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Category: 45 — Criteria for Plan Revisions for Nonattainment Areas

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

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SUBJECT: Determination of Reductions Necessary to Attain the Ozone Standard

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TO: Director, Air and Hazardous Materials Division, Regions I-X

The promulgation of the new standard for ozone has modified a number of the assumptions used in determining the necessary reductions to achieve the ozone standard. If States are revising their plans for the .12 ppm standard, the analysis should be consistent with the enclosed, revised guideline. This memorandum updates and supersedes my memorandum of August 16, 1978, entitled, "Clarification of Attainment/ Nonattainment Evaluation Guidance." States submitting plans based on the .08 ppm standard can use the assumptions in the August 16, 1978, version.

Please distribute this to all appropriate State and local agencies in your Region. If you have any questions regarding this memorandum, please contact John Calcagni at FTS 629-5365.

Enclosure

cc: Chief, Air Branch, Regions I-X
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Enclosure

DETERMINATION OF NECESSARY REDUCTION TO ATTAIN THE OZONE STANDARD

I. SELECTION OF DESIGN VALUE

Generally, the ozone design value should be developed in accordance with the "Guideline for Interpretation of Ozone Air Quality Standards" (EPA-450/4-79-003, OAQPS 1.2-108), January 1979. Several special cases are addressed below:

A. In the case where a major hydrocarbon control program has been initiated and has resulted in significant actual emission reductions in the 1975-1977 time period. In this case, the latest maximum value can be used. However, the burden of proof is on the State to demonstrate that significant actual emission reductions have occurred due to the implementation (not simply the adoption) of a control program and that the air quality improvements are consistent with, and can be attributed to, the emission reductions. Generally, the emission reduction should be equal or greater than the air quality improvement. It is not appropriate to use the latest year's data rather than the last three years if there has not been a commensurate reduction in emissions. (For example, a 10 percent difference in air quality levels cannot be attributed to a 3 percent reduction in actual emissions.)

B. In certain situations where transport influences the design value to a point that the design value is not the worst case. This case is described in greater detail in Item V.

C. In cases where less than three years of data exist. In that case, EPA will accept a design value based on the available years of data.

D. In cases where the representativeness of the data set is questionable. An input data set which is 75 percent complete for the peak ozone season should be considered representative for that year. In cases where the input data set is less than 50 percent complete during the peak ozone season or, during the monitoring period in the case of a special study, then the data should be considered inadequate. Care should be used in evaluating data sets that fall between these two limits to assure representativeness. Data determined to be unrepresentative should be used only as a last resort when no other data exist and should not be included in the routine statistical analysis with other years. Care should be taken in the treatment of data to assure that the number of valid data points (after adjusting for seasonal monitoring) from each year do not vary by more than 20 percent. If they do, the conditional probability technique discussed in Section 3.3(4), page 26 of the guideline must be applied to guard against the excessive weighting of any one year's data.

Regardless of the technique applied, the chosen design value must meet the quick test for design values test discussed in Section 3.4, page 28 of the guideline. Unless adequately substantiated, the design values not meeting this quick test will not be considered valid.

II. SELECTION OF A PRESENT TRANSPORT VALUE

The procedure set forth in the Workbook for Nonattainment Planning based on an upwind monitor is by far the most desirable technique for selection of a transport value. This procedure is to use upwind data collected on the day of the design value. The most desirable surface data to use are data collected shortly after the breakup of the nocturnal inversion. Review of the ambient data from primarily rural areas suggests that the 10-12 a.m. LST average value is appropriate. Alternatively, a more precise fixed time of nocturnal inversion breakup can be determined with the assistance of a meteorologist by reviewing specific local parameters such as time of sunrise, ambient air quality data, vertical temperature profiles, and surface temperature.

In the absence of upwind air quality data, two less satisfactory alternatives are available.

The first alternative is to assume that both future and present transport are equal to background (.04 ppm). This is most appropriate in circumstances where the urbanized area is isolated and not likely to be subject to significant transport from other urban areas, but acceptable for any urban area where transport is not an obvious major influence.

In circumstances where transport obviously is a major factor, the recommended alternative approach is to consider O3 data collected at rural sites shortly after breakup of a nocturnal inversion (e.g., 10-12 LST) on the highest O3 day in the city under review. At least five days should be considered. A range for the rural values is thus determined. The median value of this range should be considered the present transport value. This helps safeguard against the selection of an unrepresentative value. For example, if rural data suggests transport values ranging from 0.06-0.10 ppm (0.06, 0.07, 0.08, 0.09, 0.10 ppm), a present transport value of 0.08 ppm would be assumed.

For evaluations made for the .12 ppm ozone standard, the alternative of ignoring both present and future transport considerations is no longer acceptable unless the net impact on control requirements is relatively insignificant. Concurrent with the adoption of the new ozone standard, 40 CFR 51.14©) has been amended by the addition of paragraph (8) which states: "In developing an ozone control strategy for a particular area, background ozone and ozone transported into an area must be considered. States may assume that the standard will be attained in the upwind area."

III. SELECTION OF A FUTURE TRANSPORT VALUE

The generally acceptable range for future transport is .12-.04 ppm (somewhere between attainment of the standard by the upwind urban area and background). Isolated urbanized areas (at a distance greater than 36 hours travel time of an air parcel) whose air quality levels are not influenced by air masses which have passed over major urban areas, should use .04 ppm. The selection of a value within this range will be a subjective judgment on the part of the State with concurrence by the Regional Office with the isolation of the city in question as the key criterion.

However, the choice of a future transport value must be logically consistent with the determination made for the present transport value. It is inappropriate to assume a major contribution from transport presently and very low transport levels in the future. Any reduction in the future transport value from the present transport value must be attributable to an anticipated control program in another upwind urban area. Generally, assumptions for the future transport value should not be less than 60 percent of the present transport value. The only possible exception to this is in those few circumstances where present transport is so large that a 40 percent reduction is insufficient to reduce future transport to the ozone standard of .12 ppm. In these cases the States may assume that the standard will be attained in the upwind area. However, this situation will be quite unusual and should be adequately documented.

IV. CHOICE OF AN ADDITIVITY FACTOR

A presumptive value of .45 (.5 to one significant figure) should be assumed unless documentation can be presented supporting the use of a different value.

Documentation supporting the use of another value could be based on guidance contained in EPA-450/2-77-021b or, better yet, through simulations with OZIPP (a computerized, city specific version of EKMA EPA-600/8-78-014a) using locally applicable data. However, if the capability for running OZIPP exists, consideration of transport can be made more satisfactorily using OZIPP than by using the additivity concept.

Because simulations to date suggest that additivity may increase as precursor concentrations decrease and/or as NMHC/NOx ratios decrease, it is inappropriate to assume an additivity value in future years less than the currently assumed one.

V. CONSIDERATION OF A NUMBER OF HIGH DAYS

A consideration in establishing the baseline air quality is the desire to identify and base the plan on the ambient conditions which will result in attainment of the standard under all circumstances. In areas influenced significantly by transport it may well be that the day requiring the greatest percent reduction will differ from the statistically predicted design value. For example, if the design value were .24 ppm and transport on that day were 0.16 ppm local control requirements would be less stringent than a design day of 0.20 ppm with a transport value of 0.06 ppm.

If an urban area intends to demonstrate attainment by 1982, then it will be necessary to review a sufficient number of the high ozone days to ensure that the proposed plan provides for a sufficient level of control to ensure attainment. Note that this analysis will be only necessary in cases where upwind data which are specific for each day are used in development of a transport value.

If an urban area is seeking an extension to 1987 based on an evaluation of the design value determined in accordance with Section I the Region has the

option to accept this demonstration. It will not be necessary at this time to insist on the evaluation of a number of high days to determine if the higher percent reduction is necessary since the plan is subject to revision in 1982.

VI. APPROVABLE MODELING TECHNIQUES

Concurrent with the modification of the ozone standard, EPA revised 40 CFR Part 51 to rescind Appendix J and replace it with four analytical techniques: (1) photochemical dispersion models (2) empirical kinetics modeling approach (EKMA), (3) empirical and statistical models, and (4) proportional rollback. States must use one of the four techniques to determine the amount of hydrocarbon reductions necessary to demonstrate attainment of the national ozone standard.

VII. APPROPRIATE NMHC/NOx RATIOS

If no data exist, the default value of 9.5:1 should be applied when employing EKMA. If an area intends to develop a city specific value, the guidance contained in EPA-450/2-77-021b pp 3-21 through 3-24 should be carefully followed. There is a good deal of concern with the use of a single day's NMHC data at a single site being used. This is especially true if the NMHC values are less than 0.5 ppm C. Regions should carefully review these data prior to accepting a city specific NMHC/NOx ratio different than 9.5:1. Given the past lack of emphasis on monitoring of NOx and non-methane hydrocarbons, careful attention should be paid to the representativeness of this data. In particular, Regions should carefully evaluate siting and quality assurance procedures before accepting a locally derived NMHC/NOx ratio. It is especially important to review high NOx data used in the derivation of this ratio since acceptance of the data may imply the possibility of NO2 nonattainment or maintenance problems.

For estimates of future conditions, unless it can be clearly demonstrated to the contrary, or unless major reductions are necessary to attain standards, States should presume that the change in NOx concentrations are not likely to be significant. Therefore, it will be appropriate to assume a constant NOx concentration (i.e., lower future NMHC/NOx ratio).

VIII. SELECTION Of THE URBANIZED AREA

The urbanized area should generally conform to the boundaries defined by the U.S. Bureau of Census although States, with Regional Office concurrence, do have a certain degree of flexibility in defining the specific boundaries of the urban area. However, the areas must be large enough to cover the entire urbanized area and adjacent fringe areas of development. In situations where urbanized areas are contiguous or in close proximity, States should be encouraged to consolidate the urban areas for the purpose of attainment/nonattainment demonstration. In no case should an urbanized area be divided into smaller subunits, even if the urbanized area straddles more than one State.