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

MEMORANDUM

DATE: May 3, 1985

SUBJECT: NSR Advisory Memorandum #1:
TSP PSD Increment Consumption in North Carolina

FROM: Gary McCutchen, Senior Engineer
New Source Review Section, SIB, CPDD (MD-15)

TO: Mike Trutna, Chief
New Source Review Section

In response to an October 29, 1984, request from Archie Lee, Region IV, to you regarding whether a change in the North Carolina State implementation plan consumes increment, I have reviewed a September 20, 1984, letter from - Bill Johnson, Chief, Air Quality Section, North Carolina Division of Environmental Management, as well a paper by Robert Wooten and a December 21, 1984, Federal Register notice dealing with this SIP change.

The position taken by North Carolina appears to be this:

(1) Operators of several power plant boilers have indicated that they are unable to meet the State's original particulate mass emission limits (ranging from 0.10 to 0.14 pounds per million Btu).

(2) In June 1979, the State granted a 3-year variance, setting interim limits of 0.20 to 0.25 pounds per million Btu, with the requirement that the utilities conduct a series of stack tests which would provide data for setting permanent limits.

(3) The State proposes permanent limits of 0.10 to 0.25 pounds per million Btu, which are generally lower than the variance limits but higher than the original limits.

(4) The State alleges that PSD increment is not consumed by these new permanent limits because there has been no change in actual particulate matter emissions from these units. North Carolina based this statement on the following reasons:

(a) The general equipment design is the same as when originally installed or improved.

(b) The companies have good incentive to maintain their equipment and operate it properly because of a mass - opacity correlation used to find a 365 - day emission total to compare to an annual limit. (Note: EPA proposed

no action on the annual limits in the December 21, 1984, Federal Register because such limits do not protect short-term increment.)

(c) The coal burned before and during the variance is of similar quality and its quality can be monitored at will.

(d) The new limits are set at levels appropriate to what the control equipment can meet on a continuous compliance basis if properly operated and maintained.

North Carolina submitted the Wooten paper to support that there has been (and would be) no increase in actual emissions from these utilities as a result of the new limits.

It is EPA's position that a PSD increment-consuming emissions increase would result from the new emissions limits and that the acceptability of this increment consumption must be determined before the new limits could be approved. This position is presented in the attached February 25, 1985, memorandum from Bozof and Schneeberg to Archie Lee.

There are several additional issues raised by the State's proposal. First, the State evidently concludes that these utilities cannot meet the original limits. However, as Wooten points out on page 12 of his paper (although in a negative tone), these units at one time emitted at rates low enough to provide support for an NSPS of 0.03 pounds per million Btu. There is no evidence given in the Wooten paper that any effort was made to improve operation or maintenance of the control equipment to attempt to at least meet the original emissions limits, much less the NSPS levels. Acceptance of the current control levels should not have occurred without a careful and detailed study of the reasons for the decrease in efficiency, particularly the possibility of improved maintenance.

Second, the concept of continuous (opacity) versus intermittent (stack test) compliance is a good one, but much more extensive attempts than North Carolina's have failed to find a workable mass-to-opacity correlation. The State has not indicated in the Wooten paper:

(1) What the continuous opacity limit would be,

(2) How this opacity limit would differ from the usual opacity limits placed on boilers,

(3) How it would protect the short-term increments, since it appears to be intended for use with the State's annual emissions limits,

(4) How the opacity limits were derived from the mass emissions limits.

Third, the Wooten paper presents a lengthy statistical approach for determining the new emissions limits, but what it boils down to is to take all of the test data (including results which exceeded even the variance) and add a safety factor to contain a limit that none of the units would exceed, then call this the new limit. At best, this is an odd approach to standard setting.

Finally, the State contends that actual emissions would not increase because:

(1) The control equipment is the same. Operators, of course, could do many things that would decrease the control equipment effectiveness, including turning the equipment off.

(2) Day-to-day compliance would be encouraged by the opacity limits. Since there are usually opacity limits on boilers anyway, this argument doesn't seem appropriate. In addition, the opacity limits referred to are for an annual limit rather than the short-term limits.

(3) The coal burned is (and presumably will be) of similar quality. First, the Wooten paper compares a factor alpha, which is pounds sulfur per million Btu divided by the percent ash. According to the paper, a higher alpha should improve precipitator performance, all else being equal. Wooten concludes that there has been "little practical change" in alpha over the years; I disagree. Roxboro's alpha decreased over 25 percent, from 0.072 to 0.053. The H. F. Zee alpha increased 30 percent from 0.059 to 0.077. Changes in alpha have, therefore, occurred. In addition, the State indicates that it can monitor coal quality at will, but implies that it is not doing so. Therefore, coal quality could change (and has changed) greatly.

(4) The new emissions limits are more appropriate to what the control equipment can meet on a continuous compliance basis. I can understand why this is considered a reason for believing that actual emissions rates have not increased, at least when comparing emissions under the new limits to emissions under the variance, but this has little to do with whether increment is consumed if allowable, rather than actual, emissions limits are used for PSD increment consumption calculations. Of course, as stated earlier, there is nothing in the Wooten paper which supports the underlying assumption that the test data presented by the State represent the best control that can be achieved by the units tested.

Despite the above-mentioned quirks in the State's submission, EPA has elected to accept the SIP revision providing North Carolina conducts an increment consumption demonstration in accordance with the February 25 Bozof/Schneeberg memo. However, telephone conversations with Roger Pfaff, Region IV, on April 1, 1985, and Lee Daniel, North Carolina, on April 2, indicated that there were still some issues on this. A meeting with Roger and Ken Woodard was scheduled for April 9, 1985, to resolve the issues.

At the April 9 meeting, three issues were identified and resolved:

(1) Annual Average Increment Consumption. In calculating "future" (post-SIP revision) emissions, should actual or allowable capacity and operating hour values be used? Since these are existing sources with data on operating hours and capacity utilization (btu per hour) and since there are no changes or modifications contemplated by this SIP revision which would affect or influence these operating characteristics, it would seem reasonable to assume that the same operating patterns would occur in the future. Thus, "future" emissions calculations would most closely resemble "actual" future emissions if present operating parameters were assumed to continue in the future.

Although agreeing with the above, we concluded as a group to require calculation of allowable levels, not actual levels, of emissions. The definition of actual emissions states that when actual emissions cannot be determined (and how can we determine actual 1986, 1987, etc., emissions?), then allowable emissions are to be used. Allowable emissions, of course, would use maximum (100% capacity and 8760 hours per year unless there were enforceable constraints on the source. Therefore, we concluded that for annual emissions (and annual TSP increment consumption), future emissions would be represented by allowable emissions. It should be noted that this does represent a departure from the previous Region IV thinking of using maximum actual operating hours and rates instead of allowable.

Actual emissions would be calculated using the average of all valid test results. Capacity would be based on the average btu per hour for each boiler, calculated by taking an average yearly btu heat input and dividing this yearly total by 8760 hours per year to obtain an average btu per hour heat input rate. The average yearly btu heat input would be based on two years of data representative of normal unit operation during the baseline year. The first two years to be looked at would be the baseline date year and the preceding year. If no baseline date has been triggered, then increment consumption calculations are not necessary.

Note that this method of calculating actual emissions provides the same tons-per-year (tpy) emissions rate that we would obtain if we simply averages the tpy for two representative years. However, by obtaining an average per hour "actual" emissions rate, we have an emissions rate that can be input into the model, since we have resolved the question of what "hours per year" to use.

The approach outlined above provides the maximum amount of PSD increment consumption consistent with the Federal regulations and conforms with the intent of the August 7, 1980, preamble to the PSD rules. Of course, a source which meets this maximum test of increment consumption is evaluated on the basis of actual emissions when the next PSD source applies for a permit, so the use of the more conservative maximum increment consumption approach does not in the long run artificially limit growth in an area.

Another interesting sidelight to the question of emissions calculations is the policy of determining compliance with long-term (annual) National Ambient Air Quality Standards (NAAQS). A 1983 letter from Sheldon Meyers to Richard E. Grusnick (copy attached) specifies modeling at maximum capacity, defined as the allowable emission rate and the "statistical maximum operating date based on the last three years of operation." The latter cautions, however, that the "three year" concept can be affected by economic conditions, and that operating rates should "truly reflect the rates that can be expected during good economic times." This policy was confirmed in a March 25, 1985, memorandum from G. T. Helms to Winston A. Smith, with additional explanation.

As a result of the different objectives on the PSD and NAAQS calculations maximizing PSD increment consumption and maximizing actual emissions, respectively, the calculations used to determine "actual" emissions are quite different. We

should make certain that New Source Review personnel remain aware of these differences and that the correct approach is used.

(2) 24-Hour Increment Consumption Calculations. The February 25 Bozof/Schneeberg memo specifies that the baseline 24-hour boiler emissions are calculated using actual emissions and "assuming maximum actual operation over any typical 24-hour period during the two years prior to baseline triggering or other representative figure." As detailed as this instruction seems, it still leaves room for several interpretations because of the use of "typical." Suppose, for example, that the source actually operated at 100% capacity during one 24-hour period over a two-year time span. This constitutes the maximum actual operation level, but certainly isn't typical. The problem, of course, is at what frequency does the maximum actual operating rate become typical? Would five 24-hour periods at 100% capacity be acceptable as typical? If not, would 10 or 50 or even 100, or would it take operation at a certain level at least 50% of the time to be called typical?

We tentatively decided at the April 9 meeting to use the maximum actual operating rate unless that rate was so unusual as to constitute the equivalent of circumvention. As a rule of thumb, one would expect to see such maximums occur at least 5 percent of the total 24-hour operating time periods (which means nonoperating time periods don't count in making this determination). This conforms with an earlier Region IV policy determination (copy attached July - 31, 1981, summary of policy determinations; Reference #2.18, item #4, in the Region IV New Source Review: PSD Nonattainment Policy Reference Guide), which specifies use of the maximum 3-hour and 24-hour emissions rates. The use of the 5% guideline is intended only to rule out the possibility that a source could deliberately operate only a few times at very high rates in order to decrease increment consumption at some future time. Of course, this affects the amount of increment consumed. The higher the "actual" operating rate used, the less increment consumed in comparison to the allowable (future) operating rate. Since we would not be accepting the highest actual rate without question, our interpretation is at least as stringent as prior policy.

(3) Use of Test Data. The State of North Carolina has indicated that the actual emission rate should be based on the highest of the test results available. Region IV has insisted that the best estimate of emissions rates is the average of all valid test results. The best rationale North Carolina could develop was that the high value was "likely" to occur (or to have occurred) during at least some periods of time.

We felt that the only rationale for use of high values would have to be based on a parallel with the use of a maximum operating rate. However, the actual emission rate estimate itself does not appear to have been intended to be the highest value found when a stack is tested, but to consist of a value as close as possible to actual emissions. The best estimate of actual emissions is, of course, an average value, so we decided to continue to insist on use of the average of all valid test results. The 24-hour actual emissions level would therefore be based on:

(1) An emission factor based on the average of all valid test results,

(2) Maximum 24-hour heat input rates for the 24-hour increment consumption calculation,

(3) Average 2-year heat input rate (in btu per hour) for the annual increment consumption rate.

Attachments

cc: NSR Network
R. Bauman
T. Helms