Section 3. Enhanced Correlated Acceptable Continuous Methods (CAC)

A provision to enhance the existing provision for Correlated Acceptable Continuous (CAC) monitors is being proposed in concert with a new Regional Equivalent Monitor (REM) program to provide agencies with options to enhance their network of PM continuous monitors. Rationale based on data comparability for selecting the CAC or REM vehicle is discussed in Section 5 and 6. The basic premise of a revised CAC is to provide flexibility in method selection for PM monitoring sites that are not needed for direct comparison to the NAAQS and for sample frequency relief. These sites would be allowed to use CAC monitors if they meet specified performance criteria. While the current provisions for CAC(s) only allow for a reduction in sample frequency of the accompanying FRM/FEM, the provision under consideration would also allow for a continuous monitor to be approved for use without the collocation of a FRM at sites that are not required for the NAAQS. This additional flexibility is being considered for CAC monitors since no agencies have yet to have a CAC approved and it would be better to enhance the usefulness of CACs rather than to have another provision in the regulation. This approach would potentially be targeted for those agencies that need to monitor for a number of monitoring objectives other than NAAQS attainment decisions. Thus while the CAC cannot be used for attainment decisions - it can be used to meet all other applicable monitoring objectives such as: public reporting, trends, mapping, and exposure. By allowing a portion of the currently required FRM sites in a network to be substituted with continuous monitors meeting performance based criteria, the monitoring agencies can realize a reduction in resource requirements while maintaining data delivery with an acceptable defined level of quality. Also, some of the remaining FRM sites would be collocated with the same continuous methods as the CAC's to provide the performance data for ongoing assessment of the continuous method. These revised CACs would be different than the conventional Federal Equivalent Methods (FEMs) in that they could only replace a limited number of sites and the CAC met the performance criteria specified in Section 6 - Performance Standards for Continuous Monitoring. CACs would be different from REMs in that they could not be used for direct attainment decisions and there would be much more flexibility in the use of data transformations as described in Section 7 - Data Transformation Policy and Guidance. This section describes the current provisions for CAC monitors and lays out the potential scope of using CACs in a revised network.

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. Since the CAC is not used for regulatory decision making the specific criteria for precision and bias at a site or network of sites will remain "goals" and not requirements. 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 CAC for use in their network. The table below identifies the suggested criteria and rationale for CACs:

Table 3-1 Test Specification for $PM_{2.5}$ CACs

Testing Requirement	Suggested Criteria for CACs	Rational for Criteria
Number of Test Sites	1 on a site by site basis or minimum of 2 for a network (see Table 3-2 below)	Need to demonstrate that the method can meet performance criteria at a specific site or multiple locations in a State or local 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 CAC site, 1 each for each additional site tested.	Need to have collocated candidate CACs 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	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 CACs	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 CACs	- 60 sample pairs - At least 15 sample pairs per season	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 CAC

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

Number of test sites for Collocated Acceptable Continuous monitors

The number of test sites for CACs depends on a number of factors such as whether one site or a network of sites is being considered for approval of a CAC and the homogeneity of the aerosol across the area of consideration. At a minimum, 2 sites are to be tested to support a candidate CAC across a network. 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 3-2 Test Site Specifications for $PM_{2.5}$ CACs

Geographical Area of Consideration for CAC	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

Since the monitoring objectives for CACs do not include direct comparison to the NAAQS, the approval procedures for use of a method should be streamlined. Thus the review procedures should be included in the annual network review that is submitted by the State, local or Tribal Agencies to the Region. The Region would work to determine that the performance criteria have been appropriately addressed and the continuous method is suitable for inclusion in the network. Since many agencies potentially seeking the CAC approach for relief from FRM sampling are expected to be substantially below that standard, the Regions should work towards approval of the CACs where they make sense and not prevent their approval if a specific goal is not met. For instance, one way for Regions to make a good decision on the approval of a CAC is to utilize the DQO tool that has been developed with inputs of a number of variables and see if the uncertainty around the NAAQS would be worse or better. If the goals for measurement uncertainty are ± 10% bias and 20% CV and the agency has a bias of 5% and CV of 23% with their continuous method, then the uncertainty around the NAAQS may actually be better.

Ongoing Evaluation of Method Performance

Since the CAC is not to be used for direct comparison to the NAAQS, the specific QA/QC requirements of the $PM_{2.5}$ quality system do not apply in a strict sense. However, since the data are to be used for a number of other important monitoring objectives the $PM_{2.5}$ quality system does apply in a qualitative sense. This means that agencies must develop appropriate measures to determine precision and bias estimates for the CAC monitors used in their network, but they are not held to specific numbers as if they were regulatory monitors. Additionally, the CACs should be appropriately addressed in the monitoring agencies Quality Assurance Project Plan (QAPP). Agencies should be evaluating the quality of their network on an ongoing basis and work to resolve problems as they are encountered.

Potential Use of CACs in $PM_{2.5}$ Monitoring Networks

The expected outcome of having a CAC approved for use at a site or 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 a potentially revised network.