

Section 4. Regional Equivalent Monitors

A provision to allow for Regional Equivalent Monitors (REMs) is proposed to enhance the network of PM continuous monitors. The basic premise of a REM is that when a PM_{2.5} continuous method meets the precision and bias performance criteria identified in section 6 and the testing specification described below within the geographic area that it is used, then this method may be used anywhere in the network for which it is approved. The spatial extent of the approval of the method would be based upon a number of factors such as number and location of sites tested and homogeneity of the aerosol in the network. This flexibility is being considered since some methods are expected to work well in replicating FRM measurements across specific agencies networks across all seasons, but not in every network in the country. Approved REMs would be allowed to be used for attainment decisions as part of a “hybrid” network of PM_{2.5} FRMs and continuous monitors as described in section 5 - Network Design. For implementation purposes REMs are different than the conventional Federal Equivalent Methods (FEMs) in that they are only for use in the specific geographic area of approval and a minimum network of FRMs must be retained for operation in each network in which they are used. When FRMs are collocated with REMs, the FRM is identified as the *Primary* monitor, meaning it is the monitor to be used for comparison the NAAQS at that site. REMs are different from Correlated Acceptable Continuous (CAC) monitors in that data from REMs are used for direct comparison to the NAAQS, while data from CACs are not. Since the data from REMs are used for comparison to the NAAQS, there is much more control on the approaches for data transformations, as described in section 7. This section describes the test specifications and approval process for REMs.

Performance Criteria

There are two types of performance criteria to consider. The first criteria to consider are the performance standards for acceptance of a method. These criteria are provided for in section 6 and are primarily based upon the goals for measurement uncertainty as developed in the data quality objective process for the PM_{2.5} monitoring program. The second type of criteria are for on-going evaluation that the method is providing data of sufficient quality for its intended monitoring objective. These criteria are the same performance standards developed for measurement uncertainty in the PM_{2.5} monitoring program and are also presented in section 6 of this document.

Testing Requirements

There are a number of testing requirements that need to be considered. These testing requirements are intended to be designed so that State and local agencies can readily implement a field testing program to pursue a REM for use in their network. The table below identifies the required criteria and rationale for REMs:

Table 4-1 Test Specification for PM_{2.5} REMs

Testing Requirement	Suggested Criteria for REMs	Rational for Criteria
Number of Test Sites	Minimum of 2 (see Table 4-2 below)	Need to demonstrate that the method can meet performance criteria at multiple locations in a State or local agency network.
Number of FRMs per site for generating baseline data in testing	1- However strongly suggest locating test sites at collocated FRM precision sites to assure control of FRMs and to have high sample completeness	Precision of FRM can be assumed from FRM network precision statistic
Number of Candidate Samplers	2 for first REM test site, 1 for each additional site	Need to have collocated candidate REMs in order to calculate measurement precision of the continuous method for at least one site in the network.
Number of hours to make a valid 24 hour sample for comparison to the FRM	18 - valid hourly values within the midnight to midnight period.	75% completeness of the 24 hour period.
Length of testing	All 4 seasons - however testing can begin and end at any point during the year.	Need to assure that changes in aerosol or meteorology related to changes in season can meet performance requirements.
Number of data pairs - Primary Monitors, both the FRMs and the candidate REM	90 per site with at least 20 per season. See reference in section 7	Expected to be similar to 1 in 3 day sample frequency at 75% completeness for four seasons
Number of data pairs - Collocated FRMs	As found in network	Use existing collocated FRM precision sites
Number of data pairs - Collocated candidate REMs	- 60 sample pairs for the REM - At least 15 per season for the REM.	Based upon 90% confidence that the precision statistic is within 15% of the true precision. Since these are continuous methods may expect to have a substantially large data set.
Range of concentrations for siting	As found in the area of consideration.	Need to evaluate method under the conditions in which it will operate.
Range of concentrations for use in data set when determining performance of methods	May (but not required to) exclude values where the FRM concentration is below 6 ug/m ³ . Exclusion of values due to low concentrations does not result in failure of completeness requirements	As concentration values approach 0, biases can appear large. By focusing on the values that are above 6 ug/m ³ estimates of the performance of the candidate methods are more stable.

Guidance for Developing Boundaries for Applicability of Regional Equivalent Monitors

Section 8 of this document provides the detail for how the appropriate geographic size is determined for use of an approved REM.

Number of Test Sites for Regional Equivalent Monitors

The number of test sites for REMs depends on a number of factors such as the area of consideration for approval of a REM and the homogeneity of the aerosol across the area of consideration. At a minimum, 2 sites are to be tested to support a candidate REM. The following table details how many sites are to be tested assuming the aerosol is homogeneous across an area in which it is being tested:

Table 4-2 Test Site Specification for PM_{2.5} REMs

Example Geographical Area of Consideration for REM ⁸	Number of Test Sites
One MSA	2
Multiple MSA's in the same air district or State	1 for each MSA up to the first 3 MSAs, plus at least 1 site in a rural county.
Multiple States	1 for each MSA up to the first 2 MSAs, plus at least 1 site in a rural county. For each additional State add 1 urban and 1 rural site.

Note: if the aerosol is expected to vary according to the guidance provided for in section 8, then apply test sites as if each State or air district were performing testing separately. This will ensure that for each type of aerosol encountered a minimum number of sites are tested.

Review Procedures

The approval of a "Regionally" equivalent monitor should follow the same process for review and approval of other federal equivalent methods. This process works through the Office of Research and Developments National Exposure Research Laboratory (NERL) Reference and Equivalency program. That program receives, reviews and provides feedback to vendors and other parties that have applied for equivalency. Once all the criteria have been appropriately addressed and the candidate method has been determined to meet the appropriate performance criteria the Reference and Equivalency program makes a recommendation that the method be approved as "equivalent". Once approved by EPA management as "equivalent" a notice is published in the Federal Register indicating

⁸ The example presented at best reflects a minimum requirement. Definition of extent of regional applicability is addressed more completely in section 8 and is a topic requiring significant development.

that this status has been achieved. Any geographic limitations to a methods approval would also be included in this notice.

Ongoing Evaluation of Method Performance

Since the REM is to be used for NAAQS decision making all applicable elements of the PM_{2.5} quality system are to be applied to its use. This means that REMs are to be collocated with both FRM and the same continuous method as the primary monitor as well as being subject to performance evaluation audits defined in Appendix A of Part 58. Additionally, the CACs should be appropriately addressed in the monitoring agencies Quality Assurance Project Plan (QAPP). If for three consecutive years the REM does not meet the DQOs and a examination of the data indicates that the uncertainty in decision errors is increasing, then the monitoring agency should - **NOT SURE WHAT THE CONSEQUENCE SHOULD BE.** Would like to have agencies work through a solution.

Potential Use of Regional Equivalent Monitors in PM_{2.5} Monitoring Networks

The expected outcome of having a REM approved for use in a monitoring network is that it can be used in combination with a limited number of FRMs as part of a “hybrid” network. Section 5 of this document lays out the detailed network design of the a potentially revised network.