UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JAN 14 2005

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Guidance on Limiting Nitrogen Oxides (NO_x) Requirements Related to 8-Hour Ozone Implementation

FROM: Stephen D. Page, Director (C404-04)
Office of Air Quality Planning and Standards

TO: Air Directors, Regions I-X

This memorandum provides guidance related to the NO_x exemption provisions of section 182(f) of the Clean Air Act (Act) for the 8-hour ozone standard. EPA invited comment on issues related to the exemption provisions in a June 2, 2003, notice of proposed rulemaking. In addition, EPA invited comment on a draft version of this guidance on September 1, 2004. Though not specifically required by the Act, this guidance indicates how the Environmental Protection Agency expects to handle the exemption provision under the 8-hour ozone standard.

If you have any questions on this document, please contact Doug Grano of this office at (919) 541-3292, or grano.doug@epa.gov.

Attachment

cc: Lydia Wegman, OAQPS
Tom Helms, OAQPS

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Recycled Paper (40% Postconsumer)

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards

January 2005

GUIDANCE ON LIMITING NITROGEN OXIDES REQUIREMENTS RELATED TO 8-HOUR OZONE IMPLEMENTATION

GUIDANCE ON LIMITING NITROGEN OXIDES REQUIREMENTS RELATED TO 8-HOUR OZONE IMPLEMENTATION

Prepared by the

Air Quality Strategies and Standards Division
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

January 2005

TABLE OF CONTENTS

Chapter 6: Excess Emissions Reductions

Chapter 7: Modeling Techniques

Chapter 8: Emissions Analysis

LIST OF ABBREVIATIONS

CAA	Clean Air Act
CO	Carbon Monoxide
NAAQS	National Ambient Air Quality Standards
NSR	New Source Review
NO_x	Nitrogen Oxides
O_3	Ozone
PM	Particulate Matter
RACT	Reasonably Available Control Technology
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
VOC	Volatile Organic Compounds
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
OH	Hydroxyl

GUIDANCE ON LIMITING NITROGEN OXIDES (NO_X) REQUIREMENTS RELATED TO 8-HOUR OZONE IMPLEMENTATION

CHAPTER 1

INTRODUCTION

1.1 General

In subpart 2 of part D of the Clean Air Act (CAA), as amended in 1990, section 182(f) requires States to apply the same requirements to major stationary sources of nitrogen oxides (NO_x) as are applied to major stationary sources of volatile organic compounds (VOC). These requirements are Reasonably Available Control Technology (RACT) and New Source Review (NSR) for major stationary sources in certain ozone nonattainment areas and throughout States in the Ozone Transport Region.[1] In addition, section 182(f) specifies circumstances under which these NO_x requirements would be limited or would not apply (NO_x exemption). Further, as a result of rulemaking, areas granted a NO_x exemption under section 182(f) may be exempt from certain NO_x requirements related to motor vehicle inspection and maintenance, operating permits, and general and transportation conformity.

In 1993, EPA issued a guidance document for application of the section 182(f) provisions with respect to the 1-hour ozone standard.[2] The NO_x exemption guidance, as revised,[3] continues to apply for the 1-hour ozone standard.

---

[1]See 57 FR 55622 ("Nitrogen Oxides Supplement to the General Preamble," published November 25, 1992).

[2]Guideline for Determining the Applicability of Nitrogen Oxides Requirements under Section 182(f), from John S. Seitz, Director, Office of Air Quality Planning and Standards, to the Regional Division Directors, December 16, 1993.

[3]Section 182(f) Nitrogen Oxides (NO_x) Exemptions Revised Process and Criteria, memorandum from John S. Seitz, Director, Office of Air Quality Planning and Standards, to the Regional Division Directors, May 27, 1994; and Section 182(f) Nitrogen Oxides (NO_x) Exemptions--Revised Process and Criteria, memorandum from John S. Seitz, Director, Office of Air Quality Planning and Standards, to the Regional Division Directors, February 8, 1995.

In 1997, EPA established the 8-hour ozone standard. On June 2, 2003, EPA proposed rules to implement the 8-hour ozone standard (68 FR 32802). The EPA proposed to extend to subpart 1 areas the NO_x RACT and NSR requirements which apply to major stationary sources in subpart 2 nonattainment areas and throughout an Ozone Transport Region.[4] The EPA also proposed to establish NO_x exemption provisions for the 8-hour ozone standard that reflect the same concepts as the existing guidance for the 1-hour ozone standard. For additional information, see the discussion and regulatory text related to the NO_x exemption provisions in the rulemaking notices on implementation of the 8-hour ozone standard.

Decreases in NO_x emissions generally reduce ozone levels and provide significant ozone-related health benefits. At the local level, however, this is not always the case. Due to the complex photochemistry of ozone production, emissions of NO_x lead to both the formation and destruction of ozone. In sunlight, free radicals (e.g., hydroxyl radical) oxidize nitric oxide (NO) to nitrogen dioxide (NO_2) and the NO_2 reacts with sunlight to recreate NO and to produce ozone. The resulting ozone concentration depends, in part, on the relative quantities of NO_x ($NO + NO_2$), VOC, and free radicals. Some combination of VOC and NO_x is optimum at producing ozone.

In areas with large emissions of NO relative to VOC, the reaction between emitted NO and existing ozone removes some ozone (forming NO_2 and O_2). In addition, a portion of the NO_2 formed reacts with the hydroxyl (OH) radical to produce nitric acid, a form of nitrogen that does not create O_3. In these cases, decreases in NO_x emissions result in a local increase in O_3 concentrations (NO_x disbenefit). This effect is usually short-lived (local) and much of the NO_2 formed from the reaction between NO_x and ozone leads to formation of ozone later (i.e., further downwind). The ozone increases that can result from NO_x emissions reductions in these localized areas are generally limited to small regions within specific urban cores and are surrounded by larger regions in which NO_x control is beneficial.

While localized ozone increases can result from NO_x reductions, it should be noted that the most recent authoritative

---

[4]With respect to NSR, the EPA recognized that the terms of existing NSR regulations should be adequate to cover NO_x where it is considered a precursor to the formation of ozone, but proposed to codify NO_x as an ozone precursor in order to be completely clear. 68 FR 32846.

assessments of regional ozone control approaches[5, 6] have concluded that a NO_x control strategy would be most effective for reducing regional scale ozone and ozone transport, whereas VOC reductions are most effective in more dense urbanized areas. As a result, EPA has proposed or promulgated several regulatory requirements over the past decade designed, in part, to reduce regional NO_x emissions: rules from the Acid Rain Program, multiple Federal motor vehicle and off-road engine standards, the regional NO_x SIP Call Rule, and the recently proposed Clean Air Interstate Rule. Over time, these rules are expected to reduce the magnitude and the geographic extent of the nation's 8-hour ozone problem. In addition, EPA has recently concluded[7] that improvements in ozone air quality over the eastern United States since the mid-1990s have coincided with continued decreases in NO_x emissions, together with local VOC control programs.

On September 1, 2004, EPA invited comment on a draft version of the NO_x exemption guidance for the 8-hour ozone standard (69 FR 53378). This final guidance document describes EPA's preliminary views on how EPA would determine that the NO_x requirements would be limited or would not apply for the 8-hour ozone program under subparts 1 and 2. Although this document includes various statements that States or petitioners must take certain actions, these statements are guidance made pursuant to EPA's preliminary interpretations, and thus do not bind the States and the public as a matter of law. The EPA's interpretations will provide a basis for subsequent EPA approval or disapproval of requests for exemption from the NO_x requirements. This document does not impose binding, enforceable requirements on any party, nor does it assure that EPA may approve all instances of its application, and thus the guidance may not apply to a particular situation based upon the circumstances presented. The EPA retains the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate.

Any decisions by EPA regarding a particular demonstration pursuant to section 182(f) will only be made following notice and

---

[5]Ozone Transport Assessment Group, OTAG Final Report, 1997.

[6]NARSTO, An Assessment of Tropospheric Ozone Pollution - A North American Perspective, July 2000.

[7]USEPA, The Ozone Report: Measuring Progress through 2003, April 2004.

opportunity for public review and comment. Therefore, interested parties are free to raise questions and objections about the appropriateness of the application of this guidance to a particular situation; EPA will consider whether or not the guidelines set forth in this document are appropriate in that situation. This guidance is a living document and may be revised periodically without public notice. The EPA welcomes public comments on this document at any time and will consider those comments in any future revisions of this guidance document. Readers of this document are cautioned not to regard statements recommending the use of certain procedures or defaults as either precluding other procedures or information or providing guarantees that using these procedures or defaults will result in actions that are fully approvable. As noted above, EPA cannot assure that actions based upon this guidance will be fully approvable in all instances, and all final actions may only be taken following notice and opportunity for public comment.

1.2 Section 182(f)

Section 182(f) of the CAA reads as follows:

NO_x Requirements. (1) The plan provisions required under this subpart for major stationary sources of volatile organic compounds shall also apply to major stationary sources (as defined in section 302 and subsections (c), (d), and (e) of this section) of oxides of nitrogen. This subsection shall not apply in the case of oxides of nitrogen for those sources for which the Administrator determines (when the Administrator approves a plan or plan revision) that net air quality benefits are greater in the absence of reductions of oxides of nitrogen from the sources concerned. This subsection shall also not apply in the case of oxides of nitrogen for:

(A) Nonattainment areas not within an ozone transport region under section 184 if the Administrator determines (when the Administrator approves a plan or plan revision) that additional reductions of oxides of nitrogen would not contribute to attainment of the national ambient air quality standard for ozone in the area, or

(B) Nonattainment areas within such an ozone transport region if the Administrator determines (when the Administrator approves a plan or plan revision) that additional reductions of oxides of nitrogen would not produce net ozone air quality benefits in such region.

The Administrator shall, in the Administrator's determinations, consider the study required under section 185B. (2)(A) If the Administrator determines that excess reductions in emissions of NO_x would be achieved under paragraph (1), the Administrator may limit the application of paragraph (1)to the extent necessary to avoid achieving such excess reductions.

(B) For purposes of this paragraph, excess reductions in emissions of NO_x are emission reductions for which the Administrator determines that net air quality benefits are greater in the absence of such reductions. Alternatively, for purposes of this paragraph, excess reductions in emissions of NO_x are, for:

(i) nonattainment areas not within an ozone transport region under section 184, emission reductions that the Administrator determines would not contribute to attainment of the national ambient air quality standard for ozone in the area, or

(ii) nonattainment areas within such ozone transport region, emission reductions that the Administrator determines would not produce net ozone air quality benefits in such region.

(3) At any time after the final report under section 185B is submitted to Congress, a person may petition the Administrator for a determination under paragraph (1) or (2) with respect to any nonattainment area or any ozone transport region under section 184. The Administrator shall grant or deny such petition within 6 months after its filing with the Administrator.

1.3 The NO_x Requirements

The NO_x requirements for NSR and RACT are described in EPA's rulemaking on implementation of the 8-hour ozone standard. Where EPA grants a NO_x exemption, the NO_x RACT and NSR requirements may not apply. In addition, areas granted a NO_x exemption may be exempt from certain Federal requirements related to Title V operating permits, motor vehicle inspection and maintenance (I/M), and general and transportation conformity.

As stated in EPA's inspection and maintenance (40 CFR 51.351(d)) and conformity rules (40 CFR 93.119(f)(2) for transportation rules and 40 CFR 93.152 for general rules), certain NO_x requirements do not apply where EPA granted an areawide exemption under section 182(f). Pursuant to 40 CFR part 70.2 (subparagraph (3)(i) under the "major source" definition),

the major source threshold for Federal operating permit programs would be defined as 100 tons per year in areas covered by a NO_x exemption. These exemptions automatically apply; i.e., a State does not need to request the application or granting of the I/M or conformity exemptions. However, a State may request that an exemption apply for limited purposes.

1.4 Section 185B Study

Under section 185B, the Administrator, in conjunction with the National Academy of Sciences (NAS), conducted a study on the role of ozone precursors in tropospheric ozone formation. The NAS report, Rethinking the Ozone Problem in Urban and Regional Air Pollution, was completed in December 1991. The final section 185B study incorporated this NAS report along with an EPA report addressing the availability and extent of NO_x controls. The section 185B study examined the role of NO_x and VOC emissions, the extent to which NO_x reductions may contribute or be counter-productive to achieving attainment in different nonattainment areas, the sensitivity of ozone to the control of NO_x, the availability and extent of controls for NO_x, the role of biogenic VOC emissions, and the basic information required for air quality models. The final study was submitted to Congress on July 30, 1993. In making a determination under section 182(f) that the NO_x requirements do not apply, or may be limited, EPA must consider the section 185B study. This document, "Guidance on Limiting NO_x Requirements Related to 8-Hour Ozone Implementation," includes consideration of the section 185B study.

1.5 Application of Section 182(f) Requirements

Section 182(f)(1) provides that the new NO_x requirements shall not apply if the Administrator determines that any one of the following tests is met:

(1) in any area, the net air quality benefits are greater in the absence of NO_x reductions from the sources concerned;

(2) in nonattainment areas not within an ozone transport region, additional NO_x reductions would not contribute to ozone attainment in the area; or

(3) in nonattainment areas within an ozone transport region, additional NO_x reductions would not produce net ozone air quality benefits in the transport region.

Further, section 182(f)(2) states that the application of the new NO_x requirements may be limited to the extent necessary to avoid "excess reductions" of NO_x as determined by applying tests similar to tests (1)-(3) above.

As described later in this document, the "net air quality benefits" test and the "excess reductions" provision may be applied in an ozone transport region or outside the transport region; the "contribute to attainment" test may only be applied outside of an ozone transport region; and the "net ozone benefits" test may only be applied within an ozone transport region. Where any one of the tests is met (even if another test failed), the section 182(f) NO_x requirements would not apply or, under the excess reductions provision, a portion of these requirements would not apply.

1.6 Organization of this Document

Chapter 1, above, provides an introduction to the NO_x exemption provisions. In chapter 2, procedural aspects related to a request for a NO_x exemption are covered. The "net air quality benefits," "contribute to attainment," and "net ozone benefits" tests are described in detail in chapters 3-5. The "excess reductions" provision is discussed in chapter 6. Chapters 7-8 provide technical information related to modeling techniques and emissions analyses that may be carried out to support a NO_x exemption request.

CHAPTER 2

ADMINISTRATIVE PROCEDURES

2.1 Processing with the State Implementation Plan (SIP) Revision

A State may, at any time, demonstrate to the Administrator that some or all of the NO_x requirements listed in section 1.2 of this document should not apply. For example, a State may submit a demonstration along with, or as a revision to, the SIP at the time NO_x RACT rules are due. The State's NO_x exemption demonstration is not required to be a SIP revision itself.

The EPA will approve or disapprove the State's NO_x exemption demonstration when the Administrator approves a plan or plan revision. The EPA will consider the section 185B report and will base its decision on the demonstration and supporting information provided by the State. Such demonstration and information should be in sufficient detail for EPA to determine that the exemption request is consistent with the guidance contained in this document. The EPA encourages the States to consult with the appropriate EPA Regional Office during the development of the exemption request. This is necessary to ensure that the documentation provided by the State is likely to be approved and that any required rules can be adopted in a timely manner.

2.2 Petition

Section 182(f)(3) provides that a person (including a State) may petition the Administrator for a NO_x exemption at any time after the final section 185B report is submitted to Congress. The petition may be made with respect to any nonattainment area or any ozone transport region. The EPA is required to grant or deny a section 182(f) petition within 6 months after its filing.

Since an individual petition is likely to affect the SIP planning process which is primarily a State responsibility, EPA believes it is reasonable to require the petitioner to provide a copy of the petition and demonstration to the State or States which have jurisdiction over the source or sources covered by the petition at the same time it is submitted to the Administrator (where a petition is being submitted by a person other than the State itself). Where additional States may be affected by the petition, the State receiving the petition should coordinate with the other States as necessary. In some cases, there may be multiple petitions for a given area. In other cases, a single petition may have multi-State implications. The EPA will provide the State(s) a 3-month period to make a recommendation to EPA

regarding the petition. This 3-month period will run concurrently with the 6-month review period required under section 182(f)(3). The petitioner should submit the petition and demonstration to the Administrator through the appropriate EPA Regional Office.

The EPA encourages any petitioner to consult with the State air quality agency and the appropriate EPA Regional Office during the development of an exemption request. This is necessary to ensure that the documentation provided (1) meets EPA guidance, (2) does not conflict with similar analyses by the State, and (3) is likely to be accepted by the State and EPA. The EPA's decision to grant or deny a petition will include consideration of the section 185B report and will be based on the demonstration provided by the petitioner, the State's recommendation, and the provisions of section 182(f). As noted above, this document sets forth EPA's preliminary interpretations of the section 182(f) provisions.

If EPA denies a petition, the petitioner may supplement or revise the original petition at a later date. If EPA grants a petition, the NO_x requirements or portions of those requirements, would no longer apply to those sources or areas, as described in EPA's approval action. Since EPA approval of an exemption request would change SIP requirements, EPA would conduct notice and comment rulemaking on that request.

2.3 Interface with the SIP

Where a petition for an exemption is granted by EPA prior to adoption and submittal of the State's rules, the State may simply choose not to submit the NO_x rules. If a petition is granted after submittal of the NO_x rules, but prior to EPA approval, the State may choose to withdraw the rules and preclude further EPA action. In a case where a petition is granted after EPA approves the NO_x rules, the SIP would need to be modified through a SIP revision to rescind the NO_x rules provided such rescission would not interfere with attainment or reasonable further progress [section 110(l)].

Following application of a photochemical grid model to support an attainment demonstration, States adopt a control strategy that provides for attainment as expeditiously as practicable. The selection of a control strategy may result in revision of the previously adopted rules. In some instances, NO_x RACT and NSR requirements already adopted may need to be supplemented with additional or more advanced NO_x controls in order for the area to attain the National Ambient Air Quality Standards (NAAQS).

In other cases, an area initially exempted may choose, based on the new photochemical grid modeling results, to adopt certain NO_x reduction rules in order to attain and/or meet reasonable further progress requirements through NO_x substitution. The area would be removed from "exempt" status since NO_x reductions were subsequently found to be beneficial in their ozone attainment plan. Consequently, the area would have to adopt the NO_x RACT and NSR rules except to the extent modeling shows that the controls beyond those chosen are "excess reductions" (chapter 6) or are counterproductive to the net air quality (chapter 3). Credit for NO_x substitution would be granted only if in accordance with the EPA guidance. In any event, these changes must be submitted as a SIP revision and must provide for attainment as expeditiously as practicable and meet reasonable further progress requirements.

Alternatively, for an area that adopted the NO_x RACT and NSR rules (i.e., not exempt), a State may choose to revise some or all of those rules to require less NO_x stationary source controls. This action would be based on the application of a photochemical grid model showing that the subject NO_x controls result in excess emissions reductions, as determined using the section 182(f) tests set forth in this document. The revisions must be submitted as a SIP revision and the SIP must demonstrate attainment as expeditiously as practicable.

In areas that are granted a NO_x exemption, States remain free to adopt NO_x restrictions for other reasons. For example, a State may determine that NO_x reductions are needed for purposes of ozone maintenance planning, ozone attainment in separate downwind nonattainment areas, visibility protection, PM attainment or maintenance, acid deposition, or other environmental protection. The EPA could approve certain NO_x restrictions in a SIP revision despite granting an exemption request, so long as the NO_x restrictions would not interfere with meeting any applicable requirement concerning attainment and reasonable further progress or any other applicable requirement of the CAA [see section 110(l)].

Many of the areas that are violating either the 8-hour ozone or $PM_{2.5}$ NAAQS, may be violating both of these NAAQS. Thus, in many cases, States will have ozone and $PM_{2.5}$ nonattainment areas with overlapping boundaries. Requirements for regional haze apply to all areas. Each State is responsible for developing SIP revisions to meet all the requirements relevant to each nonattainment area for each pollutant as well as developing a regional haze plan. In some cases, ozone control measures may also be useful for a $PM_{2.5}$ control strategy or a regional haze plan. Similarly, controls for $PM_{2.5}$ may lead to reductions in

ozone or regional haze. For example, considered in isolation, a metropolitan area's ozone strategy might be based on additional VOC emissions reductions; if the area needs NO_x reductions for $PM_{2.5}$ attainment, however, an optimal approach might include a more complex ozone strategy using both NO_x and VOC reductions. We believe integration of ozone and $PM_{2.5}$ attainment planning will reduce the overall costs of meeting multiple air quality goals. An integrated assessment of the impact controls have on ozone, secondary fine particles, and regional haze provides safeguards to ensure ozone controls will not preclude optimal controls for secondary fine particles and visibility impairment. Therefore, we encourage States conducting modeling analyses for ozone to separately estimate effects of a strategy on PM2.5 mass and its components (e.g. sulfate, nitrate, organic carbon, etc.).

2.4 Timing

Section 182(f) contains few details regarding the administrative procedure for acting on NO_x exemption requests. The absence of specific guidelines by Congress leaves EPA with discretion to establish reasonable procedures, consistent with the requirements of the Administrative Procedure Act (APA).

The EPA believes that section 182(f) sets up two separate procedures by which the Agency may act on NO_x exemption requests. Section 182(f)(1) and (2) direct that action on NO_x exemption determination requests should take place "when [EPA] approves a plan or plan revision." This language appears to contemplate that exemption requests submitted under these paragraphs are limited to States, since States are the entities authorized under the Act to submit plans or plan revisions. By contrast, section 182(f)(3) provides that "person[s]"[8] may petition for a NO_x determination "at any time" after the ozone precursor study required under section 185B of the Act is finalized, and gives EPA a limit of 6 months after filing to grant or deny such petitions. Although section 182(f)(3) references 182(f)(1), there are certain key differences in the language. First, individuals may submit petitions under paragraph (3) "at any time" (i.e., even when there is no plan revision from the State pending at EPA). Second, the specific timeframe for EPA action established in paragraph (3) is substantially shorter than the timeframe usually required for States to develop and for EPA to take action on revisions to a SIP. These differences strongly suggest that Congress intended the process for acting on personal petitions to be distinct--and more expeditious--from the plan-

[8]Section 302(e) of the CAA defines the term "person" to include States.

revision process intended under paragraph (1). Thus, EPA believes that paragraph (3)'s reference to paragraph (1) encompasses only the substantive tests in paragraph (1) [and, by extension, paragraph (2)], not the requirement in paragraph (1) for EPA to grant exemptions only when acting on plan revisions.

The requirements of the APA apply with respect to the type of notice which must be provided regarding EPA action on NO_x exemption determinations. Notice-and-comment rulemaking is required by the APA when EPA action involves not just factual, but also policy and legal considerations that will apply as a general matter and, thus, is legislative in nature. Conversely, when EPA action can properly be described as party specific in nature, involving consideration of primarily factual evidence, notice-and-comment rulemaking is not required by the APA. In such a case, the EPA action could consist of the issuance of an order [see 5 U.S.C. sections 551(4)-(7) and 553]. Given these requirements of the APA, EPA believes that under either of the procedures established in section 182(f), where the request is for an entire area to be exempted from the NO_x requirements, the EPA must go through notice-and-comment rulemaking to grant or deny the petition. Where a petition is submitted for an exemption determination relating to an individual source (or group of sources) under subsection 182(f)(3), EPA may grant or deny the petition through an order transmitted by letter to the affected source (or sources). The EPA will also provide the public with notice in the Federal Register of the receipt and availability of the petition, as well as of the EPA's final determination.

Section 182(f)(3) requires that EPA grant or deny a petition, whether areawide or source specific, within 6 months after its filing. Where the rulemaking process is followed, EPA is aware that the 6-month requirement may be infeasible in some cases. However, courts have ruled that even in instances, such as the one presented here, where a prescribed timeframe for EPA action apparently conflicts with the requirement to provide the public with adequate opportunity for notice and comment, the notice requirement must be met. Therefore, EPA will process areawide exemption requests by rulemaking as expeditiously as practicable, with the intent of meeting the 6-month deadline.

As noted earlier, petitions submitted under section 182(f)(3) are not required to be submitted as SIP revisions. Consequently, the State is not required under the Act to hold a public hearing in order to petition for an areawide NO_x exemption determination [see section 110(a)(1) and (2)]. For similar reasons, if the State is submitting an areawide petition under subsection 182(f)(3), it is unnecessary to have the Governor

submit the petition. However, because of the need for consistency with the requirements of 40 CFR part 58, EPA believes that, particularly in cases where the NO_x exemption request (including a request for exemption from the NO_x requirements of the conformity rules) is based on monitoring data, if such data are contained in a petition submitted by a person other than the State, the petition should be coordinated with the State air agency.

2.5 Areas with a 1-Hour Ozone NO_x Exemption

For areas that were previously granted a NO_x exemption under the 1-hour ozone standard and request a NO_x exemption under the 8-hour ozone standard, EPA would conduct new rulemaking with respect to the 8-hour ozone NO_x exemption request. This is necessary to allow for public comment, to assure consistency with the exemption guidance under the 8-hour standard, and to account for any new information that may point to a different conclusion. For example, while many areas received a 1-hour NO_x exemption in the mid-1990s on the basis of having air quality monitoring data which met the 1-hour ozone standard, EPA would not grant a NO_x exemption for the 8-hour standard simply due to that 1-hour ozone data. Furthermore, several areas that initially received a NO_x exemption on the basis of photochemical grid modeling have since revoked the exemption based on more recent studies showing the necessity of NO_x emission decreases in order to reach attainment.

CHAPTER 3

NET AIR QUALITY BENEFIT

3.1 Demonstration

The "net air quality benefit" demonstration applies to specific sources in an ozone nonattainment area or in an ozone transport region. It must show that NO_x reductions from the sources seeking the exemption would be counter-productive overall, considering the net air quality benefits. Congress specified in this "test" for specific sources a higher hurdle than in the other tests for areawide exemptions: the demonstration must show a beneficial impact from the avoidance of the NO_x controls. The procedure for this test is to conduct dispersion modeling analyses, consistent with EPA guidance, with and without NO_x reductions at the sources concerned.

3.2 Factors

Unlike the tests described in chapters 4 and 5, this test is not limited to consideration of ozone impacts. Instead, this test is based on a broader set of air quality impacts. There are many air quality impacts explicitly addressed in the CAA, both health and welfare related, that may be directly or indirectly related to NO_x emissions. These impacts include, for example, ozone and PM formation, visibility impairment, acid deposition, air toxics formation, and nitrogen deposition in nutrient-sensitive areas.

Due to the number and variety of impacts, it is generally impractical or impossible to compare effects quantitatively from one of these factors to those from another factor or among several factors. For example, there is no readily available scale to use to compare ozone impacts with acid deposition impacts and/or visibility impacts. Thus, in order to describe a method for determining the "net air quality benefit," a distinction must be made regarding which of the many factors can and should be analyzed.

Although "air quality impacts" could potentially be defined in a very broad manner, EPA has concluded that the relevant air quality impacts must be related directly to goals, standards, or mandates that are explicitly addressed in the CAA. That is, the test for net air quality benefits must assure that a decision to grant an exemption would not interfere with the achievement of the specific programs or goals mandated in the CAA. The key CAA programs related to emissions of NO_x are attainment and maintenance of the NAAQS for nitrogen dioxide, ozone, and PM and

the acid deposition program. The primary NAAQS are set by the Administrator to assure protection of the public health. The purpose of the acid deposition program is to reduce the total atmospheric loading of sulfur dioxide and NO_x.

The CAA requires the primary NAAQS to be attained as expeditiously as practicable, and includes deadlines for designation of areas' attainment status, rule adoption, submittal of control strategies, and attainment of the primary NAAQS. To assure that a NO_x exemption would not adversely impact any CAA requirements, the impacts on attainment of the primary NAAQS need to be a primary concern in the net air quality benefit test. Therefore, EPA believes the net air quality benefit test should focus on protection of the public health and address the effect the exemption would have on attainment of the primary NAAQS for the criteria pollutants.

Secondary tests, as needed, can extend to the (qualitative or quantitative) consideration of other air quality impacts that are explicitly recognized in the CAA. These could include, for example, the welfare effects which EPA has considered and deemed necessary to protect against in setting secondary NAAQS for the criteria pollutants. A petitioner could also consider any other air quality effects that are explicitly addressed in the CAA through goals, standards or mandates - for example, acid deposition, air toxics, or visibility. While welfare related impacts address important environmental issues (for example, atmospheric deposition in nutrient-sensitive areas), the CAA generally does not contain the same detailed set of requirements and deadlines as it does for the public health related NAAQS. Further, EPA believes that granting a NO_x exemption would not relieve, conflict with, or otherwise affect a source's obligation or ability to achieve NO_x reductions consistent with the acid deposition requirements. In cases where NO_x reductions from a utility subject to section 407 may be counterproductive with respect to local air quality, EPA expects the State and utility would be able to use the emission averaging provisions of section 407 to achieve the required NO_x reductions at a location where they are not counterproductive. The EPA believes the welfare related impacts should be a secondary factor in the net air quality benefit test.

In all cases, the method for consideration of the net benefits must be related primarily to "air quality" since section 182(f) specifically requires a determination of the "air quality" benefits. Thus, simpler tests, such as a "net emissions" test, should not be relied upon since changes in emissions may not be directly related to changes in air quality. In general, air quality impacts can be best determined by use of air quality

dispersion models.

In order to use air quality dispersion modeling whenever possible and to avoid conflicts with other requirements of the CAA, the methods described below should be used to determine the net air quality benefit over an appropriate geographic area which includes the ozone nonattainment areas encompassing or nearby the sources concerned (see section 3.3). These methods include a primary consideration of the primary NAAQS air quality benefits and secondary consideration of other air quality benefits.

A. Ozone Nonattainment Areas

For areas that are nonattainment only for the 8-hour ozone NAAQS, the effects of NO_x reductions on ozone concentrations should be quantified with currently available air quality modeling techniques consistent with EPA guidance (see chapter 7). The net air quality benefit should be based on a comparison of the geographic area where 8-hour ozone concentrations change with and without NO_x reductions from the sources concerned. Alternatively, the change in population exposure to ozone concentrations may be used. If the modeling shows a net disbenefit for ozone, EPA could approve the NO_x exemption request.

B. Areas Nonattainment for Both Ozone and Nitrogen Dioxide

For areas that are nonattainment for both ozone and nitrogen dioxide, NO_x reductions clearly are needed to provide for attainment of the nitrogen dioxide standard, while either NO_x or VOC reductions (or both) might best provide for attainment of the ozone standard. In such cases, EPA would not make a finding of a net air quality benefit since the CAA requires the NAAQS for nitrogen dioxide to be met as expeditiously as practicable.

C. Areas Nonattainment for Both Ozone and Particulate Matter

Many of the same factors affecting concentrations of ozone also affect concentrations of secondary PM. For example, similarities exist in sources of precursors for ozone and secondary PM. Emissions of NO_x may lead to formation of nitrates as well as ozone. Presence of ozone itself may be an important factor affecting secondary particulate formation. For example, as ozone builds up, OH radicals do also as a result of equilibrium reactions between ozone, water and OH in the presence of sunlight. The OH radicals are instrumental in oxidizing gas phase SO_2 to sulfuric acid, which is eventually absorbed by liquid aerosol and converted to particulate sulfate in the

presence of ammonia. Sulfur dioxide also reacts with ozone and hydrogen peroxide (a byproduct of photochemistry), in the aqueous phase, to form particulate sulfate. Hydroxyl radicals and NO are also precursors for gas phase nitric acid, which is absorbed by liquid aerosol and, in the presence of ammonia, leads to particulate nitrate.

Strategies to reduce ozone can also affect formation of secondary PM. Reducing NO_x emissions diminishes one of the precursors for nitric acid (i.e., NO_2 which results from NO). Therefore, in the presence of sufficient ammonia, reducing NO_x emissions could reduce particulate nitrate concentrations. There are also more subtle interfaces between strategies to reduce ozone and to reduce secondary PM. For example, reducing NO_x in the presence of substantial particulate sulfates and lack of sufficient ammonia could in some cases exacerbate the particulate sulfate problem, or reducing SO_2 in the presence of substantial NO_x and ammonia could in some cases exacerbate the particulate nitrate problem.

For areas that are nonattainment for both ozone and PM (PM_{10} and/or $PM_{2.5}$), a modeling analysis is needed that addresses each pollutant for which the area is nonattainment. The net air quality benefit should be based on a comparison of the geographic area where concentrations change with and without NO_x reductions from the sources concerned. Alternatively, the change in population exposure to concentrations may be used. If the modeling shows net disbenefits for both ozone and PM (PM_{10} and/or $PM_{2.5}$ for both the short and long term standards), EPA could approve the NO_x exemption request. If the modeling shows a disbenefit for one pollutant but a benefit for the other, EPA would not make a finding of a net air quality benefit because (1) there is not a clear <u>net</u> air quality benefit since it is difficult to compare ozone benefits to PM benefits; (2) the CAA requires the NAAQS to be attained as expeditiously as practicable and granting the exemption could result in delayed attainment for one pollutant; and (3) there are secondary benefits from NO_x emissions reductions such as decreased acid rain.

D. <u>Areas Nonattainment for Ozone and Carbon Monoxide, Lead or Sulfur Dioxide</u>

For CO, lead, and sulfur dioxide, EPA is not aware of any significant impacts from NO_x emissions. Therefore, the net air quality benefits determination should be primarily based on the ozone modeling analysis described above for areas nonattainment for only ozone.

<u>Secondary Factors</u>

As noted above, equal consideration of all NO_x impacts is generally impractical in this net air quality benefit test because of the lack of scales to compare the impacts among the various factors. Nevertheless, additional factors explicitly addressed in the CAA such as those listed below may be considered in addition to any information developed from the NAAQS analyses. Consideration of the factors below is especially important in cases where the analyses on the NAAQS pollutants cannot clearly determine the net air quality benefit. In any case, EPA believes the CAA places a substantial burden on the applicant to provide a clear showing that NO_x reductions would be counterproductive overall, considering the net air quality benefits. Additional factors to determine net air quality benefit may include but are not limited to:

1. Effects associated with long-term exposures to plants, animals, and materials.

2. Visibility impairment, long-term and episodic acid deposition, air toxics, and deposition of nitrogen in nutrient-sensitive watersheds.

3.3 Geographic Scope

In contrast to the other section 182(f) tests, the net air quality benefit test is not specifically limited to an ozone nonattainment area or ozone transport region and may be directed at a specific set of sources. Thus, a very broad geographic area should be considered. The area may, in some cases, extend beyond an ozone nonattainment area or ozone transport region. In addition, the area must not be so small that downwind impacts from NO_x emissions are not fully considered. Sufficient area is needed to allow for completion and consideration of the various chemical transformations of NO_x and interaction with other pollutants. At a minimum, the geographic area should include the ozone nonattainment area(s) encompassing or nearby the sources concerned. For example, petitioning sources located in attainment portions of the ozone transport region should analyze their impact on nearby nonattainment areas and should consider other factors, such as visibility impacts throughout the surrounding area.

3.4 Scenarios

Section 182(f) states, for this test, that EPA must determine that the net air quality benefits are greater in "the absence of reductions of oxides of nitrogen from the sources concerned." The procedure for this test is to first project areawide baseline emissions that may be expected at the ozone attainment deadline (see sections 3.3 and 8.3). (As described in

section 8.2, multi-year analyses may also be conducted.) Second, the projected baseline emissions are held constant, except for the subject individual sources. Then, the air quality analyses are conducted for these two scenarios:

1. the projected baseline emissions without NO_x reductions from the sources concerned, and

2. the projected baseline emissions including NO_x reductions at all emission sources subject to the NO_x requirements.

With respect to new major sources, the two scenarios should take into account application of the section 182(f) NSR requirements as described in section 8.5.

3.5 Sources

For this net air quality benefit test, the CAA refers to "reductions of oxides of nitrogen from the sources concerned." For purposes of this analysis, "the sources concerned" are defined as the sources that would be exempted from NO_x requirements by the petition or State request. The sources concerned may be identified in any of the following ways: (1) specific individual sources, (2) one or more source categories, or (3) a geographic area containing a group of sources. As described in section 3.4, the sources concerned must be analyzed together with other sources in the area; these other NO_x sources should take into account application of any NO_x requirements (as part of the areawide baseline conditions expected at the attainment deadline year) which are not the subject of the exemption request.

CHAPTER 4

CONTRIBUTE TO ATTAINMENT

4.1 Demonstration

The "contribute to attainment" demonstration applies only to ozone nonattainment areas that are not within an ozone transport region. The demonstration must show that additional NO_x reductions would not contribute to ozone attainment in the area. The effects of substantial NO_x reductions on ozone concentrations should be quantified with currently available air quality modeling techniques consistent with EPA guidance (see chapter 7).

The procedure for this test is to use a photochemical grid model (see chapter 7) to estimate future ozone design values under conditions that may be expected within the attainment deadline period considering three emission reduction scenarios (see chapter 8): (1) substantial VOC reductions; (2) substantial NO_x reductions; and (3) both the VOC and NO_x reductions. If each predicted 8-hour ozone design value concentration under scenario (1) is less than or equal to that from scenarios (2) and (3), then the test is passed and the NO_x exemption request could be approved.

In certain ozone nonattainment areas, it is possible that NO_x emissions reductions may help to reduce ozone concentrations under some meteorological conditions but not under others. The phrase "would not contribute to attainment" could be interpreted to mean that NO_x emissions reductions would not help reduce (1) any areawide 8-hour ozone concentration, (2) the majority of areawide 8-hour ozone concentrations, or (3) the most severe areawide 8-hour ozone concentration. The EPA believes that the "majority" option is not appropriate since this is the only one of the section 182(f) tests which is not keyed to net benefits. Furthermore, (A) an area may need to demonstrate attainment under multiple meteorological conditions, (B) generally a small number of episodes will be modeled and (C) attainment of the NAAQS considers design values at each monitoring site in a nonattainment area, rather than a single location's, most severe 8-hour ozone concentration. For the above reasons, EPA believes this determination should show that NO_x emission reductions would not help reduce any 8-hr ozone predicted design value in the nonattainment area.

4.2 Geographic Scope

This demonstration focuses on attainment of the ozone NAAQS "in the area." The EPA interprets this to mean in the nonattainment area. In contrast to the provision for transport regions, which is likely to consider several attainment and

nonattainment areas in the section 182(f) analysis, this demonstration is limited to consideration of the effects in a single nonattainment area due to NO_x emissions reductions from sources in the same nonattainment area.

Where the demonstration includes photochemical grid modeling, EPA encourages States/petitioners to include consideration of the entire modeling domain since the effects of an attainment strategy may extend beyond the designated nonattainment area. States should consider such impacts since they are ultimately responsible for achieving attainment in all portions of their State and for ensuring that emissions originating in their State do not contribute significantly to nonattainment in, or interfere with maintenance by, any other State.

However, EPA believes NO_x exemptions under section 182(f) of the CAA and interstate transport of emissions under section 110(a)(2)(D) of the CAA must be considered independently. The EPA has separate authority under section 110(a)(2)(D) to require a State to reduce emissions from stationary and/or mobile sources where there is evidence showing that such emissions would contribute significantly to nonattainment or interfere with maintenance in other States. In some cases, then, EPA may grant an exemption from certain NO_x requirements and, in a separate action, require NO_x emission decreases under section 110(a)(2)(D).

4.3 Applicability to Areas Monitoring Attainment

In some cases, an ozone nonattainment area might attain the ozone standard, as demonstrated by 3 consecutive years of adequate monitoring data, without having implemented the section 182(f) NO_x provisions over that 3-year period. Where the NO_x requirements were not implemented over that 3-year period, it is clear that the section 182(f) language is met since "additional reductions of oxides of nitrogen would not contribute to attainment." That is, since attainment has already occurred, additional NO_x reductions could not improve the area's attainment status and, therefore, the NO_x exemption request could be approved.

The EPA's approval of the exemption, if warranted, would be granted on a contingent basis (i.e., the exemption would last for only as long as the area's monitoring data continue to demonstrate attainment). The State must continue to operate an appropriate air quality monitoring network, in accordance with 40 CFR part 58, to verify the attainment status of the area. The air quality data relied on for the above determinations must be consistent with 40 CFR part 58 requirements and other relevant EPA guidance. If it is subsequently determined by EPA that the area has violated the standard, EPA would conduct notice and

comment rulemaking to remove the NO_x exemption.

CHAPTER 5

NET OZONE AIR QUALITY BENEFIT

5.1 Demonstration

The "net ozone air quality benefit" demonstration applies in an Ozone Transport Region. It must show that additional reductions of NO_x would not produce net ozone benefits in the transport region. In this test, the net benefit must be demonstrated on a regionwide basis. The EPA believes this test should include all portions of an Ozone Transport Region in which impacts from NO_x emissions from the area seeking the exemption can be determined by the photochemical grid model.

The procedure for this test is to use a photochemical grid model (see chapter 7) to estimate future ozone design values under conditions that may be expected within the attainment deadline period considering three emission reduction scenarios (see chapter 8): (1) substantial VOC reductions; (2) substantial NO_x reductions; and (3) both the VOC and NO_x reductions. The net ozone benefit may be determined by comparing the ozone concentrations modeled in scenario (1) with results modeled from scenarios (2) and (3). The net ozone benefit should be based on a comparison of the net geographic area where 8-hour ozone concentrations change with and without NO_x reductions from the sources concerned. Alternatively, the net change in population exposure to ozone concentrations may be used. If the modeling shows a net disbenefit for ozone, EPA could approve the NO_x exemption request. As described in chapter 8, multi-year analyses may also be conducted.

5.2 Factors

The ozone NAAQS is set at 0.08 parts per million (ppm). In defining "net ozone benefit," however, EPA recognizes that various forms of expression could be considered with respect to ozone impacts. However, ozone concentrations with different averaging periods and values cannot readily be compared to each other. For example, it is difficult to compare a set of 1-hour ozone peak concentrations above 0.12 ppm against a set of 8-hour ozone peak concentrations above 0.08 and determine which results are more beneficial.

The EPA believes it is reasonable to focus the net ozone benefits test on the 8-hour 0.08 ppm ozone NAAQS, where possible for the following reasons: (1) the 0.08 ppm ozone NAAQS has been set by the Administrator as the level necessary to protect the most sensitive individuals from adverse health effects with an "adequate margin of safety;" (2) ozone concentrations with different averaging periods and values cannot readily be compared

to each other, and (3) the purpose of the NO_x requirements is primarily to attain the current ozone NAAQS. Therefore, the averaging time to be used should be the 8-hour daily maximum ozone concentration and the analysis should focus on values above the 0.08 ppm NAAQS level. Specifically, the net ozone benefits test should focus on the total geographic area or total population exposed to ozone concentrations above the 0.08 ppm NAAQS level.

The model results in some cases might show all scenarios to be below the 0.08 ppm ozone NAAQS level. In such cases, some might argue that there is no ozone benefit and, thus, the NO_x requirements should not apply. The EPA does not agree with such an interpretation because the CAA specifies "net ozone" rather than "ozone attainment" for this test. In such cases, the analysis should examine values just below the NAAQS level so that a comparison can be made.

5.3 Attainment/Unclassified Portions

The section 182(f)(1)(B) demonstration explicitly refers to nonattainment areas within an ozone transport region. The CAA does not clearly state whether or not portions of ozone transport regions that are attainment/unclassified can make the net ozone benefit demonstration. The section 182(f)(1) net air quality benefit test is available to any area; however, as noted previously it is a higher hurdle. Thus, while a severely polluted area might be able to demonstrate that NO_x reductions do not apply because the "net ozone benefits" test is satisfied, the CAA could be interpreted to require NO_x reductions in the surrounding attainment area because that area cannot meet the same test. It is unlikely that Congress intended such a result.

An alternative reading of the CAA can be found through section 184(b)(2). This provision states that the attainment/unclassified portions of the transport region must meet "the requirements which would be applicable to major stationary sources if the area were classified as a moderate nonattainment area." Thus, the CAA could be interpreted to provide the same section 182(f)(1)(B) demonstration process for these attainment/unclassified areas, since they should be treated as moderate nonattainment areas for the purpose of applying the section 182(f) requirements and moderate nonattainment areas in the transport region are eligible to meet the "net ozone benefits" test.

Even without that language, EPA would be inclined to allow an attainment/unclassified area in a transport region to satisfy the "net ozone benefits" test. It would be absurd and, therefore, it is unlikely that Congress intended to apply more stringent requirements in the attainment/unclassified portions of the transport region than would apply to the more polluted

portions. Congress apparently did not intend any lesser requirements to apply in the attainment/unclassified portions of the transport region. The EPA believes that it is appropriate to extend the section 182(f) provision beyond the boundaries of a nonattainment area into adjacent attainment/unclassified areas which are part of the same section 182(f) demonstration. Thus, where a State/petitioner demonstrates that NO_x reductions would not produce net ozone benefits in the transport region, then the section 182(f) NO_x requirements would not apply to those sources or areas as described in EPA's approval action. Such a demonstration must include all portions of the ozone transport region in which impacts from NO_x emissions from the area seeking the exemption can be determined by the photochemical grid model.

CHAPTER 6

EXCESS EMISSIONS REDUCTIONS

6.1 General

Section 182(f)(2) provides the flexibility to limit the scope of the NO_x requirements. Application of the NO_x requirements can be limited to the extent that any portion of those reductions are demonstrated to result in "excess reductions." The tests for demonstrating excess reductions are generally the same as in section 182(f)(1): net air quality benefit, contribute to attainment and net ozone benefit. However, in this case, the demonstration must show that a portion of the otherwise required NO_x reductions are either counterproductive to the net air quality, do not contribute to attainment, or do not provide a net ozone benefit [depending on the section 182(f) test applied].

As described below, for the "contribute to attainment" or "net ozone" tests, the excess reductions test must show that certain NO_x reductions are in excess of the reductions specified in either the 8-hour ozone attainment demonstration contained in the approved SIP or the 8-hour ozone attainment demonstration adopted by the State and submitted to EPA for approval. The excess emissions reductions may be described, for example, as (1) an areawide across-the-board tonnage reduction; (2) emissions attributed to specific sources; or (3) emissions from a geographic portion of the nonattainment or transport area.

6.2 Demonstration

The "contribute to attainment" and "net ozone benefit" tests described in chapters 4 and 5 require an areawide or regional analysis. In such areawide/regional analyses, NO_x emissions reductions at a large number of sources are considered. These analyses are appropriate to determine in a directional manner whether or not NO_x reductions are expected to be beneficial with respect to the air quality in the area/region. The analyses described in chapters 4 and 5 may be less precise than an attainment demonstration required under section 182(c).

The EPA believes that the excess reductions provision requires a more precise analysis; specifically an analysis which is based on the attainment demonstration. That is, the excess reductions provision must be more than a directional finding on an areawide basis. Under the excess reductions provision, an analysis is needed to show that a specific portion of the total areawide NO_x emissions is not beneficial under one of the three tests. Thus, individual or groups of sources may petition to

show that, while NO_x reductions may be beneficial directionally in the area, NO_x reductions from their specific sources are not beneficial and, thus, should be exempt from the NO_x requirements.

Without providing some constraints in this guidance document, the excess reductions provisions could undermine the section 182(f) requirements, since each individual emission source could theoretically petition for an exemption with the argument that their small contribution to the overall ozone problem is inconsequential. Such a petition might be considered consistent with the analyses required in chapters 4 and 5, since an exemption may be granted where the modeled NO_x reductions show no impact on ozone concentrations. Certainly, if EPA allowed very small amounts of NO_x reductions to be modeled individually, this interpretation could create a false impression that individually the sources do not affect attainment when, in fact, the aggregate of the sources does. Congress would not have intended, and therefore EPA does not accept the argument, that the owner/operator of one car or one small boiler can be excused from the CAA requirements because their emissions, viewed alone, are small. Considered together with other small contributions, the emissions may be important to attainment. That is, emissions from one car or one commercial boiler would not change the areawide ozone concentration, yet together with other cars or boilers, they may be critical to the area's attainment strategy. Furthermore, as described elsewhere in this document, ozone air quality models should not be applied solely to determine the incremental effect of small sources as such emissions could be lost in the noise of the air quality model and emissions inventory uncertainties when considered alone.

For the above reasons, EPA has determined that the excess reductions demonstration for the "contribute to attainment" or "net ozone benefits" tests must be tied to the area's SIP attainment demonstration. Thus, this test must show that the excess reductions are reductions in excess of those specified in the area's attainment demonstration and either contained in the approved SIP or as adopted by the State and submitted to EPA for approval. This tie to the attainment demonstration assures that an excess reductions petition would not arbitrarily be based on small emissions and would not undermine the State's control strategy.

In contrast, the "net air quality benefit" test discussed in chapter 3 is intended to address an individual or small number of sources and already has an adequate constraint. The net air quality benefit test requires a showing that NO_x reductions specifically from the sources concerned are counterproductive. The net air quality benefit test imposes a higher hurdle than the other two tests and EPA believes this higher hurdle is adequate for purposes of the excess emissions test as well.

CHAPTER 7

MODELING TECHNIQUES

7.1 Photochemical Grid Modeling

As described in chapters 3-6, photochemical grid modeling is generally needed to document cases where NO_x reductions are counterproductive to net air quality (chapter 3), do not contribute to attainment (chapter 4), do not show a net ozone benefit (chapter 5), or include excess reductions (chapter 6). The EPA's current modeling guideline is contained in 40 CFR part 51, appendix W. In addition, procedures for modeling ozone and PM are contained in EPA guidance posted on EPA's web site (http://www.epa.gov/ttn/scram/). The EPA has draft modeling guidance for use in attainment demonstrations for the ozone and $PM_{2.5}$ NAAQS.

It is important to note that EPA believes that photochemical grid models are not sufficient to assess incremental changes to areawide ozone concentrations from emissions reductions at a single or group of small sources. Emission changes should amount to some significant fraction of base emissions before modeling results can be interpreted with sufficient confidence that the results are not lost in the noise of the model and the input data. The EPA has reservations with respect to modeling NO_x reductions at a single source or group of sources unless the modeling includes at least 10 percent of the domain-wide emissions. Thus, this exemption analysis is appropriate for groups of large emitters or for consideration of entire source categories, rather than emissions reductions at a single or group of small sources. However, EPA will consider on a case-by-case basis an analysis that considers less than a 10 percent change in the domain-wide emissions. In such cases, the analysis of a small portion of the emissions would show only a small difference in ozone concentration, if any, between those with NO_x and without NO_x scenarios, and, therefore, consideration of secondary factors (described previously) is particularly important in order to show a net air quality benefit.

The EPA investigated the feasibility and acceptability of applying relatively inexpensive screening techniques to evaluate if NO_x control measures are likely to be beneficial with respect to attainment of the ozone NAAQS (Langstaff and Scheffe, 1991). However, EPA determined that, as a technical matter, photochemical grid modeling is the only reliable tool to justify an areawide exemption from the NO_x requirements. The EPA's reliance on photochemical grid models is supported by the findings of the NAS on tropospheric ozone (December 1991). The NAS report concluded that three-dimensional or grid-based ozone air quality models are the best available models for representing

the chemical and physical processes of ozone formation. Less sophisticated models, such as the Empirical Kinetic Modeling Analysis, lack the detailed treatment/consideration of physical orientation of NO_x sources and dispersion of their plumes. Further, since trajectory models only address a limited number of trajectories, they cannot assess whether NO_x control contributes to attainment at all locations in an ozone nonattainment area. Therefore, such models are insufficient and not acceptable for a NO_x exemption demonstration.

7.2 Regional Modeling

In an ozone transport region, the net ozone benefits test should be met by use of regional modeling. Regional modeling is needed since the section 182(f) language explicitly refers to net ozone benefits "in such region." For purposes of this document, regionwide or regional modeling includes all portions of the ozone transport region in which impacts from NO_x emissions from the area seeking the exemption can be determined by the photochemical grid model.

CHAPTER 8

EMISSIONS ANALYSIS

8.1 General

As described in chapters 3-6, photochemical grid modeling is generally needed to document cases where NO_x reductions are counterproductive to net air quality (chapter 3), do not contribute to attainment (chapter 4), do not show a net ozone benefit (chapter 5), or include excess reductions (chapter 6). Application of these models requires the use of a representative emissions inventory. The EPA's modeling guidance (referenced in chapter 7) includes discussion on how to develop appropriate emissions estimates for use in the selected air quality model. Topics include use of available inventory estimates, quality assurance, application of emissions models and estimating future emissions. This chapter describes additional emission inventory requirements for the various NO_x exemption demonstrations.

8.2 Years to Analyze

In general, the purpose of the NO_x requirements is related to attainment of the ozone standard. This suggests that a NO_x exemption demonstration should focus within the period ozone attainment is required (i.e., the 3-year period used to determine attainment). Further, many areas are likely to develop modeling analyses which demonstrate attainment within the attainment deadline period. In many cases, the emissions inventory, meteorological data, episode day selections, and control strategies which support the attainment demonstration could also be used to support a NO_x exemption analysis. As described in section 8.4, the NO_x exemption demonstration should be consistent with assumptions contained in the SIP. Considering these points, EPA believes that the NO_x exemption demonstrations should, at a minimum, reflect conditions expected within the 3-year period during which the subject area is required to attain the ozone standard.

Thus, base year emissions would be projected to the period reflecting the attainment deadline and would include growth in VOC and NO_x emissions as well as CAA-mandated emissions reductions. Specific emission scenarios with and without NO_x reductions would be built upon this projected emissions baseline as described elsewhere in this document. In addition, as described later in this chapter, multi-year analyses may also be conducted.

In an ozone transport region, a NO_x exemption demonstration would likely cover an area which includes ozone nonattainment areas of more than one classification, and thus more than one attainment deadline. For example, a metropolitan area may have a higher classification than a nearby rural nonattainment area. For these areas, it is possible that NO_x reductions may be beneficial to attainment in the near term with respect to the rural nonattainment area (and lesser classification deadline) but, at the same time or in a longer timeframe, NO_x reductions might be shown to be not beneficial when considering the area as a whole (since NO_x reductions are generally expected to be more beneficial in rural areas). In order to determine whether the NO_x reduction requirements should apply, EPA believes that, at a minimum, the NO_x exemption demonstration should reflect conditions expected at the latest attainment deadline period for the area as a whole.

Alternatively, the State/petitioner may include a multi-year analysis in its NO_x exemption demonstration. This is appropriate for areas demonstrating either a net air quality benefit or a net ozone benefit. In these demonstrations, the analysis may include periodic assessments of the effects of NO_x reductions and integrate those effects to arrive at a finding on whether or not NO_x reductions are beneficial. For example, an area may develop geographic area exposure analyses for each year or for every third year up to the attainment year and assess the overall impact of NO_x reductions from that information.

8.3 Scenarios to Compare

For the "contribute to attainment" and "net ozone benefit" tests, the projected emissions should, at a minimum, consider three scenarios which vary emissions reductions from anthropogenic sources: (1) substantial VOC reductions; (2) similar NO_x reductions; and (3) both the VOC and NO_x reductions. Total emissions to model include both anthropogenic and biogenic emissions.

In contrast to the net air quality benefit demonstration (chapter 3) which focuses on the scenario "in the absence of reductions of oxides of nitrogen from the sources concerned," the contribute to attainment and net ozone benefit demonstrations concern an unspecified "additional reductions" of NO_x. Thus, while the net air quality benefit test must focus on NO_x reductions specific to the exemption request, the other demonstrations may more broadly consider NO_x reductions, including reductions that employ advanced control technology (i.e., beyond RACT). The application of the VOC and NO_x reductions should be as source category specific as possible, rather than across-the-board, in order for the results to be most useful.

In the first scenario the demonstration should use the VOC reductions needed to attain, if available. Alternatively, if the attainment demonstration has not been completed, the demonstration may use some other substantial VOC reduction. Reductions associated with attainment are appropriate for the reasons described above. In any case, the VOC reductions should be substantial and documented as reasonable to expect for the area due to the CAA requirements. For example, a 40 percent anthropogenic VOC reduction areawide from the 2002 emission inventory may be reasonable to expect for serious areas, considering motor vehicle emission controls, I/M, reasonable further progress and other CAA requirements.

In the second scenario, NO_x reductions should be modeled without any VOC reductions above the attainment year baseline. The level of NO_x reductions should reflect the same percent reduction of anthropogenic VOC emissions in scenario (1) above. It is important to model this case since NO_x reductions, instead of additional VOC reductions, may show a clearer benefit.

In the third scenario, a similar level of NO_x reductions would be modeled along with the level of VOC reductions chosen. That is, if a 40 percent VOC reduction is chosen in scenario (1), then the model for scenario (3) would simulate a 40 percent VOC reduction and approximately a 40 percent NO_x reduction. It would be inappropriate to select a high level of VOC reductions and a low level of NO_x reductions since this could artificially favor a finding that NO_x reductions are not beneficial; the two levels should be similar.

8.4 Consistency with the SIP

Any NO_x exemption demonstration must include a showing that the exemption request uses assumptions that are consistent with requirements of the SIP and the CAA. It is possible that a petition could demonstrate that, under some circumstances, NO_x reductions are not needed to attain the ozone standard. However, unless the State actually adopts those particular circumstances into its SIP, there is no assurance that the petition's analysis is valid. That is, if the assumptions contained in the petitioner's demonstration are not valid, the conclusions are similarly not valid and EPA would not approve the petition. The NO_x exemption petition process should not undermine the State's implementation plan. The petition should reflect measures consistent with mandatory CAA requirements, federally-approved SIP requirements, and recent SIP revisions adopted by the State and submitted to EPA for approval. The EPA encourages petitioners to coordinate these analyses with the appropriate State(s) as they are being developed.

8.5 New Source Review

The section 182(f) exemption provisions center on the effect on ozone concentrations due to NO_x emissions reductions. With respect to RACT, which involves emissions reductions from existing sources, this is a perfect fit. In the case of new or modified sources, however, other factors should be considered. Even after the application of on-site controls appropriate for a major new or modified source, the source will, considered alone, result in major increases in NO_x emissions. However, the NSR offset provisions would require the new source to obtain emissions reductions from other sources so as to offset any emissions increase associated with the new source.

To take into account the full impact of the NSR program, the term "NO_x reductions" must be carefully interpreted. When considering the air quality impacts in chapters 3-6 of this document "with NO_x reductions" or with "substantial NO_x reductions," the analysis should reflect a zero emissions increase from stationary sources due to the NSR offset requirement; when considering the "without" NO_x reductions scenarios, the analysis should include NO_x emission increases due to new or modified stationary sources of NO_x, many of which would be subject to the best available control technology requirement through the prevention of significant deterioration program, but not to offsets.