. In this rulemaking, staff proposed decreasing the sulfur cap limit to 21 ppmw for CARBOB beginning December 31, 2009 to improve enforceability of the CaRFG3 program and to help protect the performance of the vehicles' sulfur-sensitive emission control components. Likewise, the sulfur limit of the new type of CARBOB being added to a storage tank will improve enforceability of the CaRFG3 program and facilitate newer engine technology by protecting the performance of sulfur-sensitive emission control components.

### *19. Ethanol Specifications*

62. Comment: The specification for ethanol is an important component of the overall regulatory package and ARB has, when necessary, adopted a specification that is more stringent than ASTM. In particular, WSPA believes that the current sulfur specification for ethanol - 10 ppm - is too high. ARB believes that future sulfur concentrations in gasoline will be lower than they are today and will approach zero in

many cases. If this is the case, then sulfur in ethanol could raise the gasoline sulfur level significantly. We believe that the specification for ethanol sulfur should be consistent with the lowest levels of sulfur needed for gasoline blends. The exact level should be the subject of discussion between ARB, ethanol suppliers and refiners. WSPA recommends that the Board instruct ARB staff to evaluate ethanol specifications and take appropriate action on this item. (GG)

Agency Response: ARB will consider future action on this item. This item was not covered in the hearing notice and did not fall within the scope of this rulemaking.

### *20. Update Gasoline Specifications*

63. Comment: In general, ARB should adopt the latest versions of ASTM specifications and methods in its regulations. They should allow adequate time after ASTM revises or modifies a specification or method to allow companies to implement the change. (GG)

Agency Response: Staff updates and evaluates ASTM methods on a case by case basis. Staff carefully reviews each ASTM method and recommends adoption as appropriate. Any further changes to ASTM methods in the 2007 CaRFG3 amendments were not covered in the hearing notice and do not fall within the scope of this rulemaking.

### *21. Diesel Fuel Concerns*

64. Comment: I think this is a case of the California Air Resources Board meddling with things that affect our economy and life styles, and you don't have all the facts except for what you guys want to hear. Just like the fiasco of MTBE in our gasoline. You, the board members, had no clue what it was going to do!!! And again you're going to make major changes. Just because you think it's a good idea, not knowing all the facts!!!!

Please stop trying to do the wrong things and pay attention to the true facts before you make a mess of the diesel fuels and the transportation industry!!! (SC)

Agency Response: This is a general comment and not specifically related to any specific provisions. Diesel fuel is not covered by the regulation. The Board's action is appropriate to reduce the emissions associated with the use of gasoline.

### *22. Regulation Modifications*

65. Comment: The current regulations contain a number of provisions that are not relevant and are not likely to be used in the future. WSPA recommends the regulatory language be revised to take into account how the regulations are used. Specifics are described below.

1. Eliminate vehicle testing option

The current regulations allow a fuel producer to certify a blend composition by conducting a vehicle test program. Initially, it was felt this was a viable option for

producers considering unusual or novel blends not described by the Predictive Model. This option is expensive and complicated. As refiners have gained experience with the various versions of the Predictive Model, it is commonly accepted as a good representation of the relationship between fuel quality and emissions. Alternative formulations are unlikely to be successfully approved through a vehicle test program.

To the best of our knowledge the vehicle option has never been used and we believe it is highly unlikely to be used in the future. WSPA proposes its elimination from the regulations.

2. The Predictive Model is the only compliance option

The regulations, as currently written, implicitly suggest that complying gasoline can be made by meeting the flat or average limit specifications. This is not the case in the summer. Since gasoline meeting the limits has excess permeation emissions in the summer, the only way to produce complying summertime gasoline is by using the Predictive Model. Thus, the Predictive Model is the single most important piece of the regulations and should be recognized as such.

In the winter, when the evaporative part of the Predictive Model is not active and permeation emissions are not considered, it is possible to make a complying gasoline by using the flat and average limits. However, we believe that even in the winter, most, if not all, gasoline blends are made using the Predictive Model. (GG)

Agency Response: Staff is committed to providing the maximum amount of flexibility for producers. The vehicle testing option is one such flexibility provision. Although it has yet to be used, staff sees no advantage to eliminating this provision from the regulation. In fact, eliminating this flexibility could be considered a potential negative impact to supply and production of CaRFG3 in California. Elimination of the vehicle testing option was not covered in the hearing notice and does not fall within the scope of this rulemaking.

Staff agrees that the Predictive Model is a very important component of the CaRFG3 regulations. However, staff disagrees that complying gasoline could not be made using the flat or averaging specifications. Staff explicitly allowed the use of flat or averaging limits, with the caveat that emissions associated with permeation must be offset. The proposed amendment to 2262.3(b) provides, “Notwithstanding section 2265.5(a), a producer or an importer that produces gasoline and that has elected to be subject to the flat limits specified in section 2262 shall offset its emissions associated with permeation by complying with sections 2265.5(b) – (i). An importer that does not produce gasoline shall not sell, offer for sale, supply, or offer for supply California gasoline if the gasoline creates emissions associated with permeation.” Furthermore, the proposed amendment to 2262.3(c) provides, “Notwithstanding section 2265.5(a), a producer or an importer that produces gasoline and that has elected to be subject to an averaging limit specified in section 2262 shall offset its emissions associated with permeation by complying with sections 2265.5(b) – (i). An importer that does not produce gasoline shall not sell, offer for sale, supply, or offer for supply California gasoline if the gasoline creates emissions associated with permeation.”

On pages 30-34 of the Initial Statement of Reasons, released April 27, 2007, staff provided detailed analyses for two AERP examples. In the first example, staff calculated the amount of mitigation required and the associated AERP costs if a producer uses the flat limits for their fuel formulation and does not choose to mitigate any increased permeation emissions through an alternative fuel formulation. In the second example, staff calculated the mitigation requirement and AERP costs for the situation where a producer chooses to mitigate some of the increased emissions using an alternative fuel formulation. In both examples, the percent change in ozone forming potential is an output from the Predictive Model. This is variable and is dependent on the fuel formulation entered into the Predictive Model. Moreover, the percent change in NOx is also an output from the Predictive Model. This too is variable and is dependent on the fuel formulation entered into the Predictive Model.

## B. Comments Received During the 15-Day Comment Period

### *22. Compliance Options*

66. Comment: In Section 2261(b)(4)(C), the wording should be modified to reflect that the restrictions on the use of the two compliance options apply to product intended for the RVP regulatory control period or product intended for outside of that period. The current wording appears to establish such restrictions based solely on the date. (CR)

Agency Response: Section 2262.4(b)(1)(A) provides, "In an air basin during the regulatory control periods specified in section (b)(2), no producer or importer shall sell, offer for sale, supply, or offer for supply from its production facility or import facility California gasoline which has a Reid vapor pressure exceeding the applicable flat limit set forth in section 2262 unless the gasoline has been reported as either a PM alternative gasoline formulation pursuant to section 2265(a) or a PM emissions offsetting formulation pursuant to section 2265.1 (applicable only to producers and importers that produce gasoline) using the evaporative emissions model element of the CaRFG Phase 3 Predictive Model." Likewise, section 2262.4(b)(1)(B) provides, "In an air basin during the regulatory control periods specified in section (b)(2), no producer or importer shall sell, offer for sale, supply, or offer for supply from its production facility or import facility California gasoline which has been reported either as a PM alternative gasoline formulation pursuant to section 2265(a) or a PM emissions offsetting formulation pursuant to section 2265.1 (applicable only to producers and importers that produce gasoline) using the evaporative emissions model element of the CaRFG Phase 3 Predictive Model if the gasoline has a Reid vapor pressure exceeding the PM flat limit for Reid vapor pressure in the identified PM alternative specifications or the designated emissions offsetting limits, as applicable."

Section 2262.4(b)(2) identifies the regulatory control periods for production and import facilities. For example, the regulatory control period for the South Coast Air Basin and Ventura County is March 1 through October 31 (Except as otherwise provided in (A)2. and (A)3.) Therefore, reading section 2262.4(b)(1) and (2) together, no producer or importer may sell, offer, or supply certain types of fuel in the South Coast Air Basin between March 1 and October 31 (with the exceptions noted). This type of prohibition, i.e., prohibiting the sale, offer, or supply during a specified time period, as opposed to prohibiting the modeling, manufacturing, refining, or

production during the specified time period was due to a long-standing recognition that there is a lag time between modeling/manufacturing/refining/production and sales/offers/supplies of the fuel. That understanding is seen not only in the RVP regulatory control period provisions, but also in the phase out of lead (section 2253.4), phase in of the CaRFG2 standards (section 2261(a)), phase in of the CaRFG3 standards (section 2261(b)), phase out of MTBE (section 2262.6), and standards for denatured ethanol (section 2262.9).

Section 2261(b)(4)(C) provides, "Any producer or importer electing to supply from its production or import facility, before December 31, 2009, any final blends of gasoline subject to the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model," as corrected November 18, 2004 and last amended April 25, 2008, or to the "Procedures for Using the California Model for California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB)," as adopted April 25, 2001, last amended April 25, 2008, may elect to use either one of the two compliance options (exhaust + evaporative emissions model elements or the exhaust emissions model element only) as defined in the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model" to certify alternative blends of gasoline. Beginning December 31, 2009, only the first compliance option (exhaust + evaporative emissions model elements) shall be used during the RVP regulatory control periods in section 2262.4(b)(2) and only the second compliance option (exhaust emissions model element only) shall be used outside of the RVP regulatory control period."

The intent of 2261(b)(4)(C) was to indicate to producers and importers which compliance option element of the CaRFG Phase 3 Predictive Model must be used for fuel sold, offered for sale, supplied, or offered for supply during the applicable regulatory control periods. Specifically, producers or importers that chose to use the amended Predictive Model before December 31, 2009 could elect to turn off the evaporative emissions portion of the Predictive Model (or could use the exhaust + evaporative emissions model elements) when certifying alternative blends of California gasoline intended for sale, offer for sale, supply, or offer for supply during the applicable regulatory control periods. Also, after December 31, 2009, producers and importers could no longer turn off the evaporative emissions portion of the Predictive Model when certifying California gasoline intended for sale, offer for sale, supply, or offer for supply during the applicable RVP regulatory control period. Section 2261(b)(4)(C) was not written to interfere with regulation language set forth in 2262.4(b). The two provisions must be read together.

Moreover, the California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model states, "Before December 31, 2009, the applicant shall first select one of two compliance options. The first compliance option uses the exhaust HC emissions models, the evaporative HC emissions models, and the CO emissions model in determining the HC emissions equivalency of the candidate fuel specifications. The second option uses only the exhaust HC emissions model in the determination of the HC emissions equivalency of the candidate fuel specifications. After December 31, 2009, the second compliance option sunsets and the first compliance option that uses the exhaust HC emissions models, the evaporative HC emissions models, and the CO

emissions model in determining the HC emissions equivalency of the candidate fuel specifications becomes the only compliance option during the RVP control season."

67. Comment: Paragraph 2261(b)(4)C: The last sentence appears to tie the use of the two compliance options to dates, rather than to the product produced for sale during those time periods. This would be problematic during transitions into and out of the RVP regulatory control period and would be inconsistent with the current regulations. (JPU)

Agency Response: See response to comment #66.

68. Comment: In Section 2261(b)(4)(C), the description of the use of the two compliance options is not correct for the period through December 30, 2009 for product produced for outside of the RVP control period. The options should be:

- Through December 30, 2009:
  - RVP Controlled: Option 1 or Option 2
  - Non-RVP Controlled: Option 2 only
- Starting December 31, 2009:
  - RVP Controlled: Option 1 only
  - Non-RVP Controlled: Option 2 only (CR)

Agency Response: See response to comment #59. The description of the use of the two compliance options is correct for the period through December 30, 2009 in Section 2261(b)(4)(C). Before December 31, 2009, producers and importers have the option of using either Option 1 or Option 2 during and outside of the RVP regulatory control period.

### *23. Revised Predictive Model*

69. Comment: The text at the end of Section 2261(b)(4)(F)4 appears to be in conflict with Section 2261(b)(4)(C) for use of the revised Predictive Model through December 30, 2009. (CR)

Agency Response: The last sentence in Section 2261(b)(4)(F)4 provides, "When it is sold or supplied from the production or import facility, no such final blend may result in emissions associated with permeation unless those emissions are offset through the Predictive Model or a valid AERP or third party AERP." The applicable portion of Section 2261(b)(4)(C) provides, "Any producer or importer electing to supply from its production or import facility, before December 31, 2009, any final blends of gasoline subject to the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model," as corrected November 18, 2004 and last amended April 25, 2008, or to the Procedures for Using the California Model for California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB)," as adopted April 25, 2001, last amended April 25, 2008 may elect to use either one of the two compliance options (exhaust + evaporative emissions model elements or the exhaust emissions model element only) as defined in the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model" to certify alternative blends of gasoline." The commenter suggests that these two provisions are in conflict because the first requires emissions associated with permeation to be offset,

while the second allows the evaporative emissions model element of the Predictive Model be turned off.

"Emissions associated with permeation" is defined as "the incremental increase in emissions because of permeation which is calculated as the difference between the emissions from the producer's or importer's final blend formulation and the flat limits without ethanol. The Phase 3 reformulated gasoline Predictive Model, as described in the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model," as corrected November 18, 2004 and last amended April 25, 2008, which is incorporated herein by reference, shall be used to calculate emissions associated with permeation." (section 2260(a)(8.5).) Furthermore, section 2260(a)(8.5) provides formulae to calculate the emissions as ozone forming potential and NOx. Each is based, in part, on the "percent change in emissions, as predicted by the CaRFG3 Predictive Model for Ozone Forming Potential (OFP) and Oxides of Nitrogen (NOx), respectively, as described in the "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model," as corrected November 18, 2004 and last amended April 25, 2008, which is incorporated herein by reference."

Therefore, in reading sections 2261(b)(4)(F)4, 2261(b)(4)(C), and 2260(a)(8.5) together, before December 31, 2009, a producer or importer may either (i) use the exhaust + evaporative emissions model elements of the Predictive Model and offset the ozone forming potential and NOx associated with permeation or (ii) use the exhaust emissions model element only and offset the NOx associated with permeation (as it is not expected to result in ozone forming potential with the evaporative element turned off).

70. Comment: Paragraph 2261(b)(4)(F)4: The last sentence appears to be in conflict with paragraph 2261(b)(4)C that describes how the revised predictive model is to be used in the period before December 31, 2009. (JPU)

Agency Response: See response to comment #69.

### *24. Regulation Modifications*

71. Comment: In Section 2261(b)(7)(D)1, the reference to paragraph (B)9 (denatured ethanol requirement) should actually be to paragraph (B)10 (recordkeeping). (CR)

Agency Response: Staff agrees and will make this minor typographical correction.

72. Comment: This section should not be restricted to 12/30/2009. Refiners should have the flexibility to blend higher levels if the pipeline specification does not go to 10vol%. (CR)

Agency Response: Staff will remain open to this option and will continue to monitor pipeline specifications and make recommendations as seen fit at a later date. At this time, it is speculative what the pipeline owners will require/allow in the future. Therefore, to develop regulations based on speculation is not appropriate.

73. Comment: Dual certification (as opposed to certification over a range) should be permitted. If dual certification is permitted, refiners should be allowed to use both the 2004 and 2007 Predictive Models. For example, the refiner could choose to use the 2004 PM to certify the batch at the lower ethanol concentration and the 2007 PM at the higher level. This is similar to allowing the early use of the 2007 PM while others are using the existing model. (CR)

Agency Response: Staff believes that the major difference between dual certification and certification over a range is due to an error in the CARBOB Model Spreadsheet. ARB's enforcement division is currently working on addressing this issue in the spreadsheet. Staff believes that with the removal of this spreadsheet error, dual certification and certification over a range become essentially the same. Producers and importers are encouraged to work with the ARB's enforcement division for clarification while the spreadsheet is being modified. These changes are not considered regulatory. The CARBOB model spreadsheet is a tool prepared by enforcement division to simplify use of the CARBOB model. The spreadsheet itself is not enforceable.

Refiners will be allowed to use either the 2004 or the 2007 Predictive Model to certify their fuels over a range. However, refiners may not be allowed to use one model at one end of the range and another model at the opposite end of the range due to tracking and enforceability issues.

74. Comment: The reporting requirements for the oxygenate blenders contained in section 2261(b)(7)(C) are excessively onerous. (CR)

Agency Response: Section 2261(b)(7) allows a producer or importer the added flexibility of blending percentages of ethanol into California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB) that are higher than the common carrier pipeline specifications for oxygen and ethanol. To use this alternative, a producer or importer must first demonstrate that all emissions reduction requirements are met at the desired level of oxygenate blending, and that any fuel to be shipped in a common carrier pipeline also meets the specifications established by that carrier. Staff believes that the reporting requirements are needed for adequate enforcement of this regulation. Nevertheless, the regulation provides that an oxygenate blender may enter into a protocol with the executive officer to establish alternative reporting requirements that are more tailored its operational procedures if the executive officer deems the alternative reporting requirements as enforceable as the requirements in the regulation.

75. Comment: ARB should consider adding a provision that allows similar downstream blending credit for CARBOBs specified at a higher ethanol level (rather than over a range). This would require modification of the prohibition against the commingling of non-identically specified CARBOBs. (CR)

Agency Response: This issue was not covered in the hearing notice and does not fall within the scope of this rulemaking. However, staff believes that this suggestion is worthy of further consideration in a future rulemaking session. This suggestion will need to be evaluated for enforceability, preservation of the emissions benefits of the current regulation, and consistency with the U.S. EPA's prohibition against the

mixing of two or more Reformulated Blendstocks for Oxygenate Blending (RBOBs) that are designated for different oxygenation (ethanol) levels.

76. Comment: We are disappointed that producers and oxygenate blenders were not given a more straightforward option to offset emissions resulting from early ethanol blending using non-fuel measures. Similar in concept to the Carl Moyer program, such an option would give parties that do not have the ability to mitigate the emissions impact using their fuel formulation another avenue to blend increased volumes of ethanol into current CARBOBs while maintaining or improving emissions benefits. (JPU)

Agency Response: Staff provided two alternatives to increase ethanol blending. Staff did not include the suggested option that relied on a Carl Moyer-type program. Such a program would be implemented by the California air pollution control districts (air districts).

There are several reasons why such a provision was not considered. First, the option would require the specification of a specific dollar amount per ton of emissions emitted. The actual amount of emissions could be quantified. However, concerning the dollar amount, staff was unable to reach any specific consensus between the air districts and the industry representatives that would use the option. Costs ranged between $2,500 and $24,000 per ton of emissions. Consensus was important because the option is voluntary; too low and the air districts would not support and too high and the industry would not use. In addition, the California Air Pollution Control Officers Association raised other policy issues and concerns. These air district concerns included: (1) The need to require 1.5 tons of emissions reductions for every one ton of emissions to ensure that actual emission reductions are achieved; (2) The need to have a higher cost effectiveness value; (3) Concern, based on recent information, that the program may lead to increases in greenhouse gases; and (4) The need to have a greater level of protection for assuring that the wholeness of the NOx offsets be achieved. Due to these complexities, the staff chose not to include this option.

### *25. California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model*

77. Comment: Page 2, Table 1 of Attachment 3: The footnote should clarify that the RVP Flat and Cap limits apply only for gasoline intended for the RVP regulatory control period. (CR)

Agency Response: Staff agrees with this suggestion. The following footnote has been added: “The Reid vapor pressure (RVP) standards apply only during the warmer weather months identified in section 2262.4.” This footnote is consistent with footnote 1 to the table in section 2262. This is a nonsubstantial change since section 2262.4(a)(1) states, “No person shall sell, offer for sale, supply, offer for supply, or transport California gasoline which exceeds the applicable cap limit for Reid vapor pressure within each of the air basins during the regulatory period set forth in section (a)(2).” Further section 2262.4(b)(1)(A) states, “In an air basin during the regulatory control periods specified in section (b)(2), no producer or importer shall sell, offer for sale, supply, or offer for supply from its production facility or import facility California gasoline which has a Reid vapor pressure exceeding the applicable

flat limit set forth in section 2262 unless the gasoline has been reported as either a PM alternative gasoline formulation pursuant to section 2265(a) or a PM emissions offsetting formulation pursuant to section 2265.1 (applicable only to producers and importers that produce gasoline) using the evaporative emissions model element of the CaRFG Phase 3 Predictive Model." Section 2262 states, "The CaRFG Phase 2 and CaRFG Phase 3 standards are set forth in the following table." The associated table provides the footnote specified above. Therefore, the requirement imposed on producers and importers to comply with the applicable RVP standards during the RVP regulatory control period already exists in the regulations. The added footnote is consistent with the existing regulations, adds clarity, and does not materially alter the requirements, rights, responsibilities, conditions, or prescriptions contained in the original text.

78. Comment: Page 74 of Attachment 3: The heading for the Running Loss Emissions should be numbered 3, instead of 2. (CR)

Agency Response: Staff agrees and will make this nonsubstantial correction.

79. Comment: Page 87 of Attachment 3: The mean and standard deviation values in Table 12 are incorrect. (CR)

Agency Response: Staff agrees and will make this nonsubstantial correction

***26. Ethanol Emissions Reduction Plan (EERP)***

80. Comment: In Section 2260, a definition of EERP should be added. (CR)

Agency Response: The EERP is a flexibility option that allows refiners to provide ARB with an emissions reduction plan to offset emissions associated with increased ethanol blending. Staff believes that the regulation is sufficiently clear in the description of an EERP. The applicability provisions in Section 2261(b)(6) lay out when an EERP applies. The following discussion provides a description of the EERP:

(1) In the case of a third party EERP, the third party has a contract or agreement to offset, in whole or in part, the elevated emissions associated with increased ethanol blending from the producer's or importer's gasoline;
(2) With regard to a batch of gasoline that does not meet the criteria for approval in the applicable Predictive Model Procedures, immediately prior to producing or importing that batch, the producer or importer has reported its gasoline as a PM alternative gasoline formulation pursuant to section 2265(a);
(3) But for the elevated emissions associated with increased ethanol blending, the PM alternative specifications would have met the criteria for approval in the applicable Predictive Model Procedures;
(4) All measures to correct the emissions associated with increased ethanol blending would result in an economic hardship to the producer or importer and the benefit in allowing the producer or importer to use an EERP is not outweighed by the public interest in enforcing the applicable Predictive Model Procedures;

(5) The producer or importer is not subject to any outstanding requirements to provide offsets at the same production facility or import facility pursuant to section 2264(c);
(6) The amount of ethanol blended into the final blend may not exceed 10.0 volume percent denatured ethanol; and
(7) All EERPs and third party EERPs sunset on December 30, 2009.

Elsewhere in the EERP provisions, the objectives are identified. Section 2261(b)(6)(B)2.h. requires the producer or importer to demonstrate that the emission reduction strategy(ies) in the EERP or third party EERP will result in equivalent or better emission benefits for NOx, total ozone forming potential, and potency-weighted toxics than would be achieved through elimination of emissions associated with increased ethanol blending from the gasoline for the same affected region and for the period the EERP or third party EERP will be in effect, during and outside the RVP regulatory control periods in section 2262.4(b)(2). Section 2261(b)(6)(B)2.i. requires emission reductions are achieved in the general region where the fuel is sold. Section 2261(b)(6)(B)2.n. requires a compliance plan that includes increments of progress that describe periodic, measurable steps toward compliance.

81. Comment: The EERP does not appear to enable blending of additional ethanol into CARBOB that meets the existing common carrier pipeline CARBOB specification of 5.7% ethanol. As a result, the EERP is not compatible with the current fungible distribution system, and its usefulness to producers and importers is limited. (CR)

Agency Response: The EERP is a flexibility option that allows refiners to provide ARB with an emissions reduction plan to offset emissions associated with increased ethanol blending. The EERP does not put restrictions on blending of additional ethanol into CARBOB that meets the existing common carrier pipeline CARBOB specification of 5.7% ethanol.

82. Comment: There is no requirement that establishes a time limit for ARB to deem an EERP or AERP application as being complete. (CR)

Agency Response: ARB did not specify a timeframe because staff anticipated working very closely with the applicants and did not intend to be a bottle neck for this process. However, staff's intention is to deem an application complete within 15 business days. ARB staff understands that most applicants will be under tight deadlines and will do our best to process the application and deem it complete in a timely manner.

83. Comment: Can offsetting emissions with lower-emitting batches of gasoline be used as an option for an EERP or AERP similar to the permissible option of "offsetting emissions with lower emitting diesel fuel batches" listed in 2265.5(b)(6)? If no, why not? (CR)

Agency Response: Section 2265.5(b)(6) provides, "AERPs may include, but are not limited to: (A) Vehicle scrappage, (B) Offsetting emissions with lower emitting diesel fuel batches, (C) Incentive grants for cleaner-than-required engines, equipment and other sources of pollution providing early or extra emission reductions." This list was not intended to be limiting, but rather, to provide some

common examples of offsetting mechanisms. A lower-emitting batch of gasoline may be used as an option provided it meets the requirements of section 2265.5.

### *27. Comments Pertaining to Draft Proposed Regulation Order*

84. Comment: Section 2263.7 encourages combining notifications to the extent practicable. Does CARB plan to provide examples or a template of how these notifications may be combined? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, we encourage stakeholders to work with Enforcement Division to combine these notifications. ARB staff believes that a template may be too general and that many of the combined notifications may be unique to each stakeholder.

85. Comment: Is the PM emission offsetting compliance option available in the winter non-RVP controlled season? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, although the PM emission offsetting compliance option was designed to alleviate higher than expected sulfur levels that may occur during the RVP regulatory control period, it is also available outside of the RVP regulatory control period.

86. Comment: Enforcement Division provided last year an example calculation sheet for the PM emissions offsetting compliance option for high sulfur. Is that example still applicable? If yes, can that be inserted somewhere in the regulations or at least a reference of it mentioned? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, the example provided by the Enforcement Division on this topic is to be used for clarity and is not enforceable. Stakeholders are encouraged to work with the Enforcement Division on the proper use of the PM emissions offsetting compliance option for their own individual cases.

87. Comment: Please clarify “adequate enforcement provisions” under 2265.5(b)(2)(I). (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, “adequate enforcement provisions” is situational and must be evaluated on a case by case basis. It may differ depending on whether the applicant is a producer or an importer; is offsetting via vehicle scrappage, lower emitting diesel fuel batches, incentive grants for cleaner-than-required engines, equipment and other sources of pollution providing early or extra emission reductions, or some other means. As we attempted to provide a reasonable degree of flexibility in the offsetting options, we cannot anticipate all the options that may arise during the life of the regulations. Therefore, we cannot anticipate what data, information, records, reports, etc. are necessary to ensure that that option is fully and faithfully being complied with.

88. Comment: Please clarify 2265.5(b)(9). Do offsets have to occur in the amount and on the day that the gasoline with excess emissions is released? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, emission offsets must be in place for the amount that occurs that day. The emission offsets can either already have been in place or have occurred the same day as the excess emissions. The excess emissions may not exceed the amount of emissions offsets that are already in place or are occurring that same day.

89. Comment: 2265.5(c)(7) Final Action: Can interested parties appeal the final action? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, there is no language in the regulation that does not allow interested parties to appeal the final action.

90. Comment: 2265.5(e)(3): The way this reads is that violations will continue to accrue until the AERP is terminated. Is this the only means to remedy this situation? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, in many enforcement cases, stakeholders are encouraged to work with the Enforcement Division to remedy the situation.

91. Comment: 2265.5(e)(4): How does this relate to 2265.5(b)(9)? How are net exceedances calculated? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, net exceedances will be calculated on a case by case basis, as AERPs may vary widely. Stakeholders are encouraged to work with Enforcement Division regarding exceedances.

92. Comment: 2265.5(i): When do the notifications for (1), (3) and (4) have to be made? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, this determination will be made through a cooperative process with the Enforcement Division dependent upon the type of AERP.

93. Comment: Why is AERP mentioned in 2270(a)(5) when it is not in 2270(a)(1) through (4)? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, staff determined that the mentioning of the AERP was not necessary in those sections.

94. Comment: Could the current proposal be expanded to allow the escrow account funds to be directed to someone besides an air district? (e.g. Cascade Sierra, EPA Region IX, Port of LB.) (CR)

Agency Response: This comment does not pertain to the 15 day changes. This comment appears to be directed at a proposal that was not part of the official 15 day package.

95. Comment: Could voluntary contributions to the Carl Moyer Program or the State's Voluntary Vehicle Scrappage Program be allowed? (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, it is unlikely that a voluntary contribution alone would be sufficient to meet the requirements of an EERP or an AERP.

### *28. Alternative Emission Reduction Plan (AERP)*

96. Comment: Regarding the proposed Alternative Emission Reduction Plan ("AERP") for refiners that cannot meet the new standard within the first two years (now only approximately 20 months) they are forced to use the AERP in order to stay in compliance. As a result, not only do refiners have to pay the costs and provide the resources associated with making the refining modifications to be in compliance, but they will also have to pay the AERP penalty and oversee the complex AERP program development, CARB approval, and execution for their facilities. Accordingly, the AERP has the potential to punitively impact refiners for fuel blend deficiencies (permeation) not of their making and beyond their control. (DWS)

Agency Response: This comment does not pertain to the 15 day changes. See response to comment #6.

97. Comment: Can importers who do not produce gasoline use a third party AERP? (The official 15-day package did clarify in 2265.5(a) that AERP applies to importers who produce gasoline.) (CR)

Agency Response: Importers who do not produce gasoline may use a third party AERP.

98. Comment: 2265.5(b)(2)(L) requires the AERP application to include the reporting of projected volume of each final blend of California gasoline subject to the AERP during the period the AERP will be in effect. How can producers be expected to know the size of each blend they will be making so far in advance? (CR)

Agency Response: This comment does not pertain to the 15 day changes. Stakeholders are encouraged to work with the Enforcement Division on details of the AERP.

99. Comment: 2265.5(d) Revocation or Modification of an Approved AERP: Since interested parties will be notified of a modification to an AERP, is there a corresponding comment period? (CR)

Agency Response: This comment does not pertain to the 15 day changes. The AERP applicant should be working closely with Enforcement Division and Stationary Source Division's fuels section staff during the process. Should a revocation or modification occur to an AERP, staff will provide a comment period in the notification of the modification or revocation.

### *29. Offsetting Emissions*

100. Comment: 2271(e)(1)(B): Clarify circumstances under which an AERP or an emissions offsetting option can be or is expected to be employed instead of applying for a variance. This paragraph seems to imply that the emissions offsetting option can be used in more instances than an infrequent batch of high sulfur gasoline, and the AERP can be used for more than offsetting ethanol permeation. (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, Section 2271(e)(1)(B) states that a variance is only available if the

applicant has made a substantial showing that no alternative (AERP and emissions offsetting option) to a variance could eliminate or mitigate the need for a variance. In response to the second sentence in the comment listed above, Section 2271(e)(1)(B) does not make any implications about the use of the emissions offsetting option or an AERP.

101. Comment: Propose to ARB to allow in the AERP an emissions offsetting method similar to the one proposed by ARB in the preliminary 15-day package for the Oxygenated Blenders who elect to blend percentages of Ethanol into CARBOB higher than the ethanol level designated for that CARBOB. This method would require the Producer or Importer to provide funds to an escrow account where the funds are dispersed from escrow to an air district. (CR)

Agency Response: This comment does not pertain to the 15 day changes. However, one may propose the described option in the comment as an AERP or an EERP. Note that all provisions of the AERP or EERP must be met.

### *30. Need for Higher Offset Ratio*

102. Comment: CARB staff is proposing in Section 2265.5 that the Alternative Emission Reduction Plan (AERP) require equivalent or better emission reduction benefits for NOx, total ozone forming potential, and potency-weighted toxics. Given that there are inherent uncertainties in the modeling and inventory associated with these emissions; in addition, the impact of higher ethanol blends use of off-road sources is not reflected in the current version of the Predictive Model, the AQMD staff recommends that an offset ratio of 1.5:1 for each of these emission categories be required to ensure that the emission impacts of added ethanol blending are mitigated to the fullest extent possible. We recognize that staff are attempting to gain additional information in these area. However, given the timelines incorporated in the current proposal and the urgent need to expedite emission reductions in the South Coast Air Basin, we consider an offset ration of 1.5:1 to be the most direct, effective and fair reconciliation of these concerns at this time. These reductions should also be achieved on a contemporaneous basis. (BRW)

Agency Response: This comment does not pertain to the 15 day changes. However, with all models, there are some uncertainties and the impacts of ethanol blends on off-road sources are unknown. In order to have the most complete model possible, staff has incorporated all known relevant emission data into the Predictive Model. The Predictive Model is designed to offset known emissions gleaned through testing. ARB is attempting to offset known emissions, rather than the speculated amount of emissions, such as those that may occur from off-road sources. ARB is currently undertaking an off-road emission test program to quantify these emissions. Until those emissions are quantified, to attempt to mitigate more than is required by the law would be arbitrary and capricious.

### *31. Tighter and More Expedited Sulfur Limit*

103. Comment: It was noted at the June 2007 hearing that 5 ppm sulfur levels are needed to achieve full flexibility and emission benefits associated with the revised Phase 3 gasoline requirements**.** In order to ensure that the 5 ppm level is attained in use, the AQMD staff urge CARB to set a sulfur cap limit at a level no higher than 10

ppm. Such a lower limit is necessary to enable advanced fuel efficiency technologies such as lean NOx catalyst technology. In addition, such a standard would align California gasoline sulfur requirements with Japan and the European Union, and ensure that the maximum potential emission reductions are achieved from gasoline. It should also be noted that under the CARB proposed sulfur cap California's gasoline sulfur limits would still be less stringent than the 15 ppm sulfur limit imposed on diesel fuel. (BRW)

Agency Response: This comment does not pertain to the 15 day changes. See also response to comment # 13.

104. Comment: With respect to the timeframe, CARB staff is proposing that the sulfur cap limit of 20 ppm be phased in by December 31, 2011 rather than February 14, 2009 as originally provided in the June 2007 staff recommendation.[3] This delay of over 2 ½ years is unnecessary, given the readily available excess gasoline desulphurization capacity already in place in California refineries. While this relaxation provides additional flexibility to refiners, it is unwarranted in the face of critical need to supply the cleanest gasoline possible as soon as possible. Given the clear benefits associated with lower sulfur levels, we urge CARB to retain the original proposed deadline of February 14, 2009 for its most stringent sulfur limit. We also believe that a 10 ppm sulfur limit is achievable in that time frame, and further recommend that the expedited schedule reflect such a limit. (BRW)

Agency Response: While ARB does recognize the clear benefits associated with lower sulfur levels, after meeting with individual refiners, staff made a determination that many of the modifications being made to the refineries to come into compliance with the amendments to the CaRFG3 regulations were directly related to lowering sulfur. Many of these modifications were deemed to take from two to four years. Therefore, staff decided that the December 31, 2011 for the phase in of the sulfur cap limit was more appropriate.

### *32. Greenhouse Gas Impacts*

105. Comment: The evolution to E10 in California – the largest gasoline market in the U.S. – will accelerate the pressure for increased corn-based ethanol production. The natural acreage devoted to corn production increased from 80 million acres to 93 million from just 2006 to 2007. Additional corn ethanol demand pressures may in fact result in INCREASED greenhouse gas emissions, according to some researchers.[4] Certain key assumptions made by CARB staff regarding the GHG efficacy of corn-based ethanol are coming under tighter scrutiny from a number of researchers. Nobel Prize winning chemist Dr. Paul Crutzen, for example, has published an important paper which challenges the key GHG parametric assumption which drives the current belief that there is a slight GHG benefit association with corn-based ethanol.[5] Dr. Crutzen's analysis, which became available in August after

[3] Staff Report, Initial Statement of Reasons (ISOR), Appendix A, Proposed CARFG3 Regulations Including Predictive Model Procedures, April 27, 2007, pg A-7.
[4] Timothy Searchinger, "Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change", Science Magazine, February 29, 2008.
[5] Dr. Paul Crutzen, Mosler, Smith and Winiwarter, "$N_20$ Release from Agro Biofuel Production Negates Global Warming Reduction by Replacing Fossil Fuels", Atmospheric Chemistry and Physics Discussions, 7, 11911-11205, August, 2007.

the June hearing, indicates that four percent – rather than two percent – of nitrogen applied as fertilizer converts to nitrous oxide ($N_20$) in the atmosphere. As a result of the updated "land use" effect on a potent GHG emission sources, the assumed net benefit associated with corn-based ethanol blends becomes a net increase in GHGs once this impact on nitrous oxide emissions is better estimated. We therefore recommend that proposed Section 2261(b)(5)(C) include a provision that the GHG assessment underlying the program is to be annually updated to ensure that the incremental impacts of the Ethanol Emission Reduction Plan (EERP) and the Alternative Emissions Reduction Plan (AERP) do not exacerbate GHGs on a full life cycle basis. (BRW)

Agency Response: The United States Congress recently enacted the Energy Independence and Security Act of 2007 (2007 Energy Act).[6] The 2007 Energy Act requires a rapid expansion of use of renewable fuels. Based on the Act, the U.S. Environmental Protection Agency now requires that fuel producers must increase their use of renewable fuels, generally ethanol, from a required average content in gasoline of 4.0% to 7.76% by volume in calendar year 2008.[7] Current California gasoline contains about 5.7% ethanol. In addition, ARB staff estimates that the required renewable fuel volumes in the 2007 Energy Act will necessitate a nationwide average of 9% ethanol in gasoline in 2009, and 10% in 2010.

The 2007 Energy Act requires substantial expanded production of advanced biofuels, such as ethanol derived from cellulosic material. However, compliance dates with these requirements are several years in the future, and it is expected that virtually all of the near term increased use of renewable fuel is likely to be accomplished through the use of ethanol derived from corn.

There are several impacts of this new legislation that are relevant to the current rulemaking and to the consideration of early blending options.

First, fuel producers now have a much greater obligation under federal law to use greater amounts of renewable fuels in the 2008 to 2009 timeframe. In fact, certain California fuel producers have indicated that they need an early blending option in order to comply with their obligations under the new federal requirements for increased use of renewable fuels.

Second, at the time the Board acted in June 2007 it was thought that, because national ethanol volumes far exceeded the minimum renewable fuel volume requirements of the 2005 Energy Act, additional early use in California would result in a net increase in ethanol use. However, much higher nationwide volume requirements have been established in the 2007 Energy Act and are now in place. Staff believes it is unlikely that a near term increase in ethanol use in California will have any impact on the amount of corn-based ethanol produced and consumed in the U.S. market.

[6] PUBLIC LAW 110–140—DEC. 19, 2007, 121 STAT. 1493

[7] United States Environmental Protection Agency, "Revised Renewable Fuel Standard for 2008, Issued Pursuant to Section 211(o) of the Clean Air Act as Amended by the Energy Independence and Security Act of 2007," [FRL-8528-9], Federal Register, Vol. 73, No. 31, February 14, 2008.

Consideration of Greenhouse Gas Benefits of Crop-Derived Biofuels

During its consideration of the proposed amendments, the Board received testimony that flexibility to allow early blending of higher levels of ethanol would produce greenhouse gas (GHG) emission benefits. This premise appeared reasonable at that time. It was consistent with ongoing work at the Board and the California Energy Commission that suggested a GHG benefit when gasoline was replaced with ethanol derived from corn under most circumstances. However, our past assessments of the lifecycle GHG emissions attributable to current biofuel production did not account for indirect land use impacts, and new information suggests that these impacts are likely to be significant.

For example, articles recently published in Science magazine have questioned the net greenhouse gas emissions benefits of using ethanol derived from corn.[8] In general, the assessments point to indirect land use changes and increased greenhouse gas generation as a result of past and future reliance on crop-based biofuels. However, several individuals and organizations have challenged the assumptions and conclusions in the Science articles.[9] At present, there is no reliable quantification of the lifecycle greenhouse gas emissions resulting from the increased use of biofuels.

The ARB's CaRFG3 regulations do not currently address or regulate greenhouse gas emissions. Staff is currently in the process of developing a low carbon fuel standard (LCFS) for California. As part of the LCFS effort, ARB staff is carefully evaluating these studies and other data to determine and quantify the GHG emission impacts of a wide range of transportation fuels. The LCFS will be developed in consultation with top national and international experts on the issue. The ARB staff intends to consider emissions relating to both direct and indirect land use, extraction, production, refining, and transport in the LCFS effort to ensure an accurate

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[8] Searchinger, T., R. Heimlich, R.A. Houghton, F. Dong, A. Elobeid, J. Fabiosa, S. Tokgoz, D. Hayes, and T.H. Yu, 2008, "Use of U.S. Croplands for Biofuels Increases Greenhouse Gases through Emissions from Land Use Change," Sciencexpress, available at www.sciencexpress.org, February. 7, 2008

Department of Energy, "New Studies Portray Unbalanced Perspective on Biofuels: DOE Committed to Environmentally Sound Biofuels Development," available at http://www1.eere.energy.gov/biomass/printable_versions/news_detail.html?news_id=11574, February 14, 2008.

[9] Wang, M., and Z. Haq, 2008, "Response to February 7, 2008 Sciencexpress Article," Letter to Science, available at http://www.transportation.anl.gov/media_center/news_stories/20080214_response.html, February 14, 2008

Mueller, S., 2008, "Sensitivity of Presented GHG Land Use Change Calculations," Comments to the Air Resources Board, available at http://www.arb.ca.gov/lists/lcfs-lifecycle-ws/9-erc_luc_comments.pdf, February 6, 2008

accounting and mitigation of the potential impacts, if any, compared to fuels sold today.

Further work is needed to determine the land use consequences and greenhouse gas emissions attributable to increased use of corn-based ethanol. At this time staff believes it is premature to conclude that increased ethanol use in California would produce greenhouse gas benefits.

Conclusions on Impact of Early Blending on California GHG Emissions

Based on the uncertainty of current GHG impact assessments and the impact of the 2007 Energy Act, staff believes it is inappropriate at this time to assume that GHG emissions will either increase or decrease with early blending of ethanol. First, because of the increased volume requirements for ethanol on the federal level, increased ethanol blending in California in the next two years will likely have no impact on the emissions of greenhouse gases because the national level of production and use is unlikely to change with greater blending in California. Second, due to uncertainty in estimating the net lifecycle GHG impacts of crop based biofuels, staff believes that more data is needed be any such effect could be quantified. As part of the LCFS, the ARB staff will propose appropriate regulations to ensure that progress is made to move quickly to low carbon fuels.

### *33. Hydrocarbon Permeation Emissions*

106. Comment: CARB is assuming that permeation emissions do not increase as a result of increasing ethanol content from 5.7% to 10% in gasoline. There is very little data available on this key assumption. The changes being proposed allow for a 75% increase in ethanol blend levels in gasoline. Rather than assume the best possible outcome, it would be far more prudent to assume that there may be some increase. Even if the increase is relatively small in percentage terms, given the $16^{+}$ billion gallons of annual gasoline consumption statewide, it is very possible that permeation emissions impact of these upcoming modifications could be meaningful. CARB staff acknowledged that the fundamental chemical/materials mechanisms governing permeation are still not well understood. A categorical assumption of no additional impact on permeation HCs from an increase from 5.7 to 10 percent ethanol blend level is directly analogous to the erroneous assumption on permeation emissions back in 2003.

The Coordinating Research Council (CRC) study E65-3, which was primarily intended to assess permeation emissions from PZEVs and E85 indicated that for two of the vehicles tested in the study, total permeation emissions increased by 4% and 38% respectively as the ethanol portion increased from E6 to E10.[10] Figure 34 of this study indicates that there is in fact a non-linear positive relationship between ethanol content and permeation rates. AQMD staff strongly recommends that CARB obtain additional permeation emissions data from both older and newer car segments to further understand the impacts of permeation emissions. We further recommend that in the interim, CARB reevaluate its assumption of no increase in permeation emissions above 6% ethanol and, at al minimum, the Predictive Model

[10] Coordinating Research Council, E65-3, Figures 26 and 27, http://www.crcao.com/reports/recentstudies2006/E-65-3/CRC%20E-65-3%20Final%20Report.pdf

should reflect some small increase in permeation HC between E6 and E10 rather than zero percent increase. (BRW)

Agency Response: In the CRC E65-3 study, under section B in Conclusions and Findings, the report states, "Diurnal permeation rates do not appear to increase between E6 and E10." More particularly, the study found the average diurnal permeation rate increased 347 mg/day (from 177 to 524 mg/day) when the E6 fuel was substituted for the base non-ethanol E0 fuel. In comparison, the study also found the average diurnal permeation rate increased 307 mg/day (from 177 to 484 mg/day) when the E10 fuel was substituted for the base non-ethanol E0 fuel. ARB staff analyzed the data and reviewed the CRC E65-3 study and agreed with the conclusions set forth in the report.

### *34. Implementation Timing and Costs*

107. Comment: The CaRFG3 Amendments significantly underestimates the time needed and the cost of complying with the proposed amendments. To reiterate what Valero has previously told the CARB Board, CARB staff, and the California Energy Commission ("CEC"), it is critical to provide refiners adequate time to install necessary equipment to meet the new standard (i.e., fuel blends). The proposed two-year compliance schedule, now only approximately 20 months, cannot reasonably be attained, largely for reasons beyond refiners' control. The proposed compliance deadline does not take into account the length of time needed for permitting, CEQA analysis, design/engineering, procurement, staffing, and construction and turnaround schedules to complete the necessary modifications to make compliant fuel blends mandated by the CaRFG3 Amendments. As Valero and others have indicated on numerous occasions, based on our collective experience, this process would reasonably be anticipated to take four to five years to accomplish. CARB has yet to justify its arbitrary selections of a compliance deadline that cannot reasonably be achieved.

In sum, as highlighted above and throughout the rulemaking process, the failure to provide necessary lead time to comply with this significant change to the current California fuel blend formulation, the significant underestimation of the cost to comply, and the potential punitive nature of the AERP has the distinct possibility to impact the market in a negative way. Given these potential significant ramifications to Valero and other refiners, fuel suppliers, terminaling operations, etc., Valero strongly urges CARB to make changes to the CaRFG3 Amendments consistent with comments offered by Valero and WSPA, before CARB finalizes the CaRFG3 Amendments and they become effective. (DWS)

Agency Response: This comment does not pertain to the 15 day changes. See responses to comments #1 and 2.

### *35. Pipeline Fungibility*

108. Comment: As emphasized to CARB staff, a large majority of the California fuel distribution is based on a common carrier fungible system where all contributors blend to a common fuel blend specification. As such, differences between refiners and their abilities to modify operations to meet the new compliant fuel blends must be carefully studied, and adequate time and means provided to protect the fungible

nature of the distribution system. CARB staff has not adequately addressed the issue of pipeline fungibility post 2009 in the proposed changes contained in the 15-day packagage.

Valero would also respectfully request that CARB delay any final action on the CaRFG3 Amendments until the CEC fungibility study is completed. (DWS)

Agency Response: This comment does not pertain to the 15 day changes. However, during the development of this rulemaking, staff met individually with stakeholders, including Kinder Morgan, the nonproprietary pipeline operator, to determine the impacts of the amendments on pipeline fungibility. Staff determined that many of the refiners have different approaches to how they will deal with the amendments when they go into effect after 2009. Staff believes there is sufficient flexibility in the regulations to address any unforeseen problems with fungibility. Also, as part of our implementation efforts, staff will continue to monitor the situation through surveys and other actions as appropriate. ARB staff is committed to working the CEC on the fungibility study and will continue to monitor pipeline fungibilty. ARB staff is prepared to make recommendations to the Board as needed.

***36. Biofuel Concerns***

109. Comment: Biofuels are causing food and water shortages, rapid food cost inflation, and are speeding global warming.

Oil price increases have not shrunk the human food supply, but biofuel production has! The more biofuels we produce, the less food we have to eat, because we grow biofuel crops, even switchgrass, using the same land, water, fertilizer, farm equipment, and labor we use to grow food. The world is running out of wheat because too many wheat farmers have switched to growing corn for ethanol production. The USDA states that by May US wheat supplies will be lower than any time since 1948.

The FAO states global food prices rose 40% in 2007. When America foolishly turns its food into fuel, we raise food prices worldwide which gives other countries a financial incentive to burn down rainforests in order to grow more food. It takes 9,000 gallons of water to create just 1 gallon of biodiesel, so biofuel production aggravates water shortages.

The twisted logic of biofuel advocates has been that we should gladly starve the world today by turning our food into fuel, but in a few years the world can eat again because we will soon make biofuels out of easy to grow inedible cellulose crops instead of food. Three agricultural economists with insider knowledge from Iowa State University have published a study which states that ethanol made from cellulose will never be affordable. Federal tax credits would have to be raised from the current $.51 per gallon for corn ethanol to $1.55 per gallon for cellulosic ethanol. That means no ethanol from switchgrass, wood chips, or crop waste will ever be sellable.
http://www.card.iastate.edu/publications/DBS/PDFFiles/08wp460.pdf

This comes on top of the recent Princeton University study published in the journal SCIENCE that concludes that all current and proposed future biofuels, even

switchgrass, are far worse for the environment and global warming than using ordinary gasoline.
http://www.sciencemag.org/cgi/content/abstract/1151861

Nitrogen fertilizers used to grow anything unleash nitrous oxide, a greenhouse gas 296 times more powerful than carbon dioxide. Farming contributes more to global warming each year than all land, sea, and air transportation combined, so farming should only be used for essential food productions.

The global destruction caused by biofuels makes no sense strategically because by 2015 it is estimated that oil from shale will cost only $30 a barrel to manufacture, and there is far more oil potential in American shale than in the entire Middle East before drilling began in 1980.

The "energy independence" argument for biofuels is a hoax because American biodiesel made out of soybeans costs the equivalent of making regular diesel out of oil at $232 a barrel. Making ethanol from corn costs the equivalent of oil at $81 a barrel and uses 28% more fossil fuels than gasoline.

MORE BIOFUEL FACTS –
http://home.att.net/~meditation/bio-fuel-hoax.html (CC)

Agency Response: ARB is currently working on these issues under the Low Carbon Fuels Standard. This item was not covered in the 15-day package and did not fall within the scope of this regulation.

***37. Other Issues***

110. Comment: The MTBE de minimus levels contained in the rules do not reflect the detection limit of the ASTM method specified for MTBE testing. The rule language needs to be harmonized with the test method detection limits. (CR)

Agency Response: ARB will consider action on this item as part of a future rulemaking. This item was not covered in the 15-day package and did not fall within the scope of this 15-day package.

111. Comment: A WSPA member has received ethanol in 2007 and 2008 that had 1-2 ppm sulfur. According to a 3rd-party terminal operator who tested their Ethanol tanks on a regular basis, the ethanol's sulfur averaged much lower than 10 ppm in 2007. The existing sulfur content assumption for ethanol in the CARBOB Model is 10 ppm. ARB anticipates that refiners will be blending batches of CARBOB well below that level to meet the new specifications. We'd ask that the current ethanol sulfur limit be lowered to better represent in-use ethanol. (CR)

Agency Response: ARB will consider action on this item at a future rulemaking. This item was not covered in the 15-day package and did not fall within the scope of this 15-day package. See response to comments #13 and #15.

112. Comment: ARB should consider allowing a refiner to blend at a second ethanol level below the common carrier specification. Currently, this option appears to be limited to blending at higher levels. (CR)

Agency Response: ARB will consider action on this item at a future rulemaking. This item was not covered in the 15-day package and did not fall within the scope of this 15-day package.

113. Comment: The vehicle certification fuel should be modified to reflect both the lower sulfur cap and the fact that MTBE is not permitted in California gasoline. (CR)

Agency Response: ARB will consider action on this item at a future rulemaking. This item was not covered in the 15-day package and did not fall within the scope of this 15-day package. See response to comment #20.

114. Comment: A future rulemaking should clean up the CaRFG Phase 3 regulations to remove references to CaRFG Phase 2 requirements. (CR)

Agency Response: ARB will consider action on this item at a future rulemaking. This item was not covered in the 15-day package and did not fall within the scope of this 15-day package.

## C. PEER REVIEWERS' COMMENTS

115. Comment: One general observation is that the environmental impact of gasoline formulation is analyzed entirely in terms of the ozone forming potential of vehicular emissions. There is hardly any mention of the fact that gasoline vehicles are a source of primary organic carbon (OC) [*Schauer et al.*, 1996], and that some VOC species in vehicle exhaust, notably aromatics, are precursors of secondary organic aerosol (SOA) formation [*Odum et al.*, 1997]. In addition there is an increased recognition in the community that SOA formation has been quantitatively underestimated [*Robinson et al.*, 2007]. With regard to SOA, I would say that the science is not good enough to predict how a change in gasoline formulation would change the SOA forming potential of vehicular emissions. Nevertheless, our understanding of SOA formation processes is expected to improve significantly over the next few years and CARB may want to follow these developments closely and incorporate the findings into future gasoline (and Diesel) formulation programs. (JDG)

Agency Response: Currently, the Predictive Model does not account for SOA formation. At the present time, not enough information exists to incorporate SOA formation into the model. As more information becomes available, staff will consider incorporating SOA formation into the model. This issue was not covered in the hearing notice and does not fall within the scope of this rulemaking.

116. Comment: My major comment on the report relates to the apparently limited consideration of greenhouse gas emissions. My recommendation is to initiate a study to more thoroughly evaluate the impact of California reformulated gasoline regulations in general on greenhouse gas emissions. This study should consider not only emissions from on-road motor vehicles, but also from refinery operations, gasoline imports (emissions at the refineries producing the gasoline for import), and ethanol production. In order to truly estimate the impact of California reformulated gasoline regulations on greenhouse gas emissions, the study will also need to estimate emissions prior to the original introduction of the regulations." (DDG)

Agency Response: Greenhouse gas emissions will be covered in more detail under the upcoming Low Carbon Fuels Standard. This issue was not covered in the hearing notice and does not fall within the scope of this rulemaking.

117. Comment: As indicated in the previous comments, the new regulations all appear to be very reasonable, and the implementation plan allows flexibility for producers to comply in a cost effective manner depending on their particular circumstances. My main suggestion is a more through study of the impact of CaRFG regulations on greenhouse gas emissions. As stated in the General Comments section of this letter, the study should be comprehensive, and not only look at the small incremental changes brought about by these proposed regulations. (DDG)

Agency Response: See response to comments #104 and #108.

118. Comment: In order to increase the supply of gasoline via imports to the California market it is suggested that the appropriate California agency, such as the Air Resources Board, pro-actively interact with refiners outside of California. This should include educational seminars on California regulations to facilitate other refiners to sell their gasoline into the California market. (DDG)

Agency Response: ARB is very pro-active in interacting with producers outside of California. ARB staff is very open and has many workshops and private meetings with producers that wish to supply California with gasoline. This issue was not covered in the hearing notice and does not fall within the scope of this rulemaking.

119. Comment: Implicit in the ARB approach is that the Predictive Model accurately represents the changes in emissions from the existing vehicle fleet with changes in fuel composition that are within the limits of the CaRFG3 standard. In fact, the regulations use the model output in a deterministic fashion to decide whether the fuel composition is acceptable. However, the model predictions are uncertain. This unaccounted-for uncertainty means that the Predictive Model may imposes unnecessary, arbitrary constraints on fuel producers. It may mean that the CaRFG3 regulations are not achieving the anticipated air quality improvements. Addressing these concerns requires a thorough assessment of the uncertainties in the Predictive Model predictions. The goal is to not paralyze ourselves with uncertainty analysis, but to identify critical knowledge gaps and, most importantly, improve the effectiveness of regulations.

There is very little information in the report and associated appendices that address uncertainty. This is a major shortcoming of the report. The report did provide very limited goodness of fit information, but only for certain submodels and for certain pollutants (for example some goodness of fit information was given in the SAS output files for the Tech 5 CO model reproduced in Appendix D). The report noticeably did not provide confidence intervals for any of the models or discuss potential uncertainties. There were no plots or other materials that evaluated the model against actual data. In order for the Predictive Model to be a credible tool for technical analysis, the report must do a better job discussing and quantifying the uncertainties in model predictions. (AR)

At a minimum, the ARB needs to assess the uncertainty in the predictions of the existing model in its current form with the existing dataset. Ideally this would account for both the uncertainty in the underlying data and the quality of the statistical fit. Evaluating the uncertainty of the existing data set may be difficult because it requires information from the original studies. This uncertainty exists on at least two dimensions: one is the uncertainty in the actual measurements (e.g. what was the uncertainty in the emission monitor) and the second is whether or not the data are even suitable for the task at hand (this second issue is discussed in more detail later in this review).

A first step would be to simply evaluate the quality of the fit. This should be done in a number of ways. First, confidence intervals need to derived and reported for each model over the full range of its application. Deriving confidence intervals for non-linear models can be challenging so the model should also be fit using randomly selected subsets of the data and its predictions tested against the balance of the dataset. These exercises will provide substantial insight into the model performance. They may suggest changes to how the model results are used in the context of the regulations. For example, a better approach might be to write specification that the producers must produce gasoline within certainty confidence limits defined by the model. In this way the regulations will better reflect the true accuracy of the model predictions. (AR)

In summary, I strongly support the concept of using a Predictive Model to provide fuel producers flexibility in developing fuel formulations to meet the CaRFG3 standard. However, in order for the regulations to be effective, the model uncertainties must be quantified. This is a major shortcoming of the existing model. Once these uncertainties are better characterized, then regulators and stakeholders can more effectively decide how this tool can be used appropriately to improve air quality in California. (AR)

Agency Response: The Predictive Model was independently reviewed by Dr. David Rocke of University of California at Davis. After careful review of the statistics involved in the Predictive Model, Dr. Rocke agreed with the statistical approach used by staff and determined that the uncertainty in the model was not a significant problem. Dr. Rocke's independent review is included in the appendices of the Initial Statement of Reasons.

120. Comment: The second issue involves the underlying structure of the model, specifically whether the model deals adequately with high emitting vehicles. The current model bins vehicles by model year/technology class, but it does not directly address the issue of high emitters. Model year/technology class is a reasonable approach because vehicle age is known and there are clear trends in increasing emissions with age. However, model year/age does not capture high emitters as has been amply demonstrated by on-road vehicle testing; high emitters occur in all age groups / model years. See, for example, the classic paper by Beaton et al. (Science, 1995, vol 268, page 991); although this paper is now dated, more recent studies show basically the trends (http://www.feat.biochem.du.edu/). Therefore, if the goal of the Predictive Model is to accurately represent how the emissions of the in-use vehicle fleet will change with changes in gasoline formulation, then the model must pay special attention to predicting the emissions from high-emitting vehicles correctly because they dominate overall fleet emissions. Given this context, a model based

on simply binning vehicles by model year likely does not accurately predict effects of reformulated gas on the actual vehicle fleet.

Better accounting for high emitting vehicles will likely require developing new submodels specifically for these vehicles. This would likely involve modifying the basic structure of the model, by for example binning the data by emission rate in addition to model year. (This issue was raised by Jonathan Cohen in his comments on the Predictive Model reproduced in Appendix D). Once high emitting sub-models have been developed, existing data on the fraction of the vehicle fleet that is high emitters can be used to estimate feet average emission rate. This sort of data is available from on-road vehicle testing studies and is already used in models such as EMFAC. Although these changes would increase the complexity of the Predictive Model, this additional complexity is justified scientifically given the dominant role of high emitting vehicles.

There are valid technical reasons to bin vehicles by emissions as opposed to simply by year. High emitting vehicles are physically different from low emitting vehicles – their engines and/or emission control systems are not functioning properly. For example, their catalytic converter may be poisoned or fuel control system has failed. If the vehicles are inspected the problem can be determined and fixed. In fact, a modern vehicle with a failed emission control system is likely more similar to a vehicle from an earlier era, even potential an uncontrolled vehicle from the 60s or 70s, than one in its technology category. Therefore, it seems appropriate to treat these vehicles separately in the model. Of course vehicle emission rates are a continuum of values and defining a boundary between normal and high emitting vehicles is inevitably somewhat arbitrary. However, I would argue that binning by emission rate maybe more meaningful than binning vehicles by model year. For example, model year is not a perfect indicator of control technology, as it is common for manufacturers to sell vehicles that meet future emissions standards years in advance because of other considerations in the vehicle development cycle." (AR)

At a minimum the report needs to do a better job of discussing high emitters. This would likely require more clearly defining the objectives of the model. It would also be useful to better define the CaRFG3 program vis a vis reducing emissions from high emitters versus other possible outcomes. (AR)

Agency Response: The Predictive Model is designed on vehicles operating in normal condition. Staff believes it is unnecessary to make a model based on high emitters because the SMOG program is designed to minimize the number of high emitters that are on the road. In addition, staff brought forth the high emitter issue to Dr. David Rocke of the University of California of Davis during his independent review of staff's work. He agreed with staffs handling of high emitters in the model. His review of staff's work was incorporated into the appendices of the Initial Statement of Reasons.

121. Comment: A final issue is the suitability of the data used to fit the parameters upon which the Predictive Model is based. To my knowledge, the ARB staff is using the best available data. However, these data have many limitations that are not discussed in the report and likely represent a major source of uncertainty. For example, many of the tests were performed many years ago, with gasoline that presumably does not meet the CaRFG3 standard. This requires the model to

extrapolate from these results to the CaRFG3 conditions. Whether the model can be used in extrapolation accurately is very uncertain. If the majority of the data are outside of the CaRFG3 composition space, I am skeptical that the model can be used in this fashion because its underlying structure (linear relationships with some higher-order terms) is not based on the on physics or chemistry of pollutant formation. A better approach would be to only consider data from tests in which the fuel met the CaRFG3 standard (or within a domain that is modestly larger than set of fuels that might be produced to meet the standard). This would ensure the best possible model predictions over the region of interest. In fact it appears that this is already being done to some degree using the fuel box properties range (Table 3 in Appendix D). However, this aspect of the work was not described clearly. In addition, some of the ranges given in Table 3 seem much wider than those defined for the CaRFG3 fuel; aromatics content for example. This issue needs to be discussed in more detail in the report to justify the use of these data. (AR)

Agency Response: The Predictive Model was independently reviewed by Dr. David Rocke of University of California at Davis. After careful review of the statistics involved in the Predictive Model, Dr. Rocke agreed with the statistical approach used by staff. Dr. Rocke's independent review is included in the appendices of the Initial Statement of Reasons.

122. Comment: Other issues include whether the data are truly representative. For example, does the data adequately represent the in-use fleet? The age distribution of vehicles in the database listed in Table 1 on page D-37 of Appendix D suggests that they do not. Therefore, to develop a predictive model would likely require more vehicle testing. Older vehicles would have to be retested using the new fuel blends. Also, a lot of data are likely needed for new vehicles. Efforts need to be made to ensure that testing accurately captures the variations in vehicle type, age, high emitter, etc. within the fleet. This will potentially require substantial resources; however, costs for this testing would likely be relatively minor compared to the other costs stated in the report for the CaRFG3 program. Whether such testing is a good investment is a policy decision. Are the benefits of improving the performance of the Predictive Model in the context of the CaRFG3 regulations and the overall California strategy to reduce vehicle emissions worth it? At a minimum, the report needs to have a more thorough discussion of the suitability of the existing data for this application. (AR)

Agency Response: Acquiring more data and retesting data will improve the accuracy of the model. However, test programs are often time consuming and very expensive. Constant testing and updating of the fleet data would make the model dynamic. Producers need a consistent model to make the necessary refinery investments to supply California. Constant changes to the model would negatively affect the supply of gasoline to California. Staff and Dr. David Rocke of the University of California at Davis, who did an independent review of staff's work, agree that the vehicle data currently being used in the Predictive Model provide a very good representation of the in-use fleet.

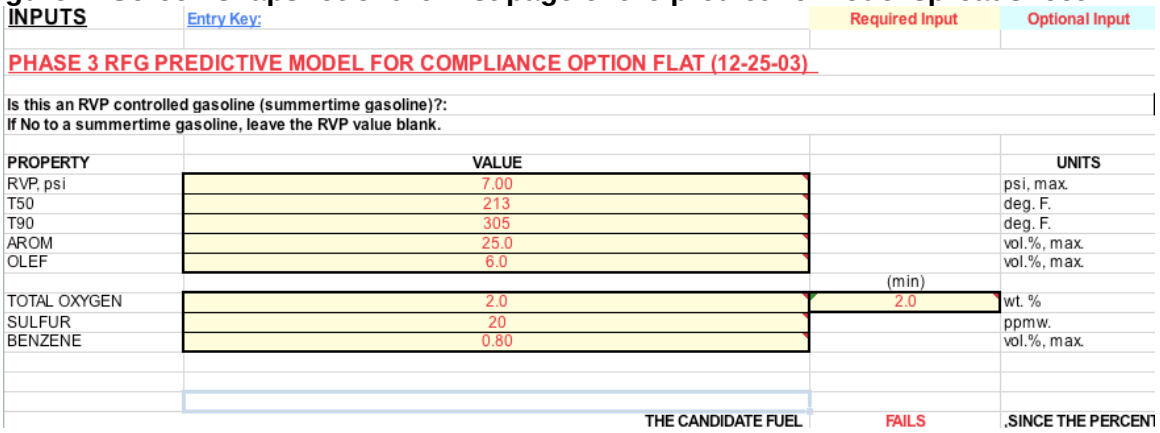
123. Comment: The Predictive Model that this reviewer received was difficult to evaluate in part due to its tabular nature but mainly due to the fact that it did not work as received. Corrections are needed to the Predictive Model. (WRS)

Agency Response: The errors in the Predictive Model spreadsheet were corrected.

124. Comment: The version of the predictive model that was received appears to have errors that inhibit its correct performance. The version that was provided was labeled "032607_draftPM.xls" in directory Updated CaRFG3 Predictive Model of the CD. This is discussed in this section. Comparison of Table ES-1 and Figure 1 illustrates the concern. The inputs to the predictive model are at or within the CaRFG3 Limits and Caps yet the fuel fails according to the predictive model.

This reviewer attempted to reduce the values further from the original values given in Figure 1. The fuel mixture may or may not be realistic but the values were chosen to represent a less volatile, less reactive fuel with lower sulfur content. In order to represent a less volatile fuel the RVP, psi was reduced to 6.40 and the T50 and T90 were raised to 220 and 330, respectively. The reactivity of the fuel was reduced by reducing the AROM to 20.0, the OLEF to 4.0 and the BENZENE to 0.70. The TOTAL OXYGEN was increased to 3.5 while the SULFUR was reduced to 15. However fuel still failed the test.

**Figure 1. Screen snapshot of the first page of the predictive model spreadsheet.**



| INPUTS | Entry Key: | Required Input | Optional Input |
|---|---|---|---|
| PHASE 3 RFG PREDICTIVE MODEL FOR COMPLIANCE OPTION FLAT (12-25-03) | | | |
| Is this an RVP controlled gasoline (summertime gasoline)?: | | | |
| If No to a summertime gasoline, leave the RVP value blank. | | | |
| PROPERTY | VALUE | | UNITS |
| RVP, psi | 7.00 | | psi, max. |
| T50 | 213 | | deg. F. |
| T90 | 305 | | deg. F. |
| AROM | 25.0 | | vol.%, max. |
| OLEF | 6.0 | | vol.%, max. |
| | | (min) | |
| TOTAL OXYGEN | 2.0 | 2.0 | wt. % |
| SULFUR | 20 | | ppmw. |
| BENZENE | 0.80 | | vol.%, max. |
| | THE CANDIDATE FUEL | FAILS | ,SINCE THE PERCENT |

**Table ES-1. Copied from Staff Report.**

**Table ES-1: CaRFG3 Limits and Caps**

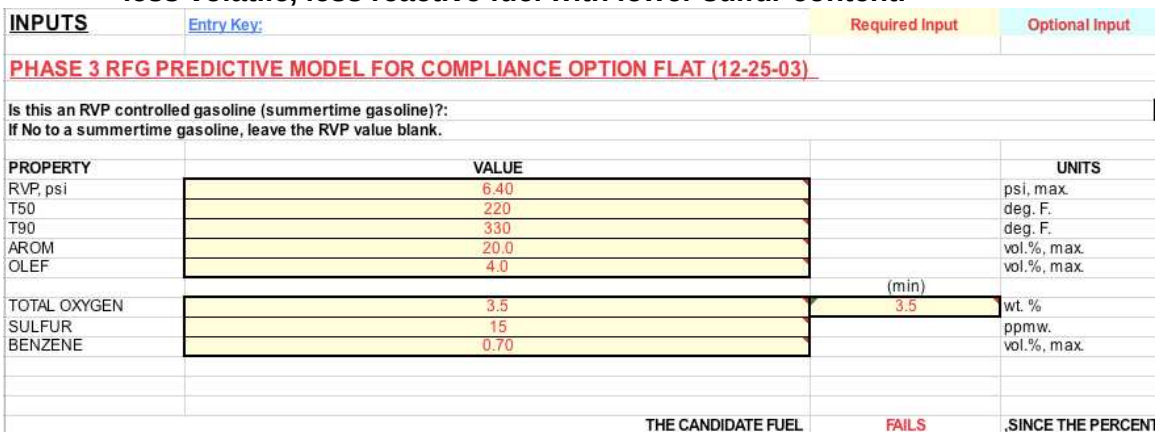
| Property | Flat Limits | Averaging Limits | Cap Limits[1] |
|---|---|---|---|
| Reid vapor pressure, psi, max | 7.00 or 6.90 [2] | --- | 6.40 - 7.20 |
| Benzene, vol%, max | 0.8 | 0.70 | 1.10 |
| Sulfur, ppmw, max | 20 | 15 | 30 |
| Aromatic HC, vol%, max | 25 | 22 | 35 |
| Olefins, vol%, max | 6.0 | 4.0 | 10 |
| Oxygen, wt% | 1.8 to 2.2 | --- | 1.8 – 3.5[3]<br>0 – 3.5 |
| T50 (temp. at 50% distilled) °F, max | 213 | 203 | 220 |
| T90 (temp. at 90% distilled) °F, max | 305 | 295 | 330 |

(1) The "cap limits" apply to all gasoline at any place in the marketing system and are not adjustable.

(2) 6.90 psi applies when a producer is using the evaporative emissions element of CaRFG3 Predictive Model and gasoline may not exceed a cap of 7.20 psi; otherwise, the 7.00 psi limit applies.

(3) The 1.8 weight percent minimum applies only during the winter and only in certain areas.

**Figure 2. Screen snapshot of the first page of the predictive model spreadsheet for a less volatile, less reactive fuel with lower sulfur content.**



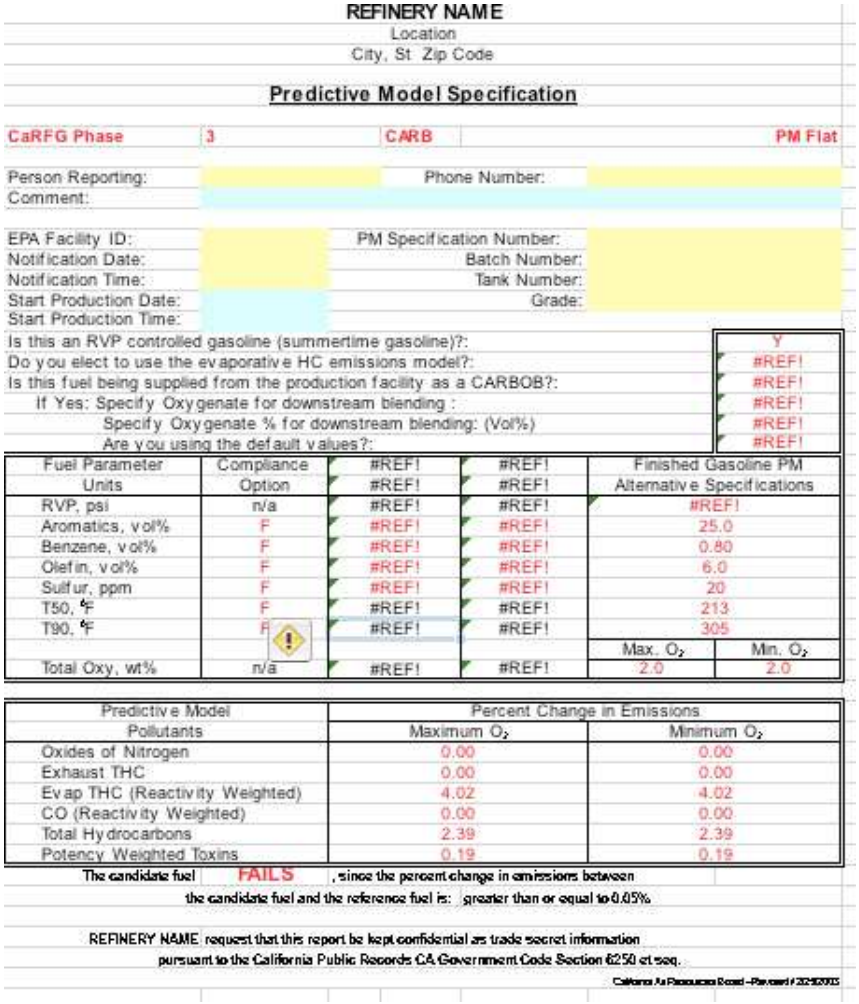
| INPUTS | Entry Key: | Required Input | Optional Input |
|---|---|---|---|
| PHASE 3 RFG PREDICTIVE MODEL FOR COMPLIANCE OPTION FLAT (12-25-03) | | | |
| Is this an RVP controlled gasoline (summertime gasoline)?: | | | |
| If No to a summertime gasoline, leave the RVP value blank. | | | |
| PROPERTY | VALUE | | UNITS |
| RVP, psi | 6.40 | | psi, max. |
| T50 | 220 | | deg. F. |
| T90 | 330 | | deg. F. |
| AROM | 20.0 | | vol.%, max. |
| OLEF | 4.0 | | vol.%, max. |
| | | (min) | |
| TOTAL OXYGEN | 3.5 | 3.5 | wt. % |
| SULFUR | 15 | | ppmw. |
| BENZENE | 0.70 | | vol.%, max. |
| | THE CANDIDATE FUEL | FAILS | ,SINCE THE PERCENT |

This reviewer attempted to find the source of the apparent problem. In the original copy there were no obvious errors in spreadsheet except for the page titled “PM Flat Batch (Report)”. A screen snapshot appears in Figure 3.

The page is filled with many unresolved references. For example the response to the question “Do you elect to use the evaporative HC emissions model?:”; “='Phase 3 PM for PM Flat'!#REF!” appears to refer to the first page but this reference was broken.

It was distressing to attempt to evaluate a model that was not provided as working. Just to insure that there were no problems due to some unknown incompatibility in EXCEL versions the predictive model was tested on two different computers (a PC and a Mac) but the results were the same. Improvements in the predictive model are recommended.

**Figure 3. Screen snapshot of the titled "PM Flat Batch (Report)" page of the predictive model spreadsheet for the original fuel mixture.**



REFINERY NAME
Location
City, St Zip Code

**Predictive Model Specification**

| | | | |
|---|---|---|---|
| CaRFG Phase | 3 | CARB | PM Flat |

| | | | |
|---|---|---|---|
| Person Reporting: | | Phone Number: | |
| Comment: | | | |
| EPA Facility ID: | | PM Specification Number: | |
| Notification Date: | | Batch Number: | |
| Notification Time: | | Tank Number: | |
| Start Production Date: | | Grade: | |
| Start Production Time: | | | |

| | |
|---|---|
| Is this an RVP controlled gasoline (summertime gasoline)?: | Y |
| Do you elect to use the evaporative HC emissions model?: | #REF! |
| Is this fuel being supplied from the production facility as a CARBOB?: | #REF! |
| If Yes: Specify Oxygenate for downstream blending : | #REF! |
| Specify Oxygenate % for downstream blending: (Vol%) | #REF! |
| Are you using the default values?: | #REF! |

| Fuel Parameter | Compliance | #REF! | #REF! | Finished Gasoline PM | |
|---|---|---|---|---|---|
| Units | Option | #REF! | #REF! | Alternative Specifications | |
| RVP, psi | n/a | #REF! | #REF! | #REF! | |
| Aromatics, vol% | F | #REF! | #REF! | 25.0 | |
| Benzene, vol% | F | #REF! | #REF! | 0.80 | |
| Olefin, vol% | F | #REF! | #REF! | 6.0 | |
| Sulfur, ppm | F | #REF! | #REF! | 20 | |
| T50, °F | F | #REF! | #REF! | 213 | |
| T90, °F | F | #REF! | #REF! | 305 | |
| | | | | Max. $O_2$ | Min. $O_2$ |
| Total Oxy, wt% | n/a | #REF! | #REF! | 2.0 | 2.0 |

| Predictive Model | Percent Change in Emissions | |
|---|---|---|
| Pollutants | Maximum $O_2$ | Minimum $O_2$ |
| Oxides of Nitrogen | 0.00 | 0.00 |
| Exhaust THC | 0.00 | 0.00 |
| Evap THC (Reactivity Weighted) | 4.02 | 4.02 |
| CO (Reactivity Weighted) | 0.00 | 0.00 |
| Total Hydrocarbons | 2.39 | 2.39 |
| Potency Weighted Toxins | 0.19 | 0.19 |

The candidate fuel FAILS , since the percent change in emissions between the candidate fuel and the reference fuel is: greater than or equal to 0.05%

REFINERY NAME request that this report be kept confidential as trade secret information pursuant to the California Public Records CA Government Code Section 6250 et seq.

(WRS)

Agency Response: The errors in the Predictive Model spreadsheet were corrected.