State of California
AIR RESOURCES BOARD

Notice of Public Availability of Modified Text

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
Public Availability Date:	March 6, 1995
Deadline for Public Comment:	March 21, 1995

At a public hearing held June 9, 1994, the Air Resources Board (ARB/Board) approved amendments to the California Phase 2 reformulated gasoline (Phase 2 RFG) regulations. The amendments allow the use of a predictive model to evaluate and approve alternative Phase 2 RFG formulations. The amendments also modify several sections of the Phase 2 RFG regulations to facilitate implementation. The amendments resulted from a proposal by the ARB staff, which is described in detail in the Staff Report released to the public on April 22, 1994.

The Board approved the staff's proposed amendments with several additional changes resulting from public comment on the original proposal. Appendix I contains Board Resolution 94-38, which sets forth the Board's action. Attachment C to the resolution describes the Board-approved modifications to the original proposal. The resolution directs the Executive Officer to modify the regulatory text to incorporate the modifications contained in Attachment C, with other conforming modifications found to be appropriate.

In accordance with Government Code section 11346.8(c), the Board directed the Executive Officer to make the modified text available to the public for a supplemental written comment period of 15 days. He is then directed either to adopt the modified regulations with such additional changes that may be appropriate in light of the supplemental comments, or to present them to the Board for further consideration if he determines such an action is warranted by comments.

The staff has completed preparation of the modified regulatory text. The modified regulatory text is being made available by this notice for public comment prior to final action by the Executive Officer.

Attachment A of Appendix II contains the modified text of the proposed amendments to the Phase 2 RFG regulations in Title 13 of the California Code of Regulations. The text of the originally-proposed amendments is shown in underline to indicate additions and strikeouts to indicate deletions compared to the regulations prior to initiation of this rulemaking. The supplemental modifications are identified in slashes and bold italics format to show deletions and additions, respectively. The supplemental modifications include several conforming revisions prepared by the staff after the June 9, 1994 hearing. Each of these is specifically identified in Attachment A of Appendix II.

The staff's original proposal included the adoption of the "California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model" (the Procedures). These Procedures will be incorporated by reference in section 2265 of the Phase 2 RFG regulations. Attachment B to Appendix II contains the modified text of the Procedures. Modifications to the originally proposed text are presented in strikeout and shaded format to show deletions and additions, respectively. In addition to the changes identified in Attachment C of the resolution, the staff is proposing additional editorial corrections and other nonsubstantive changes to the Procedures. Among the nonsubstantive changes are the following:

Simplification of the Emission Equations

The originally-proposed Procedures require the value of the Reid vapor pressure (RVP) specification 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 exhaust emission equations can be simplified. The staff's modifications consist of replacing the RVP variable with 7.00 and simplifying each of the emission equations including RVP found in sections IV.A.1., IV.A.2., V.A.1., V.A.2., VI.A.1; and VI.A.2 of the Procedures. These modifications do not change the output from the model.

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

Section III.B.1 of the originally-proposed Procedures defines the methodology for determining candidate and reference specifications for oxygen. In Table 6, entitled Candidate and Reference Specifications for Oxygen, the staff has replaced "minimum" and "maximum" in the reference fuel column with the values they represent, 1.8 and 2.2, respectively. The staff has also added two new scenarios to the table. 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.

RVP Significant Figures

Staff has corrected the RVP value reported in Table 7 of the Procedures to read "7.00" instead of 7.0.

Written comments on the modified text made available by this notice must be submitted to the Board Secretary, Air Resources Board, P.O. Box 2815, Sacramento, California, 95812, no later than March 21, 1995, to be considered by the Executive Officer prior to final action on the regulations attached hereto. Only comments relating to the modifications described in this notice will be considered by the Executive Officer. Please direct any questions on this notice to Mr. Dan Donohoue, Manager, Technical Analysis Section, Stationary Source Division, at (916) 322-8277.

CALIFORNIA AIR RESOURCES BOARD

Peter D. Venturini, Chief
Stationary Source Division

Attachments

APPENDIX I

RESOLUTION

State of California
AIR RESOURCES BOARD

Resolution 94-38

June 9, 1994

Agenda Item No.: 94-6-2

WHEREAS, sections 39600 and 39601 of the Health and Safety Code authorize the Air Resources Board (the Board or ARB) to adopt standards, rules and regulations and to do such acts as may be necessary for the proper execution of the powers and duties granted to and imposed upon the Board by law;

WHEREAS, section 43018(a) of the Health and Safety Code, enacted by the California Clean Air Act of 1988, directs the Board to endeavor to achieve the maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish the attainment of the state ambient air quality standards at the earliest practicable date;

WHEREAS, section 43018(b) of the Health and Safety Code directs the Board no later than January 1, 1992 to take whatever actions are necessary, cost-effective, and technologically feasible in order to achieve, by December 31, 2000, a reduction in motor vehicle emissions of reactive organic gases (ROG) of at least 55 percent and a reduction of motor vehicle emissions of oxides of nitrogen (NOx), and the maximum feasible reductions in particulates (PM), carbon monoxide (CO), and toxic air contaminants from vehicular sources;

WHEREAS, section 43018(c) of the Health and Safety Code provides that in carrying out section 43018, the Board shall adopt standards and regulations which will result in the most cost-effective combination of control measures on all classes of motor vehicles and motor vehicle fuel, including but not limited to specification of vehicular fuel composition;

WHEREAS, Health and Safety Code section 43013 authorizes the Board to adopt and implement motor vehicle fuel specifications for the control of air contaminants and sources of air pollution which the Board has found to be necessary, cost-effective, and technologically feasible to carry out the purposes of Division 26 of the Health and Safety Code;

WHEREAS, following a public hearing on November 21-22, 1991, the Board approved regulations for Phase 2 reformulated gasoline (Phase 2 RFG), applicable to gasoline sold in California for use in motor vehicles beginning March 1, 1996; these regulations include a comprehensive set of specifications affecting eight different gasoline properties and are designed to ensure that in-use gasoline is a significantly cleaner-burning fuel;

WHEREAS, the Phase 2 RFG regulations require that, for each of the eight regulated properties, producers and importers meet either "flat" or, if available, "averaging" limits when their gasoline is supplied from the production or import facility, and require that gasoline at any point in the distribution system not exceed "cap" limits for the properties;

WHEREAS, in Resolution 91-54 approving the Phase 2 RFG regulations, the Board directed the Executive Officer to continue work on the development of a predictive model that could be used to certify a set of alternative specifications that could be met to satisfy compliance with the Phase 2 RFG requirements, and to schedule a future rulemaking hearing for the Board to consider adoption of the predictive model;

WHEREAS, the staff has proposed amendments to the Phase 2 RFG regulations which would provide producers and importers of California gasoline the option of using the "California Predictive Model" to establish alternative Phase 2 RFG specifications that could be met in lieu of the specifications set forth in the Phase 2 RFG regulations, and which would identify the procedures and requirements for such use;

WHEREAS, the amendments proposed by the staff would also make a number of other changes to the Phase 2 RFG regulations, including extending the dates for compliance with the cap limits so that they apply starting April 15, 1996, to sales of gasoline from all facilities except for bulk plants, retail outlets, or bulk purchaser-consumer facilities, and apply throughout the distribution system starting June 1, 1996; allowing more frequent switching between the flat and averaging limits; allowing producers and importers initially to report the estimated volume of gasoline in a batch subject to designated alternative limits; requiring California refiners to comply with the Phase 2 RFG producer limits when producing gasoline that will be offered for sale at an out-of-state terminal where the fuel is identified as gasoline suitable for sale in California; and inserting an additional significant digit (to a tenth of a percent) for all references to the aromatic hydrocarbon content values;

WHEREAS, the California Environmental Quality Act and Board regulations require that an action not be adopted as proposed where it will have significant adverse environmental impacts if feasible alternatives or mitigation measures are available which would substantially reduce or avoid such impacts;

WHEREAS, the Board has considered the impact of the proposed amendments on the economy of the state;

WHEREAS, a public hearing and other administrative proceedings have been held in accordance with the provisions of Chapter 3.5 (commencing with section 11340), Part 1, Division 3, Title 2 of the Government Code; and

WHEREAS, the Board finds that:

The California Predictive Model approved herein provides a technically sound means for determining the emissions impacts of alternative gasoline formulations in comparison to gasoline meeting the Phase 2 RFG specifications;

The regulatory amendments approved herein allowing the use of the California Predictive Model will provide producers and importers of California gasoline with additional flexibility and the opportunity to maximize production capabilities, better address conditions that may affect fuel supply, and reduce the operating costs of complying with the Phase 2 RFG regulations;

The amendments approved herein pertaining to the compliance dates for the "cap" limits will help provide for a smoother transition to Phase 2 RFG and help ensure that there is a continued adequate supply of gasoline in the state;

The other amendments approved herein will help gasoline producers effectively manage refinery operations and reduce burdens on small importers of gasoline;

The modifications to the California Predictive Model described in Attachment C hereto are necessary and appropriate to improve and simplify the Model;

The modifications described in Attachment C pertaining to limited extensions of the averaging period under the averaging compliance option are necessary and appropriate to afford additional flexibility in meeting the Phase 2 RFG requirements during the initial period of implementation;

No alternative has been identified to the Board which would be less costly than the amendments approved herein while being equally or more effective in achieving increments of air quality improvement in a manner that ensures full compliance with the statutory mandates in sections 43013 and 43018 of the Health and Safety Code;

While the Phase 2 RFG regulations approved herein are different from the reformulated gasoline regulations contained in the Federal Code of Regulations, the regulations approved herein are authorized by state law;

The ARB has worked with the United States Environmental Protection Agency and gasoline producers to effectively streamline the enforcement requirements of the federal reformulated gasoline regulations as they apply in California, and, as a result, the federal regulations exempt California producers from many of the federal enforcement

requirements from March 1, 1996 to January 1, 2000, as long as certain criteria are met; and

The amendments approved herein will not have any adverse impact on the economy of the state;

WHEREAS, the Board further finds that:

The amendments approved herein may result in a very small increase in emissions during March 1 to June 1, 1996 due to the extension of the cap limit compliance date for terminals, bulk plants, and service stations; however, any such emission increases would be insignificant because no changes are being made to the requirement that gasoline leaving production and import facilities must meet the Phase 2 RFG limits beginning March 1, 1996;

There is a possibility that the amendments approved herein may sometimes result in an increase in summertime CO emissions in 1996 and subsequent years when the predictive model is used because gasoline producers will not be required to demonstrate that there will be no increases in CO;

The requirement in the Phase 2 RFG regulations that all gasoline sold in the State contain a minimum of 1.8 percent oxygen by weight during the wintertime months will minimize CO emissions during the times when carbon monoxide concentrations are highest;

All areas of California are projected to be in attainment for the federal and state ambient air quality standards for CO by 1996 except Los Angeles County; 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 CO emissions and will fully mitigate any increase in CO emissions that could otherwise be associated with use of the California Predictive Model approved herein; and

In all other respects the amendments approved herein will not result in any significant adverse environmental impacts.

NOW, THEREFORE, BE IT RESOLVED that the Board hereby approves the amendments to sections 2260, 2261, 2262.2, 2262.3, 2262.4, 2262.5, 2262.6, 2262.7, 2264, and 2270, and the adoption of sections 2264.2 and 2265, in Title 13, California Code of Regulations, as set forth in Attachment A hereto, and approves the adoption of the "California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the

California Predictive Model," as set forth in Attachment B hereto, with the modifications described in Attachment C hereto.

BE IT FURTHER RESOLVED that the Board directs the Executive Officer to incorporate into the approved regulations and incorporated document the modifications described in Attachment C hereto with such other conforming modifications as may be appropriate, and either to adopt the modified regulations, amendments, and new document after making them available to the public for a supplemental written comment period of 15 days, with such additional modifications as may be appropriate in light of supplemental comments received, or to present the regulations, amendments, and document to the Board for further consideration if he determines that this is warranted in light of supplemental written comments received.

BE IT FURTHER RESOLVED that the Board directs the Executive Officer to continue to work with the United States Environmental Protection Agency and with gasoline producers and marketers to ensure that the federal and California reformulated gasoline regulations continue to be implemented in an integrated manner that avoids unnecessary burdens on the regulated public.

I hereby certify that the above is a true and correct copy of Resolution 94-38, as adopted by the Air Resources Board.

Pat Hutchens

Pat Hutchens, Board Secretary

Resolution 94-38

June 9, 1994

Identification of Attachments to the Resolution

Attachment A: Proposed amendments to sections 2260, 2261, 2262.2, 2262.3, 2262.4, 2262.5, 2262.6, 2262.7, 2264, and 2270, and adoption of sections 2264.2 and 2265, in Title 13, California Code of Regulations, as set forth in Appendix A to the Staff Report.

Attachment B: The proposed "California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model," as set forth in Appendix B to the Staff Report.

Attachment C: Staff's Suggested Changes to the Proposed Amendments to the California Reformulated Gasoline Regulations (distributed at the hearing on June 9, 1994).

State of California
AIR RESOURCES BOARD

Staff's Suggested Changes to the Proposed Amendments to the California Reformulated Gasoline Regulations

June 9, 1994

I. Phase 2 Reformulated Gasoline Regulations

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

Existing Requirements. In the case of six of the eight Phase 2 reformulated gasoline (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 "designated alternative limits" (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 addition, a producer or importer supplying a batch of gasoline with a DAL less stringent than the averaging limit must within 90 days before or after supply from the same facility sufficient quantities of gasoline subject to more stringent DALs to fully offset the exceedances of the averaging limit.

Proposed Modification. The staff proposes a modification which would allow producers to extend the 90-day offset period in limited circumstances. The producers would be allowed up to three extensions in 1996, and up to three extensions in 1997. The maximum duration of each extension would be 10 days, and the extensions could be taken consecutively. The extension provision would sunset December 31, 1997, and thus no extensions could start on or after January 1, 1998.

Each extension would apply to the required time in which a batch or batches of gasoline with DALs generating "debits" for a particular parameter would have to be fully offset by a subsequent batch or batches of gasoline with a more stringent DAL generating "credits" for that parameter. Each extension would allow debits for a parameter to be offset up to 100 days after shipment of the debit batch, rather than in no more than 90 days. The extension would also apply to other debit batches for that parameter 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 would also apply to importers operating under the averaging compliance option.

Rationale. 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.

Section Affected: new section 2264.4.

2. <u>Use of an Enforcement Protocol with the California Predictive Model Option</u>

Add a provision that allows 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 would be identical to a current provision allowing protocols regarding designated alternative limit notifications.

Sections Affected: adopt new 2265(a)(4) to read:

> [Section 2265] (a)(4) The executive officer may enter into a written protocol with any individual producer or importer for the purposes of specifying how the requirements in section (a)(2) shall be applied to the producer's or importer's particular operations, 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 terms of section (a)(2). Any such protocol shall include the producer's or importer's agreement to be bound by the terms of the protocol.

3. Miscellaneous

Make the following nonsubstantive editorial revision in the first sentence of section 2264.2(a)(1):

(1) A producer of importer selling or supplying a final blend of gasoline from its production or import facility may elect pursuant to this section 2264.2 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,~~ T90, or T50.

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

1. Eliminate Insignificant Terms in the Toxics Equations

To simplify the equations for the individual toxics, the statistical analysis was redone to include only the statistically significant terms (at a p-value = 0.05). The analysis was redone for both Tech class 3 and 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 (See Exhibit 1)

2. Adjust the T50 and T90 Responses in the Hydrocarbon Equation for Tech Class 4

There are limited emissions data at low values of the 50 percent and 90 percent distillation temperatures. Consequently, 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. (See Exhibit 1)

3. Adjust the RVP*Oxygen Response in the Oxides of Nitrogen Equation for Tech Class 4.

There are limited emissions data at low values of the Reid vapor pressure as a function of the oxygen content of the fuel. Consequently, 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. (See Exhibit 1)

Exhibit 1

Staff's Proposed Modifications to the
California Procedures for Alternative Specifications
for Phase 2 Reformulated Gasoline Using the California Predictive Model

Note: This Exhibit contains only those sections that include changes to the originally proposed text. The modifications to the originally proposed text are shown shaded to indicate additions and ~~strikeout~~ to indicate deletions.

C. General Equations for Calculating Emissions by Pollutant and by Technology Class

The selected candidate specifications and set reference specifications are inserted into the predictive model equations to determine the predicted pollutant emissions generated from each fuel formulation by Tech Class. The following is the general form of the equations used to calculate emissions of the candidate and reference specifications for each pollutant and for each technology class.

$$ln\ y_{Tech} = \text{intercept} + \sum [(\text{fuel effects coefficient}) \times (\text{standardized fuel property})]$$

or

$$y_{Tech} = \text{Exp}\ \{\text{intercept} + \sum [(\text{fuel effects coefficient}) \times (\text{standardized fuel property})]\}$$

where

ln is the natural logarithm.

Exp is the inverse of the natural logarithm.

y_{Tech} is the emission in grams or milligrams per mile of a particular pollutant (NOx, HC, benzene, 1,3-butadiene, formaldehyde, and acetaldehyde) and for a particular technology class. (Note: $y_{Tech\text{-}REF}$ is the emissions for the reference specifications and $y_{Tech\text{-}CAND}$ is the emissions for the candidate specifications.)

intercept represents the average vehicle effect for a particular Tech class and a particular pollutant. The intercepts are provided in Table 11, Coefficients for NOx and HC Equations, and Table 12, Coefficients for Toxics Equations.

fuel effects coefficient represents the average fuel effects across all vehicles in the database for a particular Tech class and a particular pollutant. The fuel effect is provided in Table 11, Coefficients for NOx and HC Equations, and Table 12, Coefficients for Toxics.

standardized fuel property is defined as:

$$\text{standardized fuel property} = \frac{[(\text{actual fuel property}) - (\text{mean fuel value})]}{\text{standard deviation of the value for the fuel property}}$$

actual fuel property represents the candidate or reference fuel property selected by the applicant in Table 7, Worksheet for Candidate and Reference Specifications.

Note that the actual fuel property may represent the minimum value of selected candidate fuel properties and is established by the linearization equations defined in sections IV. A. 2 and V. A. 2.

mean fuel value represents the average fuel values from all data that are used in developing the California Predictive Model. The mean and standard deviation are provided in Table 10, Standardization of Fuel Properties-Mean and Standard Deviation.

standard deviation of the value for the fuel property is the standard deviation from all data that are used in developing the California Predictive Model.

IV. OXIDES NITROGEN (NOx) EXHAUST EMISSIONS CALCULATIONS

A. NOx Emissions by Technology Class

The property values from the Table 7 worksheet are used to calculate NOx emissions for the candidate and reference specifications.

1. NOx Emissions for Tech 3

The NOx emissions for the candidate ($y_{\text{Tech 3-CAND}}$) and reference ($y_{\text{Tech 3-REF}}$) specifications for Tech 3 are calculated as follows:

NOx emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation	
	Exp	
intercept	{-0.15597638	+
RVP	(-0.01671797) $\frac{(RVP - 8.651419)}{0.580438}$	+
Sulfur	(0.01785987) $\frac{(SULFUR - 193.574245)}{130.374657}$	+
Aromatic HC	(0.05428291) $\frac{(AROM - 30.967805)}{9.491877}$	+
Olefin	(0.02292342) $\frac{(OLEF - 8.34672)}{5.873768}$	+
Oxygen	(0.01439508) $\frac{(OXY - 0.912512)}{1.249609}$	+
T50	(-0.01161378) $\frac{(T50 - 211.338086)}{17.374327}$	+
T90	(0.00341764) $\frac{(T90 - 315.839826)}{25.694736}$	+
T50T90	(0.00857682) $\frac{(T50 - 211.338086)}{17.374327}$ $\frac{(T90 - 315.839826)}{25.694736}$	+

AROT90	(-0.0097818) $\frac{(ARO - 30.967805)}{9.491877}$ $\frac{(T90 - 315.839826)}{25.694736}$	}

where

RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the value limits for the candidate and reference specifications identified in the Table 7 worksheet.

2. NOx Emissions for Tech 4

The NOx emissions for the candidate ($y_{\text{Tech 4-CAND}}$) and reference ($y_{\text{Tech 4-REF}}$) specifications for Tech 4 are calculated as follows:

NOx emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation	
	Exp	
intercept	{-0.58546115	+
RVP	(0.03005909) $\frac{(RVP - 8.707348)}{0.52813}$	+
Sulfur	(0.050086115) $\frac{(SULFUR - 174.036113)}{137.356549}$	+
Aromatic HC	(0.004154304) $\frac{(AROM - 28.604566)}{7.848674}$	+
Olefin	(0.025949698) $\frac{(OLEF - 7.001772)}{4.988003}$	+
Oxygen	(0.011321599) $\frac{(OXY - 1.266843)}{1.310604}$	+
T50	(0.00195233) $\frac{(T50 - 208.186678)}{18.149553}$	+
T90	(-0.00820391) $\frac{(T90 - 311.36879)}{22.988439}$	+

$$\text{AROOXY} \quad (-0.00579379)\left(\frac{\text{AROM} - 28.604566}{7.848674}\right)\left(\frac{\text{OXY} - 1.266843}{1.310604}\right) +$$

$$\text{RVPOXY} \quad (0.006283521)\left(\frac{\text{RVP} - 8.707348}{0.52813}\right)\left(\frac{\text{OXY} - 1.266843}{1.310604}\right) +$$

$$\text{OXYOXY} \quad (0.013486985)\left(\frac{\text{OXY} - 1.266843}{1.310604}\right)\left(\frac{\text{OXY} - 1.266843}{1.310604}\right) \}$$

~~where~~

~~RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the values for the candidate and reference specifications in the Table 7 worksheet.~~

where

For calculating the reference fuel NOx emissions, RVP, SULFUR, AROM, OLEF, OXYGEN, T50, AND T90 are the values for the reference specifications in the Table 7 worksheet.

For calculating candidate fuel NOx emissions, RVP, SULFUR, AROM, OLEF, T50, AND T90 are the values for the candidate specifications in the Table 7 worksheet. The value for oxygen is determined as follows:

If the value for the candidate OXYGEN specification in the Table 7 worksheet is less than the $\text{OXYGEN}_{(LIN)}$ value , the $\text{OXYGEN}_{(LIN)}$ value is the value for OXYGEN, where $\text{OXYGEN}_{(LIN)}$ is calculated as follows:

$$\text{OXYGEN}_{(LIN)} = 4.724 + .0358669\ \text{AROM} - .578083\ \text{RVP}$$

If the value for the candidate OXYGEN specification in the Table 7 worksheet is greater than or equal to the $\text{OXYGEN}_{(LIN)}$ value, the OXYGEN specification in the Table 7 worksheet is the value for OXYGEN.

V. HYDROCARBONS (HC) EXHAUST EMISSIONS CALCULATIONS

A. HC Emissions by Technology Class

The property values from the Table 7 worksheet are used to calculate HC emissions for the candidate and reference specifications.

1. HC Emissions for Tech 3

The HC emissions for the candidate ($y_{\text{Tech 3-CAND}}$) and reference ($y_{\text{Tech 3-REF}}$) specifications for Tech 3 are calculated as follows:

HC emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation
	Exp
intercept	{-0.79454695 +
RVP	(0.004470126) $\frac{(\text{RVP} - 8.651419)}{0.580438}$ +
Sulfur	(0.001933575) $\frac{(\text{SULFUR} - 193.574245)}{130.374657}$ +
Aromatic HC	(-0.03844685) $\frac{(\text{AROM} - 30.967805)}{9.491877}$ +
Olefin	(-0.02100516) $\frac{(\text{OLEF} - 8.34672)}{5.873768}$ +
Oxygen	(-0.02735656) $\frac{(\text{OXY} - 0.912512)}{1.249609}$ +
T50	(0.010253527) $\frac{(\text{T50} - 211.338086)}{17.374327}$ +
T90	(0.017858355) $\frac{(\text{T90} - 315.839826)}{25.694736}$ +

RVPT50 $(-0.01626671)\left(\frac{RVP - 8.651419}{0.580438}\right)\left(\frac{T50 - 211.338086}{17.374327}\right)$ +

SULARO $(-0.04053717)\left(\frac{SULFUR - 193.574245}{130.374657}\right)\left(\frac{AROM - 30.967805}{9.491877}\right)$ +

AROT90 $(0.018225949)\left(\frac{AROM - 30.967805}{9.491877}\right)\left(\frac{T90 - 315.839826}{25.694736}\right)\}$

where

RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the value limits for the candidate and reference specifications identified in the Table 7 worksheet.

2. HC Emissions for Tech 4

The HC emissions for the candidate ($y_{\text{Tech 4-CAND}}$) and reference ($y_{\text{Tech 4-REF}}$) specifications for Tech 4 are calculated as follows:

HC emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation
	Exp
intercept	{-1.18303868 +
RVP	$(-0.00850444)\left(\frac{RVP - 8.707348}{0.52813}\right)$ +
Sulfur	$(0.116903682)\left(\frac{SULFUR - 174.036113}{137.356549}\right)$ +
Aromatic HC	$(0.001368326)\left(\frac{AROM - 28.604566}{7.848674}\right)$ +

Olefin (-0.0068737) $\frac{(OLEF - 7.001772)}{4.988003}$ +

Oxygen (-0.01035001) $\frac{(OXY - 1.266843)}{1.310604}$ +

T50 (0.076436841) $\frac{(T50 - 208.186678)}{18.149553}$ +

T90 (0.038947849) $\frac{(T90 - 311.36879)}{22.988439}$ +

AROARO (-0.01197286) $\frac{(AROM - 28.604566)}{7.848674}$ $\frac{(AROM - 28.604566)}{7.848674}$ +

AROT90 (0.012076013) $\frac{(AROM - 28.604566)}{7.848674}$ $\frac{(T90 - 311.36879)}{22.988439}$ +

OXYT90 (0.015107193) $\frac{(OXY - 1.266843)}{1.310604}$ $\frac{(T90 - 311.36879)}{22.988439}$ +

T50T50 (0.025807977) $\frac{(T50 - 208.186678)}{18.149553}$ $\frac{(T50 - 208.186678)}{18.149553}$ +

T90T90 (0.018209586) $\frac{(T90 - 311.36879)}{22.988439}$ $\frac{(T90 - 311.36879)}{22.988439}$ }

~~where~~

~~RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the values for the candidate and reference specifications in the Table 7 worksheet.~~

where

For calculating the reference fuel HC emissions, RVP, SULFUR, AROM, OLEF, OXYGEN, T50, AND T90 are the values for the reference specifications in the Table 7 worksheet.

For calculating the candidate fuel HC emissions, RVP, SULFUR, AROM, OLEF, and OXYGEN are the values for the candidate specifications in the Table 7 worksheet. The values for T50 and T90 are determined as follows:

If the value for the candidate T50 specification in the Table 7 worksheet is less than 181, 181 is the value for T50.

If the value for the candidate T50 specification in the Table 7 worksheet is greater than or equal to 181, the T50 specification in the Table 7 worksheet is the value for T50.

If the value for the candidate fuel T90 specification in the Table 7 worksheet is less than the $T90_{(LIN)}$ value, the $T90_{(LIN)}$ value is the value for T90, where $T90_{(LIN)}$ is calculated as follows.

$$T90_{(LIN)} = 323.8 - .9712\ AROM - 7.27598\ OXYGEN$$

If the value for the candidate T90 specification in the Table 7 worksheet is greater than or equal to the $T90_{(LIN)}$ value, the T90 specification in the Table 7 worksheet is the value for T90.

VI. POTENCY-WEIGHTED TOXICS (PWT) EXHAUST EMISSIONS CALCULATIONS

A. Mass Emissions of Toxics by Technology Classa

The property values from the Table 7 worksheet are used to calculate mass toxic emissions for the candidate and reference specifications.

1. Mass Emissions for Tech 3

The mass emissions for each toxic for Tech 3 are calculated as follows:

a. Benzene mass emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation	
	Exp	
intercept	{2.98444988 {2.9937382	+
RVP	(0.00012084)(RVP - 8.651419) / 0.580438	+
Sulfur	(0.06702145)(0.0723141)(SULFUR - 193.574245) / 130.374657	+
Aromatic HC	(0.11271704)(0.152752)(AROM - 30.967805) / 9.491877	+
Olefin	(0.0262828)(OLEF - 8.34672) / 5.873768	+
Oxygen	(0.00010461)(-0.034762)(OXY - 0.912512) / 1.249609	+
T50	(0.07400871)(T50 - 211.338086) / 17.374327	+
T90	(-0.03666419)(T90 - 315.839826) / 25.694736	+

BENZ $\quad \dfrac{(0.13158634)(0.1235949)(BENZ - 1.365963)}{0.444768}$ }

b. 1,3-Butadiene mass emissions Tech 3 = $y_{Tech\ 3}$ =

Description	Equation
	Exp
intercept	(0.55265837 (0.668257 +
RVP	$(-0.11048744)\dfrac{(RVP - 8.651419)}{0.580438}$ +
Sulfur	$(0.12662294)\dfrac{(SULFUR - 193.574245)}{130.374657}$ +
Aromatic HC	$(0.04922477)\dfrac{(AROM - 30.967805)}{9.491877}$ +
Olefin	$(0.12457297)(0.150707)\dfrac{(OLEF - 8.34672)}{5.873768}$ +
Oxygen	$(-0.01861222)\dfrac{(OXY - 0.912512)}{1.249609}$ +
T50	$(-0.04669652)\dfrac{(T50 - 211.338086)}{17.374327}$ +
T90	$(0.1898306)(0.165206)\dfrac{(T90 - 315.839826)}{25.694736}$ }

c. Formaldehyde mass emissions Tech 3 = $y_{Tech\ 3}$ =

Description	Equation	
	Exp	
intercept	{2.06596608 {2.041917	+
RVP	(0.02179558)(RVP - 8.651419) / 0.580438	+
Sulfur	(-0.18622636)(-0.18011)(SULFUR - 193.574245) / 130.374657	+
Aromatic HC	(-0.1265364)(-0.09754)(AROM - 30.967805) / 9.491877	+
Olefin	(0.00492199)(OLEF - 8.34672) / 5.873768	+
Oxygen	(0.17601939)(0.153291)(OXY - 0.912512) / 1.249609	+
T50	(0.06301058)(T50 - 211.338086) / 17.374327	+
T90	(-0.04218807)(T90 - 315.839826) / 25.694736 }	

d. Acetaldehyde mass emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation	
	Exp	
intercept	~~(0.99348033~~ (1.041177	+
~~RVP~~	~~(0.00386954)(RVP - 8.651419) / 0.580438~~	~~+~~
~~Sulfur~~	~~(0.04468183)(SULFUR - 193.574245) / 130.374657~~	~~+~~
Aromatic HC	~~(-0.14176068)~~(-0.10224)(AROM - 30.967805) / 9.491877	+
~~Olefin~~	~~(0.03247264)(OLEF - 8.34672) / 5.873768~~	~~+~~
~~Oxygen~~	~~(0.11153843)(OXY - 0.912512) / 1.249609~~	~~+~~
~~T50~~	~~(0.10500375)(T50 - 211.338086) / 17.374327~~	~~+~~
~~T90~~	~~(-0.02459286)(T90 - 315.839826) / 25.694736~~	~~}~~

where

RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the value limits for the candidate and reference specifications identified in the Table 7 worksheet.

2. Mass Emissions for Tech 4

The mass emissions for each toxic for Tech 4 are calculated as follows:

a. Benzene mass emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation	
	Exp	
intercept	~~{2.07694733~~ [2.078612	+
RVP	~~(0.0205809)~~(0.01972)(RVP - 8.707348) / 0.52813	+
Sulfur	~~(0.14014755)~~(0.140432)(SULFUR - 174.036113) / 137.356549	+
Aromatic HC	~~(0.17375044)~~(0.169401)(AROM - 28.604566) / 7.848674	+
Olefin	~~(0.02072724)~~(0.02158)(OLEF - 7.001772) / 4.988003	+
Oxygen	~~(0.02074571)~~(0.022392)(OXY - 1.266843) / 1.310604	+
T50	~~(0.04810616)~~(0.052416)(T50 - 208.186678) / 18.149553	+
~~T90~~	~~(0.00084762)(T90 - 311.36879) / 22.988439~~	~~+~~
BENZ	~~(0.14364029)~~(0.145341)(BENZ - 1.092985) / 0.563303 }	

b. 1,3-Butadiene mass emissions Tech 4 = $y_{Tech\ 4}$ =

Description	Equation	
	Exp	
intercept	~~(-0.12216754~~ ~~(-0.12765~~	+
~~RVP~~	~~(0.0235653)(RVP - 8.707348) / 0.52813~~	~~+~~
Sulfur	~~(0.05667595)~~(0.060078))(SULFUR - 174.036113) / 137.356549	+
Aromatic HC	~~(-0.04969117)~~(-0.04862)(AROM - 28.604566) / 7.848674	+
Olefin	~~(0.13697093)~~(0.135542)(OLEF - 7.001772) / 4.988003	+
~~Oxygen~~	~~(0.00190223)(OXY - 1.266843) / 1.310604~~	~~+~~
T50	~~(0.05848709)~~(0.058141)(T50 - 208.186678) / 18.149553	+
T90	~~(0.08820685)~~(0.089544)(T90 - 311.36879) / 22.988439 }	

c. Formaldehyde mass emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation
	Exp
intercept	~~(0.57054336~~ ~~(0.56907~~ +
~~RVP~~	~~(0.00037903(RVP - 8.707348)~~ ~~0.52813~~ +
Sulfur	~~(-0.04718751(-0.04472)~~(SULFUR - 174.036113) 137.356549 +
Aromatic HC	~~(-0.07461695)(-0.07248)~~(AROM - 28.604566) 7.848674 +
~~Olefin~~	~~(0.01552007)(OLEF - 7.001772)~~ ~~4.988003~~ +
Oxygen	~~(0.07852942)~~(0.073394)(OXY - 1.266843) 1.310604 +
~~T50~~	~~(0.00214242)(T50 - 208.186678)~~ ~~18.149553~~ +
T90	~~(0.08066587)~~(0.081896)(T90 - 311.36879) 22.988439 }

d. Acetaldehyde mass emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation	
	Exp	
intercept	{ ~~-0.30025158~~ -0.30842	+
RVP	~~(0.05984811)~~(0.061495)(RVP - 8.707348) / 0.52813	+
~~Sulfur~~	~~(0.00342614)(SULFUR - 174.036113) / 137.356549~~	~~+~~
Aromatic HC	~~(-0.0799839)~~(-0.06631)(AROM - 28.604566) / 7.848674	+
~~Olefin~~	~~(0.01920116)(OLEF - 7.001772) / 4.988003~~	~~+~~
Oxygen	~~(0.12257203)~~(0.084501)(OXY - 1.266843) / 1.310604	+
T50	~~(0.11079701)~~(0.08131)(T50 - 208.186678) / 18.149553	+
T90	~~(0.06243205)~~(0.070103)(T90 - 311.36879) / 22.988439	+
~~BENZ~~	~~(0.08929885)(BENZ - 1.092985) / 0.563303~~	~~}~~

where

RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the values for the candidate and reference specifications in the Table 7 worksheet.

Table 12
Coefficients for Toxics Equations

Pollutant Emission	Tech 3			
	Benzene	Butadiene	Formaldehyde	Acetaldehyde
Intercept	2.98444988	0.55265837	2.06596608	0.99348033
RVP	0.00012084	-0.11048744	0.02179558	0.00386954
Sulfur	0.06702145	0.12662294	-0.18622636	0.04468183
Aromatic HC	0.11271704	0.04922477	-0.1265364	-0.14176068
Olefin	0.0262828	0.12457297	0.00492199	0.03247264
Oxygen	0.00010461	-0.01861222	0.17601939	0.11153843
T50	0.07400871	-0.04669652	0.06301058	0.10500375
T90	-0.03666419	0.1898306	-0.04218807	-0.02459286
Benzene	0.13158634			

Pollutant Emission	Tech 4			
	Benzene	Butadiene	Formaldehyde	Acetaldehyde
Intercept	2.07694733	-0.12216754	0.57054336	-0.30025158
RVP	0.0205809	0.0235653	0.00037903	0.05984811
Sulfur	0.14014755	0.05667595	-0.04718751	0.00342614
Aromatic HC	0.17375044	-0.04969117	-0.07461695	-0.0799839
Olefin	0.02072724	0.13697093	0.01552007	0.01920116
Oxygen	0.02074571	0.00190223	0.07852942	0.12257203
T50	0.04810616	0.05848709	0.00214242	0.11079701
T90	0.00084762	0.08820685	0.08066587	0.06243205
Benzene	0.14364029			0.08929885

Table 12
Coefficients for Toxics Equations

Pollutant Emission	Tech 3			
	Benzene	Butadiene	Formaldehyde	Acetaldehyde
Intercept	2.9937382	0.668257	2.041917	1.041177
RVP				
Sulfur	0.0723141		-0.18011	
Aromatic HC	0.1524752		-0.09754	-0.10224
Olefin		0.150707		
Oxygen	-0.034762		0.153291	
T50				
T90		0.165206		
Benzene	0.1235949			

Pollutant Emission	Tech 4			
	Benzene	Butadiene	Formaldehyde	Acetaldehyde
Intercept	2.078612	-0.12765	0.56907	-0.30842
RVP	0.01972			0.061495
Sulfur	0.140432	0.060078	-0.04472	
Aromatic HC	0.169401	-0.04862	-0.07248	-0.06631
Olefin	0.02158	0.135542		
Oxygen	0.022392		0.073394	0.084501
T50	0.052416	0.058141		0.08131
T90		0.089544	0.081896	0.070103
Benzene	0.145341			

ATTACHMENT A

THE AMENDMENTS TO THE REGULATIONS

APPENDIX II

MODIFIED TEXT

PROPOSED REGULATION ORDER

NOTE: The text of the previously proposed amendments is shown below in underline to indicate additions and ~~strikeout~~ to show deletions compared to the regulations prior to initiation of this rulemaking. The supplemental modifications now proposed are shown in ***bold italics*** to show additions and ~~***bold italics***~~ to show deletions.

The originally proposed regulatory action consisted of amendments to sections 2260, 2261, 2262.2, 2262.3, 2262.4, 2262.5, 2262.6, 2262.7, 2264 and 2270, and adoption of new sections 2264.2 and 2265, in Title 13, California Code of Regulations. The supplemental modifications now proposed consist of additional amendments to sections 2260, 2261, 2264, 2264.2 and 2265, and adoption of new section 2264.4. Only these sections are shown below. Please refer to the Staff Report, release date April 22, 1994, for the remaining proposed amendments in this rulemaking.

The modified text shown below includes several conforming modifications drafted by the staff since the June 9, 1994 hearing. These conforming modifications are found in section 2260(a)(2) and (a)(12), section 2261(a), section 2264(a), section 2264.2(a) and (b), and section 2265(a)(5).

Amend Title 13, California Code of Regulations, section 2260, to read as follows (the only supplemental modifications being proposed are editorial corrections in section 2260(a)(2) and (a)(12)):

Section 2260. Definitions

(a) For the purposes of this article, the following definitions apply:

(1) "Alternative gasoline formulation" means a blend of gasoline meeting all of the specifications identified in a certification issued by the Executive Officer pursuant to the "California Test Procedures for Evaluating Alternative Specifications for Gasoline", adopted September 18, 1992, which is incorporated herein by reference.

(2) "Averaging compliance option" means, with respect to a specific gasoline property, the compliance option set forth in section 2262.2(c), section 2262.3(c), section 2262.4(c), section 2262.6(c) or ***(f)(e)***, or section 2262.7(c).

~~(2)~~ (3) "ASTM" means the American Society of Testing and Materials.

~~(3)~~ (4) "Bulk purchaser-consumer" means a person that purchases or otherwise obtains gasoline in bulk and then dispenses it into the fuel tanks or motor vehicles owned or operated by the person.

(5) "Bulk plant" means an intermediate gasoline distribution facility where delivery of gasoline to and from the facility is solely by truck.

~~(4)~~ (6) "California gasoline" means:

(A) ~~g~~Gasoline sold, intended for sale, or made available for sale as a motor vehicle fuel in California; and

(B) Gasoline that is produced in California, and that the producer knows or reasonably should know will be offered for sale or supply at an out-of-state terminal or bulk plant at which it will be identified as gasoline produced in California and suitable for sale as a motor vehicle fuel in California.

~~(5)~~ (7) "Designated alternative limit" means an alternative gasoline specification limit, expressed in the nearest part per million by weight for sulfur content, nearest ~~hundreth~~ hundredth percent by volume for benzene content, nearest tenth percent by volume for aromatic hydrocarbon content, nearest tenth percent for olefin content, and nearest degree Fahrenheit for T90 and T50, which is assigned by a producer or importer to a final blend of California gasoline pursuant to section 2264.

~~(6)~~ (8) "Ethanol" means ethyl alcohol which meets any additional requirements for ethanol or ethyl alcohol in Health and Safety Code section 43830.

~~(7)~~ (9) "Executive Officer" means the executive officer of the Air Resources Board, or his or her designee.

~~(8)~~ (10) "Final blend" means a distinct quantity of gasoline which is introduced into commerce in California without further alteration which would tend to affect a regulated gasoline specification of the fuel.

~~(9)~~ (11) "Final distribution facility" means the stationary gasoline transfer point from which gasoline is transferred into the cargo tank truck, pipeline, or other delivery vessel from which the gasoline will be delivered to the facility at which the gasoline will be dispensed into motor vehicles; except that a cargo tank truck is the final distribution facility where the cargo tank truck is used to transport gasoline and carries written documentation demonstrating that oxygenates, in quantities

that will bring the gasoline into compliance with section 2262.5(a) and (c), will be or have been blended directly into the cargo tank truck prior to delivery of the gasoline from the cargo tank truck to the facility at which the gasoline will be dispensed into motor vehicles.

(12) "Flat limit compliance option" means, with respect to a specific gasoline property, the compliance option set forth in section 2262.2(b), section 2262.3(b), section 2262.4(b), section 2262.6(b) or ~~(c)~~(d), or section 2262.7(b).

~~(10)~~ (13) "Further process" means to perform any activity on gasoline, including distillation, treating with hydrogen, or blending, for the purpose of bringing the gasoline into compliance with the standards in this subarticle.

~~(11)~~ (14) "Gasoline" means any fuel that is commonly or commercially known, sold or represented as gasoline.

(15) "Imported California gasoline" means California gasoline which is transported into California and does not meet the definition in section 2260(a)(6)(B).

~~(12)~~ (16) "Import facility" means the facility at which imported California gasoline is first received in California, including, in the case of gasoline imported by cargo tank and delivered directly to a facility for dispensing gasoline into motor vehicles, the cargo tank in which the gasoline is imported.

~~(13)~~ (17) "Importer" means any person who first accepts delivery in California of imported California gasoline.

~~(14)~~ (18) "Motor vehicle" has the same meaning as defined in section 415 of the Vehicle Code.

~~(15)~~ (19) "Oxygenate" is any oxygen-containing, ashless, organic compound, such as an alcohol or ether, which, when added to gasoline increases the amount of oxygen in gasoline.

(20) "PM alternative gasoline formulation" means a final blend of gasoline that is subject to a set of PM alternative specifications.

(21) "PM alternative specifications" means the specifications for the following gasoline properties, as determined in accordance with section 2263: maximum Reid vapor pressure, expressed in the nearest hundredth of a pound per square inch; maximum sulfur content, expressed in the nearest

part per million by weight; maximum benzene content, expressed in the nearest hundredth of a percent by volume; maximum olefin content, expressed in the nearest tenth of a percent by volume; minimum and maximum oxygen content, expressed in the nearest tenth of a percent by weight; maximum T50, expressed in the nearest degree Fahrenheit; maximum T90, expressed in the nearest degree Fahrenheit; and maximum aromatic hydrocarbon content, expressed in the nearest tenth of a percent by volume.

(22) "PM averaging compliance option" means, with reference to a specific gasoline property, the compliance option for PM alternative gasoline formulations under which final blends of gasoline are assigned designated alternative limits in accordance with section 2264.

(23) "PM averaging limit" means a PM alternative specification that is subject to the PM averaging compliance option.

(24) "PM flat limit" means a PM alternative specification that is subject to the PM flat limit compliance option.

(25) "PM flat limit compliance option" means, with reference to a specific gasoline property, the compliance option under which each gallon of gasoline must meet the specification for the property contained in the PM alternative specifications.

~~(16)~~ (26) (A) "Produce" means, except as otherwise provided in section (a)(16)(B) or (a)(16)(C), to convert liquid compounds which are not gasoline into gasoline. When a person blends volumes of blendstocks which are not gasoline with volumes of gasoline acquired from another person, and the resulting blend is gasoline, the person conducting such blending has produced only the portion of the blend which was not previously gasoline. When a person blends gasoline with other volumes of gasoline, without the addition of blendstocks which are not gasoline, the person does not produce gasoline.

(B) Where a person supplies gasoline to a refiner who agrees in writing to further process the gasoline at the refiner's refinery and to be treated as the producer of the gasoline, the refiner shall be deemed for all purposes under this article to be the producer of the gasoline.

(C) Where a person blends oxygenates into gasoline which has already been supplied from a gasoline production facility or import facility, and

does not alter the quality or quantity of the gasoline in any other way, the person does not produce gasoline.

~~(17)~~ (27) "Producer" means any person who owns, leases, operates, controls or supervises a California production facility.

~~(18)~~ (28) "Production facility" means a facility in California at which gasoline is produced. Upon request of a producer, the executive officer may designate, as part of the producer's production facility, a physically separate bulk storage facility which is owned and operated by the producer and which is not used to store or distribute gasoline that is not supplied from the production facility.

~~(19)~~ (29) "Qualifying volume" means, for each small refiner, the volume of gasoline equal to the average of the three highest annual production volumes of motor vehicle gasoline reported for the small refiner's California refinery(ies) in the period 1987 through 1991, inclusive, to the California Energy Commission as required by the Petroleum Industry Information Reporting Act of 1980 (Public Resources Code Sections 25350 et seq.), deducting the volume of oxygenates in the gasoline.

~~(20)~~ (30) "Refiner" means any person who owns, leases, operates, controls or supervises a refinery.

~~(21)~~ (31) "Refinery" means a facility that produces liquid fuels by distilling petroleum.

~~(22)~~ (32) "Small refiner" means any refiner who owns or operates a refinery in California that:

(A) Has and at all times had since January 1, 1978, a crude oil capacity of not more than 55,000 barrels per stream day;

(B) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in California with a total combined crude oil capacity of more than 55,000 barrels per stream day; and

(C) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in the United States with a total combined crude oil capacity of more than 137,500 barrels per stream day.

~~(23)~~ (33) "Stream day" means 24 consecutive hours of actual operation of a refinery.

~~(24)~~ (34) "Supply" means to provide or transfer a product to a physically separate facility, vehicle, or transportation system.

NOTE: Authority cited: sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 40000, 43016, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

Amend Title 13, California Code of Regulations, section 2261 to read as follows (the only supplemental modification being proposed consists of nonsubstantive reformatting of section 2261(a) to enhance clarity):

Section 2261. Applicability of Standards; Additional Standards

(a)(1)*(A)* Unless otherwise specifically provided, the standards in sections 2262.1(a), 2262.2(a), 2262.3(a), 2262.4(a), 2262.5(a) and (b), 2262.6(a) and 2262.7(a) shall ~~apply to California gasoline sold or supplied on or after April 1, 1996,~~ and apply:

(A) *1.* starting April 15, 1996 to all sales, supplies, offers or movements of California gasoline except for transactions directly involving:

(i) *a.* the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, or

(ii) *b.* the delivery of gasoline from a bulk plant to a retail outlet or bulk purchaser-consumer facility, and

(B) *2.* starting June 1, 1996 to all sales, supplies, offers or movements of California gasoline, including transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility.

(B) ~~the~~ The remaining standards and requirements contained in this subarticle shall apply to all sales, supplies, or offers of California gasoline ~~sold or supplied~~ occurring on or after March 1, 1996.

(2) The standards in sections 2262.1(a), 2262.2(a), 2262.3(a), 2262.4(a), 2262.5(a) and (b), 2262.6(a) and 2262.7(a) shall not apply to transactions directly involving the fueling of motor vehicles at a retail

outlet or bulk purchaser-consumer facility, where the person selling, offering, or supplying the gasoline demonstrates as an affirmative defense that the exceedance of the pertinent standard was caused by gasoline delivered to the retail outlet or bulk purchaser-consumer facility prior to April 15, 1996, or delivered to the retail outlet or bulk purchaser-consumer facility directly from a bulk plant prior to June 1, 1996.

(b) California gasoline sold or supplied on or after March 1, 1996, is also subject to section 2253.4 (Lead/Phosphorus in Gasoline), section 2254 (Manganese Additive Content), and section 2257 (Required Additives in Gasoline). California gasoline that is supplied from a small refiner's California refinery prior to March 1, 1998, and that qualifies for treatment under section 2272(a), shall also be subject to section 2250 (Degree of Unsaturation of Gasoline) and section 2252 (Sulfur Content of Gasoline).

(c) The standards contained in this subarticle shall not apply to a sale, offer for sale, or supply of California gasoline to a refiner if: (1) the refiner further processes the gasoline at the refiner's refinery prior to any subsequent sale, offer for sale, or supply of the gasoline, and (2) in the case of standards applicable only to producers or importers, the refiner to whom the gasoline is sold or supplied is the producer of the gasoline pursuant to section 2260(a)(16)(B).

(d) The prohibitions in sections 2262.2(b) and (c), 2262.3(b) and (c), 2262.4(b) and (c), 2262.5(c), 2262.6(b), (c), (e) and (f), and 2262.7(b) and (c) shall not apply to gasoline which a producer or importer demonstrates was neither produced nor imported by the producer or importer.

NOTE: Authority cited: sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43016, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

* * * *

Amend Title 13, California Code of Regulations, section 2264 to read as follows (the only supplemental modifications being proposed are editorial corrections in section 2264(a)(1) and (a)(3)):

Section 2264. Designated Alternative Limits

(a) Assignment of a designated alternative limit.

(1) A producer or importer that has elected to be subject to sections 2262.2(c), 2262.3(c), 2262.4(c), 2262.6(c), 2262.6*(f)(e)*, or 2262.7(c) may assign a designated alternative limit to a final blend of California gasoline produced or imported by the producer or importer by satisfying the notification requirements in this section (a). In no case shall a designated alternative limit be less than the sulfur, benzene, olefin or aromatic hydrocarbon content, or T90 or T50, of the final blend shown by the sample and test conducted pursuant to section 2270. If a producer or importer intends to assign designated alternative limits for more than one gasoline specification to a given quantity of gasoline, the party shall identify the same final blend for all designated alternative limits for the gasoline.

(2) (A) The producer or importer shall notify the executive officer of the estimated volume (in gallons), the designated alternative limit, the blend identity, and the location of each final blend receiving a designated alternative limit. This notification shall be received by the executive officer before the start of physical transfer of the gasoline from the production or import facility, and in no case less than 12 hours before the producer or importer either completes physical transfer or commingles the final blend. A producer or importer may revise the reported estimated volume, as long as notification of the revised volume is received by the executive officer no later than 48 hours after completion of the physical transfer of the final blend from the production or import facility. If notification of the revised volume is not timely received by the executive officer, the reported estimated volume shall be deemed the reported actual volume.

(B) For each final blend receiving a designated alternative limit exceeding 0.80 percent by volume benzene content, 30 parts per million by

weight sulfur content, 4.0 percent by volume olefin content, 22.0 percent by volume aromatic hydrocarbon content, T90 of 290 degrees Fahrenheit, or T50 of 200 degrees Fahrenheit, the producer or importer shall notify the executive officer of the date and time of the start of physical transfer from the production or import facility, within 24 hours after the start of such physical transfer. For each final blend receiving a designated alternative limit less than 0.80 percent by volume benzene content, 30 parts per million by weight sulfur content, 4.0 percent by volume olefin content, 22.0 percent by volume aromatic hydrocarbon content, T90 of 290 degrees Fahrenheit, or T50 of 200 degrees Fahrenheit, the producer or importer shall notify the executive officer of the date and time of the completion of physical transfer from the production or import facility, within 24 hours after the completion of such physical transfer.

(3) If, through no intentional or negligent conduct, a producer or importer cannot report within the time period specified in *(a)*(2) above, the producer or importer may notify the executive officer of the required data as soon as reasonably possible and may provide a written explanation of the cause of the delay in reporting. If, based on the written explanation and the surrounding circumstances, the executive officer determines that the conditions of this section (a)(3) have been met, timely notification shall be deemed to have occurred.

(4) The executive officer may enter into a written protocol with any individual producer or importer for the purposes of specifying how the requirements in section (a)(2) shall be applied to the producer's or importer's particular operations, 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 terms of section (a)(2). Any such protocol shall include the producer's or importer's agreement to be bound by the terms of the protocol.

(5) Whenever the final blend of a producer or importer includes volumes of gasoline the party has produced or imported and volumes the party has neither produced nor imported, the producer's or importer's designated alternative limit shall be assigned and applied only to the

volume of gasoline the party has produced or imported. In such a case, the producer or importer shall report to the executive officer in accordance with section (a) both the volume of gasoline produced and imported by the party, and the total volume of the final blend. The party shall also additionally report the sulfur content, benzene content, olefin content, aromatic hydrocarbon content, T90, and T50, as applicable, of the portion of the final blend neither produced nor imported by the party, determined as set forth in section 2270(b).

(b) **Additional prohibitions regarding gasoline to which a designated alternative limit has been assigned.**

(1) No producer or importer shall sell, offer for sale, or supply California gasoline in a final blend to which the producer or importer has assigned a designated alternative limit exceeding 0.80 percent by volume benzene content, 30 parts per million by weight sulfur content, 4.0 percent by volume olefin content, 22.0 percent by volume aromatic hydrocarbon content, T90 of 290 degrees Fahrenheit, or T50 of 200 degrees Fahrenheit, where the total volume of the final blend sold, offered for sale, or supplied exceeds the volume reported to the executive officer pursuant to section (a).

(2) No producer or importer shall sell, offer for sale or supply California gasoline in a final blend to which the producer or importer has assigned a designated alternative limit less than 0.80 percent by volume benzene content, 30 parts per million by weight sulfur content, 4.0 percent by volume olefin content, 22.0 percent by volume aromatic hydrocarbon content, T90 of 290 degrees Fahrenheit, or T50 of 200 degrees Fahrenheit, where the total volume of the final blend sold, offered for sale, or supplied is less than the volume reported to the executive officer pursuant to section (a).

(c) **Offsetting excess sulfur.** Within 90 days before or after the start of physical transfer from a production or import facility of any final blend of California gasoline to which a producer has assigned a designated alternative limit for sulfur content exceeding 30 parts per million, the producer or importer shall complete physical transfer from the same production or import facility of California gasoline in sufficient

quantity and with a designated alternative limit sufficiently below 30 parts per million to offset the mass of sulfur in excess of a limit of 30 parts per million.

(d) **Offsetting excess benzene.** Within 90 days before or after the start of physical transfer from a production or import facility of any final blend of California gasoline to which a producer has assigned a designated alternative limit for benzene content exceeding 0.80 percent by volume, the producer or importer shall complete physical transfer from the same production or import facility of California gasoline in sufficient quantity and with a designated alternative limit sufficiently below 0.80 percent by volume to offset the volume of benzene in excess of a limit of 0.80 percent by volume.

(e) **Offsetting excess olefins.** Within 90 days before or after the start of physical transfer from a production or import facility of any final blend of California gasoline to which a producer has assigned a designated alternative limit for olefin content exceeding 4.0 percent by volume, the producer or importer shall complete physical transfer from the same production or import facility of California gasoline in sufficient quantity and with a designated alternative limit sufficiently below 4.0 percent by volume to offset the volume of olefins in excess of a limit of 4.0 percent by volume.

(f) **Offsetting T90.** Within 90 days before or after the start of physical transfer from a production or import facility of any final blend of California gasoline to which a producer has assigned a designated alternative limit for T90 exceeding 290 degrees Fahrenheit, the producer or importer shall complete physical transfer from the same production or import facility of California gasoline in sufficient quantity and with a designated alternative limit sufficiently below 290 degrees Fahrenheit to offset the extent to which the gasoline exceeded a T90 of 290 degrees Fahrenheit .

(g) **Offsetting T50.** Within 90 days before or after the start of physical transfer from a production or import facility of any final blend of California gasoline to which a producer has assigned a designated alternative limit for T50 exceeding 200 degrees Fahrenheit, the producer or

importer shall complete physical transfer from the same production or import facility of California gasoline in sufficient quantity and with a designated alternative limit sufficiently below 200 degrees Fahrenheit to offset the extent to which the gasoline exceeded a T50 of 200 degrees Fahrenheit .

(h) **Offsetting excess aromatic hydrocarbons.** Within 90 days before or after the start of physical transfer from a production or import facility of any final blend of California gasoline to which a producer has assigned a designated alternative limit for aromatic hydrocarbon content exceeding 22.0 percent by volume, the producer or importer shall complete physical transfer from the same production or import facility of California gasoline in sufficient quantity and with a designated alternative limit sufficiently below 22.0 percent by volume to offset the volume of aromatic hydrocarbons in excess of a limit of 22.0 percent.

(i) **Designated alternative limits for PM alternative gasoline formulations.**

The producer or importer of a final blend of California gasoline that is subject to the PM averaging compliance option for one or more properties may assign a designated alternative limit to the final blend by satisfying the notification requirements of section 2264(a). The producer or importer of such a final blend shall be subject to all of the provisions of this section 2264, except that, with respect to that final blend:

(A) The PM averaging limit (if any) for benzene content shall replace any reference in this section 2264 to 0.80 percent by volume benzene content;

(B) The PM averaging limit (if any) for olefin content shall replace any reference in this section 2264 to 4.0 percent by volume olefin content;

(C) The PM averaging limit (if any) for sulfur content shall replace any reference in this section 2264 to 30 parts per million by weight sulfur content;

(D) The PM averaging limit (if any) for aromatic hydrocarbon content shall replace any reference in this section 2264 to 22.0 percent by volume aromatic hydrocarbon content;

(E) The PM averaging limit (if any) for T90 shall replace any reference in this section 2264 to T90 of 290 degrees Fahrenheit; and

(F) The PM averaging limit for T50 (if any) shall replace any reference in this section 2264 to T50 of 200 degrees Fahrenheit.

NOTE: Authority cited: sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43016, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

Adopt Title 13, California Code of Regulations, section 2264.2 to read as follows (the supplemental modifications make nonsubstantive editorial revisions in section 2264.2(a)(1), revise section 2264.2(a)(2) and (b)(2) to clarify that the provisions of section 2264(a)(3) and (4) apply to elections made pursuant to section 2264.2, and revise section 2264.2(b)(1) to assure that it also applies to elections of the flat limit compliance option by producers and importers who have been using the predictive model or an alternative gasoline formulation under section 2266):

Section 2264.2. **Election of Applicable Limit for Gasoline Supplied From a Production or Import Facility**

(a) **Election of the averaging compliance option.**

(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~~, T90 or T50. Once a producer or importer has made such an election for a gasoline property, all final blends subsequently sold or supplied from the production or import facility shall be subject to the averaging compliance option for that property until the producer or importer either (A) elects in accordance with section 2264.2(b) to have a final blend at the facility subject to the flat limit compliance option for that property, or (B)

elects in accordance with section 2265(a) to sell or supply a final blend at the facility as a PM alternative gasoline formulation, or (C) elects in accordance with section 2266(c) to sell or supply a final blend at the facility as an alternative gasoline formulation.

(2) In order to elect to have a final blend subject to the averaging option for a gasoline property, the producer or importer shall notify the executive officer of such election and of the information identified in section 2264(a)(2)(A), within the time limits set forth in section 2264(a)(2)(A) ***and subject to section 2264(a)(3) and (4).***

(b) **Election of flat limit compliance option.**

(1) A producer or importer selling or supplying ***a final blend of gasoline*** from its production or import facility ~~gasoline subject to the averaging compliance option for a property~~ may elect to have ~~a~~ ***the*** final blend subject to the flat limit compliance option in accordance with this section 2264.2~~(c)~~ ***(b)***. No such election may be made if there are outstanding requirements to provide offsets for the gasoline property at the facility pursuant to the applicable provision in section 2264(c), (d), (e), (f), (g), or (h).

(2) In order to elect to have a final blend subject to the flat limit compliance option for a gasoline property, the producer or importer shall notify the executive officer of such election and of the blend identity and the location of the final blend, within the time limits set forth in section 2264(a)(2)(A) ***and subject to section 2264(a)(3) and (4).***

(3) Once a producer or importer has made an election under this section 2264.2(b) with respect to a gasoline property, all final blends subsequently sold or supplied from the production or import facility shall be subject to the flat limit compliance option for that property until the producer or importer either (A) elects in accordance with section 2264.2(a) to have a final blend at the facility subject to the averaging compliance option for that property, or (B) elects in accordance with section 2265(a) to sell or supply a final blend at the facility as a PM alternative gasoline formulation, or (C) elects in accordance with section 2266(c) to sell or supply a final blend at the facility as an alternative gasoline formulation.

(4) Once a producer or importer has made an election under this section 2264.2(b) with respect to a gasoline property of a final blend at a production or import facility, the producer or importer may not use any previously assigned designated alternative limit for that property to provide offsets pursuant to the applicable provision in section 2264(c), (d), (e), (f), (g), or (h) for any final blend sold or supplied from the production or import facility subsequently to the election.

(c) **Inapplicability to elections for PM alternative gasoline formulations.**

Any election for a final blend to be subject to a PM averaging compliance option or a PM flat limit compliance option shall be made in accordance with section 2265 rather than this section 2264.2.

NOTE: Authority cited: sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43016, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

Adopt Title 13, California Code of Regulations, section 2264.4, to read as follows (the supplemental modifications add this section):

Section 2264.4. Extensions of the 90-Day Offset Period Under the Averaging or PM Averaging Compliance Options in 1996 and 1997

(a) Election of extension of a 90-day offset period. A producer or importer may elect an extension of a 90-day offset period identified in sections 2264(c) through 2264(h) by complying with this section. The extension will apply to the 90-day period for offsetting exceedances generated by final blends previously transferred from a production or import facility. The extension will start on the day after the day by which the producer or importer is otherwise required to fully offset the exceedance.

(b) Limitations on extensions. A producer or importer may elect no more than three extensions that start in 1996 and no more than three

extensions that start in 1997. No extension may start after December 31, 1997. None of the three extensions may exceed 10 days, but separate extensions may run consecutively.

(c) Notice. In order to elect an extension of a 90-day offset period, the producer or importer must provide notice which is received by the executive officer no later than 5:00 p.m. on the day by which full offsets would otherwise be required. The notice must include all of the following:

(1) The date the extension will go into effect;

(2) The length of the extension (not to exceed 10 days);

(3) The production facility or import facility at which the extension will apply;

(4) The primary fuel property and any additional fuel properties to which the extension will apply;

(5) Identification of an unforeseen event necessitating the extension for each of the fuel properties identified pursuant to section (c)(4).

(d) Effect of an extension. With respect to the primary gasoline property specified by the producer or importer, the extension will establish a new deadline for offsetting an exceedance of either the limit for the property identified in section 2264(c) through 2264(h) or, if applicable, the PM averaging limit for the property. The new deadline will also apply for that property to other final blends of gasoline, transferred from the production or import facility, which previously had offset deadlines during the extension period. The new deadline will also apply, with respect to any additional properties identified in the producer or importer's notice pursuant to section 2264.4(c), to final blends of gasoline transferred from the production or import facility which have offset deadlines at the start of, or during, the extension period.

For example, on September 1, 1996, a producer starts physical transfer from its production facility of a final blend of California gasoline which is subject to the averaging compliance option for sulfur and benzene content, and which has a designated alternative limit for sulfur content of 50 parts per million. On September 3, 1996, the producer starts physical transfer from its production facility of a final blend of California

gasoline having designated alternative limits for sulfur content of 42 parts per million, and for benzene content of 1.10 percent by volume. The producer provides timely and proper notice of its election to extend the November 30, 1996 deadline for offsetting the excess sulfur content of the September 1, 1996 final blend 10 days to December 10, 1996, with the extension also applying to benzene content. Under the election, the excess sulfur content of the September 1, 1996 final blend, and the excess sulfur and benzene content of the September 3, 1996 blend, will have to be offset by final blends physically transferred from the production facility no later than December 10, 1996.

NOTE: Authority cited: sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43016, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

Adopt Title 13, California Code of Regulations, section 2265, to read as follows (The supplemental modifications add section 2265(a)(4) and (a)(5). The addition of section 2265(a)(5) is a conforming modification reflecting the intent that the procedures for notifications regarding gasoline subject to PM alternative specifications will be equivalent to the procedures for notifications regarding gasoline subject to the averaging compliance option. Section 2265(a)(5) is essentially identical to section 2264(a)(3).):

Section 2265. Gasoline Subject to PM Alternative Specifications Based on the California Predictive Model

(a) Election to sell or supply a final blend as a PM alternative gasoline formulation.

(1) In order to sell or supply from its production facility or import facility a final blend of California gasoline as a PM alternative gasoline formulation subject to PM alternative specifications, a producer or importer shall satisfy the requirements of this section (a).

(2) The producer or importer shall evaluate the candidate PM alternative specifications in accordance with the Air Resources Board's "California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model," as adopted [Insert date of adoption], which is incorporated herein by reference (hereafter the "Predictive Model Procedures"). If the PM alternative specifications meet the criteria for approval in the Predictive Model Procedures, the producer shall notify the executive officer of: (A) The identity, location, and estimated volume of the final blend; (B) the PM alternative specifications that will apply to the final blend, including for each specification whether it applies as a PM flat limit or a PM averaging limit; and (C) the numerical values for percent change in emissions for oxides of nitrogen, hydrocarbons, and potency-weighted toxic air contaminants as determined in accordance with the Predictive Model Procedures. The notification shall be received by the executive officer before the start of physical transfer of the gasoline from the production or import facility, and in no case less than 12 hours before the producer or importer either completes physical transfer or commingles the final blend.

(3) Once a producer or importer has notified the executive officer pursuant to this section 2265(a) that a final blend of California gasoline is being sold or supplied from a production or import facility as a PM alternative gasoline formulation, all final blends of California gasoline subsequently sold or supplied from that production or import facility shall be subject to the same PM alternative specifications until the producer or importer either (A) designates a final blend at that facility as a PM alternative gasoline formulation subject to different PM alternative specifications, (B) elects in accordance with section 2264.2 to have a final blend at that facility subject to flat limit compliance options and/or averaging compliance options, or (C) elects in accordance with section 2266(c) to sell a final blend at that facility as an alternative gasoline formulation.

(4) The executive officer may enter into a written protocol with any individual producer or importer for the purposes of specifying how the

requirements in section (a)(2) shall be applied to the producer's or importer's particular operations, 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 terms of section (a)(2). Any such protocol shall include the producer's or importer's agreement to be bound by the terms of the protocol.

(5) If, through no intentional or negligent conduct, a producer or importer cannot report within the time period specified in section (a)(2) above, the producer or importer may notify the executive officer of the required data as soon as reasonably possible and may provide a written explanation of the cause of the delay in reporting. If, based on the written explanation and the surrounding circumstances, the executive officer determines that the conditions of this section (a)(5) have been met, timely notification shall be deemed to have occurred.

(b) Prohibited activities regarding PM alternative gasoline formulations.

(1) No producer or importer shall sell, offer for sale, supply, or offer for supply from its production or import facility California gasoline which is reported pursuant to section 2265(a) as a PM alternative gasoline formulation subject to PM alternative specifications if any of the following occur:

(A) The identified PM alternative specifications do not meet the criteria for approval in the Predictive Model Procedures; or

(B) The producer was prohibited by section 2265(c) from electing to sell or supply the gasoline as a PM alternative gasoline formulation; or

(C) The gasoline fails to conform with any PM flat limit in the identified PM alternative specifications; or

(D) With respect to any property for which the producer or importer has identified a PM averaging limit,

(i) 1. the gasoline exceeds the applicable PM average limit, and no designated alternative limit for the property has been established for the gasoline in accordance with section 2264(a); or

(ii) 2. a designated alternative limit for the property has been established for the gasoline in accordance with section 2264(a), and either of the following occur:

(A) a. The gasoline exceeds the designated alternative limit for the property, or

(B) b. Where the designated alternative limit for the property exceeds the PM averaging limit, the exceedance is not fully offset in accordance with the applicable provisions in section 2264(c) through (i).

(2) Where a producer or importer has elected to sell or supply a final blend of California gasoline as a PM alternative gasoline formulation in accordance with this section 2265, the final blend shall not be subject to section 2262.2(b) and (c), section 2262.3(b) and (c), section 2262.4(b) and (c), section 2262.5(c), section 2262.6(b), (c), *(d)(d)*, and *(f)(e)*, and section 2262.7(b) and (c).

(c) Restrictions associated with elections to sell or supply final blends as PM alternative gasoline formulations

(1) A producer or importer may not elect to sell or supply from its production or import facility a final blend of California gasoline as a PM alternative gasoline formulation if the producer or importer is subject to any outstanding requirements to provide offsets at the same production or import facility pursuant to any provision in section 2264 (c), (d), (e), (f), (g), or (h).

(2) Once a producer or importer has elected to sell or supply from its production or import facility a final blend of California gasoline as a PM alternative gasoline formulation subject to a PM averaging compliance option for one or more properties, the producer or importer may not elect any other compliance option, including another PM alternative gasoline formulation, if there are outstanding requirements to provide offsets for such property or properties pursuant to the applicable provisions in section 2264 (c), (d), (e), (f), (g), or (h).

(3) Once a producer or importer has elected to sell or supply from its production or import facility a final blend of California gasoline as a PM alternative gasoline formulation, the producer or importer may not use any

previously assigned designated alternative limit for a property to provide offsets pursuant to section 2264 (c), (d), (e), (f), (g), or (h) for any final blend sold or supplied from the production or import facility subsequent to the election.

NOTE: Authority cited: sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43016, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

ATTACHMENT B

THE AMENDMENTS TO THE PROCEDURES

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

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

Adopted: [ ]

Note: **This is a new document proposed for adoption by the Air Resources Board. Modifications to the originally proposed text are presented in strikeout and shaded format to show deletions and additions respectively.**

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

Table of Contents

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

Table of Contents (continued)

List of Tables

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

I. INTRODUCTION

A. Purpose and Applicability

1. The predictive model prescribed in this document may be used to evaluate gasoline specifications as alternatives to the gasoline specifications set forth in Title 13, California Code of Regulations (13 CCR), sections 2262.1 through 2262.7.

   This procedure:

   - prescribes the range of specifications that may be utilized to select a set of candidate Phase 2 RFG alternative gasoline specifications for evaluation,
   - defines the Phase 2 RFG reference specifications,
   - prescribes the calculations to be used to predict the emissions from the candidate specifications and the reference Phase 2 RFG specifications,
   - prescribes the calculations to be used to compare the emissions resulting from the candidate specifications to the reference Phase 2 RFG specifications,
   - establishes the requirements for the demonstration and approval of the candidate specifications as an alternative Phase 2 RFG formulation, and
   - establishes the notification requirements.

2. Gasoline properties for which alternative gasoline specifications may be set by this procedure include all eight Phase 2 RFG properties, except Reid vapor pressure (RVP).

3. The Phase 2 RFG specifications, established in 13 CCR, sections 2262.1 through 2262.7, are shown in Table 1.

Table 1
Properties and Specifications for Phase 2 Reformulated Gasoline

Fuel Property	Units	Flat Limit	Averaging Limit	Cap Limit
Reid vapor pressure (RVP)	psi, max.	7.00[1]	none	7.00
Sulfur (SUL)	ppmw,	40	30	80
Benzene (BENZ)	vol.%, max.	1.00	0.80	1.20
Aromatic HC (AROM)	vol.%, max.	25.0	22.0	30.0
Olefin (OLEF)	vol.%, max.	6.0	4.0	10
Oxygen (OXY)	wt. %	1.8 (min) 2.2 (max)	none	1.8(min)[2] 2.7(max)
Temperature at 50% distilled (T50)	deg. F,	210	200	220
Temperature at 90% distilled (T90)	deg. F,	300	290	330

[1] Applicable during the summer months identified in 13 CCR, sections 2262.1 (a) and (b).
[2] Applicable during the winter months identified in 13 CCR, section 2262.5 (a) .

4. The pollutant emissions addressed by these procedures and the units of measurement are shown in Table 2.

Table 2
Predictive Model Pollutants and Units of Measurement

Pollutant Emissions	Units
Oxides of nitrogen (NOx)	gm/mile
Hydrocarbons (HC)	gm/mile
Potency-weighted Toxics (PWT)	mg/mile

B. Synopsis of Procedure

The predictive model is used to compare the exhaust emissions predicted for gasoline meeting the Phase 2 RFG specifications (reference specifications) to the exhaust emissions predicted for gasoline meeting the alternative gasoline specifications (candidate specifications).

The predictive model is made up of several sub-models. The sub-models are equations which relate gasoline specifications for certain properties to the exhaust emissions that result when the gasoline is burned in a motor vehicle. The gasoline properties included in the model are those properties that are regulated by the California Phase 2 RFG regulations (See Table 1).

Twelve separate sub-models have been developed for six pollutants (NOx, HC, benzene, 1,3-butadiene, formaldehyde, and acetaldehyde) and two sub-models, per pollutant, for each vehicle emissions technology "Tech" class (Tech 3 and Tech 4). The predicted emissions for each Tech class are adjusted using Tech class emission-weighting factors for NOx and HC. Toxic emissions (benzene, 1,3-butadiene, formaldehyde, and acetaldehyde) are adjusted using VMT (vehicle miles traveled) weighting factors and a potency weighting factor.

The sub-models are used to predict the emissions from the Phase 2 RFG specifications and the alternative specifications. The emissions are expressed in the units identified in Table 2. If, for each pollutant (NOx, HC, and potency-weighted toxics), the percent change in emissions between the candidate specifications and the reference Phase 2 RFG specifications, is equal to or less than 0.04%, then the candidate specifications are deemed acceptable as equivalent to Phase 2 RFG. If the percent change in emissions between the candidate specifications and the reference Phase 2 RFG specifications, is equal to or greater than 0.05%, then the candidate specifications are deemed unacceptable and may not be a substitute for Phase 2 RFG. [Note: All final values of the percent change in emissions shall be reported to the nearest hundreth using conventional rounding.]

C. Definitions

1. **Alternative gasoline formulation** means a final blend of gasoline that is subject to a set of alternative specifications deemed acceptable pursuant to the California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model.

2. **Alternative specifications** means the specifications for the following gasoline properties, as determined in accordance with 13 CCR, section 2263:

   - maximum Reid vapor pressure, expressed in the nearest hundredth of a pound per square inch;
   - maximum sulfur content, expressed in the nearest parts per million by weight;
   - maximum benzene content, expressed in the nearest hundredth of a percent by volume;

- maximum olefin content, expressed in the nearest tenth of a percent by volume;
- minimum and maximum oxygen content, expressed in the nearest tenth of a percent by weight;
- maximum T50, expressed in the nearest degree Fahrenheit;
- maximum T90, expressed in the nearest degree Fahrenheit; and
- maximum aromatic hydrocarbon content, expressed in the nearest tenth of a percent by volume.

3. **Applicant** means the party seeking approval of alternative gasoline specifications and responsible for the demonstration described herein.

4. **Aromatic hydrocarbon content (Aromatic HC, AROM)** means the amount of aromatic hydrocarbons in the fuel expressed to the nearest tenth of a percent by volume in accordance with 13 CCR, section 2263.

5. **ASTM** means the American Society of Testing and Materials.

6. **Averaging Limit** means a limit for a fuel property that must be achieved in accordance with 13 CCR, sections 2264.

7. **Benzene content (BENZ)** means the amount of benzene contained in the fuel expressed to the nearest hundredth of a percent by volume in accordance with 13 CCR, section 2263.

8. **Candidate fuel or candidate specifications** means the fuel or set of specifications which are being evaluated for its emission performance using these procedures.

9. **Cap limit** means a limit that applies to all California gasoline throughout the gasoline distribution system, in accordance with 13 CCR, sections 2262.1 (a), 2262.2 (a), 2262.3 (a), 2262.4 (a), 2262.5 (a) and (b), 2262.6 (a), and 2262.7 (a).

10. **EMFAC/BURDEN 7F** means the motor vehicle emission inventory and emissions calculation system maintained by the ARB.

11. **Executive Officer** means the executive officer of the Air Resources Board, or his or her designee.

12. **Flat limit** means a single limit for a fuel property that applies to all California gasoline sold or supplied from a California production facility or import facility.

13. **Intercept** means the average vehicle effect for a particular Tech class and a particular pollutant. The intercept represents the average emissions across vehicles in the Tech class, for a fuel with properties equal to the average values of all fuels in the data base for that Tech class.

14. **Olefin content (OLEF)** means the amount of olefins in the fuel expressed in the nearest tenth of a percent by volume in accordance with 13 CCR, section 2263.

15. **Oxygen content (OXY)** means the amount of oxygen contained in the fuel expressed in the nearest tenth of a percent by weight in accordance with 13 CCR, section 2263.

16. **Phase 2 reformulated gasoline (Phase 2 RFG)** means gasoline meeting the flat or averaging limits of the Phase 2 RFG regulations.

17. **Potency-weighted toxics (PWT)** means the mass exhaust emissions of benzene, 1,3-butadiene, formaldehyde, and acetaldehyde multiplied by the relative potency with respect to 1,3-butadiene.

18. **Predictive model** means a set of equations that relate the properties of a particular gasoline formulation to the predicted emissions that result when that gasoline is combusted in a motor vehicle engine.

19. **Reference fuel or reference specification** means a gasoline meeting the flat or average specifications ~~of the~~ for Phase 2 RFG.

20. **Reid vapor pressure (RVP)** means the vapor pressure of the fuel expressed in the nearest hundredth of a pound per square inch in accordance with 13 CCR, section 2263.

21. **Sulfur content (SUL)** means the amount of sulfur contained in the fuel expressed in the nearest part per million in accordance with 13 CCR, section 2263.

~~21~~ 22. **Technology class (Tech 3, Tech 4)** means a classification of vehicles by model year based on what technology is used to control gasoline exhaust emissions.

~~22~~ 23. **50% distillation temperature (T50)** means the temperature at which 50% of the fuel evaporates expressed in the nearest degree Fahrenheit in accordance with 13 CCR, section 2263.

~~23~~ 24. **90% distillation temperature (T90)** means the temperature at which 90% of the fuel evaporates expressed in the nearest degree Fahrenheit in accordance with 13 CCR, section 2263.

~~24~~ 25. **Toxic air contaminants** means exhaust emissions of benzene, 1,3-butadiene, formaldehyde, and acetaldehyde.

II. VEHICLE TECHNOLOGY CLASS AND WEIGHTING FACTORS

A. Vehicle Technology Classes

For the purpose of these procedures, sub-models have been developed for two categories of light-duty vehicles (passenger cars and light-duty trucks) using the vehicle model year as an indicator of the type of emission controls used. Table 3 shows the two vehicle categories.

Table 3
Vehicle Categories

Technology Class	Model Year	Emission Controls
Tech 3	1981-1985	older closed-loop three-way catalyst
Tech 4	1986-1995	closed-loop three-way catalyst

B. Emission-weighting Factors

Emission-weighting factors are used to weight the relative contribution of the model-predicted NOx and HC emissions in each Technology class. These weightings represent the average fractional contribution that vehicles in the particular Tech class make to the total on-road motor vehicle emissions of a particular pollutant from gasoline-fueled light duty vehicles in the years 1996, 2000, and 2005. These values were calculated using the information in EMFAC/BURDEN 7F. The emission-weighting factors (EWF) are shown in Table 4 and are used in the evaluation of NOx and HC emissions.

Table 4
Emission-weighting Factors

Pollutant	Tech 3	Tech 4
NOx	0.174	0.826
HC	0.198	0.802

C. VMT Weighting Factors

Vehicle miles traveled (VMT) weighting factors are used to weight the relative contribution of the model-predicted toxic air contaminant emssions in each technology class. These weightings represent the average fractional contribution to VMT that vehicles in the particular Tech class make to the total VMT from vehicles in all technology classes used in the model. The values were calculated by identifying the

VMT fraction(s) for Tech class 3 and 4 vehicles for 1996, 2000, and 2005, summing these values by Tech class, and calculating the arithmetic average. The VMT data were obtained from EMFAC/BURDEN 7F. The VMT weighting factors (VMTWFs) are shown in Table 5 and are used in the evaluation of toxic air contaminants.

Table 5

Vehicle Miles Traveled Weighting Factors (VMTWFs)

Pollutant	Tech 3	Tech 4
Benzene	0.089	0.911
1,3-Butadiene	0.089	0.911
Formaldehyde	0.089	0.911
Acetaldehyde	0.089	0.911

III. GENERAL EQUATIONS FOR CALCULATING PERCENT CHANGE IN EMISSIONS

A. Summary and Explanation

- The applicant will select a candidate specification for each property, and will identify whether the specification represents a flat limit or an averaging limit. The Phase 2 RFG reference specification is identified, for each property, using the compliance option selected for the corresponding candidate specification. (See III.B.)

- The selected candidate specifications and the comparable Phase 2 RFG reference specifications are inserted into the predictive model equations to determine the predicted candidate and reference emissions by Tech Class. (See III.C.)

- For NOx and HC, the ratio of the predicted emissions for the candidate specifications to the predicted emissions for the reference specifications is emissions weighted according to the relative contribution of each technology class. These emissions-weighted ratios are summed, reduced by 1, and multiplied by 100 to represent the percent change in emissions. The resulting values represent the percent change in NOx or HC emissions between the candidate specifications and reference specifications. (See III.D.)

- For toxic air contaminants, the predicted emissions for the candidate specifications (for each pollutant and each Tech Class) are VMT weighted and potency-weighted. The VMT/potency-weighted sums for the candidate specifications are divided by the VMT/potency-weighted sums for the reference specifications. This ratio is reduced by 1 and then multiplied by 100. The resulting value represents the percent change in potency-weighted toxic emission between the candidate specifications and reference specifications. (See III.D.)

B. Selection by Applicant of Candidate and Reference Specifications

The applicant shall select a candidate specification and for each property shall identify whether the specification represents a flat limit or an averaging limit. The Phase 2 RFG reference specifications are identified using, for each property, the compliance option selected for the corresponding candidate specification. Table 7 provides an optional worksheet to assist the applicant in selecting the candidate and reference specifications.

1. Identify the value of the candidate specifications for each fuel property and insert the values into Table 7. The candidate specifications may have any value for sulfur, benzene, aromatic hydrocarbons, olefins, ~~oxygen~~, T50, and T90 as long as each specification is less than or equal to the cap limits shown in Table 1. The candidate specification may have any value for oxygen as long as the specification is within the range of the cap limits shown in Table 1. The RVP value for the reference and candidate specifications is always 7.00. The appropriate values for oxygen content are shown in Table 6.

Table 6
Candidate and Reference Specifications for Oxygen

Oxygen Content for Candidate Fuel		Number of Reference vs Candidate Comparisons Required	Values to be Used in Comparison in Equations	
minimum	maximum		Candidate	Reference
≥ 1.8	≤ 2.2	1	2.0	2.0
≥ 1.8, ≤ 2.2	> 2.2	2	minimum	~~minimum~~ 1.8
			maximum	2.0
< 1.8	≥ 1.8, ≤ 2.2	2	minimum	2.0
			maximum	~~maximum~~ 2.2
< 1.8	> 2.2	2	minimum	2.0
			maximum	2.0
< 1.8	< 1.8	2	minimum	2.0
			maximum	2.0
> 2.2	> 2.2	2	minimum	2.0
			maximum	2.0

2. Identify for each specification for a property other than RVP and oxygen ~~if~~ whether the compliance option will represent a flat limit or an averaging limit.

3. Identify the reference specifications based on the compliance options selected in step 2. Circle the appropriate flat or average limit for the reference fuel in Table 7. The circled values are the reference

specifications which will be used in the predictive model.
Write in the appropriate reference specifications for oxygen content based on the information in Table 6.

Example:

If you elect to meet a sulfur limit of 20 for the candidate fuel and elect to comply with a flat limit, the reference fuel sulfur limit would be 40. However, if you elect to meet a sulfur limit of 20 on average, the reference fuel sulfur limit would be 30.

Table 7
Optional Worksheet for Candidate and Reference Fuel Specifications

Fuel Property	Candidate Fuel[1]: Specifications	Compliance Option: Flat or Average	Reference Fuel: Phase 2 RFG Specifications (Circle Option Chosen)	
			Flat	Average
RVP[2]	7.00	Flat	7.00	None
Sulfur			40	30
Benzene			1.00	0.80
Aromatic			25.0	22.0
Olefin			6.0	4.0
Oxygen[3]	(min)	Flat-Range	(min)	None
	(max)		(max)	
T50			210	200
T90			300	290

1 The fuel property value must be ~~less than~~ within or equal to the cap limit.

2 The candidate fuel RVP values ~~should be reported as~~ is always 7.00 ~~even if measured value is below 7.0.~~

3 If the oxygen content range for the candidate fuel is ≥ 1.8 and ≤ 2.2, the candidate fuel and reference fuel oxygen value used in the predictive model equation is 2.0. For all other cases, see Table 6, Candidate and Reference Specifications for Oxygen.

C. General Equations for Calculating Emissions by Pollutant and by Technology Class

The selected candidate specifications and set reference specifications are inserted into the predictive model equations to determine the predicted pollutant emissions generated from each fuel formulation by Tech Class. The following is the general form of the equations used to calculate emissions of the candidate and reference specifications for each pollutant and for each technology class.

$$ln\ y_{Tech} = \text{intercept} + \sum [(\text{fuel effects coefficient}) \times (\text{standardized fuel property})]$$

or

$$y_{Tech} = Exp\ \{\text{intercept} + \sum [(\text{fuel effects coefficient}) \times (\text{standardized fuel property})]\}$$

where

ln is the natural logarithm.

Exp is the inverse of the natural logarithm.

y_{Tech} is the emission in grams or milligrams per mile of a particular pollutant (NOx, HC, benzene, 1,3-butadiene, formaldehyde, and acetaldehyde) and for a particular technology class. (Note: $y_{Tech\text{-}REF}$ is the emissions for the reference specifications and $y_{Tech\text{-}CAND}$ is the emissions for the candidate specifications.)

intercept represents the average vehicle effect for a particular Tech class and a particular pollutant. The intercepts are provided in Table 11, Coefficients for NOx and HC Equations, and Table 12, Coefficients for Toxics Equations.

fuel effects coefficient represents the average fuel effects across all vehicles in the database for a particular Tech class and a particular pollutant. The fuel effect coefficients are ~~is~~ provided in Table 11, Coefficients for NOx and HC Equations, and Table 12, Coefficients for Toxics.

standardized fuel property is defined as:

$$\text{standardized fuel property} = \frac{[(\text{actual fuel property}) - (\text{mean fuel value})]}{\text{standard deviation of the value for the fuel property}}$$

actual fuel property represents the candidate or reference fuel property selected by the applicant in Table 7, Worksheet for Candidate and Reference Specifications.

Note that the actual fuel property may represent the minimum value of selected candidate fuel properties and is established by the linearization equations defined in sections IV. A. 2 and V. A. 2.

mean fuel value represents the average fuel values from all data that are used in developing the California Predictive Model. The mean and standard deviation are provided in Table 10, Standardization of Fuel Properties-Mean and Standard Deviation.

standard deviation of the value for the fuel property is the standard deviation from all data that are used in developing the California Predictive Model.

D. General Equations for Calculating Percent Change of Emissions Between Candidate and Reference Specifications

To calculate the percent change of NOx and HC emissions, the ratio of the predicted emissions for the candidate specifications to the predicted emissions from reference specifications is multiplied by the technology class emission-weighting factors for NOx and HC, ~~and by the VMT and potency weighting factors for the toxic pollutants.~~ These weighted ratios are summed. The sum is reduced by 1 and multiplied by 100 to give the percent change in emission for ~~a particular~~ NOx or HC pollutant.

To calculate the percent change of toxic pollutant emissions, the emissions for the candidate and reference specifications are multiplied by the VMT weighting factors for Technology class 3 and 4 vehicles. The sum of the VMT-weighted emission estimates is multiplied by the appropriate potency-weighting factor. The sum of potency-weighted emissions for the candidate specification is divided by the sum of the potency-weighted emissions for the reference specifications. This quotient is reduced by 1 and multiplied by 100.

The following is the general form of the equations used to calculate percent change in emissions between the candidate and reference specifications relative to the reference specifications for each pollutant.

% Change in NOx and HC Emissions:

%CE = change in emissions =

$$\left(\left[\frac{y_{TECH3-CAND}}{y_{TECH3-REF}} (EWF_{3q}) \right] + \left[\frac{y_{TECH4-CAND}}{y_{TECH4-REF}} (EWF_{4q}) \right] - 1 \right) 100$$

where

$y_{Tech\ 3}$ and $y_{Tech\ 4}$ are the pollutant emissions in grams per mile of a particular pollutant and particular Tech class

where

$y_{Tech\ 3}$ and $y_{Tech\ 4}$ are the pollutant emissions in grams per mile of a particular pollutant and particular Tech class

$y_{Tech\text{-}CAND}$ is the emissions for the candidate specifications
$y_{Tech\text{-}REF}$ is the emissions for the reference specifications

$\mathbf{EWF}_{3q}$ and $\mathbf{EWF}_{4q}$ are the technology class 3 and technology class 4 weighting factor for the particular pollutant q. The Vehicle Technology Class Weighting Factors are provided in Table 4.

% Change in Potency-weighted Toxic (PWT) Emission:

Step 1. Calculation of VMT and potency-weighted emissions for candidate and reference specifications

~~CE~~ $_{PWT\text{-}CAND}$ = ~~change in~~ PWT emissions for candidate specifications =

$$\sum\left[\left(\left[\left(y_{TECH3q-CAND}\right) x \left(VMTWF_3\right)\right] + \left[\left(y_{TECH4q-CAND}\right) x \left(VMTWF_4\right)\right]\right) x \left(PWF_q\right)\right]$$

~~CE~~ $_{PWT\text{-}REF}$ = ~~change in~~ PWT emissions for reference specifications =

$$\sum\left[\left(\left[\left(y_{TECH3q-REF}\right) x \left(VMTWF_3\right)\right] + \left[\left(y_{TECH4q-REF}\right) x \left(VMTWF_4\right)\right]\right) x \left(PWF_q\right)\right]$$

where

$(y_{Tech\ 3q})$ and $(y_{Tech\ 4q})$ are the emissions in milligrams per mile for each toxic air contaminant for Tech class 3 or 4.

$y_{Tech\text{-}CAND}$ is the emissions for the candidate specifications
$y_{Tech\text{-}REF}$ is the emissions for the reference specifications

$\mathbf{VMTWF}_3$ and $\mathbf{VMTWF}_4$ are the VMT weighting factors for Tech class 3 and Tech class 4 vehicles, respectively. These values are shown in Table 5.

$\mathbf{PWF}_q$ is the potency-weighting factor for each toxic air contaminant q provided in Table 8.

Step 2. Calculation of percent change in potency-weighted toxic (PWT) emissions.

$\%\ CE_{PWT}$ = percent change in the sum of the PWT emissions =

$$\left[\frac{\sout{CE}_{PWT-CAND}}{\sout{CE}_{PWT-REF}} - 1\right] x\ (100)$$

where

$\sout{CE}_{PWT-CAND}$ is ~~the change in~~ the sum of PWT emissions for candidate specifications from Step 1 above.

$\sout{CE}_{PWT-REF}$ is ~~the change~~ in the sum of PWT emissions for reference specifications from Step 1 above.

Table 8
Toxic Air Contaminant Potency-weighting Factors

Pollutant	Potency-weighting Factor
Benzene	0.17
1,3-Butadiene	1
Formaldehyde	0.035
Acetaldehyde	0.016

IV. OXIDES NITROGEN (NOx) EXHAUST EMISSIONS CALCULATIONS

A. NOx Emissions by Technology Class

The property values from the Table 7 worksheet are used to calculate NOx emissions for the candidate and reference specifications.

1. NOx Emissions for Tech 3

The NOx emissions for the candidate ($y_{\text{Tech 3-CAND}}$) and reference ($y_{\text{Tech 3-REF}}$) specifications for Tech 3 are calculated as follows:

NOx emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation	
	Exp	
intercept	{-0.15597638	+
RVP	~~(-0.01671797)(RVP - 8.651419) (0.0476) / 0.580438~~	+
Sulfur	(0.01785987) (SULFUR - 193.574245) / 130.374657	+
Aromatic HC	(0.05428291) (AROM - 30.967805) / 9.491877	+
Olefin	(0.02292342) (OLEF - 8.34672) / 5.873768	+
Oxygen	(0.01439508) (OXY - 0.912512) / 1.249609	+
T50	(-0.01161378) (T50 - 211.338086) / 17.374327	+
T90	(0.00341764) (T90 - 315.839826) / 25.694736	+
T50T90	(0.00857682) (T50 - 211.338086) / 17.374327 (T90 - 315.839826) / 25.694736	+

AROT90 $(-0.0097818)\left(\frac{ARO - 30.967805}{9.491877}\right)\left(\frac{T90 - 315.839826}{25.694736}\right)\}$

where

~~RVP~~, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the value limits for the candidate and reference specifications identified in the Table 7 worksheet.

2. NOx Emissions for Tech 4

The NOx emissions for the candidate ($y_{\text{Tech 4-CAND}}$) and reference ($y_{\text{Tech 4-REF}}$) specifications for Tech 4 are calculated as follows:

NOx emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation	
	Exp	
intercept	{-0.58546115	+
RVP	~~(0.03005909) (RVP - 8.707348)~~ / ~~0.52813~~ ~~(0.0972)~~	+
Sulfur	(0.050086115) (SULFUR - 174.036113) / 137.356549	+
Aromatic HC	(0.004154304) (AROM - 28.604566) / 7.848674	+
Olefin	(0.025949698) (OLEF - 7.001772) / 4.988003	+
Oxygen	(0.011321599) (OXY - 1.266843) / 1.310604	+
T50	(0.00195233) (T50 - 208.186678) / 18.149553	+
T90	(-0.00820391) (T90 - 311.36879) / 22.988439	+

AROOXY (-0.00579379) $\frac{(AROM - 28.604566)}{7.848674}$ $\frac{(OXY - 1.266843)}{1.310604}$ +

RVPOXY ~~(0.006283521)~~ ~~(-0.0203)~~ $\frac{(RVP - 8.707348)}{0.52813}$ $\frac{(OXY - 1.266843)}{1.310604}$ +

OXYOXY (0.013486985) $\frac{(OXY - 1.266843)}{1.310604}$ $\frac{(OXY - 1.266843)}{1.310604}$ }

~~where~~

~~RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the values for the candidate and reference specifications in the Table 7 worksheet.~~

where

For calculating the reference fuel NOx emissions, SULFUR, AROM, OLEF, OXY, T50, and T90 are equal to the corresponding values for the reference specifications in the Table 7 worksheet.

For calculating candidate fuel NOx emissions, SULFUR, AROM, OLEF, T50, and T90 are equal to the corresponding values for the candidate specifications in the Table 7 worksheet. The value for OXY is determined as follows:

If the value of the candidate fuel Oxygen specification in the Table 7 worksheet is less than the $OXYGEN_{(LIN)}$ value, the $OXYGEN_{(LIN)}$ value is the value for OXY, where $OXYGEN_{(LIN)}$ is calculated as follows:

$$OXYGEN_{(LIN)} = 0.677 + .0358669\ AROM$$

If the value for the candidate Oxygen specification in the Table 7 worksheet is greater than or equal to the $OXYGEN_{(LIN)}$ value, the Oxygen specification in the Table 7 worksheet is the value for OXY.

B. Percent Change in NOx Emissions

The percent change in NOx emissions between the candidate specifications and the reference specifications is calculated as follows:

$$\%CE = \left[\left(\left[\frac{(y_{TECH3-CAND})}{(y_{TECH3-REF})} x\ EWF_{3-NOx}\right] + \left[\frac{(y_{TECH4-CAND})}{(y_{TECH4-REF})} x\ EWF_{4-NOx}\right]\right) - 1\right] x\ 100$$

where

$y_{Tech\ 3\text{-}CAND}$ and $y_{Tech\ 4\text{-}CAND}$ are the NOx emissions for the candidate specifications in grams per mile for Tech 3 and Tech 4, respectively.

$y_{Tech\ 3\text{-}REF}$ and $y_{Tech\ 4\text{-}REF}$ are the NOx emissions for the reference specifications in grams per mile for Tech 3 and Tech 4, respectively.

NOx emissions for Tech 3 are calculated according to the equations in section IV. A. 1.

NOx emissions for Tech 4 are calculated according to the equations in section IV. A. 2.

$EWF_{3\text{-}NOx}$ and $EWF_{4\text{-}NOx}$ are the emission-weighting factors for NOx as shown in Table 4.

V. HYDROCARBONS (HC) EXHAUST EMISSIONS CALCULATIONS

A. HC Emissions by Technology Class

The property values from the Table 7 worksheet are used to calculate HC emissions for the candidate and reference specifications.

1. HC Emissions for Tech 3

The HC emissions for the candidate ($y_{\text{Tech 3-CAND}}$) and reference ($y_{\text{Tech 3-REF}}$) specifications for Tech 3 are calculated as follows:

HC emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation	
	Exp	
intercept	{-0.79454695	+
RVP	~~(0.004470126) (RVP - 8.651419)(-0.0127)~~ / ~~0.580438~~	+
Sulfur	(0.001933575) (SULFUR - 193.574245) / 130.374657	+
Aromatic HC	(-0.03844685) (AROM - 30.967805) / 9.491877	+
Olefin	(-0.02100516) (OLEF - 8.34672) / 5.873768	+
Oxygen	(-0.02735656) (OXY - 0.912512) / 1.249609	+
T50	(0.010253527) (T50 - 211.338086) / 17.374327	+
T90	(0.017858355) (T90 - 315.839826) / 25.694736	+

RVPT50 ~~(-0.01626671)(0.0463)(RVP - 8.651419)~~ / ~~0.580438~~ (T50 - 211.338086) / 17.374327 +

SULARO (-0.04053717) (SULFUR - 193.574245) / 130.374657 (AROM - 30.967805) / 9.491877 +

AROT90 (0.018225949) (AROM - 30.967805) / 9.491877 (T90 - 315.839826) / 25.694736 }

where

~~RVP,~~ SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the value limits for the candidate and reference specifications identified in the Table 7 worksheet.

2. HC Emissions for Tech 4

The HC emissions for the candidate ($y_{\text{Tech 4-CAND}}$) and reference ($y_{\text{Tech 4-REF}}$) specifications for Tech 4 are calculated as follows:

HC emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation
	Exp
intercept	{-1.18303868 +
RVP	~~(-0.00850444) (RVP - 8.707348) (0.0275)~~ / ~~0.52813~~ +
Sulfur	(0.116903682) (SULFUR - 174.036113) / 137.356549 +
Aromatic HC	(0.001368326) (AROM - 28.604566) / 7.848674 +

Olefin (-0.0068737) $\frac{(OLEF - 7.001772)}{4.988003}$ +

Oxygen (-0.01035001) $\frac{(OXY - 1.266843)}{1.310604}$ +

T50 (0.076436841) $\frac{(T50 - 208.186678)}{18.149553}$ +

T90 (0.038947849) $\frac{(T90 - 311.36879)}{22.988439}$ +

AROARO (-0.01197286) $\frac{(AROM - 28.604566)}{7.848674}$ $\frac{(AROM - 28.604566)}{7.848674}$ +

AROT90 (0.012076013) $\frac{(AROM - 28.604566)}{7.848674}$ $\frac{(T90 - 311.36879)}{22.988439}$ +

OXYT90 (0.015107193) $\frac{(OXY - 1.266843)}{1.310604}$ $\frac{(T90 - 311.36879)}{22.988439}$ +

T50T50 (0.025807977) $\frac{(T50 - 208.186678)}{18.149553}$ $\frac{(T50 - 208.186678)}{18.149553}$ +

T90T90 (0.018209586) $\frac{(T90 - 311.36879)}{22.988439}$ $\frac{(T90 - 311.36879)}{22.988439}$ }

~~where~~ ~~RVP, SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the values for the candidate and reference specifications in the Table 7 worksheet.~~

where For calculating the reference fuel HC emissions, SULFUR, AROM, OLEF, OXY, T50, and T90 are equal to the corresponding values for the reference specifications in the Table 7 worksheet.

For calculating the candidate fuel HC emissions, SULFUR, AROM, OLEF, and OXY are equal to the corresponding values for the candidate specifications in the Table 7 worksheet. The values for T50 and T90 are determined as follows.

If the value for the candidate T50 specification in the Table 7 worksheet is less that 181, 181 is the value for T50.

If the value for the candidate T50 specification in the Table 7 worksheet is greater than or equal to 181, the T50 specification in the Table 7 worksheet is the value for T50.

If the value for the candidate fuel T90 specification in the Table 7 worksheet is less than the $T90_{(LIN)}$ value, the $T90_{(LIN)}$ value is the value for T90 where $T90_{(LIN)}$ is calculated as follows:

$$T90_{(LIN)} = 323.8 - .9712\ AROM - 7.27598\ OXY$$

If the value for the candidate T90 specification in the Table 7 worksheet is greater than or equal to the $T90_{(LIN)}$ value, the T90 specification in the Table 7 worksheet is the value for T90.

B. Percent Change in HC Emissions

The percent change in HC emissions between the candidate specifications and the reference specifications is calculated as follows:

$$\%CE = \left[\left[\left[\frac{(y_{TECH\,3-CAND})}{(y_{TECH\,3-REF})} \times EWF_{3-VOC}\right] + \left[\frac{(y_{TECH\,4-CAND})}{(y_{TECH\,4-REF})} \times EWF_{4-VOC}\right]\right] - 1\right] \times 100$$

where

$y_{Tech\ 3\text{-}CAND}$ and $y_{Tech\ 4\text{-}CAND}$ are the HC emissions for the candidate specifications in grams per mile for Tech 3 and Tech 4, respectively.

$y_{Tech\ 3\text{-}REF}$ and $y_{Tech\ 4\text{-}REF}$ are the HC emissions for the reference specifications in grams per mile for Tech 3 and Tech 4, respectively.

HC emissions for Tech 3 are calculated according to the equations in section V. A. 1.

HC emissions for Tech 4 are calculated according to the equations in section V. A. 2.

$EWF_{3\text{-}HC}$ and $EWF_{4\text{-}HC}$ are the emission-weighting factors for HC as shown in Table 4.

VI. POTENCY-WEIGHTED TOXICS (PWT) EXHAUST EMISSIONS CALCULATIONS

A. Mass Emissions of Toxics by Technology Classa

The property values from the Table 7 worksheet are used to calculate mass toxic emissions for the candidate and reference specifications.

1. Mass Emissions for Tech 3

The mass emissions for each toxic for Tech 3 are calculated as follows:

a. Benzene mass emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation
	Exp
intercept	{2.98444088 {2.9937382 +
~~RVP~~	~~(0.00012084)(RVP - 8.651419) / 0.580438 +~~
Sulfur	~~(0.06702145)~~(0.0723141)(SULFUR - 193.574245) / 130.374657 +
Aromatic HC	~~(0.11271704)~~(0.1524752)(AROM - 30.967805) / 9.491877 +
~~Olefin~~	~~(0.0262828)(OLEF - 8.34672) / 5.873768 +~~
Oxygen	~~(0.00010461)~~(-0.034762)(OXY - 0.912512) / 1.249609 +
~~T50~~	~~(0.07400871)(T50 - 211.338086) / 17.374327 +~~
~~T90~~	~~(-0.03666419)(T90 - 315.839826) / 25.694736 +~~

BENZ $\left\{ \frac{(0.13158634)(0.1235949)(BENZ - 1.365963)}{0.444768} \right\}$

b. 1,3-Butadiene mass emissions Tech 3 = $y_{Tech\ 3}$ =

Description	Equation	
	Exp	
intercept	{0.55265837 {0.668257	+
RVP	$\frac{(-0.11048744)(RVP - 8.651419)}{0.580438}$	+
Sulfur	$\frac{(0.12662294)(SULFUR - 193.574245)}{130.374657}$	+
Aromatic HC	$\frac{(0.04922477)(AROM - 30.967805)}{9.491877}$	+
Olefin	$\frac{(0.12457297)(0.150707)(OLEF - 8.34672)}{5.873768}$	+
Oxygen	$\frac{(-0.01861222)(OXY - 0.912512)}{1.249609}$	+
T50	$\frac{(-0.04669652)(T50 - 211.338086)}{17.374327}$	+
T90	$\left\{ \frac{(0.1898306)(0.165206)(T90 - 315.839826)}{25.694736} \right\}$	

c. Formaldehyde mass emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation
	Exp
intercept	{2.06596608 {2.041917 +
RVP	(0.02179558)(RVP − 8.651419) / 0.580438 +
Sulfur	(−0.18622636)(−0.18011)(SULFUR − 193.574245) / 130.374657 +
Aromatic HC	(−0.1265364)(−0.09754)(AROM − 30.967805) / 9.491877 +
Olefin	(0.00492199)(OLEF − 8.34672) / 5.873768 +
Oxygen	(0.17601939)(0.153291)(OXY − 0.912512) / 1.249609 +
T50	(0.06301058)(T50 − 211.338086) / 17.374327 +
T90	(−0.04218807)(T90 − 315.839826) / 25.694736 }

d. Acetaldehyde mass emissions Tech 3 = $y_{\text{Tech 3}}$ =

Description	Equation
	Exp
intercept	{0.99348033 [1.041177 +
~~RVP~~	~~(0.00386954)(RVP - 8.651419) / 0.580438 +~~
~~Sulfur~~	~~(0.04468183)(SULFUR - 193.574245) / 130.374657 +~~
Aromatic HC	~~(-0.14176068)(-0.10224)~~(AROM - 30.967805) / 9.491877 +
~~Olefin~~	~~(0.03247264)(OLEF - 8.34672) / 5.873768 +~~
~~Oxygen~~	~~(0.11153843)(OXY - 0.912512) / 1.249609 +~~
~~T50~~	~~(0.10500375)(T50 - 211.338086) / 17.374327 +~~
~~T90~~	~~(-0.02459286)(T90 - 315.839826) / 25.694736~~ }

where

~~RVP,~~ SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the value limits for the candidate and reference specifications identified in the Table 7 worksheet.

2. Mass Emissions for Tech 4

The mass emissions for each toxic for Tech 4 are calculated as follows:

a. Benzene mass emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation	
	Exp	
intercept	~~(2.07694733~~ (2.078612	+
RVP	~~(0.0205809)~~(-0.0638)~~(RVP – 8.707348)~~ / ~~0.52813~~	+
Sulfur	~~(0.14014755)~~(0.140432)(SULFUR - 174.036113) / 137.356549	+
Aromatic HC	~~(0.17375044)~~(0.169401)(AROM - 28.604566) / 7.848674	+
Olefin	~~(0.02072724)~~(0.02158)(OLEF - 7.001772) / 4.988003	+
Oxygen	~~(0.02074571)~~(0.022392)(OXY - 1.266843) / 1.310604	+
T50	~~(0.04810616)~~(0.052416)(T50 - 208.186678) / 18.149553	+
~~T90~~	~~(0.00084762)(T90 – 311.36879) / 22.988439~~	~~+~~
BENZ	~~(0.14364029)~~(0.145341)(BENZ - 1.092985) / 0.563303 }	

b. 1,3-Butadiene mass emissions Tech 4 = $y_{Tech\ 4}$ =

Description	Equation	
	Exp	
intercept	{-0.12216754 (-0.12765	+
~~RVP~~	~~(0.0235653)(RVP - 8.707348) / 0.52813~~	~~+~~
Sulfur	(0.05667595)(0.060078)(SULFUR - 174.036113) / 137.356549	+
Aromatic HC	(-0.04969117)(-0.04862)(AROM - 28.604566) / 7.848674	+
Olefin	(0.13697093)(0.135542)(OLEF - 7.001772) / 4.988003	+
~~Oxygen~~	~~(0.00190223)(OXY - 1.266843) / 1.310604~~	~~+~~
T50	(0.05848709)(0.058141)(T50 - 208.186678) / 18.149553	+
T90	(0.08820685)(0.089544)(T90 - 311.36879) / 22.988439 }	

c. Formaldehyde mass emissions Tech 4 = $y_{Tech\ 4}$ =

Description	Equation
	Exp
intercept	{0.57054336 [0.56907 +
RVP	(0.00037903(RVP - 8.707348) / 0.52813) +
Sulfur	(-0.04718751)(-0.04472)(SULFUR - 174.036113) / 137.356549 +
Aromatic HC	(-0.07461695)(-0.07248)(AROM - 28.604566) / 7.848674 +
Olefin	(0.01552007)(OLEF - 7.001772) / 4.988003 +
Oxygen	(0.07852942)(0.073394)(OXY - 1.266843) / 1.310604 +
T50	(0.00214242)(T50 - 208.186678) / 18.149553 +
T90	(0.08066587)(0.081896)(T90 - 311.36879) / 22.988439 }

d. Acetaldehyde mass emissions Tech 4 = $y_{\text{Tech 4}}$ =

Description	Equation	
	Exp	
intercept	~~{-0.30025158~~ {-0.30842	+
RVP	~~(0.05984811)(-0.1988)(RVP - 8.707348) / 0.52813~~	+
~~Sulfur~~	~~(0.00342614)(SULFUR - 174.036113) / 137.356549~~	~~+~~
Aromatic HC	~~(-0.0799839)(-0.06631)~~(AROM - 28.604566) / 7.848674	+
~~Olefin~~	~~(0.01920116)(OLEF - 7.001772) / 4.988003~~	~~+~~
Oxygen	~~(0.12257203)(0.084501)~~(OXY - 1.266843) / 1.310604	+
T50	~~(0.11079701)(0.08131)~~(T50 - 208.186678) / 18.149553	+
T90	~~(0.06243205)(0.070103)~~(T90 - 311.36879) / 22.988439	+
~~BENZ~~	~~(0.08929885)(BENZ - 1.092985) / 0.563303~~ }	

where

~~RVP,~~ SULFUR, AROM, OLEF, OXYGEN, T50, and T90 are the values for the candidate and reference specifications in the Table 7 worksheet.

B. Percent Change in Potency-weighted Toxic Emissions

1. Calculation of Percent VMT and Potency-weighted Emissions for Candidate Specifications

$$\text{~~CE~~}_{PWT\text{-}CAND} =$$

$$\left[\left(\left[(y_{BZ-TECH3})(VMTWF_3)\right]+\left[(y_{BZ-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{BZ})\right]+$$

$$\left[\left(\left[(y_{BD-TECH3})(VMTWF_3)\right]+\left[(y_{BD-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{BD})\right]+$$

$$\left[\left(\left[(y_{FOR-TECH3})(VMTWF_3)\right]+\left[(y_{FOR-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{FOR})\right]+$$

$$\left[\left(\left[(y_{ACE-TECH3})(VMTWF_3)\right]+\left[(y_{ACE-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{ACE})\right]$$

where

$\text{~~CE~~}_{PWT\text{-}CAND}$ is ~~the change in~~ PWT emissions for the candidate specifications.

$y_{BZ\text{-}TECH}$ is the benzene emission for Tech 3 or Tech 4
$y_{BD\text{-}TECH}$ is the 1,3-butadiene emission for Tech 3 or Tech 4
$y_{FOR\text{-}TECH}$ is the formaldehyde emission for Tech 3 or Tech 4
$y_{ACE\text{-}TECH}$ is the acetaldehyde emission for Tech 3 or Tech 4

$\mathbf{VMTWF_3}$ and $\mathbf{VMTWF_4}$ are the VMT weighting factors for Tech class 3 and Tech class 4 vehicles, respectively. These values are shown in Table 5.

$\mathbf{PWF_q}$ is the potency weighting factor for toxic pollutant q provided in Table 8.

2. Calculation of Percent VMT and Potency-weighted Emissions for Reference Specifications

$$\text{~~CE~~}_{PWT\text{-}REF} =$$

$$\left[\left(\left[(y_{BZ-TECH3})(VMTWF_3)\right]+\left[(y_{BZ-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{BZ})\right]+$$

$$\left[\left(\left[(y_{BD-TECH3})(VMTWF_3)\right]+\left[(y_{BD-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{BD})\right]+$$

$$\left[\left(\left[(y_{FOR-TECH3})(VMTWF_3)\right]+\left[(y_{FOR-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{FOR})\right]+$$

$$\left[\left(\left[(y_{ACE-TECH3})(VMTWF_3)\right]+\left[(y_{ACE-TECH4})(VMTWF_4)\right]\right)x\,(PWF_{ACE})\right]$$

where

~~CE~~ PWT-REF is the ~~change in~~ PWT emissions for the reference specifications.

y BZ-TECH is the benzene emission for Tech 3 or Tech 4
y BD-TECH is the 1,3-butadiene emission for Tech 3 or Tech 4
y FOR-TECH is the formaldehyde emission for Tech 3 or Tech 4
y ACE-TECH is the acetaldehyde emission for Tech 3 or Tech 4

$VMTWF_3$ and **$VMTWF_4$** are the VMT weighting factors for Tech class 3 and Tech class 4 vehicles, respectively. These values are shown in Table 5.

PWF_q is the potency-weighting factor for toxic pollutant q provided in Table 8.

3. Calculation of Percent Change in Emissions

% CE $_{PWT}$ = percent change in potency-weighted toxic emissions

$$\%CE_{PWT} = \left[\frac{\text{~~CE~~}_{PWT-CAND}}{\text{~~CE~~}_{PWT-REF}} - 1\right] x\ (100)$$

VII. DETERMINATION OF ACCEPTABILITY

If for each pollutant (NOx, HC, and potency-weighted toxics), the percent change in emissions between the candidate specifications and the reference Phase 2 RFG specifications is equal to or less than 0.04%, then the candidate specifications are deemed acceptable as an alternative to Phase 2 RFG. The candidate specifications must pass for all three categories -- NOx, HC, and PWT -- to be acceptable as an alternative Phase 2 RFG formulation;

$$\%CE_{NOx} \leq 0.04\%, \text{ and}$$
$$\%CE_{HC} \leq 0.04\%, \text{ and}$$
$$\%CE_{PWT} \leq 0.04\%.$$

If the percent change in emission between the candidate specifications and the reference Phase 2 RFG specifications is equal to or greater than 0.05%, then the candidate specifications are deemed unacceptable and may not be a substitute for Phase 2 RFG. [Note: All final values of the percent change in emissions shall be reported to the nearest hundreth using conventional rounding.]

If the candidate specifications are deemed acceptable, the property values and the compliance options of the candidate specifications become the property values and compliance options for the alternative gasoline formulation.

~~VII.~~ VIII. NOTIFICATION OF INTENT TO OFFER AN ALTERNATIVE GASOLINE FORMULATION

A producer or importer intending to sell or supply an alternative gasoline formulation of California gasoline from its production facility or import facility shall notify the executive officer in accordance with 13 CCR, section 2265(a).

Table 9, Alternative Specifications for Phase 2 RFG Using the California Predictive Model Notification has been provided as an example of the minimum information required.

Table 9
Alternative Specifications for Phase 2 RFG
Using California Predictive Model Notification

Name of Producer/Importer: _____ Facility Location: _____
Name of Person Reporting: _____ Telephone No.: _____
Date/Time of This Report: _____ I.D. of 1st Batch with this Specification: _____

☞ *All California gasoline transfered from this facility will meet the specifications listed below until the next Alternative Specifications report to the ARB.*

☞ *Fuel properties that will be averaged will be reported as the "Designated Alternative Limit and Volume of Gasoline Report" separately to the ARB.*

Fuel Property:	Candidate Fuel: Fuel Property Value	Compliance Option: Flat or Average	Reference Fuel: Phase 2 RFG Property Value	
			Flat	Average
RVP	7.00	Flat	7.00	None
Sulfur			40	30
Benzene			1.00	0.80
Aromatic HC			25.0	22.0
Olefin			6.0	4.0
Oxygen[1]	(min.)	Flat Range	(min.)	None
	(max.)		(max.)	
T50			210	200
T90			300	290

[1] If the oxygen content range for the candidate specification is ≥ 1.8 and ≤ 2.2, the candidate and reference oxygen property value used in the predictive model equation is 2.0. For all other cases, see Table 6 in the Predictive Model Procedures.

Pollutant[1]	Percent Change in Emissions[2] $\left[\left[\frac{\%CE_{CAND}}{\%CE_{REF}}\right] - 1\right](100)$
Oxides of Nitrogen	
Hydrocarbons	
Potency-weighted Toxics	

[1] If one or both oxygen specifications are outside the 1.8-2.2 volume percent range, a %CE must be reported for both the minimum and maximum specifications.

[2] Percent change calculated using equations presented in sections IV.B, V.B, and VI.B

☎ ***Please FAX this reports to the ARB at (916) 445-5745*** ☎

Table 10
Standardization of Fuel Properties - Mean and Standard Deviation

Fuel Property	Tech 3		Tech 4	
	Mean	Std. Dev.	Mean	Std. Dev.
RVP	8.651419	0.580438	8.707348	0.52813
Sulfur	193.574245	130.374657	174.036113	137.356549
Aromatic HC	30.967805	9.491877	28.604566	7.848674
Olefin	8.34672	5.873768	7.001772	4.988003
Oxygen	0.912512	1.249609	1.266843	1.310604
T50	211.338086	17.374327	208.186678	18.149553
T90	315.839826	25.694736	311.36879	22.988439
Benzene	1.365963	0.444768	1.092985	0.563303

Table 11
Coefficients for NOx and HC Equations

Pollutant Emission	Tech 3		Tech 4	
	NOx	HC	NOx	HC
Intercept	-0.15597638	-0.79454695	-0.58546115	-1.18303868
RVP	-0.01671797	0.004470126	0.03005909	-0.00850444
Sulfur	0.01785987	0.001933575	0.050086115	0.116903682
Aromatic HC	0.05428291	-0.03844685	0.004154304	0.001368326
Olefin	0.02292342	-0.02100516	0.025949698	-0.0068737
Oxygen	0.01439508	-0.02735656	0.011321599	-0.01035001
T50	-0.01161378	0.010253527	0.00195233	0.076436841
T90	0.00341764	0.017858355	-0.00820391	0.038947849
RVPT50		-0.01626671		
RVPOXY			0.006283521	
SULARO		-0.04053717		
AROARO				-0.01197286
AROOXY			-0.00579379	
AROT90	-0.0097818	0.018225949		0.012076013
OXYOXY			0.013486985	
OXYT90				0.015107193
T50T50				0.025807977
T50T90	0.00857682			
T90T90				0.018209586

~~Table 12~~
~~Coefficients for Toxics Equations~~

~~Pollutant Emission~~	~~Tech 3~~			
	~~Benzene~~	~~Butadiene~~	~~Formaldehyde~~	~~Acetaldehyde~~
~~Intercept~~	~~2.98444988~~	~~0.55265837~~	~~2.06596608~~	~~0.99348033~~
~~RVP~~	~~0.00012084~~	~~-0.11048744~~	~~0.02179558~~	~~0.00386954~~
~~Sulfur~~	~~0.06702145~~	~~0.12662294~~	~~-0.18622636~~	~~0.04468183~~
~~Aromatic HC~~	~~0.11271704~~	~~0.04922477~~	~~-0.1265364~~	~~-0.14176068~~
~~Olefin~~	~~0.0262828~~	~~0.12457297~~	~~0.00492199~~	~~0.03247264~~
~~Oxygen~~	~~0.00010461~~	~~-0.01861222~~	~~0.17601939~~	~~0.11153843~~
~~T50~~	~~0.07400871~~	~~-0.04669652~~	~~0.06301058~~	~~0.10500375~~
~~T90~~	~~-0.03666419~~	~~0.1898306~~	~~-0.04218807~~	~~-0.02459286~~
~~Benzene~~	~~0.13158634~~			

~~Pollutant Emission~~	~~Tech 4~~			
	~~Benzene~~	~~Butadiene~~	~~Formaldehyde~~	~~Acetaldehyde~~
~~Intercept~~	~~2.07694733~~	~~-0.12216754~~	~~0.57054336~~	~~-0.30025158~~
~~RVP~~	~~0.0205809~~	~~0.0235653~~	~~0.00037903~~	~~0.05984811~~
~~Sulfur~~	~~0.14014755~~	~~0.05667595~~	~~-0.04718751~~	~~0.00342614~~
~~Aromatic HC~~	~~0.17375044~~	~~-0.04969117~~	~~-0.07461695~~	~~-0.0799839~~
~~Olefin~~	~~0.02072724~~	~~0.13697093~~	~~0.01552007~~	~~0.01920116~~
~~Oxygen~~	~~0.02074571~~	~~0.00190223~~	~~0.07852942~~	~~0.12257203~~
~~T50~~	~~0.04810616~~	~~0.05848709~~	~~0.00214242~~	~~0.11079701~~
~~T90~~	~~0.00084762~~	~~0.08820685~~	~~0.08066587~~	~~0.06243205~~
~~Benzene~~	~~0.14364029~~			~~0.08929885~~

Table 12
Coefficients for Toxics Equations

Pollutant Emission	Tech 3			
	Benzene	Butadiene	Formaldehyde	Acetaldehyde
Intercept	2.9937382	0.668257	2.041917	1.041177
RVP				
Sulfur	0.0723141		-0.18011	
Aromatic HC	0.1524752		-0.09754	-0.10224
Olefin		0.150707		
Oxygen	-0.034762		0.153291	
T50				
T90		0.166206		
Benzene	0.1235949			

Pollutant Emission	Tech 4			
	Benzene	Butadiene	Formaldehyde	Acetaldehyde
Intercept	2.078612	-0.12765	0.56907	0.30842
RVP	0.01972			0.061495
Sulfur	0.140432	0.060078	-0.04472	
Aromatic HC	0.169401	-0.04862	-0.07248	-0.06631
Olefin	0.02158	0.135542		
Oxygen	0.022392		0.073394	0.084501
T50	0.052416	0.058141		0.08131
T90		0.089544	0.081896	0.070103
Benzene	0.145341			