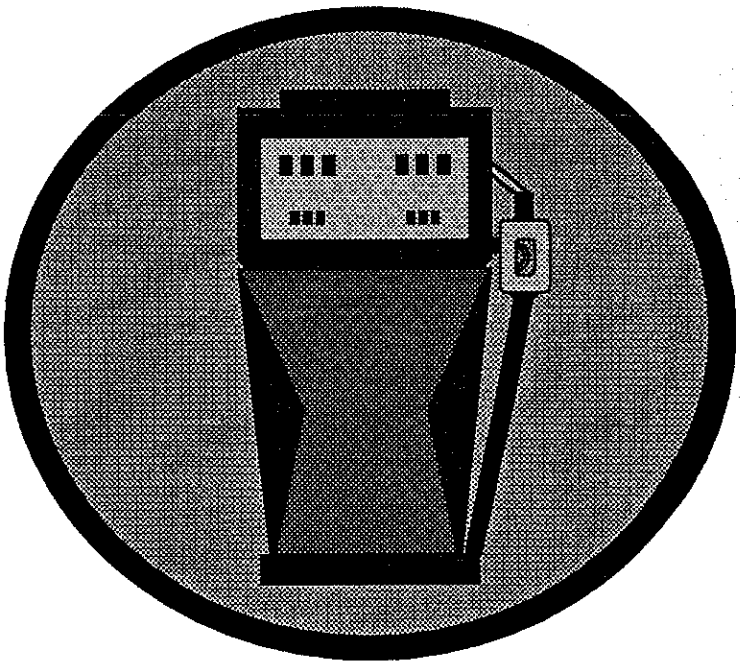
California Environmental Protection Agency

Air Resources Board

Final Statement of Reasons



Amendments to the California Phase 2 Reformulated Gasoline Regulations, Including Amendments Providing for the Use of a Predictive Model

April 1995

FINAL STATEMENT OF REASONS

Proposed Amendments to the California Phase 2 Reformulated Gasoline Regulations, Including Amendments Providing for the Use of a Predictive Model

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State of California
AIR RESOURCES BOARD

Final Statement of Reasons for Rulemaking
Including Summary of Comments and Agency Responses

PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE CALIFORNIA PHASE 2 REFORMULATED GASOLINE REGULATIONS, INCLUDING AMENDMENTS PROVIDING FOR THE USE OF A PREDICTIVE MODEL

Public Hearing Date: June 9, 1994
Agenda Item No: 94-6-2

I. GENERAL

On June 9, 1994, the Air Resources Board (ARB) conducted a public hearing to consider amendments to the Phase 2 reformulated gasoline (Phase 2 RFG) regulations. The ARB originally adopted the Phase 2 RFG regulations following a public hearing in November 1991. These regulations established a comprehensive set of specifications for gasoline designed to achieve the maximum reductions in emissions of criteria pollutants and toxic air contaminants from gasoline-powered motor vehicles. The specifications are applicable beginning March 1, 1996.

As proposed, the amendments would provide additional flexibility to California refiners in the production of Phase 2 RFG without sacrificing either the environmental benefits or the enforceability of the Phase 2 RFG regulations. The amendments would allow the use of a predictive model to evaluate and approve alternative Phase 2 RFG formulations and modify several sections of the Phase 2 RFG regulations to facilitate implementation.

At the conclusion of the hearing, the Board adopted resolution 94-38 approving the proposed amendments to the regulations with various modifications. Most of the modifications were based on changes the staff proposed at the hearing. The Board directed the Executive Officer to incorporate the modifications into the originally proposed regulatory text with such other conforming changes as were appropriate. In accordance with Government Code section 11346.8(c), the Board directed the Executive Officer to make the modified regulatory text available to the public for a supplemental written comment period of 15 days. He was then directed either to adopt the modified regulations with such additional changes as may be appropriate in light of the supplemental comments, or to present them to the ARB for further consideration if he determined such an action was warranted by the comments.

The modified text of the regulations was made available on March 6, 1995 for a 15-day period for supplemental public comment. During the comment period, the ARB received written comments from five commenters. After considering the comments, the Executive Officer issued Executive Order G-95-018, amending sections 2260, 2261, 2262.2, 2262.3, 2262.4, 2262.5, 2262.6, 2262.7, 2264, and 2270 in Title 13, California Code of Regulations, adopting sections 2264.2, 2264.4, and 2265, in Title 13, California Code of Regulations, and adopting the "California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model," incorporated by reference in section 2265, Title 13, California Code of Regulations.[1]

The Staff Report for this rulemaking was available for public inspection on April 22, 1994. The Staff Report included the text of the amendments as initially proposed by the staff, along with extensive descriptions of the rationale for the proposal. The Staff Report is incorporated by reference herein. This Final Statement of Reasons updates the Staff Report by identifying and explaining the modifications made to the originally proposed texts. The Final Statement of Reasons also contains a summary of the comments the ARB received on the proposed amendments during the formal rulemaking process and the ARB's responses to the comments.

New section 2265 of Title 13, California Code of Regulations, incorporates by reference the ARB's "California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model." This incorporated document is readily available from the ARB upon request. The original proposed version was attached as Appendix B of the Staff Report, and a full modified proposed text was attached to the Notice of Public Availability of Modified Text. The document is incorporated in the California Code of Regulations by reference because it would be cumbersome, unduly expensive, and otherwise impractical to publish it in the Code. It contains complex equations and charts. The other ARB procedure pertaining to the establishment of alternative formulations of Phase 2 RFG--the "California Test Procedures for Alternative Specifications for Gasoline" as adopted September 18, 1992--has similarly been incorporated by reference in Title 13, California Code of Regulations, section 2266(a). It has been the longstanding and accepted practice for the ARB to incorporate other such Procedures by reference (see Title 13, California Code of Regulations, section 2317). As the interested audience for the predictive model evaluation procedures is small (most specifically the employees of oil refiners and importers who would actually use the procedures), distribution to all recipients of the Code is unnecessary.

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1. As adopted, the amended regulations and procedures contained various nonsubstantive modifications to the texts made available on March 6, 1995. These additional modifications are identified in Attachment A to this Final Statement of Reasons. See also the responses to comments made during the 15-day comment period, set forth in Section III below.

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 reimbursable by the State pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code.

The ARB has further determined that no alternative considered by 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 the ARB. The bases for these findings are combined in Section V.F. of the Staff Report and in the responses to comments set forth in Section III below.

II. MODIFICATIONS TO THE AMENDMENTS

The objective of the amendments is to provide additional flexibility to gasoline producers without sacrificing either the emission benefits or the enforceability of the Phase 2 RFG regulations. As originally proposed, the amendments modify several sections of the Phase 2 RFG regulations to facilitate implementation, and add an option to allow the use of a predictive model to evaluate and approve alternative Phase 2 RFG formulations. The amendments are described in detail in the Staff Report and are summarized in section A below. Sections B and C describe the modifications identified at, and subsequent to, the Board hearing.

A. Description of the Originally-Proposed Amendments

1. Implementation Amendments

The implementation amendments modify the Phase 2 RFG regulations in the following five ways. First, they allow producers and importers to select flat or averaging limits on a more frequent basis for gasoline transferred from production and import facilities. Second, they allow operators of gasoline terminals, bulk plants, and service stations additional time for compliance with the cap limits. Third, they allow producers and importers to first report the estimated volume of fuel shipped and then report the final volume shipped within 48 hours after completing the final transfer. Fourth, they relieve the burden of compliance from importers of gasoline originally refined in California. And fifth, they allow producers to report the aromatic hydrocarbon volume percent of their Phase 2 RFG to the tenth of a volume percent.

2. California Predictive Model

The amendments relating to the California predictive model allow gasoline producers to compare, via computer model, the performance of Phase 2 RFG with the performance of an alternative gasoline formulation that has different specifications. An alternative gasoline formulation would be acceptable if the predicted emissions resulting from its use were equal to or better than the predicted emissions resulting from the use of Phase 2 RFG. The amendments define the California predictive model and specify how producers may use the model to evaluate alternative gasoline formulations.

The California predictive model is comprised of three equations. In each equation, the vehicular emissions that will result from the use of an alternative gasoline formulation are compared to emissions resulting from the use of Phase 2 RFG. One equation determines the percent change in exhaust emissions of hydrocarbons; the second determines the percent change in exhaust emissions of oxides of nitrogen; and the third determines the percent change in the combined exhaust emissions of four toxic air contaminants. The four toxic air contaminants included are benzene, 1,3-butadiene, acetaldehyde, and formaldehyde. An alternative gasoline formulation is acceptable if the percent change in emissions is less than or equal to 0.04 percent for hydrocarbons, oxides of nitrogen, and the potency-weighted toxic air contaminants.

The staff developed the California predictive model based on an analysis of vehicle emissions tests for two different classes of motor vehicles. The first class represents model year 1981 through 1985 motor vehicles and the second class represents model year 1986 through 1995 motor vehicles. Each class is comprised of vehicles with similar exhaust emission control technologies. These data generally represent the best data available for predicting the emissions impact that an alternative gasoline formulation will have when used in gasoline-powered vehicles and future motor vehicle fleets in California.

Each of the three equations in the California predictive model considers the effects from the two motor vehicle classes. The effects are combined using a technique to "weight" the impact that changes in fuel properties may have on each vehicle class. For hydrocarbons and oxides of nitrogen, the predicted emissions for the two vehicle classes are weighted by the average contribution each vehicle class is expected to make to the total on-road emissions for light-duty vehicles in the years 1996, 2000, and 2005. For the toxic air contaminants equation, the predicted emissions are weighted by the average contribution each vehicle class is expected to make to the total on-road vehicle miles traveled for light-duty vehicles in the years 1996, 2000, and 2005. The predicted emissions for each toxic air contaminant are further weighted by the potential of the toxic air contaminant to cause cancer relative to 1,3-butadiene.

In order to evaluate an alternative gasoline formulation using the California predictive model, a producer would identify specifications for the eight properties subject to the Phase 2 RFG regulations. Each of the eight specifications must not exceed the cap limit applicable to the property. For each fuel property other than RVP and oxygen content, a producer may choose between a specification to be applied as a flat limit and a specification to be applied as an averaging limit.

A producer wishing to produce an alternative gasoline formulation would notify the Executive Officer of the alternative specifications and of the percent change in emissions under the model for emissions of hydrocarbons, oxides of nitrogen, and potency-weighted toxic air contaminants. The producer would also provide the identity, location, and estimated volume of the batch. The notification would be subject to the same time requirements that apply to notification of designated alternative limits (DALs) established using the averaging option.

Under the amendments, a producer is required to offset any outstanding DAL debits before using the California predictive model to approve an alternative gasoline formulation. Once a producer starts supplying an alternative gasoline formulation certified using the California predictive model and using the averaging limits, the producer is required to offset any averaging debits before switching to another compliance option.

The provisions regarding the California predictive model apply to importers of gasoline as well as to producers.

B. Modifications Identified at the June 9, 1994 Board Hearing

1. Changes to the Phase 2 Reformulated Gasoline Regulations

a. Limited Extensions of the 90-Day Offset Period Under the Averaging Compliance Option

In the case of six of the eight Phase 2 RFG specifications, the regulations allow producers or importers to use an averaging compliance option instead of complying with the specified flat limits. The averaging limits for each of the six properties are more stringent than the comparable flat limits. Under the averaging option, a producer or importer may assign differing DALs to different batches of gasoline being supplied from the production or import facility. Each batch of gasoline must meet the DAL for the batch.

In the original regulations, a producer or importer supplying a batch of gasoline with a DAL less stringent than the averaging limit must fully offset the exceedances of the averaging limit using sufficient quantities of gasoline subject to more stringent DALs. This must be done within 90 days before or after supply of gasoline from the same facility.

The modified amendments add a new section 2264.4 which allows producers and importers to extend the 90-day offset period in limited circumstances. The elements of the new section are closely patterned after recommendations in a May 25, 1994 comment letter from the Western States Petroleum Association.

Under the modifications, producers and importers are allowed up to three extensions in 1996 and up to three extensions in 1997. The maximum duration of each extension is 10 days and the extensions can be taken consecutively. The extension provision ends December 31, 1997. Therefore, no extensions can start on or after January 1, 1998. Each extension applies to the required time in which a batch or batches of gasoline with DALs generating "debits" for a particular property would have to be fully offset by a subsequent batch or batches of gasoline with a more stringent DAL generating "credits" for that property. Each extension allows debits for a property to be offset up to 100 days after shipment of the debit batch, rather than in no more than 90 days. The extension also applies to other debit batches for

that property whose 90-day offset period expires during the extension period, although the extension length for these batches would diminish as the fixed ending date is approached. For example, a refiner may on January 1 produce a batch of gasoline with a sulfur deficit and on January 6 produce another batch with a sulfur deficit. The 90-day period for offsetting the January 1 batch ends March 31. If a refiner extends the March 31 offset deadline 10 days to April 10, April 10 would also become the new offset deadline for the January 6 batch.

In order to extend an offset period beyond 90 days, a producer would have to notify the ARB before 5:00 p.m. on the 90th day. The producer would be required to identify an unforeseen event necessitating the extension. In the notification, the producer would have to specify the DAL parameter(s) and the date the extension would go into effect.

A single extension could apply to more than one DAL parameter if (a) the additional fuel parameters are identified in the original notification, (b) the need for an extension for the additional parameters is shown to be attributable to the unforeseen event identified in the notification, and (c) the additional parameters have a "debit" balance at the time of the extension notification and would reach 90-day offset deadlines during the requested extension period. This modification also applies to importers operating under the averaging compliance option.

The extension provisions are designed to provide additional flexibility in meeting the Phase 2 RFG regulations during the early years of implementation as producers are gaining more experience in blending gasoline to simultaneously meet all of the Phase 2 RFG specifications. While they will allow an extension of the offset period, the modifications will not change the requirement for full offsets for all DAL "debit" batches. See also Comment 20 and the Agency Response to the comment, set forth below.

b. Use of an Enforcement Protocol with the California Predictive Model Option

A new subsection (4) was added to section 2265(a), Title 13, California Code of Regulations, to allow the use of enforcement protocols to vary the notification requirements pertaining to gasoline batches to be sold subject to alternative specifications based on application of the California predictive model. The regulatory language is identical to a preexisting provision allowing protocols regarding designated alternative limit notifications.

c. Miscellaneous

The following nonsubstantive clarifying editorial revisions were made in the first sentence of section 2264.2(a)(1):

(1) A producer or importer selling or supplying a final blend of gasoline from its production or import facility may elect pursuant to this section 2264.2(a) to have the final blend subject to the averaging compliance option for one or more of the following properties: sulfur,

benzene, olefins, ~~or~~ aromatic hydrocarbons, ~~content,~~ T50, or T90.

2. Changes to the California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model

a. Eliminate Statistically Insignificant Terms in the Toxics Equations

The equations for the individual toxics were derived using the SAS Institute's Mixed Model Procedure. Each equation has several terms that relate the concentration of a fuel property to the emissions of a specific pollutant. Originally, the seven first-order (linear) terms in the toxics equations were included in the equations regardless of the significance of these terms. To simplify the equations, the statistical analysis was redone including only the statistically significant terms. Significance was determined using a standard t-statistic evaluation where a significant term was one whose probability of random occurrence was less than 0.05. The analysis was redone for both Technology (Tech) class 3 and Tech class 4 and all four toxics (benzene, 1,3-butadiene, acetaldehyde, and formaldehyde). As a result, a number of insignificant terms in the individual equations were eliminated and the coefficients for the remaining terms were changed.

Sections Affected: VI.A., Table 12

b. Adjust the T50 and T90 Responses in the Hydrocarbon Equation for Technology Class 4

The Tech class 4 hydrocarbon equation was originally derived using the SAS Institute's Mixed Model procedure. This procedure derives equations based on the information contained in the database. Unfortunately, there is a limited amount of emissions data at low values of the 50 percent (T50) and 90 percent (T90) distillation temperatures. The responses predicted by the Tech class 4 hydrocarbon equation relative to low T50 and T90 values indicate that there will be an increase in hydrocarbon emissions at low values of the two distillation temperatures. These responses do not appear to be supported by the data. Therefore, a linearization technique has been employed to "flatten-out" the responses of T50 and T90.

Sections Affected: III.C., V.A.2.

c. Adjust the RVP*Oxygen Response in the Oxides of Nitrogen Equation for Technology Class 4

As with the T50 and T90 data discussed in subsection b immediately above, there are limited emissions data at low values of the RVP as a function of the oxygen content of the fuel. The responses predicted by the Tech class 4 oxides of nitrogen equation relative to low RVP and oxygen values indicate that there will be an increase in oxides of nitrogen emissions at low values of RVP and oxygen. These responses do not appear to be supported by the data.

Therefore, a linearization technique has been employed to "flatten-out" the responses of RVP and oxygen.

Sections Affected: III.C., IV.A.2.

C. Additional Changes to the Procedures Made After the Board Hearing

The following changes were identified after the Board hearing. The first three changes discussed are nonsubstantive in nature and do not affect the output of the California predictive model. The fourth change more precisely defines the oxygen content in the methodology for determining the candidate and reference specifications for oxygen content and is a necessary change to improve the clarity of the Procedures.

1. Simplification of Emission Equations

The Procedures for evaluating an alternative specification for Phase 2 RFG using the California predictive model require the value of the RVP specifications to be 7.00 for both the candidate and reference fuels. Because RVP is held at a constant value, the oxides of nitrogen, hydrocarbon, and potency-weighted toxics equations can be simplified. The simplification consists of replacing the RVP variable with 7.00 and simplifying each of the three emission equations found in the Procedures. These modifications do not change the output of the California predictive model.

Sections affected: IV.A.1., IV.A.2., V.A.1., V.A.2., VI.A.1., and VI.A.2.

2. RVP Significant Figures

The RVP value reported in Table 7 of the Procedures has been changed to read "7.00" instead of 7.0 to be consistent with the Phase 2 RFG regulations (section 2260(a)(21)).

Section affected: Table 7

3. Editorial Revisions

Various nonsubstantive editorial corrections were made to the text of the Procedures.

Sections affected: I.B., I.C., Table 6, Table 7, III.C., and III.D.

4. Modification of the Methodology for Determining Candidate and Reference Specifications for Oxygen

Section III.B.1. of the Procedures defines the methodology for determining candidate and reference specifications for oxygen. This section includes Table 6, entitled Candidate and

Reference Specifications for Oxygen. In Table 6, the terms "minimum" and "maximum" in the reference fuel column have been replaced with 1.8 and 2.2, which are the values they represent. Also, two new scenarios have been added to Table 6. These two new scenarios address candidate fuels with minimum oxygen levels below 1.8 weight percent and maximum oxygen levels either greater than 2.2 weight percent or less than 1.8 weight percent.

Section Affected: Table 6

III. SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

The Board received numerous written and oral comments, both in connection with the June 9, 1994 Board hearing and during the subsequent 15-day public comment period. Attachment B contains a list of all persons who presented comments during the comment periods--other then those who supported the proposed amendments without raising specific concerns--including the date and form of each comment and the shorthand identification of the commenter as used in this Final Statement of Reasons.

Set forth below is a summary of each objection or recommendation made regarding the specific regulatory actions proposed, together with an explanation of how the proposed action was changed to accommodate each objection or recommendation, or the reasons for making no change. The comments have been grouped by topic whenever possible. In several cases, similar comments were made by two or more individuals. These comments are listed sequentially with the agency response following the last of these comments.

Most commenters generally supported adoption of the amendments to the California Phase 2 RFG regulations, including the amendments providing for the use of the California predictive model. These commenters included the Western States Petroleum Association (WSPA), Mobil Oil Company (Mobil), Chevron, Toyota, Texaco, American Automobile Manufacturers Association (AAMA), California Independent Oil Marketers Association (CIOMA), and Arco Products (ARCO).

A. Comments Pertaining to the California Predictive Model

1. Pre-exclusion of Terms

Comment 1: The staff's decision to use all 28 potential second order terms as potential candidate fuel variables results in a few technically inappropriate terms in the final model. Second order terms should be allowed as candidate variables only if the underlying dataset contains test results from at least one program designed to specifically evaluate the second order term under consideration. (WSPA)

Agency Response: We have included all 28 possible second order terms as potential candidate fuel variables. We used the SAS Institute's Mixed Model Procedure to determine which second order terms are considered statistically significant. Stepwise analysis is repeated until there are no candidate second order terms found to be significant at the five percent level and all second order terms already in the model remain significant. We believe this procedure does not arbitrarily exclude variables that may contribute significantly to estimating emissions.

Further, we believe that second order terms should be allowed as candidate variables even if the dataset does not contain a test program specifically designed to evaluate the second order term under consideration. By combining a large set of related information into a single database and by using appropriate statistical methodologies, one can identify interactions and relationships that individual studies were not specifically designed to evaluate. We used such an approach to identify statistically significant second order terms. This approach is consistent with generally accepted statistical analysis methods.

2. Elimination of Statistically Significant Terms From the Toxic Model

Comment 2: The final toxics model should only include statistically significant terms. (WSPA, Unocal)

Agency Response: We agree with the commenters. The California predictive model's toxics equations, as made available in the 15-day package, include only terms statistically significant at a p-value of 0.05. This approach simplifies the toxic equations without sacrificing the predictive powers of the model.

3. Linearization of Predictive Model Responses

Comment 3: In developing the California predictive model, the staff should use linear extrapolation to correct counter-intuitive model trends whenever possible. (Unocal)

Agency Response: We agree with the commenter's suggestion in two cases. We believe that the use of a flat line linear extrapolation technique is appropriate to: 1) adjust the T50 and T90 responses in the hydrocarbon equation for Tech class 4, and 2) adjust the RVP*Oxygen response in the oxides of nitrogen equation for Tech class 4. We were concerned that the model's response, particularly for low values of T50, T90, RVP, and oxygen, could not be supported without additional data. Therefore, a flat line linearization technique was employed to "flatten-out" the responses of T90, T50, RVP, and oxygen. We believe that linearization of these equations does not adversely affect the predictive power of the model. In all other cases, we are confident that the California predictive model's responses are supported by the data and use of the linearization technique is not warranted.

4. Predictive Power of the Model

Comment 4: Tests of the California predictive model indicate that the model adequately represents the effects of changes in fuel parameters on vehicle emissions. However, the AAMA's tests of the model used the same fuel and emissions data that were used in the construction of the model and thus do not provide an independent check of the model. The AAMA acknowledges that robust, independent data sets do not at this time exist. (AAMA)

Agency Response: We recognize that the most valid check of the California predictive model is to use independent data. However, as the commenter noted, no independent data sets existed at the time. Therefore, the next best approach was to use data from particular studies in the database and compare the model's predictions to actual observed emission changes. The AAMA test of the California predictive model used this approach.

We also conducted a test of the California predictive model using selected studies that are part of the ARB working database to compare predictions versus observations. These studies were different than those selected by AAMA. For each fuel in each study, we determined the average percent change in the observed emissions between the study's reference fuel and each fuel tested. We then used the California predictive model to predict the percent change between the reference fuel and each fuel tested. Finally, we compared the observed percent change to the predicted percent change for each set of fuels. This comparison showed that the California predictive model predictions are generally within 10% of the observed values. The AAMA analysis showed a similar level of agreement.

5. Issues Associated with Reid Vapor Pressure

Comment 5: Several commenters questioned the accuracy of the model's response relative to RVP. One commenter questioned the substantial oxides of nitrogen decreases and hydrocarbon increases predicted by the model as RVP is reduced within the range of 6.5 psi to 7.5 psi. While acknowledging that the staff addresses the concerns by proposing to fix RVP at 7.00 psi, the commenter still expressed concern about underlying issues associated with the accuracy of the model. A second commenter indicated that the RVP/hydrocarbon relationship is influenced by several highly influential observations. (WSPA, Unocal)

Agency Response: The equations that make up the predictive model were derived using a statistical approach discussed in detail on pages 28 to 33 in the Staff Report. Overall, the database used to derive the predictive model equations was the most extensive yet assembled for motor vehicle emissions testing results. The database consisted of over 20 studies representing over 7,700 individual vehicle tests.

The RVP equations in the version of the predictive model made available April 22, 1994 with the Staff Report showed that as RVP is reduced below 7.00, emissions of oxides of nitrogen decreased substantially and emissions of hydrocarbons increased.

There is disagreement among scientists and engineers regarding the accuracy of this response to changes in RVP. Some maintained that the results predicted by the model are counter-intuitive. That is, one would expect both oxides of nitrogen and hydrocarbons to decrease as RVP decreases. Others argued that low RVP fuel could affect engine performance, particularly driveability, and therefore result in an increase in both oxides of nitrogen and hydrocarbons as the RVP is reduced to lower levels.

Our analysis of the RVP equations, particularly for Tech class 4 vehicles, showed that the responses were strongly influenced by a few data points from fuels with RVP values less than 7.00. Because we had very little data in the low RVP range (RVPs less than 7.00) and there were conflicting opinions concerning what impact low RVP fuels will have on emissions of oxides of nitrogen and hydrocarbons, we revised the model by fixing the RVP value at the Phase 2 RFG limit of 7.00. Fixing the RVP value at 7.00 essentially removes RVP as a variable in the model. This approach does limit producers' flexibility somewhat, but we believe it is the best approach given the conflicting opinions and uncertainty concerning the effects of low RVP fuel.

Comment 6: The industry should be allowed to average the RVP because:

a) The model is designed to allow only the use of an RVP of 7.00. However, the emissions response to RVP is questionable and virtually no gasoline is expected to be produced at exactly 7.00. Fixing the RVP at 7.00 results in the elimination of all data to one side of the observed minimum because the model is random-balanced over the 6.50-7.50 psi range where less than 2.6% of the available Tech class 4 data lie. This results in a straight line response where exhaust hydrocarbons increase as RVP is lowered. The combined effect of the erroneous hydrocarbons trend and lack of evaporative hydrocarbons credit eliminates RVP as a cost-effective hydrocarbons control parameter in the model.

b) In order to account for RVP variability, the upper control limit for RVP becomes 6.90 psi and the lower limit is 6.50 psi, and there are several problems with RVP results in this range. There is very little vehicle emission data in the low RVP range and auto driveability is affected.

As a result, the commenter recommends that the ARB allow the RVP to be averaged at 6.90 psi with a cap at 7.10 psi. (Unocal)

Agency Response: Currently, the Phase 2 RFG regulations require producers to meet a "flat" limit for RVP set at 7.00 psi during the RVP season. Flat limits are limits that must not be exceeded in any gallon of gasoline leaving the production facility. In the case of RVP, this limit applies throughout the gasoline distribution system.

The 7.00 psi flat limit RVP specification was established in November 1991 when the Phase 2 RFG specifications were originally adopted. We have not proposed amending RVP limits as part of the June 9, 1994 Board hearing. Therefore, the RVP specification value cannot be amended or changed as part of this rulemaking. Any change to the RVP specification would have to be addressed in a separate rulemaking. We will continue to work with gasoline producers and marketers regarding this issue.

In response to the concerns the commenter raised, we agree that an "averaging" limit for RVP would be numerically lower than 7.00 psi. Under an averaging option, the producer could assign differing designated alternative limits (DALs) for RVP to different batches of gasoline. If a producer supplies a batch of gasoline with a DAL lower than the averaging limit, the producer must, within 90 days, supply from the same facility sufficient quantities of gasoline subject to more stringent DALs to fully offset the exceedances of the averaging limit.

Concerning issue a), we agree that there are very little vehicle emission data in the low RVP range. Because of this, we modified the originally proposed RVP equations by fixing the RVP value in the model at 7.00. Further, the model addresses exhaust emissions only and does not predict the impact of changes in RVP on evaporative emissions. We have discussed issues concerning the model's prediction of hydrocarbon emissions with changes in RVP specifications in the Agency Response to Comment 5. The rationale for not including an evaporative element in the predictive model is discussed in the response to Comment 10 below. The effect of these two actions is to not provide credits for reductions in RVP below 7.00. We maintain this is appropriate given the uncertainty of the impact of low RVP fuels on hydrocarbon emission and the problems identified in developing an evaporative emissions model.

Concerning issue b), we do not believe a gasoline with an RVP in the range of 6.50 to 7.00 psi will result in driveability problems. RVP by itself can be a poor predictor of vehicle driveability. If low RVP gasoline is produced in an integrated refinery configuration by making changes across the entire gasoline distillation range, the low RVP values would not adversely affect vehicle driveability. Studies have shown that vehicle driveability is highly dependent on the distillation characteristics of the fuel.

Generally, the performance of automobile engines will improve when operated on gasolines with low driveability indexes (DI). Thus, even at low RVPs, a refiner can decrease the gasoline's DI by making changes over the entire distillation range.

The automobile manufacturers have indicated to the ARB staff that the use of gasoline with RVP values as low as 6.50 should not result in driveability problems as long as the Phase 2 RFG cap limits for T50 and T90 remain. In support of this claim, a significant quantity of the gasoline currently available in California during the summer months has RVP values that fall within the 6.80 to 7.00 range. We have found values as low as 6.2. Further, the U.S. EPA complex model is valid for evaluating reformulated gasolines with a minimum RVP as low as 6.40 psi.

Comment 7: The ARB should consider making RVP a variable within the predictive model in order to provide more flexibility in terms of adjusting other critical gasoline specifications. Fixing RVP allows users no flexibility to gain credit for a sub-7.0 RVP fuel with reduced VOC emissions. (Tosco, Unocal)

Agency Response: We agree that allowing the RVP input to the predictive model to be varied would offer producers greater flexibility in designing alternative gasoline formulations. However, because of concerns raised by several commenters about the ability of the model to accurately predict the impact on emissions of RVP values below 7.00, we decided allowing this type of flexibility is not appropriate. As discussed in prior responses in this subsection (see Comments 5 and 6), the lack of available data is the main reason for the uncertainty associated with emission predictions from fuels with low RVP values. There are very little emissions data from fuels with RVP values below 6.80. Because of this, we elected to fix the RVP value at 7.00.

A side issue associated with the flexibility gained from allowing the RVP value to vary is the generation of credit. In this context, the term "credit" refers to the additional flexibility afforded producers in determining the values for the other regulated parameters based on reductions in hydrocarbon or oxides of nitrogen emissions provided by RVP values less than 7.00. In other words, an increase in the value of aromatic hydrocarbon content, or any other regulated property, may be offset by a decrease in RVP. We do not believe this type of credit is appropriate given the concerns about the accuracy of the model predictions for low RVP fuels.

Comment 8: We would oppose the use of the predictive model to generate RVP credits as we question the RVP emission effects predicted by the model. (Mobil)

Agency Response: For reasons cited above in the Agency Response to Comment 7, we agree with the commenter.

Comment 9: Several commenters expressed concern about the lack of operational flexibility associated with the RVP and supported additional work in this area, including RVP averaging. (Mobil, Tosco)

Agency Response: We are committed to continue to work with industry to review and evaluate new significant information that could provide further flexibility to produce Phase 2 RFG.

6. Accounting for Evaporative Emissions

Comment 10: The California predictive model excludes the effect of evaporative emissions. Evaporative emissions make up a substantial portion of automotive emissions--half or more, depending on your assumptions.

Inclusion of an evaporative component in the predictive model would result in more flexibility for refiners. (Exxon)

Agency Response: The commenter is correct that the California predictive model does not predict the effect of changes in fuel specification on evaporative emissions.

We did not pursue the option of developing an evaporative emission model option at this time for several reasons. First, tests to measure evaporative emissions are difficult and very expensive. As a result, the available data are limited and highly variable. Second, the ARB has adopted new evaporative emissions standards for motor vehicles that will reduce evaporative emissions to very low levels. Finally, fixing RVP at 7.00 significantly decreases the need for an evaporative emissions model since RVP is the most important parameter in controlling evaporative emissions.

7. Cancer Potency Values in the toxics model

Comment 11: We are concerned about the underlying risk factors used to develop the relative potency weighting, particularly the risk factors for benzene and 1,3-butadiene. New data showing species differences in response to 1,3-butadiene suggest that existing cancer potency based on the mouse bioassay data is inappropriate for human risk assessment. As a result, the ARB cancer potency estimate should be adjusted to include interspecies differences in metabolism and mechanism of action. (Exxon, WSPA)

Agency Response: The potency values for the individual toxic air contaminants are established by a separate process that involves the Office of Environmental Health Hazard Assessment (OEHHA), the Scientific Review Panel, and the ARB. If OEHHA determines that new data suggest the existing cancer potency of 1,3-butadiene should be adjusted, we will evaluate the effect of an adjustment and make any necessary changes to the California predictive model in a subsequent rulemaking.

8. Wintertime Predictive Model

Comment 12: We strongly support the decision to allow producers the option of using a wintertime model if it is developed. We are concerned about the mandatory use of a new wintertime model promulgated sometime in the future. (WSPA)

Agency Response: If a wintertime version of the California predictive model is developed, it will be subject to a full public review associated with the rulemaking process. The issues of the mandatory use of a new wintertime model would best be addressed if and when a wintertime model is developed.

9. Review of Changes After the 45-day notice

Comment 13: Changes made to the model subsequent to the 45 day notice violate statutory and regulatory provisions and should be addressed in a 15-day change package. (WSPA)

Agency Response: We do not agree with the commenters that the changes made violate statutory and regulatory requirements. The changes made to the model subsequent to the 45-day notice were made in response to industry requests and have been made available for supplemental public comment in a 15-day change package issued March 6, 1995.

10. Potential Conflicts with Federal RFG Models

Comment 14: Since California refiners will be subject to the provisions of both the ARB Phase 2 RFG regulations and the U.S. EPA RFG regulations, a refiner's flexibility will be limited because these regulations conflict, cause confusion, or are ambiguous. The ARB should approach the U.S. EPA about accepting the ARB predictive model as a means of complying with the federal RFG requirements. (Tosco)

Agency Response: We are committed to work with industry and the U.S. EPA to have the California predictive model accepted for federal purposes.

The U.S. EPA RFG program is mandated by section 211(k) of the federal Clean Air Act (42 U.S.C. section 7545(k)) and will be implemented in two phases. Phase I of the program begins on January 1, 1995 and Phase II begins on January 1, 2000. The federal regulations are contained in 40 CFR section 80.40 et seq. Between December 1, 1994 and December 31, 1997, refiners may demonstrate compliance with emission reduction performance standards using either the "simple model" or the "Phase I complex model." Between January 1, 1998 and December 31, 1999, refiners must demonstrate compliance using the Phase I complex model. We have run the Phase I complex model with the California Phase 2 RFG cap limit values for all specifications except for benzene. The Phase I standard for benzene is capped at 1.00. Therefore, we used 1.00 instead of the Phase 2 RFG cap value of 1.2. The results of our run showed that a gasoline meeting the Phase 2 RFG cap limits will also meet the federal RFG emission requirements. Therefore, any RFG complying with the California predictive model requirements would comply with the federal requirements at least until January 1, 2000.

Beginning January 1, 2000, refiners must show compliance using the "Phase II complex model." We have run the Phase II complex model with the Phase 2 RFG flat limit values for all properties. The results indicate the fuel barely fails the federal hydrocarbon requirement, but easily passes the oxides of nitrogen and toxic air contaminant reduction requirements. If we use a value of 6.9 psi, the results indicate the fuel would meet all federal requirements. We are committed to work with the U.S. EPA to resolve this issue.

Comment 15: The Phase 2 RFG specifications entered into the U.S. EPA certification model will not meet the year 2000 requirement for hydrocarbon reductions. This model is the only way to determine compliance with federal requirements. However, entering 6.9 psi for RVP will make Phase 2 RFG qualify in the year 2000. Allowing RVP averaging would resolve this issue. (Unocal)

Agency Response: We recognize that the 7.00 RVP limit will not satisfy the year 2000 requirement for hydrocarbon reductions and are committed to work with U.S. EPA to resolve this discrepancy. However, we do not agree that the use of RVP averaging is an appropriate way to resolve this issue. In addition, this is not an issue until the year 2000. When Phase 2 cap limits are used in the U.S. EPA simple model and Phase I complex model, the federal RFG emission requirements are satisfied. Although the RVP standard is 7.00 psi, we fully anticipate that the actual RVP will be 6.90 or less. As discussed in the Agency Response to Comment 14, we are committed to working with U.S. EPA to allow the use of actual values in their model.

11. Impact of the Model on the Cost of Producing Phase 2 RFG

Comment 16: Any opportunity to save capital investment has expired because the effective date of Phase 2 gasoline was not tied to the promulgation date of the model. We are now in the process of building facilities that appear could have been less expensive if the model was promulgated earlier. (Unocal)

Agency Response: We originally anticipated that we could develop a predictive model in a few months. We were not able to meet this original projection for three main reasons. First, we underestimated the complexity and effort necessary to develop the California predictive model. Second, we believed that including the results of several key emissions studies would provide a more accurate and ultimately more useable model. Third, it took longer than expected to achieve a consensus with industry.

Over the last few years, we have spent over 15,000 person-hours developing the California predictive model. We did not anticipate that this level of effort would be required. This was not a situation where an "off-the-shelf" approach was available.

The development and analysis of the database and the thorough evaluation of various statistical approaches was necessary to provide the maximum flexibility to industry without compromising the environmental benefits of the Phase 2 RFG regulations.

We also wanted to be confident that the California predictive model was as accurate as possible. After we released the April 1993 version of the model, refiners expressed serious concerns about the model and asked that we delay further action until the data from two key studies could be included. These studies were the Auto/Oil AQIRP heavy hydrocarbon study and the Auto/Oil AQIRP low-sulfur study. We agreed on the need to include these studies to improve the model, although this action delayed the development of the model about five months.

Finally, the process took time because we believe it was important to reach consensus on as many issues as possible. WSPA supported the decision to delay completion of the model to resolve issues. From November 1993 through the June 1994 Board hearing, we met almost monthly with affected parties. After a May 19, 1994 meeting, we believed we successfully reached consensus with affected parties on virtually every major issue associated with the California predictive model. This effort resulted in a model that will provide flexibility to industry in reducing the operating costs of the model while providing assurance that we have maintained the environmental benefits of the Phase 2 RFG regulations.

We strongly believe that the approach taken to develop the California predictive model, while admittedly time-consuming, was necessary and appropriate and resulted in a far more useable predictive model. In fact, we believe the approach taken to develop the California predictive model has been an excellent example of how industry and government can work together to find mutually acceptable solutions to extremely difficult and complex technical issues.

Comment 17: We do not believe that the California predictive model will reduce production cost and minimize the potential for supply disruptions as a result of the inflexibility of the model. This inflexibility is based on two policy decisions affecting the model structure. First, the CARB model excludes the effects of evaporative emissions. Second, the ARB uses potency-weighting of the toxics as a basis to determine the acceptability of the model. (Exxon)

Agency Response: We believe the California predictive model will reduce production costs and minimize the potential for supply disruptions. WSPA agrees with our position. On June 8, 1994, WSPA presented written comments on the California predictive model. In the attachment to their letter they wrote,

> "WSPA believes the proposed model will provide flexibility that will reduce the difficulty in producing Phase 2 gasoline on a day-to-day basis. Producers will be able to "tailor" equivalent-emissions fuel specification sets to their operation. Specifications that would otherwise be limiting can be relaxed while...tightening other fuel parameters that are most cost effective for a particular refiner. This type of easing of day-to-day to day operations will tend to manifest itself in a better ability of refiners to meet delivery schedules, without compromising the environmental protection goals of the regulation."

Representatives from Texaco and Chevron made similar statements at the Board hearing.

The commenter states that the flexibility of the California predictive model is restricted as a direct result of the exclusion of the evaluation of evaporative emissions and the weighting of

toxic emissions. The California predictive model does not incorporate an evaporative emissions model, but it does address evaporative emissions by fixing RVP at 7.00. At the Board hearing, ARCO testified that "the constant RVP model should enhance refining flexibility while maintaining the emission benefits of California Phase 2 reformulated gasoline."

Inclusion of an evaporative model in the California predictive model would result in a much more complex model and was not done for the reasons mentioned in Agency Response to Comment 10.

The California predictive model evaluates toxic emissions on a potency-weighted mass basis. If the model evaluated toxics on a mass basis, the relative impact of a gram/mile reduction of formaldehyde would be equal to a gram/mile reduction of 1,3-butadiene. This approach does not consider the potential cancer risk associated with each pollutant. We believe the model should take this into account when evaluating the equivalency of two fuels.

12. Future Updates to the California Predictive Model

Comment 18: We urge adoption of the California predictive model and recommend that the use be held fixed without the threat of a continuous stream of changes based on just small additional test data. (Mobil)

Comment 19: The ARB should direct staff to develop a mechanism to update the model as needed and to ensure the best possible predictions of real world behavior. (AAMA)

Agency Response: The ARB staff is committed to reviewing all new data that becomes available and evaluating the impact that these data have on the model responses. We are aware of the potential economic impact any changes to the model may have on refinery operations. Therefore, any proposed amendments will be discussed thoroughly through a full public process, similar to the process used in developing these amendments. No changes to the model will be made without a full rulemaking proceeding.

B. Comments Pertaining to the Averaging Protocol

Comment 20: The averaging compliance option is essential to the successful implementation of the Phase 2 RFG program. Until the refiners are able to gain experience with the averaging compliance option, language should be added to the ARB Phase 2 RFG regulations to allow refiners additional flexibility in the use of the averaging compliance option during the initial years of implementation. This additional flexibility could be provided by allowing extensions of time to comply with the 90 day offset period. Changing the length of the offset period will not change the value of the averaging standard and will thus have no impact on the environmental benefits of the program. The increased flexibility offered by these extensions may prove invaluable to refiners to address minor operational problems.

We suggest two options for the ARB to consider. The first option would allow refiners three extensions in the 90 day period averaging period. The extensions could not exceed ten days per extension and could run concurrently. In addition, the refiner must provide adequate notice of the request, specify the unforeseen event necessitating the extension, specify the DAL parameter(s) at the time of notification of extension, and specify the date that the extension would go into effect. The extension could apply to more than one DAL parameter under specified conditions.

In the second option, the refiner would also be allowed a fixed number of extensions per year not to exceed a predetermined number of days. However, unlike Option 1, the applicant refiner would have to satisfy predefined, discreet criteria before the Executive Officer could review and rule on the extension application. The refiner's petition would establish the following: (1) the cause for the extension request and that it was beyond reasonable control of the refiner, (2) the averaging parameters for which the extension is sought and that this extension is the only dispensation requested, (3) the length of the extension, not to exceed 30 days, and (4) a plan reasonably detailing how recovery to the average will be achieved.

In subsequent comments, the commenter supported the first option. (WSPA)

Agency Response: We agree with the commenter and have included changes to the averaging protocol as part of the 15-day change package. We have essentially followed the first option the commenter suggested and have modified the regulations by adding a new section 2264.4 which allows limited extensions of the 90-day offset period under the averaging compliance option. The extension provisions are designed to provide additional flexibility in meeting the Phase 2 RFG regulations during the early years of implementation as producers gain more experience in blending gasoline to simultaneously meet all of the Phase 2 RFG specifications. While they will allow an extension of the offset period, they will not change the requirement for full offsets for all DAL "debit" batches.

Under the added provisions, producers and importers will be allowed three extensions per year, each not to exceed 10 days. The extensions may run consecutively. The extension provision will sunset December 31, 1997. A producer will have to notify the ARB in advance, identify the unforeseen event necessitating the extension, specify the DAL parameters affected, and specify the date the extension would go into effect. The provisions are described in more detail in Section II.B.1.a. above.

We chose the first option because it reduces the discretionary nature of the decision, and thus would reduce potential challenges regarding the appropriateness of the decision. In addition, it is substantially more enforceable than the second option. Finally, it tends to reduce the administrative burden on the ARB.

Comment 21: We support the changes to the averaging protocol to allow for extensions. The proposed changes to the averaging protocol, combined with the reasonable enforcement approach, will make the predictive model a workable, flexible option. (Mobil)

Agency Response: We agree with the commenter. As discussed in the response to Comment 20, we have included changes to the averaging protocol as part of the 15-day change package.

Comment 22: A refiner should be able to apply different compliance methods to each grade of gasoline in order to enhance flexibility. Currently, the rules do not allow the use of separate flat limits and/or averaging for different grades of gasoline produced at the same refinery. (Tosco)

Agency Response: We have not incorporated the requested change. We believe allowing a refiner to apply different compliance methods to each grade of gasoline would make administration and enforcement of the regulations extremely onerous and would increase opportunities for cheating. It would also require extensive recordkeeping and reporting requirements.

C. Comments Pertaining to Enforcement of the Phase 2 Regulations

Comment 23: We believe that not allowing refineries to commingle complying gasoline at an individual refinery would place refineries at a disadvantage in terms of gasoline logistics since Phase 2 RFG may be produced by more than one compliance method. The inability to commingle reduces flexibility of production methods, making a refinery's storage capacity the determining factor in what methods are used to produce gasoline. We suggest that an individual refiner be allowed to submit an alternative testing protocol so that ARB field tests can be performed before the gasoline reaches the final point of distribution from the refinery. This would allow testing of separate batches of gasoline to assure compliance, and these batches could then be stored in a single gasoline tank elsewhere within the refinery. (Tosco)

Agency Response: There are no restrictions on commingling different batches of gasoline at a refinery if the batches are uniformly subject to the flat limits. The restrictions exist for commingling batches that are subject to different specification limits (due to the assignment of designated alternative limits or use of the predictive model option for at least one of the batches), or where the volume of at least one of the batches has compliance significance (due to the designated alternative limit offset mechanism). In these circumstances the regulations require the refiner to notify the Executive Officer of the identity, location, volume, and applicable limits for each final blend; this notification must be provided before the start of physical transfer of the gasoline from the refinery and in no case less than 12 hours before the refiner either completes physical transfer or commingles the final blend. (sections 2264(a), 2264.2(a) and (b) and 2265(a).) These requirements are designed to provide ARB compliance

personnel with the opportunity to sample and test the gasoline against previously defined limits, before it has left the refinery.

The regulations do allow a refiner to enter into a protocol with the Executive Officer to specify an alternative means of applying the final blend notification requirements to its refinery, as long as the Executive Officer reasonably determines that application of the regulatory requirements under the protocol is not less stringent or enforceable than application of the express regulatory terms. (section 2264(a)(4), referenced in section 2264.2(a)(2) and (b)(2).) One of the modifications made available for the 15-day supplemental comment period was the addition of section 2265(a)(5), to allow protocols governing notifications for predictive model alternative specifications. A protocol may include a system allowing separate batches of gasoline to be commingled at the refinery after they have been made available for compliance testing against previously defined limits, as long as the system meets the criteria of equivalent enforceability and stringency.

Comment 24: The extension for compliance at retail facilities until June 1, 1996 will increase the potential for the importation of non-complying fuel into the state during the transition period which will depress retail margins. We strongly urge ARB to enforce the Phase 2 regulations at the retail level, particularly the "paper trail" of the gasoline delivered to stations during the transition period. (Texaco)

Comment 25: We agree with the proposal to smooth out the transition period by allowing longer periods of time to turn inventories at terminals and service stations. That proposal is a valuable lesson from the diesel introduction. However, we are very concerned that there will be a significant financial incentive for unscrupulous operators to cheat and that, during this transition period, they will be particularly difficult to catch. We would encourage a simple reporting requirement that any such importer be registered in a special category and provide advance notice of product source and destination. (Unocal)

Comment 26: We are concerned that the proposed modified compliance schedule could lead to increased cheating. We strongly recommend that any tank car or tank truck of gasoline imported into California from March 1 to June 1, 1996 be held to the same accountability as any importer. They must comply with all Phase 2 RFG requirements and report their volume, specifications, and distribution to the Compliance Division when this fuel first enters the state. The ARB needs to develop a mechanism to specifically identify and take action against the illegitimate movement of gasoline by tank truck or rail into the State during this transition period. (Chevron)

Comment 27: We are concerned that the proposed amendments regarding imported gasoline that originates in California will not be sufficient to deter cheating. Mobil recommends that the ARB adopt appropriate reporting and enforcement requirements for Phase 2 gasoline delivered from out-of-state terminals to prevent the importation of non-complying gasoline. (Mobil)

Agency Response: The "extension for compliance" and "transition period" discussed by the commenters refers to the extension of the dates for complying with the cap limits. In this rulemaking we are proposing that compliance be extended from April 1, 1996 to April 15, 1996 for sales or supplies of gasoline from all facilities other than bulk plants, retail outlets, or bulk purchaser-consumer facilities. Compliance throughout the distribution system would begin June 1, 1996. We believe that allowing approximately 45 days for tanks at terminals to turnover, and allowing an additional 45 days for full turnover at bulk plants and service stations, should promote a smooth transition to Phase 2 RFG without disruptions in supply.

We are aware that during this transition period unscrupulous operators may attempt to import non-Phase 2 RFG into the State. As a result, we are committed to vigorously enforce the Phase 2 RFG regulations during the initial implementation phase. Under the regulation, importers of gasoline--other than gasoline that is identified at an out-of-state terminal as gasoline produced in California and suitable for sale as a California motor vehicle fuel--are subject to requirements analogous to those applicable to California refiners. These requirements include sampling, testing, reporting, and recordkeeping for gasoline subject to designated alternative limits, and reporting elections to change compliance mechanisms.

In addition, motor vehicle fuel distributors are subject to the registration and recordkeeping requirements of Health and Safety Code section 43021. This includes any person who, with an ownership interest in the fuel, transports or causes the transport of gasoline at any point between an import facility and a retail outlet, or who sells or supplies gasoline to a retail outlet. Each such distributor must annually inform the ARB of the place at which its records are kept and obtain a certificate of compliance from the ARB. The distributors must maintain complete records of each purchase, delivery, and supply of gasoline for at least two years. A person who knowingly transports gasoline for an uncertified or otherwise noncomplying distributor is liable for a civil penalty of up to $10,000 per day. A retailer who knowingly sells gasoline delivered by or on behalf of a noncomplying distributor is liable for a civil penalty of up to $10,000 for each transaction.

At the present time, we believe that these provisions will enable the ARB to effectively enforce the Phase 2 RFG regulations against persons who would import and distribute noncomplying gasoline during the transition period. We will continue to evaluate this issue and will take additional actions we find necessary to assure effective enforcement.

Comment 28: We urge the ARB to develop and continuously implement protocols that will allow the DAL values to be adequately enforced and still allow the flexibility conceived in the development of the averaging protocol. (Texaco)

Agency Response: Section 2264(a)(4) authorizes the Executive Officer to enter into a protocol with an individual refiner which specifies how the DAL notification requirements apply to the refiner. In order to enter into a protocol, the Executive Officer must reasonably determine that application of the regulatory requirements under the protocol is not less stringent or

enforceable than application of the express regulatory terms. The Executive Officer and the staff will continue to work with refiners to develop effective and reasonable protocols.

Comment 29: We strongly urge the ARB to develop a set of variance conditions in order to avoid panic decisions and surprises to those that have made significant investments. These conditions should include an economic penalty consistent with the expected production cost of Phase 2 RFG and should be consistently applied to all producers seeking a variance. (Texaco)

Comment 30: We urge the ARB to clarify as soon as possible the variance protocol to assure that facilities do not use ARB's delay on the California predictive model and/or changes in the averaging rules as justification for missing the deadline. (Mobil)

Agency Response: The provisions authorizing variances from the Phase 2 RFG requirements are contained in section 2271. Any changes to the variance regulation would be outside the scope of this rulemaking. We intend to work openly with refiners and other interested parties to assure that any variance mechanism is applied fairly and equitably, and that any variance recipients do not receive an economic benefit from their noncompliance with the regulations.

D. Comments Pertaining to Vehicle Compatibility

Comment 31: The events associated with the relatively recent introduction of low-aromatic hydrocarbon diesel fuel in California and the low-sulfur diesel fuel nationwide have pointed out that there still are a lot of implementation issues, including material compatibility, which need to be addressed prior to the March 1996 deadline. The ARB should take the steps necessary to maximize the probability of a smooth transition to Phase 2 gasoline. (Chevron, CIOMA)

Agency Response: To ensure all implementation issues are addressed prior to the March 1996 deadline, the ARB has established an advisory committee to assist in the implementation of the Phase 2 RFG regulations. This committee has a broad representation of affected parties including vehicle operators, vehicle manufacturers, the fuel industry, environmental groups, and federal, state, and local governmental agencies. Subcommittees have been formed to address issues associated with performance, transition, and public education. The performance subcommittee is monitoring a major ARB program now underway in which a number of vehicle fleets are operating on Phase 2 RFG.

We have already initiated several other actions to ensure an orderly transition to Phase 2 RFG. We have developed a guidance document to assist gasoline producers with the development and submittal of compliance plans for their Phase 2 RFG projects. We are also working with the California Energy Commission to address supply and demand issues for Phase 2 RFG during the time the regulation is implemented.

E. Miscellaneous Comments

Comment 32: The U.S. EPA RFG program limits RVP to a minimum of 6.6 psi under the "simple model" which is available for use through 1997. This minimum, in combination with the ARB's cap level of 7.00 psi, will severely limit blending flexibility for refiners producing gasoline subject to both the federal and ARB requirements. With a 6.60 to 7.00 psi RVP range, a little over 20 percent of the blends would not meet specifications in a well-controlled blending operation. That gasoline could not be shipped, nor would there be a way to correct it. This, in turn, could lead to disruptions in supply. The ARB should instruct the staff to take a serious look at this issue, get input from industry, and report back in a reasonable length of time on this issue. (Texaco)

Agency Response: The appropriate approach to address this problem is to effect a change in the U.S. EPA simple model limits, not to relax the 7.00 psi standard for RVP in the California Phase 2 RFG regulations.

The most likely mechanism for changing the lower limit for RVP in the federal simple model is to include it on a "California only" basis in the California exemptions in 40 C.F.R. Section 80.81. The 6.6 psi lower limit for RVP in the federal simple model was included because automakers were concerned that lower RVPs could cause driveability problems. The other Phase 2 RFG specifications -- particularly those on distillation range -- should assure that RVPs marginally lower than 6.6 psi in California Phase 2 RFG will not adversely effect driveability. Since the June 9, 1994 hearing, ARB staff have supported WSPA's efforts to reduce the simple model's RVP lower limits for California gasoline.

Comment 33: We believe that changes to the staff proposal should be provided to impacted parties sufficiently in advance of the hearing to allow enough time to analyze and respond to the proposed changes. We have yet to see the entire slate of staff's proposed changes, and how certain changes may be implemented. (Unocal)

Agency Response: We have made every effort to provide changes to the staff proposal to impacted parties as quickly as possible in advance of the hearing. Due to resource and time constraints, all parties may not have received all of the latest proposals and changes. However, in accordance with the California Administrative Procedure, we have made all of the modifications available to interested parties for a supplemental 15-day comment period prior to final adoption. All of the supplemental comments have been considered and addressed in this Final Statement of Reasons. We also note that the staff worked closely with industry, including the commenter, in developing each modification.

Comment 34: We suggest that conventional gasoline contain a marker which could easily be detected at the service station with field tests in order to prevent cheating. (Unocal)

Agency Response: Adopting such a requirement is outside the scope of this rulemaking. In any event, we believe the requirement is unnecessary. We expect that existing enforcement programs, testing and recordkeeping requirements, and state and local enforcement efforts are sufficient to ensure compliance with the Phase 2 RFG regulations.

Comment 35: The U.S. EPA proposal for the renewable oxygen requirement could make a substantial impact on successful implementation of the Phase 2 RFG regulation. The recently proposed Federal Implementation Plan would include Sacramento as a severe area in order to give it more time to comply. If promulgated, this would have the probably unintended result of throwing Sacramento into the renewable oxygen program since it would have to adopt federal reformulated gasoline requirements one year after the promulgation of the FIP. (Unocal)

Agency Response: At the time of the June 9, 1994 hearing, U.S. EPA had proposed but not yet adopted its renewable oxygenate regulations. This program is intended to require that 30% of the oxygenate content of federal reformulated gasoline come from renewable sources. The U.S. EPA Administrator adopted the regulations on June 30, 1994, and they were published in the August 2, 1994 Federal Register (59 F.R. 39258). U.S. EPA scheduled the program to be phased-in beginning January 1, 1995. In a lawsuit brought by the American Petroleum Institute, on September 13, 1994, the United States Court of Appeal for the District of Columbia stayed the renewable oxygenate regulations pending review. As of April 17, 1995, the court had not issued a final ruling. (See 59 F.R. 60715 (November 28, 1994).)

In light of the stay, it is not necessary at this time to evaluate the potential impacts of the renewable oxygenate requirements on the Phase 2 RFG program. If changed circumstances necessitate additional action, we will consider amendments in a subsequent rulemaking proceeding.

Comment 36: The vehicle test option is real impractical to use given its current incarnation. An option that would be less onerous and less costly could stimulate research into new and innovative fuel formulations that really couldn't otherwise be certified under the regulations. Our research staff is currently evaluating the test option to see how it can be made more useful for certification purposes. We are willing to work with staff to develop acceptable modifications and hope that the cooperative approach that was demonstrated during the California predictive model development can be carried over into modification to the vehicle test option. (Chevron)

Agency Response: This rulemaking does not include consideration of modifications to the vehicle test option. We will continue to work with industry to evaluate the appropriateness of the vehicle test option as it currently stands. Any changes to the vehicle test option would be addressed in a separate rulemaking with appropriate public notice, public workshops, and comment periods.

Comment 37: The commenter has at least a couple of lawsuits involving the permits and the CEQA process associated with refinery construction. Those are serious challenges and do offer a significant roadblock if they were to delay any further our activities. (Unocal)

Agency Response: We believe this comment is outside the scope of the rulemaking. However, the ARB has been working with the Governor's Office of Planning and Research, local air districts, concerned state agencies, and local permitting agencies to facilitate the CEQA process. The ARB staff have attended numerous public meetings to explain the Phase 2 RFG program and to address technical issues. We will continue to monitor the progress of the remaining refineries and facilitate the CEQA and permitting process. We do not understand the commenter to be requesting amendments in the present rulemaking due to CEQA delays, and such amendments would not be within the scope of the rulemaking.

F. Comments Made During the 15-day Comment Period

Comment 38: The first entry in Table 6 of the Procedures describes the equivalence testing to be performed when both the maximum and minimum of the candidate specification for oxygen lie between 1.8 and 2.2 weight percent. The minimum is currently shown as [$\geq$ 1.8] and the maximum as [$\leq$2.2]. To be consistent with the convention used to define the remainder of the cases in the same Table, we suggest that both the minimum and maximum entries should be represented as [$\geq$1.8,$\leq$2.2]. (Unocal)

Agency Response: We agree with the commenter and have made this nonsubstantive change.

Comment 39: The changes implemented as a result of setting RVP equal to 7.00 psi appear to be incomplete. Once constants are calculated as the result of this procedure, term consolidation should be performed in the following equations:

Page #	Emission	Tech Type	Terms to Consolidate
17	NOx	3	RVP with intercept
18	NOx	4	RVP with intercept
18 & 19	NOx	4	RVPOXY with Oxygen
21	HC	3	RVP with intercept
21 & 22	HC	3	RVPT50 with T50
22	HC	4	RVP with intercept
30	Benzene	4	RVP with intercept
33	Acetaldehyde	4	RVP with intercept

In line with the term considerations described above by setting RVP equal to 7.00 in all Complex Model equations, changes need to be made to both Tables 11 and 12. (Unocal)

Agency Response: We agree with the commenter and have made the nonsubstantive changes.

Comment 40: Please confirm that the new coefficient for the oxygen term in the Tech class 3-Benzene Equation (shown as -0.034672) is correct. The sign of the coefficient has changed (versus the previous Table 12). Also, there has been a change of two orders of magnitude in the absolute value of the coefficient. The reason for the change is difficult to understand, given that the revisions to Table 12 merely involve re-registration of the data after removal of statistically non-significant terms. (Unocal, WSPA)

Agency Response: We have checked the value of the new coefficient for the oxygen term in the Tech 3 Benzene equation, -0.034672, and have found it to be correct. The change in sign and magnitude of the value reflects the variation of the term or terms that were excluded when only statistically significant terms were retained.

Comment 41: The staff should develop a process through which the model can be updated to improve its prediction capability. However, this process must be implemented in a manner which would not cause undue burden on the fuel providers who depend on the model for their compliance demonstration. (Ford)

Agency Response: See the Agency Response to Comments 18 and 19.

Comment 42: Oxygen should be allowed to vary up to 3.5 percent by weight under the predictive model. (CRFC)

Agency Response: Title 13, California Code of Regulations, Section 2262.5(b) establishes an oxygen cap of 2.7 weight percent. The notice for this rulemaking stated that the rulemaking will not include revisions to the cap limit. Therefore, any change to the oxygen specification would have to be addressed in a separate rulemaking.

Comment 43: The predictive model methodology led to a version of the model which responded to low RVP and oxygen by the Tech 4 Class oxides of nitrogen equation that was not supported by the data. Therefore, the staff proposed modifications to linearize or "flatten out" the RVP and oxygen response. This reaction by the model seems to identify an area in the methodology that requires continued development and refinement in order to make a model that would be more robust. CRFC strongly urges staff to continue to refine this relationship in the model. (CRFC)

Agency Response: We are committed to continue to work with industry to review and evaluate new information that could be used to improve the predictive model methodology.

Comment 44: The reference fuel specification for RVP has been fixed at 7.00 psi. This approach seems appropriate for use for summertime fuels. However, this approach may not

prove satisfactory for any gasoline refiner or producer that chooses to use the California predictive model for certifying a fuel for use during the wintertime. CRFC would urge the ARB staff to continue to look at the issue of whether the California predictive model can be used for wintertime fuels. (CRFC)

Agency Response: The ARB staff will continue to evaluate the need for, and feasibility of, developing a separate predictive model for the wintertime oxygenate season. Currently, the California predictive model is designed to be used during the wintertime oxygenate season. For a wintertime blend, the value for each regulated fuel property would be entered into the model. The RVP values would remain at 7.00. Any fuel that qualifies as a alternative Phase 2 RFG through use of the California predictive model would be allowed to be offered for sale during the winter RVP season as long as the actual RVP value meets the requirements of Title 13, Section 2262.1.

Comment 45: The ARB has predicted that California will be in attainment for carbon monoxide by 1996 except in the Los Angeles basin area. However, the California predictive model no longer quantifies carbon monoxide emissions. CRFC would urge the ARB staff to consider an option for carbon monoxide to be included within the predictive model as a means of monitoring carbon monoxide levels. (CRFC)

Agency Response: Since most of California will be in attainment for carbon monoxide by 1996, we believe it is not necessary to include carbon monoxide emissions as a criterion for evaluating whether a candidate fuel can be substituted for Phase 2 RFG. However, this does not mean we did not account for carbon monoxide emissions in the model. The California predictive model is designed to be used during the wintertime oxygenate season and incorporates the oxygenate requirements of the Wintertime Oxygenate Program. (See Agency Responses to Comments 44 and 46).

Comment 46: We disagree with the finding in Resolution 94-38 that "...a minimum of 2.0 percent oxygen by weight throughout the year will help minimize carbon monoxide emissions and will fully mitigate any increase in carbon monoxide emissions that could otherwise be associated with use of the California predictive model." We disagree with this argument since the California predictive model no longer contains an oxygen term. We suggest that oxygen levels at a minimum of 2.7 percent by weight in the winter months as stipulated in the federal Clean Air Act Amendments of 1990 would allow for greater carbon monoxide reductions without exacerbating other air quality problems. (It should be noted that California has not received a waiver from EPA for winter oxygen levels below 2.7 percent by weight.) (CRFC)

Agency Response: The finding in Resolution 94-36 referred to by the commenter is in the portion of the resolution that acknowledges the possibility that use of the predictive model may sometimes result in an increase in summertime carbon monoxide emissions in 1996 and subsequent years because gasoline producers using the model will not be required to demonstrate

that there will be no increases in emissions of carbon monoxide. The resolution notes that Los Angeles County is the only area of the state that is not projected to be in attainment of the state and federal ambient air quality standards for carbon monoxide by 1996. It then notes that the requirement in the federal reformulated gasoline regulations that all gasoline sold in Los Angeles County and most of the rest of Southern California contain a minimum of 2.0 percent oxygen by weight throughout the year will help minimize carbon monoxide emissions and will fully mitigate any increase in carbon monoxide emissions that could otherwise be associated with use of the predictive model.

These findings are clearly justified. The federal reformulated gasoline requirement of a year-round minimum 2.0 percent content will still apply to gasoline sold in southern California under the California predictive model, even though the predictive model itself does not preclude summertime oxygen contents of less than 1.8 weight percent. The federally-required minimum oxygen content will assure reductions in CO emissions.

Further, the commenter's claim that the California predictive model no longer contains an oxygen term is incorrect. The model does contain an oxygen term. During the wintertime oxygenate season, the value of the oxygenate term can range from 1.8 to 2.7 weight percent. During the summer months, the value can range from 0.0 to 2.7 weight percent.

We do not agree that increasing oxygen levels to a minimum of 2.7 percent by weight would not exacerbate air quality problems other than carbon monoxide. The California predictive model incorporates the 1.8 to 2.2 weight percent oxygen content requirements of the Wintertime Oxygenates Program. In developing that program, the ARB concluded that oxygenate levels of 2.7 weight percent would result in increases of oxides of nitrogen emissions. The ARB also concluded that limiting the addition of oxygenates at levels that give about two weight percent oxygen content still results in significant reduction of carbon monoxide, a small reduction in emissions of hydrocarbons, and avoids increases in oxides of nitrogen emissions. The fact that the U.S. EPA has not yet taken final action on the ARB's federal Clean Air Act section 211(m)(3)(A) waiver request does not affect these determinations.

The California predictive model compares the emissions from candidate fuels to reference fuels. As discussed previously, the candidate fuel oxygen content can range from 0.0 to 2.7 weight percent, depending on the season. However, the reference fuel oxygen content can only range from 1.8 to 2.2 weight percent, which is consistent with the Wintertime Oxygenates Program requirements. Table 6 of the Procedures defines the methodology for determining the candidate and reference specifications to be used in the model. Therefore, the California predictive model allows the producer the additional flexibility of creating a fuel with a 0.0 to 2.7 weight percent oxygen content as long as the percent reduction in emissions is essentially equivalent to a reference fuel with an oxygen content from 1.8 to 2.2 weight percent.

Comment 47: We acknowledge that the California predictive model in its current form will require review at regular intervals to incorporate changes in the predictive model methodology as it evolves through further research. We would urge the Board to set policy for the regular review of the California predictive model. (CRFC)

Agency Response: Once the California predictive model is adopted as part of the Phase 2 RFG regulations, the ARB will be able to make substantive changes only in a subsequent rulemaking with notice and public comment. We do not have any specific schedule for reviewing and updating the California predictive model. However, we expect to consider the implications that new emission test data may have on results of the predictive model. Any potential changes to the adopted predictive model would be presented to the public for review and discussion prior to any proposed formal regulatory action. This review would include our evaluation of the economic impacts any proposed change would have on a producer's ability to recover costs associated with producing Phase 2 RFG.

Attachment A
MODIFICATIONS TO THE REGULATIONS AND PROCEDURES MADE AFTER THE 15-DAY AVAILABILITY PERIOD

The following is a summary of the nonsubstantive changes made to the regulations and procedures subsequent to the 15-day comment period. See also the responses to Comments 38-47, made during the 15-day comment period.

I. Title 13, California Code of Regulations

A. Section 2261(c): Change "2260(a)(16)(B)" to "2260(a)(26)(B)", to reflect renumbering of definitions.

B. Section 2261(d): Change "2262.6. . . (e) and (f)" to "2262.6. . . ~~(e)~~(d) and ~~(f)~~(e)" to reflect relettering of subsections.

C. Section 2270(a)(1), 2270(a)(2), 2270(a)(4) and 2270(a)(5): change "2262.6(f)" to "2262.6~~(f)~~(e)" to reflect relettering of subsection.

II. California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model

A. Table 6, Candidate and Reference Specifications for Oxygen: Change the first entries in the Oxygen Content for Candidate Fuel minimum and maximum columns from "$\geq$ 1.8" and "$\leq$ 2.2" to "$\geq$ 1.8, $\leq$ 2.2".

B. Section IV, A., 1.: Remove "RVP" and associated equation from Description and Equation columns, respectively. Change "intercept" equation from "-0.15597638" to "-0.108411656."

C. Section IV, A., 2.: Remove "RVP" and "RVPOXY" and associated equations from Description and Equation columns, respectively. Change "intercept" equation from "-0.58546115" to "-0.6826367." Change "Oxygen" equation coefficient from "0.011321599" to "0.008991879."

C. Section V, A., 1.: Remove "RVP" and "RVPT50" and associated equations from Description and Equation columns, respectively. Change "intercept" equation from "-0.79454695" to "-0.80726502." Change "T50" equation coefficient from "0.010253527" to "0.056534360."

D. Section V, A., 2.: Remove "RVP" and associated equation from Description and Equation columns, respectively. Change "intercept" equation from "-1.18303868" to "-1.15555."

E. Section VI, A., 2., a.: Remove "RVP" and associated equation from Description and Equation columns, respectively. Change "intercept" equation from "2.078612" to "2.014861."

F. Section VI, A., 2., d.: Remove "RVP" and associated equation from Description and Equation columns, respectively. Change "intercept" equation from "-0.30842" to "-0.50722."

G. Table 11, Coefficients for NOX and HC Equations: Change Tech 3, NOx and HC values from "-0.15597638", "-0.79454695", and "0.010253527" to "-0.108411656", "-0.80726502", and "0.056534360", respectively. Change Tech 4, NOx and HC values from "-0.58546115", "-1.18303868", and "0.011321599" to "-0.6826364", "-1.15555", and "-0.008991879", respectively. Remove all values for "RVP", "RVPT50", and "RVPOXY."

H. Table 12, Coefficients for Toxics Equations: Change Tech 4, Benzene and Acetaldehyde values from "2.078612" and "-0.30842" to "2.014861" and "-0.50722", respectively. Remove all values for "RVP."

Attachment B
LIST OF COMMENTERS
Commenters Providing Objections or Recommendations
Specifically Directed at the Proposed Action or Procedures Followed

Code	Commenter
AAMA	Nancy Homeister American Automobile Manufacturers Association Written Testimony: June 9, 1994 Oral Testimony: June 9, 1994
ARCO	Alan Lippincott ARCO Products Oral Testimony: June 9, 1994
Chevron	Dixon B. Smith, Jerry Horn General Manager Strategic Planning and Business Evaluation Written Testimony: June 7, 1994 Oral Testimony: June 9, 1994
CRFC	California Renewable Fuels Council Written Testimony: March 21, 1995
CIOMA	California Independent Oil Marketers Association Written Testimony: June 9, 1994
Exxon	Thomas R. Eizember, Dr. Michael G. Bird, DATB, FRIC Refining Department/Exxon Biomedical Sciences, Inc. Exxon Company, USA Written Testimony: June 9, 1994 Oral Testimony: June 9, 1994
Ford	Walter M. Kreucher Manager, Advanced Environmental and Fuel Engineering Ford Motor Company Written Testimony: March 21, 1995

Mobil	C.R. Morgan, Manager Environmental Affairs - West Coast Mobil Oil Company Written Testimony: June 7, 1994 Oral Testimony: June 9, 1994
Texaco	D.J. Youngblood General Manager Environment Health & Safety Texaco Refining and Marketing, Inc. Written Testimony: June 8, 1994 Oral Testimony: June 9, 1994
Tosco	Duane Bordvick Vice President Environmental and External Affairs Tosco Refining Company Written Testimony: June 9, 1994 Oral Testimony: June 9, 1994
Toyota	Ed Brune, General Manager Powertrain Department AA1 Toyota Technical Center, USA, Inc. Written Testimony: June 8, 1994
Unocal	Dennis W. Lamb Manager, Fuels Planning Planning and Services Unocal Petroleum Products & Chemicals Division Written Testimony: June 3, 1994; June 9, 1994; and March 20, 1995 Oral Testimony: June 9, 1994
WSPA	Gina Grey, Mike Kulakowski Western States Petroleum Association Written Testimony: May 25, 1994; June 8, 1994; and March 21, 1995 Oral Testimony: June 9, 1994