

(2) If the candidate parameter is not included in the unaugmented complex model and is not represented in whole or in part by one or more parameters included in the model, the modification shall be accomplished by adding the terms and coefficients to the complex model equation for that pollutant, technology group, and emitter category.

(3) If the parameter is included in the complex model but is being tested at levels beyond the current range of the model, the terms and coefficients determined in paragraph (d) of this section shall be used to supplement the complex emission model equation for the corresponding pollutant.

(i) The terms and coefficients of the complex model described at § 80.45 shall be used to evaluate the emissions performance of fuels with levels of the parameter being tested that are within the valid range of the model, as defined at § 80.45.

(ii) The emissions performance of fuels with levels of the parameter that are beyond the valid range of the unaugmented model shall be given in percentage change terms by  $100 - [(100 + A) \times (100 + C) / (100 + B)]$ , where:

(A) "A" shall be set equal to the percentage change in emissions for a fuel with identical fuel property values to the fuel being evaluated except for the parameter being extended, which shall be set equal to the nearest limit of the data core, using the unaugmented complex model.

(B) "B" shall be set equal to the percentage change in emissions for the fuel described in paragraph (f)(3)(i) of this section according to the augmented complex model.

(C) "C" shall be set equal to the percentage change in emissions of the actual fuel being evaluated using the augmented complex model.

(g) EPA reserves the right to analyze the data generated during vehicle testing, to use such analyses to determine the validity of other augmentation petitions, and to use such data to update the complex model for use in certifying all reformulated gasolines.

(h) Duration of acceptance of emission effects determined through vehicle testing:

(1) If the Agency does not accept, modify, or reject a particular augmentation for inclusion in an updated complex model (performed through rulemaking), then the augmentation shall remain in effect until the next update to the complex model takes effect.

(2) If the Agency does reject or modify a particular augmentation for inclusion in an updated complex model, then the augmentation shall no longer be able to be used as of the date the updated complex model is deemed to take effect, unless the following conditions and limitations apply:

(i) The augmentation in question may continue to be used by those fuel suppliers which can prove, to the Administrator's satisfaction, that the fuel supplier had already begun producing a fuel utilizing the augmentation at the time the revised model is promulgated.

(ii) The augmentation in question may only be used to evaluate the emissions performance of fuels in conjunction with the complex emission model in effect as of the date of production of the fuels.

(iii) The augmentation may only be used for three years of fuel production, or a total of five years from the date the augmentation first took effect, whichever is shorter.

(3) The Administrator shall determine when sufficient new information on the effects of fuel properties on vehicle emissions has been obtained to warrant development of an updated complex model.

[59 FR 7813, Feb. 16, 1994, as amended at 59 FR 36962, July 20, 1994]

**§ 80.49 Fuels to be used in augmenting the complex emission model through vehicle testing.**

(a) Seven fuels (hereinafter called the "addition fuels") shall be tested for the purpose of augmenting the complex emission model with a parameter not currently included in the complex emission model. The properties of the addition fuels are specified in paragraphs (a) (1) and (2) of this section. The addition fuels shall be specified with at least the same level of detail and precision as in § 80.43(c), and this information must be included in the

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petition submitted to the Administrator requesting augmentation of the complex emission model.

model specified at §80.45 with a new fuel parameter shall have the properties specified as follows:

(1) The seven addition fuels to be tested when augmenting the complex

PROPERTIES OF FUELS TO BE TESTED WHEN AUGMENTING THE MODEL WITH A NEW FUEL PARAMETER

Fuel property	Fuels						
	1	2	3	4	5	6	7
Sulfur, ppm .....	150	150	150	35	35	500	500
Benzene, vol % .....	1.0	1.0	1.0	0.5	0.5	1.3	1.3
RVP, psi .....	7.5	7.5	7.5	6.5	6.5	8.1	8.1
E200, % .....	50	50	50	62	62	37	37
E300, % .....	85	85	85	92	92	79	79
Aromatics, vol % .....	27	27	27	20	20	45	45
Olefins, vol % .....	9.0	9.0	9.0	2.0	2.0	18	18
Oxygen, wt % .....	2.1	2.1	2.1	2.7	2.7	1.5	1.5
Octane, (R+M)/2 .....	87	87	87	87	87	87	87
New Parameter <sup>1</sup> .....	C	C+B/2	B	C	B	C	B

<sup>1</sup> C = Candidate level, B = Baseline level.

(i) For the purposes of vehicle testing, the “baseline” level of the parameter shall refer to the level of the parameter in Clean Air Act baseline gasoline. The “candidate” level of the parameter shall refer to the most extreme value of the parameter, relative to baseline levels, for which the augmentation shall be valid.

this information shall be included in the petition submitted to the Administrator requesting augmentation of the complex emission model.

(ii) If the fuel parameter for which the fuel supplier is petitioning EPA to augment the complex emission model (hereinafter defined as the “candidate parameter”) is not specified for Clean Air Act summer baseline fuel, then the baseline level for the candidate parameter shall be set at the levels found in typical gasoline. This level and the justification for this level shall be included in the petitioner’s submittal to EPA prior to initiating the test program, and EPA must approve this level prior to the start of the program.

(i) Paraffin levels in Fuels 1 and 2 shall be altered from the paraffin level in Fuel 3 to compensate for the addition or removal of the candidate parameter, if necessary. Paraffin levels in Fuel 4 shall be altered from the paraffin level in Fuel 5 to compensate for the addition or removal of the candidate parameter, if necessary. Paraffin levels in Fuel 6 shall be altered from the paraffin level in Fuel 7 to compensate for the addition or removal of the candidate parameter, if necessary.

(iii) If the candidate parameter is not specified for Clean Air Act summer baseline fuel, and is not present in typical gasoline, its baseline level shall be zero.

(ii) Other properties of Fuels 4 and 6 shall not vary from the levels for Fuels 5 and 7, respectively, unless such variations are the naturally-occurring result of the changes described in paragraphs (a)(1) and (2) of this section. Other properties of Fuels 1 and 2 shall not vary from the levels for Fuel 3, unless such variations are the naturally-occurring result of the changes described in paragraphs (a)(1) and (2) of this section.

(2) The addition fuels shall contain detergent control additives in accordance with section 211(l) of the Clean Air Act Amendments of 1990 and the associated EPA requirements for such additives.

(iii) The addition fuels shall be specified with at least the same level of detail and precision as defined in paragraph (a)(5)(i) of this section, and this information must be included in the

(3) The addition fuels shall be specified with at least the same level of detail and precision as in §80.43(c), and

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petition submitted to the Administrator requesting augmentation of the complex emission model.

(4) The properties of the addition fuels shall be within the blending tolerances defined in this paragraph (a)(4) relative to the values specified in paragraphs (a)(1) and (2) of this section. Fuels that do not meet these tolerances shall require the approval of the Administrator to be used in vehicle testing to augment the complex emission model:

Fuel parameter	Blending tolerance
Sulfur content .....	±25 ppm.
Benzene content .....	±0.2 vol %.
RVP .....	±0.2 psi.
E200 level .....	±2 %.
E300 level .....	±4 %.
Oxygenate content .....	±1.0 vol %.
Aromatics content .....	±2.7 vol %.
Olefins content .....	±2.5 vol %.
Saturates content .....	±2.0 vol %.
Octane .....	±0.5.
Detergent control additives ...	±10% of the level required by EPA's detergents rule.
Candidate parameter .....	To be determined as part of the augmentation process.

(5) The composition and properties of the addition fuels shall be determined by averaging a series of independent tests of the properties and compositional factors defined in paragraph (a)(5)(i) of this section as well as any additional properties or compositional factors for which emission benefits are claimed.

(i) The number of independent tests to be conducted shall be sufficiently large to reduce the measurement uncertainty for each parameter to a sufficiently small value. At a minimum the 95% confidence limits (as calculated using a standard t-test) for each parameter must be within the following range of the mean measured value of each parameter:

Fuel parameter	Measurement uncertainty
API gravity .....	±0.2°API
Sulfur content .....	±10 ppm
Benzene content ....	±0.02 vol %
RVP .....	±0.05 psi
Octane .....	±0.2(R+M/2)
E200 level .....	±2%
E300 level .....	±2%

Fuel parameter	Measurement uncertainty
Oxygenate content	±0.2 vol %
Aromatics content ..	±0.5 vol %
Olefins content .....	±0.3 vol %
Saturates content ...	±1.0 vol %
Detergent control Additives.	±2% of the level required by EPA's detergents rule.

(ii) The 95% confidence limits for measurements of fuel parameters for which emission reduction benefits are claimed and for which tolerances are not defined in paragraph (a)(5)(i) of this section must be within ±5% of the mean measured value.

(iii) Each test must be conducted in the same laboratory in accordance with the procedures outlined at §80.46.

(b) Three fuels (hereinafter called the "extension fuels") shall be tested for the purpose of extending the valid range of the complex emission model for a parameter currently included in the complex emission model. The properties of the extension fuels are specified in paragraphs (b)(2) through (4) of this section. The extension fuels shall be specified with at least the same level of detail and precision as in §80.43(c), and this information must be included in the petition submitted to the Administrator requesting augmentation of the complex emission model. Each set of three extension fuels shall be used only to extend the range of a single complex model parameter.

(1) The "extension level" shall refer to the level to which the parameter being tested is to be extended. The three fuels to be tested when extending the range of fuel parameters already included in the complex model or a prior augmentation to the complex model shall be referred to as "extension fuels."

(2) The composition and properties of the extension fuels shall be as described in paragraphs (b)(2) (i) and (ii) of this section.

(i) The extension fuels shall have the following levels of the parameter being extended:

LEVEL OF EXISTING COMPLEX MODEL PARAMETERS BEING EXTENDED

Fuel property being extended	Extension fuel No. 1	Extension fuel No. 2	Extension fuel No. 3
Sulfur, ppm .....	Extension level .....	80	450
Benzene, vol % .....	Extension level .....	0.5	1.5
RVP, psi .....	Extension level .....	6.7	8.0
E200, % .....	Extension level .....	38	61
E300, % .....	Extension level .....	78	92
Aromatics, vol % .....	Extension level .....	20	45
Olefins, vol % .....	Extension level .....	3.0	18
Oxygen, wt % .....	Extension level .....	1.7	2.7
Octane, R+M/2 .....	87 .....	87	87

(ii) The levels of parameters other than the one being extended shall be given by the following table for all three extension fuels:

LEVELS FOR FUEL PARAMETERS OTHER THAN THOSE BEING EXTENDED

Fuel property	Extension fuel No. 1	Extension fuel No. 2	Extension fuel No. 3
Sulfur, ppm .....	150	150	150
Benzene, vol % .....	1.0	1.0	1.0
RVP, psi .....	7.5	7.5	7.5
E200, % .....	50	50	50
E300, % .....	85	85	85
Aromatics, vol % .....	25	25	25
Olefins, vol % .....	9.0	9.0	9.0
Oxygen, wt % .....	2.0	2.0	2.0
Octane, R+M/2 .....	87	87	87

(3) If the Complex Model for any pollutant includes one or more interactive terms involving the parameter being extended, then two additional extension fuels shall be required to be tested for each such interactive term. These additional extension fuels shall have the following properties:

(i) The parameter being tested shall be present at its extension level.

(ii) The interacting parameter shall be present at the levels specified in paragraph (b)(2)(i) of this section for extension Fuels 2 and 3.

(iii) All other parameters shall be present at the levels specified in paragraph (b)(2)(ii) of this section.

(4) All extension fuels shall contain detergent control additives in accordance with Section 211(l) of the Clean Air Act Amendments of 1990 and the associated EPA requirements for such additives.

(c) The addition fuels defined in paragraph (a) of this section and the extension fuels defined in paragraph (b) of this section shall meet the following

requirements for blending and measurement precision:

(1) The properties of the test and extension fuels shall be within the blending tolerances defined in this paragraph (c) relative to the values specified in paragraphs (a) and (b) of this section. Fuels that do not meet the following tolerances shall require the approval of the Administrator to be used in vehicle testing to augment the complex emission model:

Fuel parameter	Blending tolerance
Sulfur content .....	±25 ppm.
Benzene content .....	±0.2 vol %.
RVP .....	±0.2 psi.
E200 level .....	±2 %.
E300 level .....	±4 %.
Oxygenate content .....	±1.5 vol %.
Aromatics content .....	±2.7 vol %.
Olefins content .....	±2.5 vol %.
Saturates content .....	±2.0 vol %.
Octane .....	±0.5.
Candidate parameter .....	To be determined as part of the augmentation process.

(2) The extension and addition fuels shall be specified with at least the same level of detail and precision as defined in paragraph (c)(2)(ii) of this section, and this information must be included in the petition submitted to the Administrator requesting augmentation of the complex emission model.

(i) The composition and properties of the addition and extension fuels shall be determined by averaging a series of independent tests of the properties and compositional factors defined in paragraph (c)(2)(ii) of this section as well as any additional properties or compositional factors for which emission benefits are claimed.

(ii) The number of independent tests to be conducted shall be sufficiently

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large to reduce the measurement uncertainty for each parameter to a sufficiently small value. At a minimum the 95% confidence limits (as calculated using a standard t-test) for each parameter must be within the following range of the mean measured value of each parameter:

Fuel parameter	Measurement uncertainty
API gravity .....	±0.2 °API.
Sulfur content .....	±5 ppm.
Benzene content .....	±0.05 vol %.
RVP .....	±0.08 psi.
Octane .....	±0.1 (R+M/2).
E200 level .....	±2 %.
E300 level .....	±2 %.
Oxygenate content .....	±0.2 vol %.
Aromatics content .....	±0.5 vol %.
Olefins content .....	±0.3 vol %.
Saturates content .....	±1.0 vol.%
Octane .....	±0.2.
Candidate parameter .....	To be determined as part of the augmentation process.

(iii) Petitioners shall obtain approval from EPA for the 95% confidence limits for measurements of fuel parameters for which emission reduction benefits are claimed and for which tolerances are not defined in paragraph (c)(2)(i) of this section.

(iv) Each test must be conducted in the same laboratory in accordance with the procedures outlined at § 80.46.

(v) The complex emission model described at § 80.45 shall be used to adjust the emission performance of the addition and extension fuels to compensate for differences in fuel compositions that are incorporated in the complex model, as described at § 80.48. Compensating adjustments for naturally-resulting variations in fuel parameters shall also be made using the complex model. The adjustment process is described in paragraph (d) of this section.

(d) The complex emission model described at § 80.45 shall be used to adjust the emission performance of addition and extension fuels to compensate for differences in fuel parameters other than the parameter being tested. Compensating adjustments for naturally-resulting variations in fuel parameters shall also be made using the complex model. These adjustments shall be calculated as follows:

(1) Determine the exhaust emissions performance of the actual addition or extension fuels relative to the exhaust emissions performance of Clean Air

Act baseline fuel using the complex model. For addition fuels, set the level of the parameter being tested at baseline levels for purposes of emissions performance evaluation using the complex model. For extension fuel #1, set the level of the parameter being extended at the level specified in extension fuel #2. Also determine the exhaust emissions performance of the addition fuels specified in paragraph (a)(1) of this section with the level of the parameter being tested set at baseline levels.

(2) Calculate adjustment factors for each addition fuel as follows:

(i) Adjustment factors shall be calculated using the formula:

$$A = \frac{[1 + (P(\text{actual})/100)]}{[1 + (P(\text{nominal})/100)]}$$

where

A = the adjustment factor

P(actual) = the performance of the actual fuel used in testing according to the complex model

P(nominal) = the performance that would have been achieved by the test fuel defined in paragraph (a)(1) of this section according to the complex model (as described in paragraph (d)(1) of this section).

(ii) Adjustment factors shall be calculated for each pollutant and for each emitter class.

(3) Multiply the measured emissions from each vehicle by the corresponding adjustment factor for the appropriate addition or extension fuel, pollutant, and emitter class. Use the resulting adjusted emissions to conduct all modeling and emission effect estimation activities described in § 80.48.

(e) All fuels included in vehicle testing programs shall have an octane number of 87.5, as measured by the (R+M)/2 method following the ASTM D4814 procedures, to within the measurement and blending tolerances specified in paragraph (c) of this section.

(f) A single batch of each addition or extension fuel shall be used throughout the duration of the testing program.

[59 FR 7813, Feb. 16, 1994, as amended at 59 FR 36962, July 20, 1994]