GUIDELINE FOR PM_{10} MONITORING AND DATA REPORTING

May 1985

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Monitoring and Data Analysis Division
Monitoring and Reports Branch
Research Triangle Park, North Carolina 27711

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FOREWORD

Many individuals were involved in developing the monitoring strategy to support the PM_{10} Ambient Air Quality Standards, as well as the material contained in this document. For further information on specific subject areas, please contact the individuals listed below:

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SIP Development	Joseph Sableski	541-5697	629-5697
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GUIDELINE FOR PM_{10} MONITORING AND DATA REPORTING

I. INTRODUCTION

The major purposes of this guideline are to provide interim assistance and information for the implementation of PM_{10} sampling networks to support PM_{10} analyses and for the acquisition of data to be used in the development of PM_{10} State Implementation Plans (SIP's). The guidance will apply for the interim period prior to promulgation of the NAAQS and SIP requirements, and should be implemented immediately because of the scarcity of PM_{10} ambient air quality data and the potentially short-time period for SIP development in areas of high probability of nonattainment of the PM_{10} standard.

Further, there are currently two separate Federal Register actions pertaining to PM_{10} and air quality monitoring and data reporting. On March 20, 1984, EPA proposed revisions to (a) the particulate matter standards[1] and the reference method in 40 CFR Part 50[2], (b) the monitoring and reporting regulations in Part 58[3], and (c) the reference equivalent method requirements in Part 53[4]. The time period for public comment on these proposals is still open and will remain so until 60 days after the proposal of PM_{10} Part 51 SIP requirements. In addition, proposed generic changes to Part 58 were proposed on March 8, 1985[5]. These latter changes affect PM_{10} as well as other criteria pollutants.

To significantly increase the available PM_{10} data base, EPA has purchased and distributed 662 PM_{10} samplers for use by State and local agencies to expedite establishment of PM_{10} monitoring networks.

Due to the rather lengthy time period between the Part 58 proposal and projected promulgation date, numerous questions have arisen regarding the

best approach for PM_{10} monitoring during this interim period. This guideline has been prepared to respond to these questions, and thus it is structured in a question and answer format and organized by subject area. EPA suggests a careful review of the proposed Part 58 (March 20, 1984 and March 8, 1985) monitoring regulation amendments and welcomes comments on them. In this interim period, EPA encourages States to begin monitoring following, to the maximum extent possible, the March 20, 1984, and March 8, 1985, proposed requirements for probe siting, station location, quality assurance, and sampling frequency.

As stated earlier, the intent of this guideline is to set-forth criteria and related rationale for establishing networks for collecting data prior to the time that final PM_{10} rulemaking occurs.

Strict adherance to the criteria contained in this guidance will not constitute the only permissible way to collect PM_{10} that can be used for SIP purposes. Local adaptations of this guidance may be appropriate; however, it is our recommendation that any such departures be carefully considered, well justified by technical and/or cost factors, and be documented on a case by case basis.

II. PM_{10} SAMPLER ALLOCATION, PROCUREMENT, AND DISTRIBUTION

Q1 What was the rationale behind the PM_{10} sampler distribution made by EPA?

A1 The rationale is described in the August 29, 1984 memo from Richard G. Rhoads, Director, Monitoring and Data Analysis Division, to the Regional Office Environmental Services Division Directors. To summarize, the focus is on acquiring PM_{10} data in those areas which had a high probability of their TSP SIP's being inadequate to attain the PM_{10} NAAQS based on the best available data at that time. These areas are, in descending order of importance; (a) any area (county, urbanized area, city or town) which has a probability of nonattainment equal to or greater than .95; (b) any urbanized area greater than 100,000 population which has a probability of nonattainment equal to or greater than .20 and less than .95; (c) any urbanized area greater than 250,000 population and less than .20 probability of nonattainment; (d) any urbanized area equal to or greater than 100,000 population and less than 250,000 population with a probability of nonattainment equal to or greater than .05 and less than .20; and (e) any remaining area (county, city, town) with a population less than 100,000 with a probability of nonattainment equal to or greater than .41 and less than .95. Areas with populations less than 100,000 and with probabilities less than 0.41 will be considered prime candidates for FY-86 Section 105 Grant monies for PM_{10} samplers.

The distribution of dichotomous samplers to urbanized areas was made considering factors other than PM_{10} nonattainment decisions. These

factors include acid deposition, visibility protection, and the likelihood of PM_{10} SIP control strategy development. In these situations, the ability to separately measure fine and coarse PM_{10} particulate matter may be important.

Q2 Where within the geographical areas identified in A1, should the PM_{10} samplers be located?

A2 Each area that has been identified in A1 as an urbanized area, city, town, or a rural part of a county, had a specific NAMS or SLAMS TSP sampler from which the probability of nonattainment was derived. The PM_{10} samplers should be located at those existing sites. However, the local agency may have additional information concerning sources, population or emission changes, or other factors which may suggest that another location within the area may be more suitable.

Q3 Should a PM_{10} size selective inlet (SSI) sampler be collocated with a dichotomous sampler?

A3 Not necessarily. Since the monitoring objectives for the two samplers may be different, it would be a coincidence if one location could adequately fulfill both sets of monitoring objectives. For instance, the SSI might be used to demonstrate PM_{10} attainment at the expected maximum concentration location while the dichotomous samplers might be located in areas where visibility degradation and a vista with targets is important. In another instance, the dichotomous sampler may be more suitable in a source apportionment analysis where the fine (2.5 microns) versus coarse (10 microns) data could be important in determining a more cost effective control strategy.

Q4 With limited resources, what is the priority in which the PM_{10} samplers should be brought on line?

A4 Since most of those areas with a 95 percent or greater probability of nonattainment could be required to submit a full control strategy SIP within 9 months after promulgation of the NAAQS, they should be brought on line first. Next would be those locations which consider the urbanized area size and probability of nonattainment, and finally smaller cities, towns, or rural county areas based on their probability of nonattainment. In some cases, the control agency may choose in lieu of PM_{10} monitoring, to develop a SIP based on a design value which may be the maximum one measured, rather than the second maximum, or even an extrapolated PM_{10} or TSP value. Decisions to forego PM_{10} monitoring in such areas would allow monitoring in areas of higher uncertainty, i.e., those areas with probabilities between .20 and .95.

Q5 What guidance can be given regarding the purchase of PM_{10} samplers?

A5 The question of sampler procurement by State and local agencies is addressed in terms of three time frames: Case 1, between now and promulgation of the PM_{10} NAAQS; Case 2, after promulgation but before designation of any specific instruments as reference or equivalent methods; and Case 3, after federal reference or equivalent method designation.

For Case 1, any method which is based on the proposed Federal Reference Method principles, is designed to produce a 50 percent cut point of 10um, and includes the availability of a manufacturer's warranty that the sampler will meet or be upgraded to meet final FRM specifications is acceptable.

For Case 2, as discussed in EPA's SIP guideline[6], approval of ambient PM_{10} samplers for SIP purposes will be made by EMSL, therefore, the prospective purchaser should consult with the Environmental Monitoring and Systems Laboratory (EMSL) Methods Standardization Branch, for the latest information on the status of those monitors which have applied for, or are in the process of being approved as reference or equivalent methods.

For Case 3, only approved reference or equivalent methods may be purchased for use as a NAMS or SLAMS or for other SIP monitoring purposes. It is likely that selected instruments purchased prior to promulgation will be grandfathered for use for up to five years. An appropriate data adjustment factor may, if necessary, be developed for use with the grandfathered samplers.

III. SELECTIVE SAMPLING SCHEDULE

The issue of selective sampling schedules has caused by far, the most concern in the implementation of the PM_{10} monitoring program. Consequently, a fairly lengthy discussion has been prepared to discuss this issue and has been included as an appendix to this document. This section highlights a number of questions concerning sampling frequencies for PM_{10} samplers.

Q6 What benefit is there in sampling every day instead of continuing to sample every sixth day as is the current practice for TSP?

A6 There are three major benefits of everyday sampling: a) reduces the risk of misclassifying the attainment/nonattainment status of an area, b) provides a more accurate design value, and c) allows for attainment decisions to be made with less than three years of data.

Any area, where a 1 in 6 sampling schedule is selected, would immediately indicate nonattainment as soon as the first exceedance of the NAAQS is measured. This one measurement would translate into six expected exceedances as described in Part 50 Appendix K.[7] However, it is possible that this one measured exceedance was the maximum concentration and the only exceedance for the area in the year, which could result in a misclassification of the area.

The accuracy of SIP design values are also dependent on sampling frequency. More frequent measurements provide for a better chance of actually measuring the second maximum value (design value). In general, the maximum concentration levels measured on a 1 in 6 day sampling

schedule are substantially lower than the true maximum value. Consequently, to establish an accurate design value, from a 1 in 6 day sampling schedule, may require the use of an adjustment factor. Typically, the measured values may be increased by 40 percent, more or less, depending on the variability of the data base used.

Attainment decisions may be made with less than three years of data. As proposed in Appendix K of Part 50[7], a single year of PM_{10} data collected on a daily sampling schedule with at least a 75 percent capture rate would suffice. Similarly, 2 years of data with a 50 percent capture rate would also be sufficient to determine the attainment status of an area.

Q7 Would it be better to obtain <u>some</u> PM_{10} data from three different locations rather than <u>complete</u> data (everyday sampling, i.e., three samplers at one station) from one location?

A7 The response to this question depends on the level of the probability of nonattainment of the PM_{10} NAAQS and the time period until promulgation of the PM_{10} standards. These factors are considered and discussed in detail in the Appendix for several situations and, therefore, are not repeated here. A response, however, is given for the case of an area which already has a 95 percent probability of exceeding the PM_{10} NAAQS based on existing TSP data. In this situation, if three separate sites were used on a 1 in 6 day sampling schedule, there would be three separate chances of determining a NAAQS violation (by recording a single exceedance) and no chance to unequivocally pass the attainment test. If however,

the three samplers were used at one location, presumably the location with the highest expected PM_{10} levels, then a determination of NAAQS attainment could be made after 1 year of everyday monitoring.

Q8 Assuming the availability of three PM_{10} samplers per site, are there any options available for relaxing the weekend burden of an everyday sampling schedule?

A8 EPA is in the process of evaluating several alternative sampling schemes which may alleviate this problem. These alternatives are discussed below. During the interim period until promulgation, options b, c, d, and e are acceptable. However, the proposals are still being statistically evaluated for their impact on estimation of annual averages, expected exceedances, or data capture requirements, and therefore may be changed at promulgation.

a. Eliminate all sampling on one of the weekend days, i.e., Sunday, is an option. However, it is not acceptable because of the undetermined bias that would be introduced to the annual average and subsequent problems if the annual average turned out to be the controlling standard. Also, the effect on estimated exceedances needs to be evaluated.

b. Adjust the sampling period from midnight-to-midnight to noon-to-noon. This option would eliminate weekend site visits. It is not known if this alternative would introduce a bias into the data but this scheme would offer the most complete data capture.

c. Systematically alternate the non-sampling day between Saturday and Sunday. The bias to the annual mean created by this sampling

scheme could be accounted for by analyzing enough data to determine a weekday/weekend difference. The weighted average for each sampling regime (Monday through Friday regime and Saturday, Sunday regime) would be added to create an annual mean. The expected exceedances of the 24-hour standard would also be derived for each regime. An exceedance on a weekend could count as two with no additional missing data since only 50 percent of the total weekend days were sampled. Exceedances observed during the Monday through Friday regime would then be combined with the weekend exceedances.

d. Systematically alternate the non-sampling day between Friday, Saturday, Sunday, and Monday. The main difference between this scheme and that described in (c) would be that an exceedance of the 24-hour standard on one of the Friday through Monday 4-day weekend regime days would be worth 1.33 exceedances rather than 2. A factor of 1.33 or 4/3 is used since only 75 percent or three of the total 4-day weekend regime days were sampled. Conceptually, the annual mean would also be calculated on a weighted average. Further guidance on these approaches will be developed.

e. Operate a 4th sampler at the every day sampling site and eliminate weekend visits.

Q9 Is sampling only during certain seasons of the year allowed (seasonal sampling)?

Seasonal sampling and the use of different sampling frequencies depending on the season of the year (increased sampling frequencies during the season(s) of greatest expected impact and reduced frequencies for seasons

of low potential) are generally not allowed. The reason for disallowing seasonal sampling and varying sampling frequencies is that in most situations there is insufficient PM_{10} air quality data to make an informed evaluation.

In a few cases, it may be possible to justify deviations from uniform sampling schedules. In these situations, at least one complete year of data is required. The number of samples necessary for a complete year of data is determined by the area's nonattainment probability, i.e., an area with a $\geq$ .95 probability would require 365 samples. However, if at least 75 percent of these samples were obtained with adequate coverage in each of the four calendar quarters, this would be satisfactory. All relevant air quality and emission data must be presented to the Regional Administrator who will have final approval over any State's proposed deviations from normal (uniform) sampling schedules.

Q10 A large area with a probability of exceeding the PM_{10} NAAQS of .95 or greater currently has three or four PM_{10} sampling sites, all with high concentrations. One of these sites is judged as the area of maximum concentration and conducts everyday PM_{10} sampling. The others sample every sixth day. If there is only one exceedance of the 24-hour standard in the area during the first year of monitoring and it occurs at the site monitoring everyday, it is counted as one exceedance and the area is in attainment. If, however, the exceedance is measured at a site which samples every sixth day the expected exceedances are six and the NAAQS are considered to be violated. How will this situation be equitably handled?

A10 In this example the assumption is made that the four sites are within the boundaries of some spatially defined area. Guidance on defining the spatial extent of a nonattainment area (or an area having a high probability of nonattainment) is given in the probability guideline.[8] There is a provision in the proposed Part 58 Regulation[9] to change the location of the monitor on the selective sampling schedule based on the annual SLAMS review. In addition, the proposed SIP guideline[6] specifies that the first observed exceedance will not be adjusted for missing data and be counted as only one exceedance if everyday sampling is initiated. Only one site would be required to intensify sampling frequency. If a single exceedance was observed at another site, it would also be counted as only one exceedance and not be adjusted for missing data. The SIP guideline[6] specifies rules for estimating attainment status regarding the first observed exceedance, subsequent exceedances and previous years of monitoring data. In any event, a review of the monitoring data should be made at the end of the year along with other pertinent information, i.e., population density, emission patterns, etc. to determine if a change in the maximum concentration site and required sampling frequency is warranted.

Q11 If an agency is sampling every sixth day and an exceedance is observed, is a determination of NAAQS violation automatic?

A11 During the first year of monitoring, the first exceedance detected by a sampler operating every sixth day will only count as one, provided sampling at the site commences on an everyday schedule for the next year within 90 days after the end of the calendar quarter in which the

exceedance occurred. This assumes that a second exceedance was not registered at the site before everyday sampling was initiated. Further guidance may be obtained from the SIP guideline.[6]

IV. STATE IMPLEMENTATION PLAN (SIP)

This subject is also addressed more fully in the Appendix, thus only a few questions will be addressed here.

Q12 How do the requirements for PM_{10} SIP development affect PM_{10} sampling?

A12 PM_{10} SIP requirements would vary dependent upon the category to which EPA assigns a particular area. There will be three types of categories. The assignment to a category would be based initially on PM_{10} nonattainment probabilities and then adjusted based on additional information which could affect categorization. Group 1 would contain areas with $\geq$95 9 months of NAAQS promulgation; Group II would contain areas with $\geq$ 20 to < 95 percent probability in which "committal" SIP's would be due within 9 months; and Group III would contain the remaining areas for which existing TSP SIP's would be considered adequate for PM_{10}. States should consider placing PM_{10} samplers in Group I or II areas for reasons such as:

a. To obtain a design value for the area based on ambient PM_{10} data,

b. To pass the attainment test so that no SIP will be due,

c. To obtain ambient PM_{10} data to use in calculating an updated (more accurate) nonattainment probability, or

d. To determine PM_{10} background for the area.

Prior to promulgation of the PM_{10} NAAQS, States may wish to move samplers around among monitoring stations to accomplish as many data objectives as possible. See Section 4 of the Appendix for additional information.

Q13 How much PM_{10} data is needed to determine attainment of the PM_{10} NAAQS.

A13 Appendix K to 40 CFR Part 50[7] proposal contains the PM_{10} NAAQS attainment criteria as follows:

a. If three years of data are available, then 12 observations per calendar quarter would be sufficient. The data must be representative of normal conditions, but may be derived from 1-in-6, 1-in-2, or everyday sampling schedules.

b. If 3 years of data are not available, then 2 years of representative everyday sampling data are needed and with a 50 percent data capture.

c. If only 1 year of data is available, the 1 year of representative everyday sampling data is necessary, and with a 75 percent data capture.

Q14 When will an area be officially categorized as Group I, II, or III?

A14 Area categorizations will be available at the time EPA promulgates the PM_{10} NAAQS.

Q15 What data base will be used for this categorization?

A15 Several months before promulgation (as accurately as this can be determined) preliminary groupings will be done by the States and Regional Offices using the most recent 3 years of ambient TSP and/or PM_{10} data. These data will be put into one-half calendar year segments and the most current six continuous segments will be used.

V. PM_{10} SAMPLER SITING

Q16 The TSP sites used to determine the probability of nonattainment for PM_{10} were classified as neighborhood scale with respect to roads and point sources if they were NAMS, and no closer than middle scale with respect to roads and point sources if they were SLAMS. Now that micro scale PM_{10} sites are allowed, will they be required?

A16 The reasons for allowing micro/middle scale PM_{10} sites is to provide additional locations from which sampling sites could be chosen rather than a mechanism for requiring all category (a) maximum concentration sites to be microscale sites. The exclusion, in the past, of microscale NAMS sites for TSP sampling was for the purpose of minimizing the impact of larger particles coming from roadways on the collected sample. For PM_{10} samplers, the impact of the larger particles is eliminated by the design of the sampler. Therefore, it is by no means a certainty that a roadway microscale site will yield higher annual or 24-hour levels than a neighborhood scale site in the midst of point sources with no heavily traveled roadway nearby. If however, it is judged that a roadway corridor or street canyon type exposure would represent the maximum concentration area for PM_{10} samplers, then such a site should be used.

Q17 With multiple PM_{10} and/or TSP samplers at the same site, what are the requirements for separation distances between monitors?

A17 If possible, a separation distance of 2 meters should be maintained. It is recognized that this may be physically impossible if the site is on the roof of a small building or trailer and there are three PM_{10} samplers,

a NAMS TSP sampler, and collocated lead samplers. At a minimum, the samplers which are operating concurrently, i.e., the PM_{10} and the NAMS TSP sampler or the collocated samplers must be a minimum of 2 meters apart. It is also recommended that concurrently operating samplers have their exhausts directed away from each other. Additionally, any two particulate samplers operating simultaneously for meeting precision requirements of 40 CFR 58 Appendix A[10] purposes, should not be more than 4 meters apart. For the case of PM_{10} sampling everyday (three samplers), if a 2-meter separation distance between PM_{10} samplers is not possible, then the greatest practical distance will be acceptable. Further, for collocated samplers the same relative distance from roadways, parapets, or penthouse obstructions should be maintained and prevailing wind directions should be considered.

Q18 If a NAMS TSP site is selected as a site for PM_{10} (which will be operating on an everyday or every other day sampling schedule), how frequent must the hi-vol be run in order to comply with the requirements in Appendix C[11] which states that the TSP hi-vol sampler must be operated concurrently with the PM_{10} sampler for a 1-year period?

A18 Once every 6 days is required. It may be advantageous to run the hi-vol samplers more frequently, however, to cross check the PM_{10} results or to develop a site specific PM_{10}/TSP relationship for possible probability of nonattainment calculations.

Q19 Under what conditions may a high volume (TSP) sampler be substituted for a PM_{10} sampler?

A19 As specified in Appendix C to the proposed Part 58 changes,[11] a high volume (TSP) sampler may be used in place of (designated as) a PM_{10} sampler if:

a. The sampling is for the purpose of showing compliance with the NAAQS.

b. All 24-hour TSP concentration levels and annual average TSP levels remain below the respective concentration levels of the PM_{10} NAAQS.

c. The sampling site is not a NAMS site.

Q20 The regulation states that as soon as the TSP sampler (referred to in question 19) measures a single value that is higher than the PM_{10} 24-hour standard or has an annual average greater than the PM_{10} annual standard, it is necessary to replace it with a PM_{10} sampler. How soon is soon?

A20 For the 24-hour standard, the TSP sampler should be replaced with a PM_{10} sampler before the end of the calendar quarter following the quarter in which the exceedance occurred. This would allow a minimum of 91 and a maximum of 181 days to procure and install the required PM_{10} sampler. For the annual standard, the PM_{10} sampler should be operating by June 30 of the year following the exceedance. This would also allow up to 181 days.

VI. QUALITY ASSURANCE

The questions and answers included in this section also reflect the March 8, 1985 proposed changes to Part 58.[12]

Q21 What are the proposed precision assessment requirements for PM_{10} samplers?

A21 The proposed reporting organization precision assessment requirements for PM_{10} sampling are the same as for TSP sampling: two collocated PM_{10} samplers per reporting organization at each of the two highest concentration sites, operated concurrently at least once per week.

Q22 What are the acccuracy assessment requirements for PM_{10} samplers in the March 1985 proposed Part 58?[12]

A22 The proposed accuracy assessment requirements for PM_{10} samplers are also the same as for TSP samplers: a flow audit of the sampler's regular flow rate once per year (or more if there are fewer than four sites in the monitoring network), using a flow standard different than the one used for calibration.

Q23 How should precision and accuracy data be submitted under the proposed new reporting requirements?

A23 New forms have been developed for entering the results of individual precision and accuracy tests. If desired, these forms may be filled out directly at the monitoring site during the precision or accuracy test to avoid the need for transcribing the data to another form later. These forms are to be submitted quarterly to the Regional Office. Alternatively, we encourage the submission of the precision and accuracy test results electronically via a terminal input program that will be made available.

Q24 What precision and accuracy data should the annual report contain?

A24 Since in the March 1985 proposed Part 58[12], it states that EPA will calculate all integrated precision and accuracy estimates for all reporting organizations from the individual information submitted quarterly, no additional precision or accuracy information need be submitted annually.

Q25 What are the new requirements for the number of collocated sampling sites for manual methods?

A25 Under the new requirements (March 1985 proposed generic revisions to Part 58)[12], the number of collocated sites required per reporting organization is determined separately for each method by the number of sampling sites in the sampling network: one collocated site would be required in a network of one to five sites, two collocated sites in a network of 6-20 sites, and three collocated sites in a network of over 20 sites. These proposed requirements would also apply to lead sampling networks, for which collocated sampling replaces the previous requirements for analysis of duplicate filter strips. The number of collocated sites for lead and TSP networks is determined separately, even though common filters are analyzed for both TSP and lead. However, in such cases, a single collocated site could serve both networks.

Q26 What type of filter media should be used in PM_{10} samplers?

A26 The proposed reference method requires the filters to pass a collection efficiency test, handling integrity test, and an alkalinity test.[13] The alkalinity test eliminates glass fiber filters for PM_{10} sampling. Quartz filters, however, meet the specifications and are currently being

used in size selective inlet (SSI) PM_{10} samplers. Teflon filters are recommended for use in dichotomous PM_{10} samplers.

For TSP sampling, States should continue to use glass fiber filters. The primary reason is for historical data continuity. Secondary reasons are (a) cost of glass fiber filters are about 40 percent of the cost of quartz filters; and, (b) quartz filters are fragile and if they are to be used with hi-vols, the hi-vols must be retrofitted to make them cassette compatable.

VII. DATA REPORTING

Q27 Can PM_{10} data be reported to SAROAD?

A27 PM_{10} data from the 662 EPA supplied samplers must be reported to SAROAD as part of the routine quarterly data submission. PM_{10} data from State and locally owned samplers which are to be used for SIP purposes must be reported as well. In addition, the Agency requests that all PM_{10} data be reported to SAROAD. The data must be coded on SAROAD Form 2 (Daily Data Form) as discussed in Volume II, AEROS User's Manual, Section 3.4.3.[14] All data must pass routine SAROAD edits as described in Section 7.1.2.

Q28 What specific codes must be used to report PM_{10} data?

A28 Interim codes were initially assigned in 1979-80 to permit the storage of data for particulate matter data less than 15 microns.[15] Interim codes were assigned in 1984 for PM_{10}. These interim codes utilized one pollutant code (81101) and different method codes to designate collection mechanism and particle size. These codes are listed in Volume V, AEROS Manual of Codes, Section 4.5.0, Parameter Method File.[15]

Q29 When will other SAROAD codes be assigned?

A29 Revised SAROAD codes will be assigned for PM_{10} samplers by June 1985. The pollutant code for PM_{10} will be 81102, and a unique method code will be assigned for each type sampler in use or being marketed. For the dichotomous sampler, the pollutant code will be 81103 for 10-2.5 micron size range and the pollutant code will be 81104 for <2.5 micron size range. For a given dichotomous sampler, the same method code will be

assigned for all size fractions. The codes will be distributed to Regional Office SAROAD, NAMS, and QA Contacts when available.

Q30 How will the sampling frequency be handled?

A30 SAROAD does not currently provide the capability to store the sampling frequency. SAROAD is being replaced with the Aerometric Information Retrieval Systems (AIRS) in early FY-87. Because SAROAD is going to be replaced, no modifications are being made to it. The capability to store sampling frequency is currently being implemented on AIRS. However, agencies should provide EPA with the sampling frequency for each PM_{10} sampler as part of its PM_{10} network description.

Q31 If a TSP sampler is used as a substitute PM_{10} sampler as specified in Appendix C, how should the data be reported?

A31 Since it is a TSP sampler which is being used only to show compliance with the NAAQS for particulate matter (PM_{10}) the data should continue to be reported like any other TSP sampler.

Q32 Should previously collected PM_{10} and PM_{15} data be reported to SAROAD?

A32 Yes, the more PM_{10} or PM_{15} data available to characterize an area, the more accurate the classification.

VIII. OTHER CONSIDERATIONS

Q33 Appendix K[7] indicates that PM_{10} data from exceptional events may be weighted or discounted in the computation of exceedances or averages. What is the definition of a rare or unusual event for PM_{10} sampling?

A33 The definition and criteria for these exceptional events are to be covered in a guideline document entitled "Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events."[16] This guidance is currently in draft form. A final version is not expected until late 1985.

Q34 Should a PM_{10} sampler be used to replace a TSP sampler currently included in the National Particulate Network (NPN)? This network was previously called the National Filter Analysis Network (NFAN) and National Air Surveillance Network (NASN).

A34 No, metals and benzo(a)pyrene (BaP) analyses will continue to be performed on samples of particulate matter collected with the high volume air sampler on glass fiber filters.

Q35 How long should PM_{10} quartz filters be kept after analysis or weighing?

A35 No specific time periods are specified in the regulations; however, it is sufficient to continue the same practices as currently exist with the agencies' TSP glass fiber filters.

Q36 How frequently should PM_{10} sampling be conducted for Pollutant Standard Index (PSI) purposes?

A36 The regulation (Appendix G, Part 58)[17] specifies that the data used to

prepare the daily index report must be based on data collected from the regular schedule sampling days.[17] That is, an everyday schedule requires daily PSI reporting while a 1 in 6 day schedule would only require PSI reporting every sixth day. EPA recommends, therefore, that initially the PM_{10} sampling frequency for PSI purposes be dictated by the site's probability of nonattainment, i.e., greater or equal to .95, sample and report everyday; greater or equal to .20 but less than .95, sample and report every other day; and less than .20, sample and report every sixth day. If after 1 year of monitoring at any of the above frequencies, the PSI value has not exceeded 50, the PSI reporting is left to the discretion of the reporting agency.

Q37 Can PM_{10} sampling for emergency episodes deviate from the reference method, similar to the way TSP was handled in the past?

A37 Yes, sampling over short time intervals and staggered samples are acceptable alternates. These topics are discussed in the draft document "Guideline for PM_{10} Episode Monitoring Methods."[18]

Q38 Should emergency episode data be submitted to EPA?

A38 Yes.

Q39 Will additional PM_{10} samplers and support equipment such as microbalances, calibration devices, and filter cassettes be furnished to State and local agencies?

A39 At this time, the Agency has no plans to directly procure additional PM_{10} samplers and related equipment. The Agency requested an increase of approximately $400K in FY-86 Section 105 grants to support the additional

PM_{10} samplers and microbalances by grantees. Approximately 80 samplers and 18 microbalances could be purchased with these funds, but the majority of the additional equipment necessary to complete the PM_{10} networks will have to be obtained through normal funding procedures.

APPENDIX

THE SELECTION OF SAMPLING FREQUENCY FOR PM_{10} MONITORING PRIOR TO PROMULGATION OF THE PM STANDARDS

1. BACKGROUND

The proposed Part 58 monitoring regulations for particulate matter specify minimum sampling frequency requirements for the first year and subsequent years of PM_{10} monitoring. These are described in Section 58.13.[9] EPA has allocated PM_{10} instrumentation throughout the Nation, so that State and local agencies can initiate monitoring prior to formal promulgation. These instruments have been allocated according to the estimated probability of nonattainment using the probabilty guideline[8] and TSP data, and the corresponding Section 58.13 first year requirements. The most stringent PM_{10} NAAQS (150 ug/m^3, 24-hour and 50 ug/m^3, annual) were assumed. The proposed regulations specify that the monitoring frequency for the site with maximum concentration within an air quality monitoring area shall be:

- o every day for areas with estimated probability $\geq$0.95 (Group I)
- o every-other day for areas with estimated probability 0.2-<0.95 (Group II)
- o every sixth day for areas with estimated probability <0.2 (Group III)

The Group I, Group II and Group III classifications are used in the proposed PM_{10} SIP development policy.[6] These PM_{10} nonattainment probabilities will be redetermined based on the latest PM data just prior to promulgation of the revised NAAQS.

The allocation of EPA equipment was based on a preliminary estimate of the national network of NAMS and SLAMS monitors. Estimated probability of nonattainment (i.e., the group category) and other factors, such as population size were also used in the allocation process. Multiple instruments were allocated at the maximum site per area to permit the

appropriate number of samplers per site (operated with timers) needed to sample at proposed frequencies and to minimize site visits: three instruments were allocated for Group I NAMS and SLAMS, two instruments were allocated for Group II NAMS and SLAMS. Single instruments were allocated for Group III NAMS and for other areas needing more than one site. Although the instrument allocation will permit agencies to monitor at the proposed post-promulgation frequencies, how should these instruments be utilized prior to promulgation? Should multiple instruments be placed at a single location for frequent sampling or should the instruments be spread out to cover more locations? The following discussion addresses this question from two viewpoints: (1) how could available PM_{10} data affect the estimate of PM_{10} nonattainment probability; and (2) how could available PM_{10} data affect categorizing an area for purposes of PM_{10} SIP development? A summary of recommended pre-promulgation sampling frequencies is found in Table 1.

TABLE 1

Pre-Promulgation Sampling Frequency (for the worst site per area)

Group	Nonattainment Probability	Sampling Frequency		
		1 in 1	1 in 2	1 in 6
I	$\geq$ 0.95	recommended	-	-
II	0.2 - < 0.95	-	recommended	optional[a]
III	< 0.2	-	optional[b]	recommended[a]

[a] for attainment areas estimated to be < 0.8 standard
[b] for attainment areas estimated to be $\geq$ 0.8 standard

2. PRE-PROMULGATION USE OF PM_{10} DATA

The Probability Guideline specifies procedures for estimating the probability of not attaining the PM_{10} standards. According to this guideline, a site is assigned a probability of zero if it satisfies Appendix K to the proposed Part 50 requirements for attainment determination with the use of available PM_{10} data.[7] This situation occurs if:

- o One year of PM_{10} data is available with
  - every day sampling and 75 percent data capture
  - $\leq$ 1 exceedance and annual mean $\leq$ level of standard
- o Two years of PM_{10} data are available with
  - everyday sampling and 50 percent average data capture
  - $\leq$ 1 estimated exceedance and annual mean $\leq$ level of standard
- o Three or more years of PM_{10} data are available with
  - 12 observations per quarter
  - $\leq$ 1 estimated exceedance and annual mean $\leq$ level of standard

If PM_{10} data are not sufficient to declare attainment, then the probability of nonattainment shall be calculated using both TSP and PM_{10} data, following the methods in the probability guideline.[8] In situations where plans are to use TSP data for one or more years and PM_{10} data for the remainder of the 3-year assessment period, agencies should collocate TSP and PM_{10} samplers in order to provide a site specific relationship between the two pollutants.

3. EFFECT OF TSP DERIVED NONATTAINMENT PROBABILITY

For the purposes of this discussion, assume that 3 years of TSP data with 60 samples per year were available. Furthermore, each year had similar

air quality, and each contained TSP concentrations above the level of the PM_{10} standards.

If PM_{10} is sampled 1 in 6 days, then each year of PM_{10} data simply replaces a year of TSP data. If any PM_{10} exceedances are observed, the daily exceedance probabilities used in the computational formulas (3) & (4) are defined as 1.0. Thus, if any PM_{10} exceedances occur, the probability of nonattainment automatically becomes 1.0. On the other hand, if a year of PM_{10} data had no exceedances, then the 3-year nonattainment probability will be made smaller. The magnitude of the decrease depends on the "replaced" number of high TSP concentrations and their corresponding estimated daily PM_{10} exceedance probabilities. See Section 5 of the probability guideline for clarification and further details.

If PM_{10} is sampled more frequently, then one or more PM_{10} exceedances may not indicate violation of the PM_{10} NAAQS. With every-other day sampling, one PM_{10} exceedance may be permitted; with everyday sampling, up to 3 PM_{10} exceedances may be permitted. In general, as long as the estimated number of PM_{10} exceedances in a single year are less than or equal to 3, then the attainment test over a 3-year period has not automatically been failed. If PM_{10} exceedances are observed, but attainment or NAAQS violation has not been determined, the probability of nonattainment is estimated using prior TSP data coupled with the collected PM_{10} data. Recall that attainment could be demonstrated with 1-3 years of PM_{10} data as discussed above. The probability guideline considers the impact of additional PM_{10} exceedances that would be expected with more frequent PM_{10} sampling. Considering the typical case of prior years with 1 in 6 day TSP sampling, the nonattainment probability calculations using the combined TSP and PM_{10} data would be the

same whether one exceedance is observed with 180 days of PM_{10} data or two exceedances with 360 days of PM_{10} data. To this extent, the PM_{10} sampling rate does not affect the computations of PM_{10} nonattainment probability.

In all cases, especially if PM_{10} exceedances have not been observed, nonattainment probabilities which were based on TSP data can be rederived using site specific PM_{10}/TSP information. If PM_{10} data are paired with TSP data (from co-located samplers), then a site-specific PM_{10} to TSP ratio distribution could be developed. Frequent PM_{10} sampling would be more desirable for this purpose. Using the revised distributions, the TSP derived nonattainment probability can be recalculated. This approach should produce a more reliable probability estimate.

3.1 Potential Group I Areas

For these areas, more frequent PM_{10} sampling reduces the risk of miscalculating the nonattainment probability. If the NAAQS is truely being attained, then a single observed exceedances with 1 in 6 day sampling could maintain the Group I classification. The ultimate probability will be lower if no exceedances are observed with 1 in 6 day PM_{10} sampling. It will be equivalently lower if one exceedance is observed with every-other day sampling, or 2-3 exceedances are observed with every day sampling. If the 24-hour NAAQS is truely being violated, then exceedances are expected. Again, more frequent sampling reduces the risk of miscalculation of the nonattainment probability. With 1 in 6 day sampling, the true exceedance day may not be sampled and the probability of nonattainment might be inappropriately reduced.

3.2 Potential Group II Areas

For these areas similar arguments apply. More frequent sampling

reduces the risk of nonattainment probability miscalculation.

3.3 Potential Group III Areas

For these areas, attainment status is assumed. Nonattainment probability miscalculation with 1 in 6 day sampling is possible but not very likely.

4. EFFECT ON SIP REQUIREMENTS

4.1 Group I Areas

The maximum site in this area is expected to be in violation of the PM_{10} NAAQS and must have a SIP submitted, with a full control strategy, 9 months after NAAQS promulgation. In most cases, the 24-hour standard is expected to be the controlling standard. This is based on the probability calculations. In order to estimate a good design value for such an area, at least 365 observations are desired.[9] Even if the annual standard is controlling, a small data base may cause the 24-hour standard to appear to be controlling, resulting in the wrong control strategy and potential over estimation of control requirements.

If the 24-hour standard is expected to be controlling, everyday sampling at the expected high concentration site should be initiated as soon as possible. This shall provide 1 year for data collection and 9 months for data analysis and control strategy development. If less frequent monitoring is performed, the design value must be estimated by extrapolation from observed measurements with potential over or under estimation of control requirements. (The 24-hour design value is defined as the concentration with one expected exceedance per year, as discussed in the PM_{10} SIP guideline.[6] With incomplete sampling, the design value estimate is uncertain due to variability among daily values and to possible extrapolation beyond observed PM_{10} values).

If the annual standard were known to be controlling, 1 in 6 day sampling could be sufficient to estimate the annual design value. Due to variability in the estimation of 24-hour design values with incomplete (i.e. 1 in 6 day) sampling, the 24-hour standard may appear to be controlling. Until a PM_{10} data history is established, the misidentification of the controlling standard can be a problem. Therefore, more complete data is necessary.

4.2 Group II Areas

A sampling site in this area is likely to be close to the standard(s) or not be in attainment. Data for Group II areas will first be used to establish the adequacy of the existing particulte matter SIP and next, to develop a PM_{10} control strategy, if necessary. A "committal" SIP for the area must be submitted within 9 months after NAAQS promulgation. Eighteen months from SIP approval the State must declare the SIP to be adequate or must submit a control strategy within the next 6 months (24 months total from SIP approval).

In light of these time periods, over 3 years from the present will elapse before States will have to establish attainment or determine that the SIP needs modification for Group II areas, plus an additional 6 months for control strategy development. Every other day sampling is recommended for the first year(s) of sampling to determine attainment of the standards or to improve design value estimation in potential Group II areas.

If attainment is anticipated, then 3 years of data with 1 in 6 day sampling could be sufficient to declare attainment as per Appendix K, Section 2.4.[7] However, If the site is in reality between 80 and 100 percent of the standard (as estimated by its design value), the chance of determining

that the NAAQS are being violated (i.e., measuring a 24-hour exceedance) is estimated to be greater than 5 percent.[19] Thus, this 1 in 6 day monitoring strategy could lead to this erroneous conclusion and to the resulting need for a PM_{10} control strategy. In addition, the strategy could result in the need to intensify sampling to everyday following the first measured exceedance as per the proposed Section 58.13.[9]

Every other day sampling, therefore, is recommended for the first year of sampling and for subsequent years if the site is anticipated to be within 20 percent of the 24-hour standard (corresponding to the Selective Sampling requirements of the proposed Section 58.13).[9] The site could be sampled 1 in 6 days, however, if the State is prepared to increase sampling to every day. While the two instruments needed for every other day sampling at one location can be used to sample 1 in 6 days at two separate locations, the increase to everyday sampling would require three instruments which may mean the termination of a third sampling site. This possibility must be weighed against the likelihood that a single exceedance would be observed. If for example, the probability of nonattainment from TSP data were closer to 0.20, the agency could take that chance while if the probability were $\geq$ 0.50, the agency might not be willing to do so.

If attainment status is uncertain (e.g. the probability of nonattainment is $\geq$0.50), then exceedances of the standard are expected and design value development will be needed. In this case, enough data should be collected during the available 3-year period to determine a good design value. This requirement indicates that at least every other day sampling should be used. Although NAAQS violation is anticipated, the high PM_{10}

site may not necessarily be the site with the maximum nonattainment probability. This is because the relationship between PM_{10} and TSP may be somewhat different from site to site. Therefore, 1 in 6 day sampling, compared to more frequent sampling, would permit the agency to monitor at additional locations, thereby providing the opportunity to explore the spatial variability of PM_{10} and to find "higher" concentration sites. However, with 1 in 6 day sampling, estimation of design values over a 3-year period will be uncertain and control requirements may be over or under estimated (recall that at least 365 observations are desired.) If exceedances are not observed during the first year(s) (perhaps, the probability estimate may have been too high), then attainment could be established. As indicated earlier; however, if the site is estimated to be between 80 to 100 percent of the standard, at least 1 in 2 day sampling should be maintained, to minimize the chance of erroneously concluding a NAAQS violation.

4.3 Group III Areas

This site is expected to be in attainment of the PM_{10} NAAQS and would not be required to sample more often than 1 in 6 days.

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