United States
Environmental Protection
Agency

Air and Radiation

EPA420-R-05-009
June 2005

Analysis of New York's Request for Waiver of the Reformulated Gasoline Oxygen Content Requirement for New York Covered Area:

Technical Support Document

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Transportation and Regional Programs Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Docket OAR-2003-0004
Document Number III-B-1

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EXECUTIVE SUMMARY

Section 211(k)(1) of the Clean Air Act (CAA) requires that the Administrator of the Environmental Protection Agency promulgate regulations establishing requirements for reformulated gasoline (RFG) to be used in gasoline-fueled vehicles in specified ozone nonattainment areas. The CAA mandates RFG use in certain nonattainment areas, based on ozone air quality and population criteria. Other ozone nonattainment areas are allowed to opt into the RFG program. Within the state of New York, RFG is mandated in the New York City Consolidated Metropolitan Statistical Area (CMSA). Dutchess County, New York is an opt-in area.

Section 211(k)(2)(B) of the Act, 42 U.S.C. § 7545(k)(2)(B), establishes an oxygen content requirement for federal RFG, but allows EPA to waive compliance with the requirement under certain circumstances. Section 211(k)(2)(B) provides that:

> The oxygen content of the gasoline shall equal or exceed 2.0 percent by weight (subject to a testing tolerance established by the Administrator) except as otherwise required by this Act. The Administrator may waive, in whole or in part, the application of this subparagraph for any ozone nonattainment area upon a determination by the Administrator that compliance with such requirement would prevent or interfere with attainment by the area of a national primary ambient air quality standard.

In a letter dated January 6, 2003 from New York State Department of Environmental Conservation (DEC) Commissioner Erin Crotty to then Administrator Whitman, New York requested a waiver from the federal oxygen content requirement for reformulated gasoline. The submission asserted that because MTBE would be banned in the State of New York beginning January 1, 2004, and because of the Clean Air Act's oxygen requirement, ethanol would be used as an oxygenate in the RFG areas in New York State. DEC further argued that the use of ethanol as a replacement for MTBE in RFG would result in an increase in volatile organic compounds (VOC) and oxides of nitrogen (NOx) during the summer ozone season, and that these increases would prevent or interfere with New York's ability to demonstrate reasonable further progress to attain and maintain the National Ambient Air Quality Standard for ozone in its RFG areas.

EPA determined that DEC's submission did not contain sufficient information and because New York's submission failed to address the requirements in the statute, EPA

notified NY that technical and supporting information was needed for EPA to evaluate the merits of the request. In a letter to DEC dated April 1, 2003, EPA requested clarification and additional information.[1] A subsequent submission dated December 12, 2003 from DEC acknowledged EPA's April 1, 2003 request for additional information.[2] DEC provided some additional information in support of its waiver request with this correspondence, but generally did not provide the information requested by EPA, for reasons set forth in its letter.[3]

In order to determine whether the RFG oxygen content requirement prevents or interferes with New York's ability to attain National Ambient Air Quality Standards (NAAQS), it is necessary to consider the gasoline quality and related emissions impacts that would be likely to exist with and without the RFG oxygen content requirement. In the case of New York, attainment of the ozone NAAQS is the only issue raised by New York DEC. To evaluate the potential for interference, EPA must first consider the emissions differences for each pollutant contributing to ozone formation (NOx, VOC and carbon monoxide (CO)), between cases where the oxygen requirement remains in effect ("no-waiver") and cases where the oxygen requirement is waived ("waiver"). In deciding whether to grant or deny a waiver, as a threshold matter EPA must determine what difference, if any, a waiver would have on emissions, and what effect, if any, the difference in emissions would have on ambient ozone levels.

Certain underlying information is required in order to make a quantitative estimate, or even a reasonably certain qualitative directional estimate of the emissions changes that might occur from a waiver. This information includes knowledge of certain emission-related fuel properties of the RFG that would be supplied to New York with and without a waiver. Models relating these fuel properties to vehicle emissions would then be used to estimate percent differences in emissions between the "no waiver" and "waiver" conditions. Additionally, area-specific on-road and off-road gasoline emission inventory data are needed in order to convert relative (%) changes to absolute (tons/day) changes.

New York DEC's submissions did not include quantitative estimates of the emissions differences between "no waiver" and "waiver" scenarios for any of the pollutants contributing to ozone formation, NOx, VOC and CO. While New York's submissions did contain quantitative estimates of certain VOC emission changes that could be associated with the change from MTBE use to ethanol use, these estimates were incomplete and in some cases unsupported. Changes in NOx emissions from

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1 Docket OAR-2003-0004, Document II.C.1.

2 Docket OAR-2003-0004, Document II.D.6.

3 DEC's stated reasons for not providing the information requested by EPA, and EPA's responses to those statements (that are not otherwise addressed in the TSD), are set forth in Appendix B to the Technical Support Document.

MTBE use to ethanol use were not quantified and changes in CO emissions were not addressed in New York's submissions.

If New York had provided quantitative estimates of the emission differences between the "no waiver" and "waiver" situations, EPA's evaluation of its waiver submission would have included a thorough review of the basis for these estimates (fuel property estimation and emission modeling methodology), and subsequently, a thorough review of whether these emission differences indicate that ambient ozone is likely to be higher with the oxygen requirement than without. However, EPA's initial review of the information contained in DEC's waiver submissions determined that it lacked not only the quantitative estimates of the "no waiver" to "waiver" emission changes, but the underlying information necessary to make such estimates. Consequently, EPA asked for additional information and analyses that are 1) necessary to estimate the effect a waiver might have on the properties of New York reformulated gasoline, and 2) the effect that this change in fuel properties would have on emissions from highway and off-road vehicles and equipment. Since this information has not been submitted, EPA is unable to determine whether implementation of the oxygen content requirement in the New York RFG area will prevent or interfere with the attainment of a NAAQS.

EPA has considered the information that New York has provided which may be relevant to an analysis of New York's waiver request. EPA has determined that the relevant no-waiver to waiver comparison cannot be made either qualitatively or quantitatively. In making this evaluation, EPA has considered the information provided by New York with regard to the potential effect of a waiver on each of the pollutants, NOx, VOC and CO, for both on-road and off-road gasoline vehicles and engines.

In order to evaluate the information submitted by New York, we have identified the fuel properties, vehicle fleets (e.g., on-road versus off-road, older technology vehicles versus newer technology, etc.), and emission sources (e.g. exhaust, "as blended" evaporative, commingling and permeation-related) that would need to be considered in a waiver/no-waiver analysis. We have also identified emissions models and other information necessary to make the relevant emission estimates that could be utilized to make the waiver/no-waiver comparison.

The information that DEC has provided fails to clearly demonstrate what effect a waiver would have an on ozone levels in New York. This is because: 1) there are three pollutants whose emission rates could be altered by a waiver, (NOx, VOC and CO) and all three affect ozone formation to varying degrees, 2) the lack of information on fuel qualities with and without a waiver and the lack of other relevant and necessary information precludes even a directional estimate of the impact of a waiver on NOx and VOC emissions, 3) the best estimate of the net impact of a waiver on CO emissions is that CO emissions would be greater with a waiver than without, but the difference cannot be quantified and 4) no analysis has been provided or performed, and the information before the agency does not allow an analysis to be performed, on the

combined effect of these emissions changes on ozone.[4]

Since no determination can be made regarding the overall effect of a waiver on ozone-related emissions, the information that DEC has provided fails to clearly demonstrate what effect a waiver would have on ozone. Since this threshold demonstration has not been made, EPA is not able to determine whether the oxygen requirement for RFG interferes with attainment of the ozone NAAQS in the New York RFG area. EPA concludes that New York's request therefore should be denied.[5]

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[4] CO plays a far less important role in ozone formation that NOx or VOC. Thus, even though a gross directional determination can be made for CO, such a determination provides little information in making an overall judgement about ozone formation.

[5] New York has not raised any issue concerning interference with attainment of the particulate matter (PM) NAAQS. However, our conclusions regarding the PM NAAQS would be the same as those regarding the ozone NAAQS, i.e., New York has provided insufficient information to clearly demonstrate what effect, if any, a waiver would have on PM. This is because New York has not provided sufficient information to determine PM-related emissions for the no waiver and waiver comparison.

I. BASIS FOR DEC'S REQUEST FOR A WAIVER

As EPA interprets it, New York's request for a waiver is based primarily on DEC's contentions that use of ethanol-oxygenated gasoline will interfere with attainment of the ozone NAAQS because:

- The NOx and VOC emissions performance of ethanol-oxygenated RFG will be worse than the emissions performance of the MTBE-oxygenated RFG supplied to New York prior to its MTBE ban.

- Commingling and permeation resulting from ethanol use will increase VOC emissions compared to MTBE-oxygenated RFG.

- Ethanol-oxygenated RFG will not provide the NOx reduction benefits expected under the RFG program because the Complex Model does not fully capture the effects of oxygenates on vehicle emissions of NOx.

- Relaxation of the RFG VOC performance standard for 10 percent ethanol blends, or granting of 1 psi volatility waivers for 10 percent ethanol blends could increase VOC emissions.

- There would be emissions associated with ships and barges transporting ethanol into the NY area for adding to RFG at terminals.

II. GENERAL CONCLUSIONS EPA CAN MAKE ABOUT EMISSIONS BASED ON DEC'S SUBMISSION AND OTHER INFORMATION AVAILABLE

The only emission modeling which DEC submitted in its January 6, 2003 waiver request was characterized in its December 12, 2003 letter as "reflecting the potential impact of ethanol as an oxygenate replacement for MTBE."[6] DEC provided no information on the likely properties of the oxygenated or non-oxygenated RFG that would be supplied to New York with a waiver, nor has DEC discussed the market share of non-oxygenated RFG market share should a waiver be granted.[7] The only information supplied by DEC on oxygenated RFG without a waiver is that it is likely to contain ethanol at 10% by volume. As discussed in Section IV of this document, information on likely fuel properties would be critical to an estimation of the emissions differences between the waiver and non-waiver scenarios in New York, as is evidenced

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[6] Although comparing emissions associated with MTBE-oxygenated RFG to ethanol-oxygenated RFG is not the relevant question for EPA's decision on New York's waiver request, EPA notes that the proffered analysis is inadequate. While EPA agrees with certain of New York's assertions (e.g., permeation from ethanol and commingling of ethanol and non-ethanol fuels lead to VOC emissions increases, and there are much less VOC emissions from these pathways with MTBE use), EPA disagrees with others (e.g., the assumptions that VOC emissions will increase with ethanol use as a result of a volatility waiver or VOC adjustment regulation, discussed below). Furthermore, there are other considerations related to a switch from MTBE to ethanol that New York simply ignores, such as differences in the composition of MTBE-oxygenated and ethanol-oxygenated RFG that may result in emission differences. When all relevant factors and available information are considered, EPA also cannot determine what the effect on ozone formation will be from a switch in New York from MTBE-oxygenated RFG to ethanol-oxygenated RFG.

[7] Although the program report enclosed with DEC's December, 2003 submission included analyses for the gasolines used in a DEC test program discussed in sections III-C and III-D below, DEC has provided no basis for EPA to conclude that these formulations are likely to represent the gasoline that would be supplied were a waiver granted. All fuels met the 30 ppm sulfur standard. However, the report notes that the ethanol RFG and non-oxygenated equivalent RFG test fuels were specified to have Complex Model performance similar to the study MTBE RFG. The MTBE RFG was specified, except for sulfur, to represent "typical year 2000 NYCMA RFG". No other restrictions or specifications were imposed on the fuel supplier. As noted, the composition and emissions performance of actual RFG with or without a waiver will be determined by a number of regulatory, economic and technical constraints. Consequently the specifications DEC imposed on the test fuels are insufficient to ensure that they will be similar to actual future RFG, with or without a waiver.

by EPA's evaluation of California's waiver request.

In other words, DEC has asked EPA to grant a waiver of the RFG oxygen requirement, based solely on its assertion that NOx and VOC emissions will increase with RFG using ethanol when compared to the use of RFG oxygenated with MTBE. There is a very fundamental problem with New York's analysis. In focusing on the effect of switching from MTBE use to the use of ethanol as an RFG oxygenate, New York is addressing the wrong question. In light of New York's ban on the use of MTBE as an oxygenate, EPA must compare the base case of ethanol-oxygenated RFG without a waiver to the RFG that would be supplied if an oxygen content waiver were granted. This is the proper comparison for determining whether continuing to maintain the oxygen content requirement interferes with attainment of the ozone NAAQS. The properties of MTBE-oxygenated RFG are irrelevant to this analysis. To put it another way, maintaining the current oxygen content requirement could not amount to interference, unless, at a minimum, a waiver is likely to produce a better situation with respect to ozone-forming pollutants than would exist absent the waiver. As noted, DEC has not provided information regarding the emission-related properties of the RFG that would be supplied were a waiver granted, nor did it address the issue of non-oxygenated RFG market share were a waiver granted.[8] As noted, DEC has not provided the kinds of information necessary to reach this conclusion. In summary, with the information at hand, EPA cannot estimate no-waiver to waiver emission changes, as it must do to ascertain whether the oxygenate requirement interferes with NAAQS attainment.[9] This general conclusion is explained in more detail below with respect to

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[8] Ethanol-oxygenated RFG could constitute a portion, potentially a substantial portion, of New York's gasoline pool even if a waiver were granted. DEC may have implicitly assumed in their submissions that all RFG would be non-oxygenated if a waiver were granted, but it has provided no information or analysis, such as refinery modeling, to substantiate this position. This is an issue not only because the pool average emission-related property values of New York's "waiver" RFG would depend on the extent to which ethanol is used, but because substantial market shares of both ethanol RFG and non-oxygenated RFG in New York could result in "worst case" commingling-related VOC emissions.

[9] In the California waiver analysis, EPA evaluated twelve "no waiver" to "waiver" scenarios. Each scenario consisted of a set of "no waiver" and "waiver" fuel properties predicted by refinery modeling with a specific set of assumptions. EPA treated the "no waiver" case as the reference, computed percent differences in emissions between "no waiver" and "waiver" fuels, and applied these percent differences to emission inventories to determine tons/day differences in NOx, VOC and CO emissions. EPA assumed that the tons/day emission inventory information that was available for the California analysis represented the all ethanol-oxygenated "no waiver" reference condition. EPA was therefore able to compute "no waiver" to "waiver" tons/day differences from percent differences in a single step. While it would be possible in a waiver analysis to calculate emissions changes from a different reference condition than the "no waiver" baseline, *it still necessary to make a "no waiver" to "waiver" emissions comparison*. If a different reference condition (e.g. pre-MTBE ban) were used, it would be necessary to first estimate both reference to "waiver" and reference to "no waiver" percent change and tons per day emissions changes, and

each individual pollutant of concern.

Below are more detailed discussions of the information submitted by NY. The following sections of this TSD discuss EPA's evaluation of the information. Our evaluation clearly shows that the information is insufficient to come to any definitive conclusion regarding the effect of an oxygen waiver on ozone.

subsequently combine them to estimate the total "no waiver" to "waiver" changes.

III. INFORMATION NEW YORK HAS PROVIDED TO EPA

In a letter dated January 6, 2003 from New York State Department of Environmental Conservation (DEC) Commissioner Erin Crotty to then Administrator Whitman, New York requested a waiver from the federal oxygen content requirement for reformulated gasoline, under Section 211(k)(2)(B).[10] The submission stated that because MTBE would be banned in the State of New York beginning January 1, 2004, and because of the Act's oxygen content requirement, ethanol would be used as an oxygenate in the RFG areas in New York State. DEC stated that the use of ethanol as a replacement for MTBE in RFG would result in an increase in volatile organic compounds (VOC), and oxides of nitrogen (NOx) during the summer ozone season. DEC further stated that "increases in these pollutants will immediately interfere with New York's ability to demonstrate reasonable progress to attain and maintain the federal ozone standard...".

In a letter dated April 1, 2003 to DEC Commissioner Erin Crotty, EPA asked for additional information in order to evaluate DEC's request for a waiver. A subsequent submission dated December 12, 2003 from DEC acknowledged EPA's April 1, 2003 request, and provided some limited additional information, but failed to provide the information requested.

In the sections below, EPA describes in detail the information that DEC has submitted in detail.

A. Information on VOC emissions

DEC argues that the use of ethanol as a replacement oxygenate for MTBE will result in substantial increases in VOC emissions due to (1) increased permeation through vehicle components that hold gasoline, (2) commingling of ethanol-blended fuels with fuels that do not contain ethanol, and (3) possible modifications in regulatory limitations on fuel volatility.[11] DEC has estimated that the use of gasoline with 10%

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[10] Filed in docket OAR-2003-0004, document number II.D.1

[11] Permeation refers to the escape of gasoline constituents through the walls of non-metallic fuel lines and gasoline tanks. These soft components of automotive fuel systems tend to be more permeable to ethanol than to other hydrocarbons in gasoline. Thus, ethanol-

ethanol in a fleet of five million vehicles would increase VOC emissions due to permeation by 6.1 tons per day, as compared to use of gasoline with 0% ethanol. It has provided some explanation of the methodology used in deriving this estimate (Enclosure H of the January, 2003 DEC submission). DEC states that there would also be an increase in VOC emissions due to commingling of ethanol and non-ethanol blended gasolines, compared to before the MTBE ban, but does not provide a quantitative estimate of the increase.

DEC has also provided quantitative estimates of the VOC emissions increases associated with a 0.3 pound-per-square-inch (psi) and 1.0 psi Reid Vapor Pressure (RVP) increase, which DEC claims could occur if EPA were to adopt a VOC adjustment rule for the NY area and if NY were to provide blenders of ethanol-oxygenated conventional gasoline a volatility waiver. As is discussed in section V.B.2 of this document, EPA believes that estimations of VOC increases associated with such regulatory changes are irrelevant to the appropriate analysis for an oxygen waiver. Nevertheless, DEC estimated emissions increases of 30.2 tons/day with an RVP increase of 0.3 psi statewide, 67.2 tons/day if there is an increase of 0.3 psi in RFG areas and 1.0 psi in conventional gasoline areas, and 82.7 tons/day if there is an increase of 1.0 psi statewide. Some details of their estimation methodology are provided in enclosure G of their January, 2003 submission.

DEC also notes that there will be emission increases (for both VOC and NOx) due to the transport of ethanol to the New York City CMSA from production centers in the Midwest, but has not provided a quantitative estimate of the emission increases that will occur within the New York City CMSA.

DEC has not identified or quantified any other VOC emission changes (increases or decreases) that could occur with ethanol use, nor has it clearly stated that no other significant VOC emission changes will occur.

B. Information on NOx emissions

DEC claims that NOx emissions will increase with the use of ethanol blended

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RFG blends tend to result in an increase in evaporative emissions due to permeation through these components. Commingling refers to the RVP increase (with resultant emission increase) that occurs when non-ethanol and ethanol-oxygenated gasoline blends are mixed in the gas tanks of consumer's automobiles. Since the presence of ethanol causes an increase in the volatility of the gasoline (as measured by the Reid Vapor Pressure or RVP), such commingling would contribute to an increase in evaporative VOC emissions. The regulatory changes New York refers to concern regulations that provide an allowance for higher VOC emissions when ethanol RFG is used in the Chicago and Milwaukee area, and potential allowances New York could provide when blenders add ethanol to conventional gasoline. As is discussed in section V.B.2 of this TSD, there is no basis to expect that such changes would occur and, therefore, they are not relevant to an appropriate oxygen waiver analysis.

RFG compared to MTBE-blended RFG, but has not quantified the anticipated increases. DEC stated in its January, 2003 letter that existing test data indicate that NOx emissions from newer vehicles increase with ethanol, although it did not explicitly define "newer vehicles". In its December, 2003 letter, however, DEC states that vehicle technology has rendered the need for an oxygen content requirement obsolete because the fuel control systems in modern fuel injected vehicles will compensate for the additional oxygen in gasoline and that oxygenated gasoline no longer provides a benefit.[12] Additionally, DEC states in its January, 2003 submission that data show that ethanol causes NOx emissions increases in older vehicles and even more significantly in nonroad vehicles.

DEC notes that Phase II RFG regulations require refineries to produce gasoline that reduces NOx emissions by 6.8 percent and VOC emissions by 27.4 percent compared to 1990 levels, as quantified by the EPA Complex Model. DEC states, however, that it believes that the EPA Complex Model does not fully capture the effects that oxygenates such as ethanol have on emissions from current fleet vehicles. It believes that NOx emissions will increase due to the use of ethanol compared to MTBE, and that this actual increase in NOx emissions will not be identified by, or constrained through the use of, the Complex Model to measure RFG compliance with phase II RFG regulations. The basis for New York's claim is a report prepared by NESCAUM and submitted as enclosure B of their January 6, 2003 letter.[13]

C. Information on CO emissions

DEC made no explicit references to the potential effect of a waiver on CO emissions or the relationship of CO to ozone formation in its January 6, 2003 or December 12, 2003 letters, but appears to have implicitly claimed that a waiver would have no effect on CO emissions from newer vehicles. As previously noted, DEC stated in its December 12, 2003 letter that vehicle technology has rendered the need for an oxygen content requirement obsolete because the fuel control systems in modern fuel injected vehicles will compensate for the additional oxygen in gasoline.

DEC claimed that it has verified the lack of need for an oxygenate through laboratory testing of two automobiles both with and without oxygenated fuel in a study DEC provided, with its December 12, 2003 submission, entitled "Emission Impacts of

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[12] In essence, DEC is saying in its December, 2003 letter that ethanol will not affect exhaust emissions in newer vehicles because fuel control systems will compensate for the additional oxygen in gasoline. This appears to contradict the earlier argument that NOx emissions from newer vehicles will increase with ethanol.

[13] "Health, Environmental, and Economic Impacts of Adding Ethanol to Gasoline in the Northeast States"; New England Interstate Water Pollution Control Commission, Northeast States for Coordinated Air Use Management; July, 2001. See Volume 1, page 11 and Volume 2, page 11.

Fuels to Accommodate the NY State Oxy-waiver Request and MTBE Ban."[14] This study describes a test program conducted at DEC's Automotive Emissions Laboratory (AEL), in which two vehicles, a 1998 Plymouth Breeze and a 1997 Oldsmobile Achieva, were tested multiple times using an MTBE-oxygenated RFG, an ethanol-oxygenated RFG, and a non-oxygenated "equivalent RFG". The program report concluded that data from over 200 emission tests on these two vehicles do not indicate any consistent increase in any of the regulated emission species (HC, CO, NOx) for either the ethanol-oxygenated RFG or the non-oxygenated "equivalent RFG" relative to the MTBE-oxygenated RFG.

D. Information on likely oxygenated RFG composition subsequent to New York's ban on MTBE

DEC has provided EPA with very little information on the likely emission-related properties of its RFG subsequent to an MTBE ban.[15] These properties will determine the exhaust and evaporative emissions associated with RFG use in a non-waiver scenario.

NY stated in its December 12, 2003 letter that refiners will, almost uniformly, be blending 10 (volume) percent ethanol. This is equivalent to approximately 3.5 weight percent oxygen. Blending at approximately 5.7 volume percent ethanol is required to meet the 2 weight percent RFG oxygen requirement, but, according to DEC, tax incentives and other considerations will likely lead refiners to blend ethanol at 10%. Beyond this, NY has provided no further information on the probable composition of ethanol-oxygenated RFG subsequent to its MTBE ban.[16]

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[14] "Program Report: Emission Impacts of Fuels to Accommodate the NY State Oxy-waiver Request and MTBE Ban", May 6 ,2003, submitted as an enclosure to DEC's December 12, 2003 letter.

[15] These emission-related properties are the parameters used in emission models to estimate emission differences resulting from fuel formulation differences. The Complex Model inputs affecting VOC and NOx emissions are RVP, oxygen wt%, aromatics vol%, olefin vol%, sulfur ppm, E200 and E300. (E200 and E300 are the percent of gasoline evaporated at 200F and 300F, respectively.) The alternative Tech 4 models which EPA developed for its California waiver analysis use RVP, oxygen wt%, aromatics vol%, olefin vol%, sulfur ppm, T50 and T90 as inputs . (T50 and T90 are the temperatures at which 50% and 90% of the gasoline are evaporated, and are highly correlated with E200 and E300.). As discussed later, these models should be applicable to a portion of New York's on-road fleet, as well.

[16] DEC does suggest that the as-blended Reid Vapor Pressure (RVP), could increase from current levels, either because of a change in the RFG VOC emission performance standard, such as that which EPA allowed in Chicago and Milwaukee (VOC adjustment rule), or because of a 1.0 psi volatility waiver available for 10% ethanol-blended conventional gasoline. As is discussed in section V.B.2 of this document, such changes

The program report for DEC's vehicle testing study, cited earlier, included certificates of analysis showing properties for the gasolines used in the study. The report states "AEL believes that the study fuel specifications approximate the fuel blending situation that refiners will face upon implementation of the NY MTBE ban." EPA is unsure if DEC was suggesting that the ethanol-oxygenated and non-oxygenated RFG formulations described in the study are likely to represent New York's RFG with and/or without a waiver, subsequent to an MTBE ban. Since the ethanol-oxygenated RFG formulation in this study was not blended with 10 volume percent ethanol, EPA assumes that DEC would not consider it to be representative of New York's "no waiver" ethanol-oxygenated RFG.

E. Information on likely RFG composition subsequent to a waiver of the oxygen content requirement

DEC did not explicitly address this issue in the text of either submission letter. Except as noted in the previous section and in footnote 7, DEC provided no description of the potential composition of RFG were a waiver granted.

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are not expected to occur and, therefore, are not relevant to an appropriate oxygen waiver analysis.

IV. INFORMATION NEEDED TO EVALUATE NOX, VOC AND CO EMISSIONS CHANGES RESULTING FROM AN OXYGEN CONTENT WAIVER

A. Background

RFG, in order to comply with statutory and regulatory requirements, must meet certain emissions performance and content standards. The emission performance standards are specified as percent reductions in NOx, VOC and toxics emissions relative to emissions with a statutory baseline gasoline having properties representative of 1990 gasoline. These reductions are calculated by the Complex Model, which estimates the emissions that 1990 technology vehicles would achieve when using both the statutory baseline gasoline and any RFG formulation that is being evaluated. The Complex Model calculates a percent reduction between the baseline gasoline and the RFG at issue. (The properties which are inputs to the Complex Model have previously been identified in a footnote.) RFG is also subject to oxygen and benzene content standards. It must contain, on average, at least 2.1 weight percent oxygen and no more than 0.95 volume percent benzene. In addition to the requirements imposed by the RFG standards, both RFG and conventional gasoline (CG) are also affected by the Mobile Source Air Toxics (MSAT) regulations. These regulations cap Complex Model toxics emissions at their 1998-2000 levels on a refinery-specific basis.[17] The Tier 2 gasoline sulfur requirements, when fully implemented, will require an average sulfur level of 30 ppm or less in both RFG and CG.[18]

RFG producers must meet these emission-related regulatory constraints, and also must supply RFG and CG that meets octane and other driveability-related requirements. Refiners attempt to produce gasoline and other products in the most economically advantageous manner, subject to these constraints. The manner in which a given refinery meets this objective depends on the configuration of the refinery, the cost and availability of various blending components (e.g. MTBE, ethanol, and alkylate which have good octane characteristics), and other technical and economic factors. Consequently:

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[17] Since much RFG overcomplied with toxics performance requirements, MSAT imposes a tighter constraint on RFG composition than the RFG performance standard for many suppliers.

[18] The sulfur level in RFG is currently constrained by RFG performance standards, but the Tier 2 sulfur content requirement imposes a tighter constraint.

- RFG emission performance and content standards alone do not determine RFG's composition. Other factors may provide additional constraints on certain emission-related properties.

- RFG composition without a waiver is not uniform across refiners and refineries. Complex Model emission performance varies and much RFG overcomplies, particularly with the NOx and toxics standards. Emissions performance for New York's RFG cannot be fully evaluated without estimates of all the relevant fuel properties which are inputs to the Complex Model.

- The same factors that lead to variety in RFG composition and emissions performance without a waiver would lead to variety in RFG composition and emissions performance with a waiver.

- Even though RFG must meet the same Complex Model performance standards with or without an oxygen waiver, the actual emissions performance may be different with and without a waiver because the composition of the fuel is likely be different with and without a waiver.

B. Emissions Models

Emission performance, as measured by the Complex Model, is a function of several fuel parameters. The relationship between emissions and gasoline properties was determined by statistical regression analysis, using several thousand vehicle emission tests from a number of different studies. Development of the Complex Model, or any comparable model, such as California's Predictive Model, requires a number of decisions, some of which are subjective. Additionally, there are choices in the statistical techniques that can be used to develop these models. Thus, different models, showing different relationships between fuel properties and emissions for the same pollutant, can reasonably result from the same data set.

EPA developed updated models for NOx and exhaust VOC in order to evaluate California's RFG oxygen content waiver request, using data which California used to develop its Predictive Model. Much of these data were also used to develop EPA's Complex Model. These alternative models could be applied to a New York waiver analysis. While these EPA models differ from the Complex Model, particularly with respect to the relationship of NOx and oxygen, these models require the same basic fuel property information as inputs.

In order to evaluate the effect of a change in fuel properties on vehicle emissions, it is common practice to separate the vehicle fleet into several technology groups. It is widely believed, and supporting data indicate, that different technology groups respond differently to fuel property or composition changes. In the California waiver evaluation, vehicles were divided into three technology groups: older technology vehicles (pre-1986

model years), mid-age technology vehicles (model years 1986 through 1995) and newer vehicles (model year 1996+). These older, mid-age, and newer technology vehicles were referred to as Tech 3, Tech 4, and Tech 5 vehicles respectively.

EPA's alternative NOx and exhaust VOC models, like the Complex Model, are designed to predict emissions from only a portion of the gasoline mobile source fleet. In its California waiver analysis, the alternative NOx and exhaust VOC models which were developed represented the Tech 4 portion of California's light duty vehicle fleet. Based on California's EMFAC7G emission model, Tech 4 vehicles are expected to be the second largest contributor of the three tech groups to California's NOx emission inventory and the largest to its exhaust VOC inventory in 2005. (While the Tech 5 vehicles may have the largest contribution of these three tech groups to the NOx inventory, there were insufficient data to produce Tech 5 fuel effects emission models comparable to the Tech 4 models, and engineering reasons to assume that Tech 5 vehicles may not be substantially affected by certain fuel parameter changes).

EPA assumed in the California waiver analysis that newer "Tech 5" vehicles (model years 1996+) would not respond to changes in oxygen content or other fuel parameter changes. EPA assumed, as does DEC, that fuel control systems in modern fuel injected vehicles will compensate for the additional oxygen in gasoline.[19]

EPA used the "Tech 3" model portion of California's phase 3 predictive model representing model year 1981-85 technology, to estimate emissions changes that would occur in older vehicles. EPA also had emission weighting factors, which were part of California's phase 3 predictive model and which estimated the relative contribution to emissions in year 2005 of these three technology groups. This allowed EPA to combine separate percent change emission estimates for each of these technology groups into a single percent change estimate, and apply this percent change to an on-road gasoline NOx and exhaust VOC emission inventory (in tons per day). This allowed EPA to estimate overall on-road gasoline NOx and exhaust VOC no-waiver to waiver emission differences in tons per day.

EPA believes that an approach utilizing these models, with weighting factors appropriate for New York, could be used by New York to perform the appropriate emissions modeling for on-road vehicles in a waiver application.

In its analysis of the California waiver, EPA assumed that changes in emissions from off-highway or non-road engines would be a function of oxygen content only, using

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[19] While the assumption regarding no effect certainly does not apply to the relationship between gasoline sulfur content and NOx performance for these newer Tech 5 vehicles, in its California waiver analysis EPA was comparing waiver and non-waiver fuel formulations which had very small differences in sulfur content. Thus, the assumption that the sulfur content had no effect on "Tech 5" emissions introduced little or no error in that analysis.

factors (in percent change in emissions per weight percent of fuel oxygen added) published in EPA Report No. NR-003, as the basis for its estimate of percent changes in non-road emissions. Barring new information, it would be reasonable to apply these same non-road factors in a New York analysis.

In its California analysis, EPA had emission inventory information for both on-road and non-road mobile sources. Thus, knowing oxygen content and other fuel properties, and oxygenated/non-oxygenated market share for each waiver case, EPA was able to estimate the percent difference in emissions between waiver and non-waiver scenarios, apply this difference to the inventory to estimate a tons/day difference and combine the on-road and non-road changes.

For the reasons described in EPA's California waiver analysis[20], EPA assumes that carbon monoxide emissions would be primarily affected by fuel oxygen content, with CO emissions increasing as oxygen content decreases. For California, EPA modeled on-road CO changes using "percent reduction per weight percent oxygen increase factors" published in a California Air Resources board staff report.[21] EPA used factors from NR-003, cited earlier, to model off-road CO changes. The on-road percent changes may be somewhat California-specific, since they were derived from California's EMFAC emission factors model. It is probably more appropriate to quantify the CO emission changes in New York using the Mobile model.

In summary,

- There are models which may be superior to the Complex Model for evaluation of on-road vehicle emissions differences in New York with and without an oxygenate waiver

- These alternative models require essentially the same fuel property information as the Complex Model, and emission performance for New York's RFG cannot be evaluated using these models without estimates of all the fuel property inputs.

- It is reasonable to estimate off-road exhaust emission and on-road CO changes from oxygen changes alone and the methods to estimate these emission changes could (if the requisite information were available) be used in evaluating a waiver request in New York.

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[20] EPA Docket A-2000-10, Docket Number II-B-2.

[21] California Air Resources Board (CARB) Staff Report: Initial Statement of Reasons; Proposed California Phase 3 Reformulated Gasoline Regulations; released October 22, 1999.

C. RFG Properties and Composition

Knowledge of the likely formulation of RFG in New York with and without an oxygen content waiver is critical to EPA's evaluation of whether or not the oxygen content mandate interfere's with attainment of the ozone NAAQS. Because this information has not been provided, EPA is not able to conclude what effect a waiver would have on vehicle emissions in the NY RFG area. Some information exists regarding the composition and properties of ethanol-oxygenated RFG [22] supplied to New York during the ozone season subsequent to New York's MTBE ban. This RFG does not, on average, meet the ultimate 30 ppm sulfur requirement which the Tier 2 gasoline sulfur regulations will impose on both conventional and reformulated gasoline, but reflects transitional sulfur requirements which become more stringent over a multi-year period. Even though these data do not represent full implementation of the Tier 2 sulfur requirement, they are likely to be somewhat informative of the composition of the RFG that will be supplied to New York in the future in the absence of an oxygen content waiver.[23] However, these data do not predict the composition and properties of the RFG that would be supplied to New York if a waiver were granted. Consequently, this information, by itself, is insufficient to evaluate the impact of an oxygen content waiver.

New York's submissions provide no source of real world data or predicted data that is informative of the composition of the RFG that would be supplied to New York if EPA waived the oxygen content requirement. In its waiver submission, California relied on refinery modeling studies to predict the properties of California Phase 3 RFG (CaRFG3) and, similarly, EPA relied on expansions of these same refinery modeling studies to evaluate California's submission. These studies predicted the properties of the CaRFG3 that would be produced if an oxygen content waiver were granted, as well as the properties of the oxygenated CaRFG3 that would be produced without a waiver. This modeling was conducted on those refineries supplying RFG to California, so is

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[22] RFG surveys are conducted each year by the RFG Survey Association, an association of refiners, importers and oxygenate blenders. Gasoline samples are collected at retail stations in RFG covered areas, under a survey plan which EPA approves, and analyzed for emission-related properties. Independent contractors perform the sample collection and analysis. These surveys are required by 40 CFR 80.67, for suppliers who choose to meet RFG standards on an average basis, rather than on a "per gallon" basis. These surveys are intended to ensure that the RFG supplied to each covered area meets standards. Specific requirements pertaining to these surveys can be found in 40 CFR 80.68.

[23] EPA has published average property information from RFG surveys through 2003. Although 2004 averages have not been published, EPA would have provided data from 2004 surveys to New York DEC as soon as it was available, had it been requested. Ozone-season RFG surveys in NY were conducted between June and late August. EPA receives data approximately 30 days after each survey is completed and received all ozone season survey data for NY prior to October, 2004.

California-specific.[24] Furthermore, California reformulated gasoline standards, which are applicable to RFG sold in federal RFG areas in California, differ from federal RFG standards. Thus, the predictions of the California fuel properties from this modeling are not applicable to the analysis of the New York waiver since different modeling constraints would be applied for the California case versus the New York case. For example, modeling indicated that it was infeasible for California refiners to make RFG oxygenated at 10% ethanol, while New York is likely to receive 10% ethanol during the ozone season.[25] The California modeling does predict that substantial amounts of ethanol-oxygenated gasoline would be used in California, even with a waiver of the federal RFG oxygen content requirement. Although the California analysis is certainly not directly applicable to New York, the expected use of ethanol in California demonstrates that, lacking information to the contrary, EPA cannot assume that ethanol will not be used in New York in a waiver situation. Ethanol may be used to make up, in part, for the volume and octane which MTBE provided even if EPA waived the oxygen content requirement. Other studies support such a conclusion.[26]

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[24] In fact, refinery modelers typically use completely different models to estimate the composition of gasoline produced for the New York area versus gasoline produced for the California market.

[25] The modeling which EPA commissioned for the California waiver analysis represented the characteristics of the California refinery system. Additionally, the modeling required that California Phase 3 RFG meet California standards for NOx and hydrocarbons based on California's Phase 3 predictive model, rather than the Complex Model. Thus, the RFG modeled for the California waiver analysis was required to meet a much more stringent NOx standard than the Federal standard. Additionally, since the predictive model, unlike the Complex Model, indicates that NOx emissions will increase as oxygen content increases, California's NOx performance requirements impose a practical limit on weight percentage of oxygen that can be used in California blends. Consequently, EPA has little confidence that the forecasts of emission-related fuel parameters which these models produced would be applicable to New York.

[26] The NESCAUM report submitted as enclosure B of NY's January 6, 2003 submission states on page 9, vol.2 "If the oxygen requirement were waived or lifted, it is highly likely that some amount of ethanol would still be blended into RFG..."

V. EMISSIONS-RELATED CONCLUSIONS BASED ON NEW YORK'S SUBMISSION

A. Effect of a waiver on NOx emissions based on New York's submission

1. Multiple gasoline properties affect NOx emissions

With regard to DEC's comments regarding the complex Model, EPA does agree that the Complex Model may over-estimate the NOx emission performance of certain 10 v% (about 3.5 wt% oxygen) ethanol-oxygenated RFG blends, because the Complex Model does not show a NOx increase with increasing oxygen. According to EPA's models developed during the California waiver analysis and readily available to NY DEC, all other properties being equal, as oxygen content increases, NOx emissions will also increase for Tech 4 vehicles. Thus, if two RFG blends with different oxygen content were formulated to have the exact same Complex Model NOx performance (e.g. 6.8 percent reduction from 1990 baseline, the averaged standard), EPA would suspect that the "true" NOx performance of the blend with the higher oxygen content would be worse than that of the blend with the lower oxygen content. The problem with this simplistic argument is that there are many properties and components of RFG other than oxygen content which would likely be different in a waiver versus no-waiver scenario, and these other properties and components also affect NOx emissions. (This is discussed in the previous section of this TSD.) Thus, neither the magnitude nor direction of a NOx change can be predicted using the data submitted by DEC since the argument above is based only on oxygen content. [27]

[27] Although oxygen increases taken alone (i.e., all other properties being equal) directionally increase NOx emissions in EPA's alternative models for Tech 4 vehicles, real world situations clearly show that other RFG properties can and do change the magnitude and even the direction of this change. In EPA's evaluation of California's waiver request using the alternative models, NOx emissions clearly go down where average oxygen content of the gasoline pool is lower (i.e., all of the waiver scenarios). However, in other real world situations fuels can exhibit better NOx performance even with higher oxygen content due to differences in other properties that affect NOx emissions. To further illustrate this point, EPA has examined "real world" VOC-controlled RFG survey data collected during the 2003 ozone season and computed two sets of average fuel properties, one from an RFG area with lower oxygen content and one from an area with higher oxygen content. EPA utilized averages from surveys conducted in the New York-New Jersey-Long Island-Connecticut area to represent the lower oxygen content RFG, and averages from Louisville, Kentucky surveys to represent the higher oxygen content RFG. EPA computed the NOx performance for these two "average fuels" using EPA's alternative NOx models.

2. NOx emissions from on-road vehicles with and without a waiver.

Given property estimates for New York's "waiver" and "no-waiver" gasolines, a complete waiver submission would presumably use EPA's alternative "Tech 4" NOx models to estimate the emissions change for a portion of the on-road fleet, since these models were developed with data that are not California-specific. *As explained earlier, the information which DEC has submitted is insufficient to even determine the expected direction of the "Tech 4" "no waiver" to "waiver" NOx emission change.*

An assumption similar to that made for the California analysis, i.e., that the "no waiver" to "waiver" fuel property differences would have no effect on exhaust emissions in "Tech 5" vehicles, would likely be appropriate for NY as long as there was little difference in the sulfur content of the "no waiver" and "waiver" fuels. While this is somewhat uncertain prior to the implementation of the 30 ppm Tier 2 standard, this should be the case with that standard in place. *Consequently, it would likely be appropriate to assume that "Tech 5" "no waiver" to "waiver" emission differences would be zero*.

It would probably be adequate to use the "Tech 3" NOx model portion of California's phase 3 predictive model to estimate NOx emission changes for older vehicles. This model, although it was created by California to represent a portion of their fleet, was not based solely on California vehicles. This model requires the same fuel parameter inputs as the alternative "Tech 4" NOx models which EPA developed. Thus, it cannot be used to determine the probable direction of the NOx emission change without estimates of New York's "no waiver" and "waiver" RFG parameters.

EPA applied California-specific emission weighting factors for Tech 3, 4 and 5 vehicles in its California analysis. They represent the California fleet in 2005 and were estimated using a California-specific emission factors model. Weighting factors more applicable to the federal fleet and/or to the New York fleet could be developed with EPA's Mobile model. However, DEC did not submit the fuel parameter information to calculate the Tech 3 or Tech 4 emission changes, nor did it develop weighting factors for the various Tech groups. Therefore, it is not possible, given the data submitted, to draw any reasonable conclusions about the magnitude or the direction of NOx emissions changes in on-road vehicles for the New York waiver/no-waiver comparison.

The NOx performance of the Louisville, KY "average fuel" is better than that of the New York "average fuel" based on the EPA alternative model, even though the oxygen content of the Louisville "average fuel" was higher. (See Docket OAR-2003-0004 Document II-B-1.)

3. NOx emissions from non-road vehicles with and without a waiver

EPA assumes that granting an oxygen content waiver would result in some decrease in the average oxygen content of New York's RFG.[28] In that case, there would be some percent decrease in non-road NOx emissions with an oxygen content waiver. However, EPA cannot estimate how much non-oxygenated RFG would be used if a waiver were granted in New York. Consequently, EPA can only qualitatively estimate a directional decrease in NOx for non-road vehicles and engines with a waiver.

DEC has not submitted any NOx emission inventory information as part of its waiver request. While the non-road percent change NOx factors are large, EPA assumes that the non-road gasoline NOx emissions inventory for New York is small compared to the on-road gasoline NOx emissions inventory. Consequently, even if EPA concludes that non-road gasoline NOx emissions will be lower with a waiver, EPA cannot determine with confidence, based only on a qualitative assessment, whether total mobile source gasoline NOx emissions would be lower with or without a waiver.

B. Effect of a waiver on VOC emissions based on New York's submission

Evaluating the potential impact of ethanol-oxygenated gasoline on NOx emissions between a waiver and no-waiver scenario only calls for considering changes in exhaust emissions. Analysis of VOC impacts is considerably more complex. In addition to the changes in on-road and non-road exhaust emissions, one must also consider evaporative VOC emission changes that may occur as a result of "as-blended" RVP differences between various gasoline formulations. [29] There are also other emission effects that may occur as a result of ethanol use. Commingling of ethanol and non-ethanol gasolines in vehicle fuel tanks causes increases in RVP which can result in higher evaporative VOC emissions. Additionally, use of ethanol-oxygenated gasoline is believed to increase VOC permeation emissions.

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[28] Although without the appropriate analysis, it cannot be said with any certainty that the waiver would result in the production of non-oxygenated RFG, at least one refiner has strongly supported granting New York's request for a waiver. The letter of support from Tosco Corporation enclosed with New York's January 6, 2003 submission clearly indicates that less oxygen would be utilized in New York RFG if a waiver were granted. One would presume that support for a waiver from the refining community would indicate that at least some refiners would blend RFG without oxygen or the waiver would have no effect on RFG production.

[29] "As-blended" RVP refers to the RVP resulting from blending at a refinery or terminal. It is distinct from the RVP that may exist in commingled fuel in a vehicle fuel tank.

1. VOC on-road and non-road exhaust emissions

As previously noted, for its California waiver analysis EPA developed alternative exhaust hydrocarbon models, estimating changes in exhaust hydrocarbon emissions as a function of various fuel parameters. For Tech 4 vehicles (Model Year 1986-1995), these models predict that as oxygen content increases from zero, with other parameters constant, exhaust hydrocarbon (HC) will first decrease and then increase.[30] According to these different models, therefore, decreasing oxygen content from a 3.5% "no waiver" level, in the absence of other parameter changes, could either reduce or increase exhaust HC emissions from Tech 4 vehicles, depending on the "waiver" oxygen content. However, these HC models are a function of several parameters, i.e., the same parameters that are inputs to the alternative NOx models identified earlier. As discussed and demonstrated earlier with respect to NOx, knowing only that oxygen content is likely to decrease with a waiver, and even knowing the pool average oxygen content with a waiver, does not provide enough information to determine the net effect on emissions, because changes in other parameters could offset emission changes due to oxygen. Consequently, without further information, EPA cannot predict even the direction of the exhaust VOC emission differences between "no waiver" and "waiver" RFG in Tech 4 vehicles.

EPA believes that the assumptions discussed earlier for Tech 3 and Tech 5 NOx emissions are valid for Tech 3 and Tech 5 exhaust HC as well; that exhaust HC will probably not be substantially affected by oxygen content or other parameters for Tech 5 vehicles, and the "Tech 3" exhaust HC portion of California's Phase 3 Predictive Model may be the best available model to predict fuel-related exhaust HC changes in older vehicles. However, this Tech 3 model requires the same fuel parameter inputs as the alternative "Tech 4" HC models which EPA developed.

In its California analysis, EPA used Tech 3, Tech 4 and Tech 5 exhaust HC weighting factors. As with NOx, these weighting factors were derived with California's mobile source emissions model, and incorporated into the predictive model. The emission weighting factors which were applied in the California analysis are California-specific; they represent the California fleet in 2005 and were estimated using a California-specific emission factors model. Weighting factors more applicable to the federal fleet and/or to the New York fleet could be developed with EPA's Mobile model. However, DEC did not submit the fuel parameter information to calculate the Tech 3 or Tech 4 emission changes nor did it develop weighting factors for the various Tech groups. Therefore, it is not possible, given the data submitted to make conclusions about either the magnitude or the direction of exhaust VOC emissions from on-road vehicles for the waiver/no-waiver comparison.

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[30] While for certain discussions, it may be useful to make a distinction between VOC emissions and HC emissions, for purposes of the discussion here, there is no difference between references to VOC and HC emissions. Generally speaking, we use the term HC as the appropriate convention when referring to emissions models.

As we did in the California analysis, EPA assumes that non-road exhaust VOC emission changes are largely a function of oxygen content, and that exhaust VOC emissions would increase as oxygen content decreases.[31] Thus EPA would expect an increase in non-road exhaust VOC emissions with a waiver. It would probably be appropriate to model these emissions for New York using the factors which EPA used in the California analysis. These factors are incorporated into EPA's NONROAD2004 model, and this model could be used directly to estimate nonroad exhaust emission levels, in tons per day, for the RFG areas in New York in the absence of a waiver. However, since DEC has not addressed the issue of non-oxygenated market share with a waiver and has not provided an estimate of pool average oxygen content with a waiver, it is not possible to estimate the magnitude of the "no waiver" to "waiver" emission change in non-road VOC exhaust emissions.

2. Evaporative VOC emissions due to RVP increases

Non-exhaust emissions of VOC (except permeation) are modeled as a function of RVP only.[32] In other words, if estimates are available of RVP changes between the waiver and non-waiver scenarios, existing models can be used to predict non-permeation changes in evaporative emissions of VOC. New York has offered some estimates of RVP changes of MTBE-containing RFG and ethanol-containing RFG. As described earlier, this comparison is not relevant to the technical question before EPA - whether use of ethanol-containing RFG without a waiver leads to more ozone formation than use of RFG with an oxygen waiver. There are also other problems with New York's assumptions.

The RVP level in ozone season RFG is tightly constrained by the need to comply with Complex Model VOC performance standards.[33] Specifically, DEC assumed that RFG in the New York RFG area would increase in RVP by 0.3 psi if a waiver is not granted. They attributed such increase in RVP to a regulation that EPA promulgated on July 17, 2001 that allows a more lenient VOC performance standard (equivalent to an increase in RVP by 0.3 psi) for RFG containing 10 volume percent ethanol. However, this regulation applies only in Chicago and Milwaukee, and in the rulemaking EPA noted

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31 Available data and models do not accommodate consideration of additional fuel properties.

32 That is, RVP is the only fuel parameter input assumed to affect evaporative emissions. The evaporative emission estimates produced by EPA's Mobile model are also affected by ambient temperature inputs and other area-specific factors. In its California waiver analysis, EPA used a formula, derived with California's EMFAC7G model, to estimate the VOC emission differences resulting from RVP differences. It would be appropriate to use a non-California model such as the Mobile model or the Complex model to model any relevant RVP-related "no waiver" to "waiver" evaporative emissions changes in New York.

33 See 40 CFR 80.41(e) and (f).

that this limitation was needed based on the area-specific modeling used to support the rule.[34] DEC's assumptions regarding the RVP increase and associated VOC increases are therefore in error. It is not reasonable for DEC to assume that EPA would conduct a future rulemaking to establish a similar adjusted VOC standard for New York RFG blended at 10 volume percent ethanol, without considering the potential impact on New York's ozone air quality.

DEC also included estimates of a VOC emission increase predicted to occur either statewide or just outside of RFG areas if New York granted a 1.0 psi increase in the RVP volatility standard for ethanol-containing gasoline were granted by New York.[35] There are several problems with DEC's analysis. First, DEC did not explain how the federal oxygen content requirement for RFG relates to the use of ethanol in the conventional gasoline used in non-RFG areas. Thus, EPA has no basis for evaluating New York's apparent assumption that, without a waiver, ethanol will be blended into conventional gasoline in such a way as to affect attainment of the ozone NAAQS. Furthermore, New York itself would have to allow such a volatility waiver for conventional gasoline. Finally, even if New York allowed the RVP of conventional gasoline to increase, such an allowance would clearly not be applicable to RFG since RFG is subject to other completely separate and more stringent VOC standards. Consequently, there are flaws in New York's analysis of RVP levels to be expected in the non-waiver scenario in both CG and RFG areas in the State. Without a more detailed explanation of New York's argument, EPA cannot come to any conclusions about how a 1.0 psi change in conventional gasoline might occur, how it might impact RFG properties in the New York RFG area, and, finally, how such changes might impact attainment of the ozone NAAQS.

As described earlier, an RVP boost and associated increase in VOC emissions can occur within the gas tanks of cars when fuel containing ethanol is commingled with fuel that does not contain ethanol. New York asserts that commingling will increase when ethanol is substituted for MTBE as an oxygenate in RFG. Presumably New York is referring to the commingling of ethanol-oxygenated RFG purchased within the New York RFG area with non-ethanol gasolines purchased outside of the New York RFG area. NY does not attempt to quantify this effect. While this may occur in a no-waiver scenario, New York does not address the central question of how much ethanol-oxygenated and non-oxygenated RFG would exist within the NY RFG area if an oxygen content waiver were granted.

EPA believes that the maximum adverse commingling impact occurs when ethanol and non-ethanol gasolines are sold in significant quantities in the same

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[34] See 66 FR 37157 and 40 CFR 80.40(c)(3).

[35] New York does not allow use of the 1.0 psi RVP allowance for ethanol-containing gasoline but can provide a waiver to blenders to use such an allowance.

geographic area (e.g. the New York State portion of the New York City CMSA). In its California waiver analysis, EPA concluded that this condition could exist if California were granted an oxygen content waiver, because the refinery modeling indicated that some refiners would blend ethanol in RFG even if the waiver was granted, while other refiners would not. As noted previously, DEC has not addressed the issue of possible use of ethanol in New York RFG if a waiver were granted. EPA believes that some refiners supplying RFG to New York would blend ethanol into RFG even if a waiver was granted, due to the octane ethanol provides and to make up for the lost gasoline volume from MTBE resulting from New York's MTBE ban. As discussed previously, there is no basis for EPA to assume that under a waiver, all RFG will be free of ethanol. Consequently, the maximum adverse commingling impact could occur in New York if EPA grants an oxygen content waiver, leading to corresponding increases in RVP and evaporative VOC emissions. This maximum adverse commingling impact condition would not exist in New York without a waiver, since without a waiver only ethanol-oxygenated RFG would be sold within the New York portion of New York's RFG areas.

In summary, while some commingling could occur in the non-waiver scenario as cars travel back and forth from New York's RFG areas (where ethanol is used) to other areas (where it may or may not be used), such commingling would likely be much less prevalent than would be the case with an oxygen waiver. In the absence of modeling showing how much ethanol will be used in New York's RFG if the oxygen content requirement were removed, EPA believes it most likely that commingling will be more prevalent with a waiver than without a waiver. It follows that VOC evaporative emissions resulting from commingling would likely be greater if a waiver were granted than if it were not, however without further explanation it is not possible to estimate the magnitude of this impact.

3. Evaporative VOC emissions due to permeation

EPA assumes that increased ethanol use would cause some increase in permeation-related VOC emissions. DEC has provided a quantitative estimate of the increase in emissions that could occur (6.1 tons per day over a fleet of five million vehicles) compared to levels prior to an MTBE ban. While it provided some explanation of the basis for this estimate, it did not specify in its January 6, 2003 submission what this fleet represented. An enclosure to DEC's December, 2003 submission identified the 6.1 tons per day estimated increase as occurring in the NYCMA ozone nonattainment area as a result of conversion from MTBE-RFG to ethanol–RFG.[36] Since ethanol may still be used in some significant quantities even if a waiver were granted, this estimate would lead to overstating the difference in permeation VOC emissions between the "no waiver" and "waiver" cases. EPA assumes that the "no waiver" to

[36] "Emission Impacts of Fuels to Accommodate the NY State Oxy-waiver Request and MTBE Ban" page 6.

"waiver" difference in permeation effect would be dependent on the amount of ethanol used if a waiver were granted.

The change in permeation emissions between the non-waiver and waiver conditions depends on the extent to which ethanol RFG would be used were a waiver granted, and DEC has not provided estimates of ethanol use in RFG with a waiver. Additionally, estimates of permeation emission changes would have to be combined with estimates of exhaust and other evaporative VOC emission changes in order to estimate the total "no waiver" to "waiver" VOC change. DEC has not provided such estimates or the underlying fuel property information needed to make such estimates. Thus, even with the best available quantitative estimate of permeation emission differences between ethanol-oxygenated and non-ethanol gasoline, EPA could still not determine the net effect of the oxygen waiver on VOC emissions with the information submitted by DEC. In summary, EPA believes that permeation-related VOC emissions would likely be less with a waiver, because we assume that less ethanol will be used with a waiver than without. However, without further information it is not possible to estimate the magnitude of this impact.

C. Effect of a waiver on CO emissions

DEC did not address emissions of CO, although increases in CO can contribute to increases in ozone Because of the lack of information on ethanol market share should a waiver be granted, there is insufficient information for a quantitative estimate of "waiver" to "no waiver" CO emission changes for New York, since EPA cannot determine the average oxygen content for the "no waiver" case or cases from the available information. Directionally, EPA assumes that average oxygen content will decrease with a waiver. CO emissions should increase for Tech 3 , Tech 4 and non-road, and remain the same for Tech 5. While EPA can estimate this directional impact, without further information it is not possible to estimate the magnitude of this impact.

D. Ethanol transport-related emissions

While there will be emissions resulting from the transport of ethanol to terminals, the difference in emissions would depend, in part, on the amount of ethanol used in New York with and without a waiver. DEC has not provided that information. Therefore, EPA concludes that without further information it is not possible to estimate the magnitude of this impact. In any case, Enclosure I of DEC's January, 2003 submission suggests that the relative contribution of these emissions would be small.

VI. CONCLUSIONS OF EPA'S ANALYSIS OF DEC'S SUBMISSION

The information that DEC has provided fails to clearly demonstrate what effect a waiver would have an on ozone levels in New York. This is because: 1) there are three pollutants whose emission rates could be altered by a waiver, (NOx, VOC and CO) and all three affect ozone formation to varying degrees, 2) the lack of information on fuel qualities with and without a waiver and the lack of other relevant and necessary information precludes even a directional estimate of the impact of a waiver on NOx and VOC emissions, 3) the best estimate of the net impact of a waiver on CO emissions is that CO emissions would be greater with a waiver than without, but the difference cannot be quantified and 4) no analysis has been provided or performed, and the information before the agency does not allow an analysis to be performed, on the combined effect of these emissions changes on ozone. EPA concludes that there has been no clear demonstration as to the effect a waiver would have on ozone. [37]

[37] The table in Appendix A summarizes EPA's qualitative consideration of New York's waiver request.

APPENDIX A: SUMMARY OF EPA'S ANALYSIS OF DEC'S SUBMISSION

The following table summarizes EPA's assessment of the directional change in "no waiver" to "waiver" emissions for each on-road vehicle technology group, and for non-road gasoline vehicles and engines. "I" indicates an increase, "D" a decrease, "0" little or no change, and "?" means insufficient information to determine.

	NOx	Exhaust VOC	as blended evap VOC	commingling VOC [38]	Permeation VOC	CO
Tech 3 on-road	?	?	?	I or ?	D	I
Tech 4 on-road	?	?	?	I or ?	D	I
Tech 5 on-road	0	0	?	I or ?	D	0
non-road	D	I	?	I or ?	D	I

[38] If ethanol is used in NY's RFG to a significant extent with a waiver, then EPA expects commingling VOC emissions to increase. If ethanol is not used extensively with a waiver, then the direction of this VOC change is uncertain. EPA believes that significant ethanol use with a waiver is likely.

APPENDIX B: EPA'S RESPONSE TO DEC'S REASONS FOR NOT PROVIDING INFORMATION THAT EPA REQUESTED

DEC provided information in its January 6, 2003 submission to EPA which we reviewed. We responded in a letter dated April 1, 2003 with comments and questions on the data submitted, and asked DEC to provide specific types of analyses and information in order for EPA to evaluate New York's request for a waiver. DEC responded to our questions in a letter to EPA dated December 12, 2003 and provided reasons why it did not provide what we requested and in some cases why DEC felt such information was not necessary. For those issues not discussed in the Technical Support Document, we describe here DEC's responses and our assessment of those responses.

I. DEC failed to provide information on the actual fuels that would likely be used in the New York RFG area with and without a waiver

DEC states that EPA's request for refinery modeling goes beyond the scope of the Clean Air Act as it pertains to waivers of the oxygen requirement in RFG. DEC also states that the benefits of refinery models are questionable and that the information that models provide is "of limited applicability" for evaluation of its waiver request. Finally, DEC argues that because EPA commissioned its own refinery modeling study when evaluating California's request for a waiver, that "it is more reasonable and appropriate for EPA to perform the modeling, as New York lacks refineries or the authority to collect specific information on their production plans."

A. Requesting refinery modeling is within the scope of the Clean Air Act

In DEC's December 12, 2003 letter to EPA, DEC states that the refinery modeling we requested "goes far beyond the scope of the language contained in section 211 of the Clean Air Act and was clearly not contemplated by Congress when it drafted section 211(k)(2)(B) of the Act." We disagree. The Act only allows EPA to grant a waiver if it determines that compliance with the RFG oxygenate requirement would prevent or interfere with the attainment by the area of a national primary ambient air quality standard. As explained in the Decision Document and the main body of this Technical Support Document, refinery modeling is necessary for EPA to be able to make a determination one way or another as to whether the oxygen content requirement prevents or interferes with NAAQS attainment.

B. DEC provides no evidence that refinery models are of limited applicability with respect to its request for a waiver.

In its assertion that refinery models are questionable and provide information that is of limited applicability, DEC refers to discussion of refinery modeling in the matter of *Oxygenated Fuels Association (OFA) v. Pataki*, a court decision which they provided as an attachment to their December 12, 2003 letter.[39]

The referenced document is a court decision in the case brought by OFA against the State of New York. OFA claimed that New York's law prohibiting MTBE use in that state is a violation of the Supremacy Clause of the U.S, Constitution because it legislates in a field preempted by Congress. DEC points to the discussion of refinery modeling in this court decision as an example of how the information provided by refinery models is of limited applicability in DEC's waiver application. The discussion of refinery modeling in the referenced document does not provide such an example.

Specifically, the court rejected the evidence presented by an expert refinery modeler based on "its lack of reliability and credibility." The expert's testimony consisted of the results of running a refinery model comparing MTBE and ethanol-oxygenated gasolines. Cross examination disclosed that the expert employed undisclosed methods in preparing his report and testimony. These methods included excluding from the expert's report model results which were unfavorable to OFA, and using predetermined values for certain of the parameters of gasoline that affect tailpipe emissions for MTBE-RFG but not using such predetermined values for ethanol-RFG. Although the court discredited the expert's testimony, such action is not evidence that the results of any and all refinery modeling is of "limited applicability," as claimed by New York. The inappropriate withholding of modeling results or limiting variation of the input parameters does not prove that the models themselves are inappropriate or of limited applicability when correctly used. This fact is acknowledged in the document that DEC included in its January 6, 2003 letter requesting a waiver--a chapter entitled "Background and Strategies for Developing a Northeast States Oxygenate Waiver Request" excerpted from a report prepared by the Northeast States for Coordinated Air Use Management (NESCAUM).[40] The chapter identifies arguments and data needed for waiver requests. For each of the various arguments the document identifies for inclusion in an application for a waiver, refinery modeling is recommended as the initial step.

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[39] Oxygenated Fuels Association, Inc. v George Pataki; U.S. District court, Norther District of New York filed Nov 24, 2003; pp. 9-13. (This document is filed in docket OAR-2003-0004, Document II.D.6A.)

[40] Filed in docket OAR-2003-0004, Document II.D.1i.

C. New York's lack of refineries does not prevent the State from collecting specific information on refinery production plans

In its December 12, 2003 letter, DEC states that if EPA wishes refinery modeling to be performed that EPA perform such modeling, because "New York lacks refineries or the authority to collect specific information on their production plans".

Although New York State may not have the authority to collect specific refinery information, there is a great deal of information regarding the fuel properties of gasoline delivered to the New York area and to the Northeast generally.[41] More importantly, refinery modeling services would have to be employed in order to predict *changes* in the properties of gasoline delivered to New York if a waiver were granted. Such predictions were made by refinery modeling services for both the state of California in its waiver request and in EPA's own analysis of those predictions. There are several widely recognized independent refinery modeling companies that offer such services.

D. EPA's commissioning of a refinery study to evaluate California's request for a waiver does not obligate the Agency to commission such a study in evaluating DEC's request

DEC argues in its December 12, 2003 letter that the precedent for EPA conducting refinery modeling exists, pointing to EPA's commissioning a refinery modeling study for California's waiver application.

California made available to us the following: 1) refinery modeling conducted by Math Pro and commissioned by Chevron and Tosco[42]) and 2) refinery modeling conducted by the California Energy Commission, dated December 7, 1999.[43] EPA discussed these reports and other information with California Air Resources Board (CARB) in January of 2000. EPA concluded that the refinery modeling that CARB provided EPA, for reasons discussed in the Technical Support Document[44], did not provide a sufficient basis for evaluation of California's waiver request. Consequently, EPA commissioned MathPro to do additional modeling.

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41 For example, the industry collects information on gasoline quality in RFG areas under the survey requirements found at 40 CFR 80.68 and EPA regularly shares and publishes such information and would be willing to work with New York to provide such information.

42 Available at http://www.arb.ca.gov/regact/carfg3/appo.pdf.

43 Available at http://www.energy.ca.gov/mtbe/documents/1999-12-07_PHASE-3_.FINAL.PDF.

44 Available at http://www.epa.gov/otaq/regs/fuels/rfg/r01016.pdf

When California requested a waiver, it was the first request for a waiver under Section 211(k)(2)(B) of the Clean Air Act. As such, there were no analytical precedents for either California or EPA were able to follow. CARB diligently attempted to support its waiver request by providing the refinery modeling that they did to EPA We felt it appropriate that we arrange to have additional refinery modeling conducted to better define the technical issues that we felt such analysis should address.

Therefore, our action with respect to California's waiver request was predicated under different circumstances and does not set a precedent for similar action for New York. Our experience with California's waiver request has now clarified the kind of refinery modeling and comparable analyses that are appropriate to support a waiver request. Information on the kind of modeling and analyses needed was available to New York before it applied for a waiver, making it appropriate for EPA to expect DEC to conduct or have conducted such analyses.

Beyond these considerations, EPA notes that it is DEC, not EPA, that seeks the waiver. EPA believes it is appropriate to require the petitioner in such circumstances to provide the information needed for favorable consideration of its request.

II. DEC failed to respond to our request to provide the expected changes in emissions that would occur in a waiver and non-waiver scenario, from on-road and non-road sources

In its initial submission, DEC only attempted to quantify emissions increases of VOCs If a waiver was not granted, and did not provide quantitative emissions estimates for CO or NOx for either the waiver or non-waiver scenarios. In our April 1, 2003 letter to DEC, we asked for clarification and additional information. We requested that DEC address the emissions (for both on-road and non-road sources) for all pollutants that have a potential to impact a NAAQS. We requested information relating to VOC emissions resulting from commingling and permeation effects due to ethanol with and without a waiver. We asked specific questions about the estimates of VOC increases that DEC made for the New York RFG area as well as upstate New York. Finally, we asked for estimates of emission increases due to transport of ethanol to the New York RFG area.

In its December 12, 2003 letter, DEC responded that it had considered EPA's request for emissions modeling and that "such analyses cannot be reasonably completed with the approved tools available - specifically the Mobile and Nonroad models." DEC states that the emissions modeling EPA requested cannot be completed with these models because the user inputs for the two models are different, and the nonroad model does not model RFG at all. DEC also states: "The Mobile model does not provide for differing the oxygenate amounts when modeling RFG, nor does it allow the user to differentiate between oxygenate types - the very purpose of the requested modeling."

Regarding permeation emissions, DEC stated that it included a draft paper on permeation in its original submission. With respect to estimates of VOC due to commingling, DEC states that such emissions are affected by a wide range of variables "that cannot be accurately predicted with the tools available." DEC further argues that a reduction in ethanol usage resulting from a waiver would directly reduce VOC emissions from permeation and commingling. Finally, DEC states that the emissions modeling that it included in its January 6, 2003 submission is accurate for purposes of the waiver application and enclosed it again in its December 12, 2003 letter[45].

A. DEC's claims that the requested emission modeling cannot be completed are not valid.

In the attachment to EPA's April 1, 2003 letter to DEC, we stated that DEC could use models and methods other than those referenced by DEC in its response to estimate emission changes resulting from fuel property changes. We specifically mentioned the model that EPA developed as part of its analysis of California's request for waiver[46], and stated that consistent with EPA's approach in its analysis of the California waiver, DEC may use separate models and methods to estimate fuel-related emission effects in different segments of the fleet. The referenced document also contains information on estimating emissions from non-road sources using RFG.

We disagree with DEC's assertion that the Mobile model does not allow for variable amounts of oxygen in the fuel. Mobile does model variable amounts of oxygen in RFG.[47] We provide advice to many states on issues such as this pertaining to the Mobile model and are willing to do the same for New York. We note that DEC did not contact us on this issue prior to its December 12, 2003 letter.

We also do not agree with DEC's assumption that the Mobile model does not allow the user to differentiate between oxygenate types. Mobile does allow for such differentiation for the reason that if ethanol is specified and the ethanol market share is

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45 Filed in docket OAR-2003-0004, Document I.D.g

46 The model is discussed in Section III.A.5 of the Technical Support Document associated with California's request for waiver (EPA-420-R-01-016, June 2001), and which is available at http://www.epa.gov/otaq/regs/fuels/ref/r01016.pdf.

47 The FUEL PROGRAM command option 4 as a conventional gasoline program with alternate sulfur levels can be used to provide differing inputs of oxygen. It is designed to allow users to specify an RFG program with alternate sulfur levels, but it also allows for varying the other non-sulfur fuel parameters through the FUEL RVP and OXYGENATED FUELS fuel commands to approximate the non-sulfur effects of RFG. These commands allow the user to specify the fuel RVP, the ether and ethanol market shares, and the oxygen content of the ether and ethanol blends. Thus, if the user wanted to keep the sulfur defaults, and was interested only in modeling RFG's with different RVPs and oxygen content, the user would enter the default sulfur values as his alternate sulfur values.

not 100 percent, then Mobile slightly increases the RVP depending on market share. Although permeation effects are not considered in Mobile, they can be estimated using other methods.

B. DEC's reasons for not estimating commingling emissions are not valid.

DEC asserts that the tools for estimating commingling emissions do not allow for accurate predictions. We note that the referenced Technical Support Document for EPA's response to California's request for waiver contains information on how commingling emissions may be estimated.[48] The variables that affect commingling emissions allow for a range of emission changes to be estimated and evaluated as was done for California. Increases in VOC associated with commingling are a function of the mix of non-ethanol and ethanol-oxygenated RFG available in a given area. Some amount of oxygenated RFG would still likely be made and supplied to the New York RFG area even if a waiver were granted and there would also be some oxygenated RFG used in the New York RFG area because of the adjacent areas still using MTBE-blended RFG, or conventional gasoline. Like most models, the accuracy of a model's estimations depends on the accuracy of the information that is used as input to the model. Refinery modeling or comparable analysis augmented by survey data (to assess consumers "brand loyalty", which the commingling model uses to estimate the degree of commingling that could occur in a given area) would provide estimates of the likely mix of these two types of fuels that refiners would supply the New York RFG area in a waiver scenario. These estimates would then be used as inputs to the commingling model which provides a valid method to assess the potential for emission increases due to commingling.

C. DEC's resubmitted emission estimates are in error and do not address questions raised in our April 1, 2003 letter to them.

DEC's emission estimates that it resubmitted do not include changes in NOx and CO emissions with and without a waiver which we asked for in our April 1, 2003 letter. With respect to its estimates for VOCs, DEC assumes that all RFG in the New York RFG area will be non-oxygenated in a waiver scenario. This assumption regarding the penetration level of non-oxygenated RFG is not supported and, as described in section IV-C of this TSD, appears likely to be faulty.

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[48] Specifically, SAE paper 940765, "In-Use Volatility Impact of Commingling Ethanol and Non-Ethanol Fuels", by Peter J. Caffrey and Paul A. Machiele, USEPA, describes a model developed to estimate commingling effects. Also, Dr. D. M. Rocke, University of California at Davis, developed a probability model ("UCD model") to study commingling.

In our April 1, 2003 letter to DEC we raised several questions regarding DEC's emission estimates for VOCs. Specifically, DEC assumed that RFG in the New York RFG area would increase in RVP by 0.3 psi if a waiver is not granted. They attributed such increase in RVP to a regulation that EPA promulgated on July 17, 2001 that allows a more lenient VOC performance standard (equivalent to an increase in RVP by 0.3 psi) for RFG containing 10 volume percent ethanol. Since the regulation applies only in Chicago and Milwaukee[49], DEC's assumptions regarding the RVP increase and associated VOC increases are in error.

DEC has not answered our questions as to why there would be statewide increases in RVP of either 0.3 or 1.0 psi in conventional gasoline (CG) if a waiver were not granted. With respect to the prediction of the 1.0 psi increase in RVP in CG, we asked how the oxygen requirement for RFG (if a waiver were not granted) would result in a level of 10 volume percent ethanol in all CG in New York State.

DEC has not responded to our request to provide an estimate of the emission increase associated with transport of ethanol to the New York RFG area, both with and without a waiver.

Finally, DEC also has not responded to our question regarding permeation emissions except to say that information on this topic is limited. We asked for clarification and explanation regarding information DEC provided in its January 6, 2003 submission. Specifically, DEC stated that ethanol as a replacement for MTBE will result in VOC increases from permeation of 6.1 tons/day based on a derived emission factor applied to five million vehicles.[50] We requested DEC explain what the five million vehicles represents; i.e., is it total vehicles in the New York RFG area, or in all of New York State? If the latter, is it only that portion of vehicles that would use gasoline containing ethanol?

In summary, DEC asserts that its emissions modeling for VOCs is accurate, but EPA has identified certain shortcomings in New York's approach, and has asked several questions (which DEC has chosen not to answer) that need to be answered for EPA to ascertain whether or not other shortcomings exist.

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[49] See 66 FR 37157 and 40 CFR 80.40(c)(3)

[50] Filed in docket OAR-2003-0004, Document II.D.1h.

III. EPA's issuance of an enforcement discretion letter does not preclude the granting of an oxygenate waiver

In its December 12, 2003 letter, DEC references an enforcement discretion letter from EPA to the American Petroleum Institute.[51] DEC asserts that EPA through this enforcement discretion "has enacted a requirement for fuels containing 10 percent ethanol" and that such action precludes the granting of an oxygen content waiver.

The referenced letter does not constitute a requirement that fuels in the New York RFG Area contain 10 percent ethanol. In fact, the enforcement discretion letter does not preclude the use by refiners of oxygenates other than ethanol or, if EPA were to grant New York's waiver request, the delivery of RFG with no oxygenate. The enforcement discretion letter simply informs parties that receive reformulated gasoline blendstock for oxygenate blending (RBOB) at terminals and blend 10 volume % ethanol to produce RFG of a set of circumstances under which their RBOB will be treated as certified under 40 C.F.R. Section 80.69(a)(2). It does not require that all RFG in the New York RFG area contain any quantity of ethanol, and does not preclude the granting of an oxygen content waiver.

[51] Letter dated December 3, 2003 from John Peter Suarez, Assistant Administrator of the Office of Enforcement and Compliance Assistance, to Edward H. Murphy, American Petroleum Institute.