Appendix A

Policy Memoranda

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Ozone and Carbon Monoxide Design Value Calculations

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

June 18, 1990

MEMORANDUM

SUBJECT: Ozone and Carbon Monoxide Design Value Calculations

FROM: William G. Laxton, Director
Technical Support Division (MD-14)

TO: See Below

In discussions related to the Clean Air Act legislation, design values for ozone and carbon monoxide are receiving particular attention. Previously, it sufficed to designate areas as either attainment or nonattainment but now areas will be further classified into different categories based upon the magnitude of the appropriate design value. This additional classification step places added emphasis on the need to accurately determine these design values. The classification will be done according to concentration cutpoints, and on a schedule, specified in the legislation.

Obviously, once this process is set in motion we will be working very closely with you to develop these design values. However, I thought it would be appropriate to reiterate our design value computation procedures in advance to help people anticipate the types of data review questions that may arise. The computation procedures stated here are consistent with our previous methods. There are differences between the procedures for ozone and carbon monoxide because the National Ambient Air Quality Standard (NAAQS) is structured in terms of expected exceedances while the carbon monoxide NAAQS uses the older "once per year" format. The most apparent difference is that the CO design values are based upon 2 years of data while design values for ozone use 3 years. Another difference is that the ozone NAAQS uses the daily maximum ozone value while the CO NAAQS considers running 8-hour averages so that, even though they must be non-overlapping, it is possible to have more than one CO exceedance per day. Because of these differences, it is convenient to discuss each pollutant separately. With respect to terminology, you may hear the CO design value approach referred to as "the highest of the second highs', while the ozone design value is frequently simplified as "the fourth high in 3 years."

One point to remember is that all locations within an area have to meet the standard (NAAQS). Therefore, when we do our evaluations, we look at each individual site to make sure that every site meets the standard. A separate design value is developed for each site that does not meet the NAAQS, and the highest of these design values is the design value for the area.

Carbon Monoxide

CO design values are discussed in terms of the 8-hour CO NAAQS, rather that the 1-hour NAAQS, because the 8-hour NAAQS is typically the standard of concern. However, a 1-hour design value would be computed in the same manner. For 8-hour CO, we simply look at the maximum and second maximum (non-overlapping) 8-hour values at a site for the most recent 2 years of data. These values may be readily found on an AIRS AMP450, "Quick Look", printout. Then we choose the highest of the second highs and use this as our design value for that site. We then look at all design values within an area and the highest of these serves as the design value for the area. Note that, for each site, individual years of CO data are considered separately to determine the second maximum for each year - CO data are not combined from different years. It is probably worth commenting on this. The CO NAAQS requires that not more than one 8-hour average per year can exceed 9 ppm (greater than or equal to 9.5 ppm to adjust for rounding). We evaluate attainment over a 2-year period. If an area has a design value greater that 9 ppm, it means there was a monitoring site where the second highest (non-overlapping) 8-hour average was greater that 9 ppm in at least 1 year. Therefore, there were at least two values above the standard during 1 year at that site and thus the standard was not met.

Hypothetical Case (two CO sites in an area)

		(8-Hour Averages) MAX	2nd High	
SITE 1	1987	14.6	8.9	
	1988	13.9	10.9	
				10.9 is the Design Value for Site 1

		(8-Hour Averages) MAX	2nd High	
SITE 2	1987	12.2	11.1	
	1988	10.8	10.4	
				11.1 is the Design Value for Site 2

11.1 ppm would be the design value for the area.

Ozone

The form of the ozone NAAQS requires the use of a 3-year period to determine the average number of exceedances per year. In its simplest form, the ozone standard requires that the average number of exceedances over a 3-year period, cannot be greater than 1.0. An area with four exceedances during a 3-year period, therefore, does not meet the ozone standard because four exceedances in 3 years averages out to more than once per year. Now, if the fourth highest value was equal to the level of the ozone standard, i.e. 0.12 ppm, then the area would have no more than three exceedances during the 3-year period and the average number of exceedances per year would not be greater 3

than one. This assumes no missing data and is how the fourth high value in 3-years came to be used as the design value. Actually, an adjustment is specified in the ozone NAAQS to account for missing data in determining the expected exceedances for ozone. Because of considerations associated with control strategy modeling, the following basic approach for ozone design values has been in use since 1981. If there are 3 complete years of ozone data, then the fourth highest daily maximum during the 3-year period is the data, then the fourth highest daily maximum during the 3-year period is the design value for that site. If only 2 complete years of data are available, then the third highest is used and, if only one complete year is available, then the second highest is used. In this approach, a year of ozone data is considered complete if valid daily maximums are available for at least 75 percent of the ozone season. Note that because of the form of the ozone NAAQS, data are combined over multiple years but they are not

combined from different sites.

Hypothetical Case (two O3 sites in an area, each year at least 75% complete)

		FOUR HIGHEST DAILY MAXIMUM VALUES			
		Max	2nd Hi	3rd Hi	4th Hi
SITE 1	1986	.127	.123	.122	.110
	1987	.129	.124	.121	.116
	1988	.142	.136	.134	.115

The design value for Site 1 is 0.129 ppm, the fourth highest daily maximum value during the three year period.

		FOUR HIGHEST DAILY MAXIMUM VALUES			
		Max	2nd Hi	3rd Hi	4th Hi
SITE 2	1986	.110	.100	.095	.090
	1987	.110	.100	.095	.090
	1988	.180	.175	.160	.110

The design value for Site 2 is 0.110, the fourth highest value during the three year period.

0.129 ppm would be the design value for the area.

There are a few additional comments warranted on the ozone example. First, note that data from each site was treated independently in computing the design value for that site. Assuming no missing data, the second site would meet the ozone NAAQS but the area would not because the other site shows that the NAAQS is not being met. Also, it should be noted that the high

values for a year are considered even if the data for that year did not satisfy the 75 percent data completeness criterion. For example, if a site had 2 years of data that met the 75 percent data completeness requirement and 1 year that did not, then the third highest value during the 3-year period would be the design value because there were only 2 complete years of data but the data from all 3 years would be considered when determining the third highest value. This ensures that valid high ozone measurements in a particular year are not ignored simply because other data in that year were missing. When computing data completeness, the number of valid days can be increased to include days that may be assumed to be less than the standard level as stated in the ozone NAAQS. Also, for new sites that have just come on line, the 75 percent data completeness requirement for the start-up year may be applied beginning with the first day of actual monitoring as long as the data set is at least 75 percent complete for June through August.

A final practical complication that must be addressed in determining ozone design values is the case where a site reports data but has no year that meets the 75 percent data completeness requirement. Admittedly, this is an unusual situation but, for the sake of completeness, it needs to be addressed. At the same time, however, the reason for this consistent data completeness problem should be examined because ozone monitoring data completeness is typically greater that 90 percent. In general, if a site has no complete years of data and fewer than 90 days of data during the 3-year period, the design value will be determined on a case by case basis. In such cases, the data base is so sparse that it would be extremely difficult to describe general rules that would apply and a careful evaluation would have to be made to determine why this situation occurred and what is the most appropriate way to use the data. For a site without a single complete year of data but at least 90 days of

data during the 3-year period, the following steps are followed in determining the ozone design value:

1. Divide the number of valid daily maximums during the 3-year period by the required number of monitoring days per year. As noted earlier, the number of valid days can be increased by including the number of days that may be assumed to be less than the standard level as specified in the ozone NAAQS.

2. Add 1.0 to the above total and then use the integer portion of the result as the rank of the design value.

These steps are not as complicated as they may initially appear. For example, suppose a site with a required ozone monitoring season of 214 days each year reports 0, 121, and 130 valid days of ozone data during the 3-year period. Step 1 would give (0+121+130)/214=1.17. In step 2, 1.0 is added to this total giving 2.17. The integer portion of 2.17 is 2 and so the design value is the second highest value during the three year period. Again, this type of situation should not occur that often and the reasons for the data completeness problems should be identified.

When discussing data completeness for ozone, it is important to recognize that monitoring sites are occasionally discontinued for valid

practical reasons. In such cases, if data are available from another site that is representative of the same situation, then data from the discontinued site may be superceded by data from the other site. The intent is to ensure that a single year of data from a monitor that was discontinued 2 years ago, does not dictate the design value if data are available from another, equally representative, site. This is not intended to eliminate the missing data penalty when a site is discontinued and there is no data available from a similar monitor.

I have not discussed certain basic data handling conventions, such as computing 8-hour CO averages with missing data, determining the non-overlapping second maximum 8-hour average, or the definition of a valid daily maximum 1-hour ozone daily maximum. All of these conventions have been in place since the 1970's and are routinely incorporated into AIRS outputs so I have not bothered to discuss these points.

Addressees:
Director, Environmental Services Division, Regions I-VIII, X
Director, Office of Policy and Management, Region IX
Director, Air Management Division, Region III
Director, Air and Waste Management Division, Region II
Director, Air, Pesticides and Toxics Management Division, Regions I and IV
Director, Air and Radiation Division, Region V
Director, Air, Pesticides and Toxics Division, Region VI
Director, Air and Toxics Division, Regions VII, VIII, IX, and X

cc: J. Calcagni (MD-15)
R. Campbell (MD-10)
T. Curran (MD-14)
D. DeVoe (ANR-443)
J. Farmer (MD-13)
T. Helms (MD-15)
W. Hunt (MD-14)
S. Meiburg (MD-11)
R. Ossias (LE-132A)

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Note to reader:

This copy of the Laxton memo is a retyped version of the original. As a result, the page breaks had to be forced after the last word on each page on the original document.

STATE OF NORTH CAROLINA
OFFICE OF THE GOVERNOR
RALEIGH 27603-8001

JAMES G. MARTIN
GOVERNOR

March 15, 1991

Mr. Greer C. Tidwell
Regional Administrator
U. S. Environmental Protection Agency
Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Dear Mr. Tidwell:

In response to your letter of February 5, 1991, inviting North Carolina to provide designations of ozone and carbon monoxide nonattainment areas, the State of North Carolina chooses to make the following designations.

North Carolina proposes carbon monoxide nonattainment areas as follows:

1) Within the Greensboro/Winston-Salem/High Point Metropolitan Statistical Area (MSA) we propose Forsyth County. The level of nonattainment is classified as moderate.

2) Within the Raleigh/Durham MSA we propose Wake and Durham counties. The level of nonattainment is classified as moderate.

3) Mecklenburg County continues to be classified as a nonattainment area by previous designation. We expect an attainment demonstration to be submitted soon after EPA issues new guidance.

4) All other areas of the State are considered to be in attainment of the standard for carbon monoxide.

North Carolina proposes ozone nonattainment areas as follows:

1) We propose the following counties in the North Carolina portion of the Charlotte/Gastonia/Rock Hill MSA with a classification of moderate: Gaston and Mecklenburg.

2) We propose the following counties in the Greensboro/ Winston-Salem/High Point MSA with a classification of moderate: Davidson, Forsyth and Guilford.

3) We propose the following counties in the Raleigh/Durham MSA with a classification of moderate: Durham and Wake.

4) All other areas of the State are considered to be in attainment of the standard for ozone.

In addition to these nonattainment counties, North Carolina proposes to expand its inspection and maintenance program for vehicles into four more counties - Cabarrus, Union, Randolph, and Orange. This will further reduce emissions which contribute to ozone formation because of the large number of commuters from these counties to the seven proposed for nonattainment designation.

Attached is a report from the Division of Environmental Management, Air Quality Section, which explains how these areas were evaluated.

We have submitted, or have in the hearing process and expect to submit before May 15, 1991, all corrections of RACT deficiencies noted in the May 26, 1988, and November 8, 1989, letters.

We have implemented the December 27, 1988, inspection/ maintenance corrective action plan, including use of tampered undercover vehicles and the imminent use of BAR-90 analyzers. When new EPA policy requirements for inspection/maintenance programs are issued, we expect to adjust our program as appropriate.

The implementation costs of the Clean Air Act Amendments will be substantial, but we are moving to secure the necessary funding and staff. Thank you for the opportunity to make these designations as an early step in meeting the Clean Air Act requirements.

Sincerely,

James G. Martin

James G. Martin

JGM/WWCjr.

Attachments

cc: William W. Cobey, Jr.
George T. Everett
Lee A. Daniel

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

October 6, 1995

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Limited Maintenance Plan Option for Nonclassifiable CO Nonattainment Areas

FROM: Joseph W. Paisie, Group Leader
Integrated Policy and Strategies Group (MD-15)

TO: Air Branch Chiefs, Regions I-X

On November 16, 1994, EPA issued guidance regarding a limited maintenance plan option for nonclassifiable ozone nonattainment areas in a memorandum from Sally L. Shaver, Director, Air Quality Strategies and Standards Division, to Regional Air Division Directors. EPA believes that such an option is also appropriate for nonclassifiable CO nonattainment areas and the following questions and answers set forth EPA's guidance regarding the availability of this option for such areas. As this is guidance, final and binding determinations regarding the eligibility of areas for the limited maintenance plan option will only be made in the context of notice and comment rulemaking actions regarding specific redesignation requests.

If there are any questions concerning the limited maintenance plan option for nonclassifiable CO areas, please contact me at (919) 541-5556 or Larry Wallace at (919) 541-0906.

Attachment

cc: E. Cummings, OMS
K. McLean, OGC
C. Oldham
L. Wallace

Received: OCT 16 1995
in the Air Quality Branch

10/6/95

Limited Maintenance Plan Option for Nonclassifiable CO Nonattainment areas

1. **Question:**

What requirements must CO nonclassifiable areas, which are attaining the CO NAAQS with a design value that is significantly below the NAAQS, meet in order to have an approvable maintenance plan under section 175A of the Act?

Answer:

Nonclassifiable CO nonattainment areas seeking redesignation to attainment whose design values are at or below 7.65ppm (85 percent of exceedance levels of the CO NAAQS) at the time of redesignation may choose to submit a less rigorous maintenance plan than was formerly required. This new option is being termed a limited maintenance plan. Nonclassifiable CO areas with design values greater than 7.65ppm will continue to be subject to full maintenance plan requirements described in the September 4, 1992 memorandum, "Procedures for Processing Requests to Redesignate Areas to Attainment," from John Calcagni, former Director of the OAQPS Air Quality Management Division to the Regional Air Division Directors.

The EPA now believes that it is justifiable and appropriate to apply a different set of maintenance plan requirements to a nonclassifiable CO nonattainment areas whose monitored air quality is equal to or less than 85 percent of exceedance levels of the ozone NAAQS. The EPA does not believe that the full maintenance plan requirements need be applied to these areas because they have achieved air quality levels well below the standard without the application of control measures required by the Act for moderate and serious nonattainment areas. Also, these areas do not have either a recent history of monitored violation of the CO NAAQS or a long prior history of monitored air quality problems. The EPA believes that the continued applicability of prevention of significant deterioration (PSD) requirements, any control measures already in the SIP, and Federal measures (such as the Federal motor vehicle control program) should provide adequate assurance of maintenance for these areas.

2. **Question:**

Besides having a design value that is equal to or less than 85% of the CO NAAQS what other requirements are necessary for a nonclassifiable CO nonattainment area to qualify for the limited maintenance plan option?

Answer:

To qualify for the limited maintenance plan option, the CO design value for the area, based on the 8 consecutive quarters (2 years of data) used to demonstrate attainment, must be at or below 7.65ppm (85 percent of exceedance levels of the ozone NAAQS). Additionally, the design value for the area must continue to be at or below 7.65ppm until the time of final EPA action on the redesignation. The method for calculating design values is presented in the June 18, 1990 memorandum, "Ozone and Carbon Monoxide Design Value Calculations," from William G. Laxton, former Director of the OAQPS Technical Support Division to Regional Air Directors. The memorandum focuses primarily on determining design values for nonattainment areas in order to classify the areas as moderate or serious for CO. Therefore, the document discusses determining the design value for an area based on the monitors which are exceeding the standard. In the case of a nonattainment area seeking redesignation to attainment, all monitors must be meeting the standard. To assess whether a nonclassifiable area meets the applicability cutoff for the limited maintenance plan, a separate design value must be developed for every monitoring site. The highest of these design values is the design value for the whole area. If the area design value is at or below 7.65ppm, the State may select the limited maintenance plan option for the first 10-year maintenance period under section 175A. If the design value for the area exceeds 7.65ppm prior to final EPA action on the redesignation, the area no longer qualifies for the limited maintenance plan and must instead submit a full maintenance plan, as indicated in the September 4, 1992 memorandum.

3. **Question:**

What elements must be contained in a section 175A maintenance plan for nonclassifiable CO areas which qualify for the limited maintenance plan option?

Answer:

Following is a list of core provisions which should be included in the limited maintenance plan for CO nonclassifiable areas. Any final EPA determination regarding the adequacy of a limited maintenance plan will be made following review of the plan submittal in light of the particular circumstances facing the area proposed for redesignation and based on all relevant available information.

a. Attainment Inventory

The State should develop an attainment emissions inventory to identify a level of emissions in the area which is sufficient to attain the NAAQS. This inventory should be consistent with EPA's most recent guidance[1] on emissions inventories for nonattainment areas available at the time and should represent emissions during the time period associated with the monitoring data showing attainment. The inventory should be based on actual "typical winter day" emissions of CO.

b. Maintenance Demonstration

The maintenance demonstration requirement is considered to be satisfied for nonclassifiable areas if the monitoring data show that the area is meeting the air quality criteria for limited maintenance areas (7.65ppm or 85% of the CO NAAQS). There is no requirement to project emissions over the maintenance period. The EPA believes if the area begins the maintenance period at or below 85 percent of exceedance levels, the air quality along with the continued applicability of PSD requirements, any control measures already in the SIP, and Federal measures, should provide adequate assurance of maintenance over the initial 10-year

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[1]The EPA's current guidance on the preparation of emissions inventories for ozone areas is contained in the following documents: "Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone: Volume I" (EPA-450/4-91-016), "Emission Inventory Requirements for Ozone State Implementation Plans" (EPA-450/4-91-010), and "Procedures for Emission Inventory Preparation: Volume IV, Mobile Sources" (EPA-450/4-81-026d).

maintenance period.

When EPA approves a limited maintenance plan, EPA is concluding that an emissions budget may be treated as essentially not constraining for the length of the maintenance period because it is unreasonable to expect that such an area will experience so much growth in that period that a violation of the CO NAAQS would result.

c. Monitoring Network/Verification of Continued Attainment

To verify the attainment status of the area over the maintenance period, the maintenance plan should contain provisions for continued operation of an appropriate, EPA-approved air quality monitoring network, in accordance with 40 CFR part 58. This is particularly important for areas using a limited maintenance plan because there will be no cap on emissions.

d. Contingency Plan

Section 175A of the Act requires that a maintenance plan include contingency provisions, as necessary, to promptly correct any violation of the NAAQS that occurs after redesignation of the area. These contingency measures do not have to be fully adopted at the time of redesignation. However, the contingency plan is considered to be an enforceable part of the SIP and should ensure that the contingency measures are adopted expeditiously once they are triggered by a specified event. The contingency plan should identify the measures to be promptly adopted and provide a schedule and procedure for adoption and implementation of the measures. The State should also identify specific indicators, or triggers, which will be used to determine when the contingency measures need to be implemented. While a violation of the NAAQS is an acceptable trigger, States may wish to choose a pre-violation action level as a trigger, such as an exceedance of the NAAQS. By taking early action, a State may be able to prevent any actual violation of the NAAQS and, therefore, eliminate any need on the part of EPA to redesignate an area back to nonattainment.

e. Conformity Determinations Under Limited Maintenance Plans

The transportation conformity rule (58 FR 62188; November 24, 1993) and the general conformity rule (58 FR 63214; November 30, 1993) apply to nonattainment areas and maintenance areas operating under maintenance plans. Under either rule, one means of demonstrating conformity of Federal actions is to indicate that expected emissions from

planned actions are consistent with the emissions budget for the area. Emissions budgets in limited maintenance plan areas may be treated as essentially not constraining for the length of the initial maintenance period because it is unreasonable to expect that such an area will experience so much growth in that period that a violation of the CO NAAQS would result. In other words, EPA would be concluding that emissions need not be capped for the maintenance period. Therefore, in areas with approved limited maintenance plans, Federal actions requiring conformity determinations under the transportation conformity rule could be considered to satisfy the "budget test" required in sections 93.118, 93.119, and 93.120 of the rule. Similarly, in these areas, Federal actions subject to the general conformity rule could be considered to satisfy the "budget test" specified in section 93.158(a)(5)(i)(A) of the rule.