



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JUL 24 2008

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Implementing Continuous PM_{2.5} Federal Equivalent Methods (FEMs) and Approved Regional Methods (ARMs) in State or Local Air Monitoring Station (SLAMS) Networks

FROM: Richard A. Wayland, Director 
Air Quality Assessment Division (C304-02)

TO: Regional Air Division Directors

I am writing to you to provide information on the use of PM_{2.5} FEMs and ARMs in the SLAMS network. As you may know, EPA's Office of Research and Development recently designated the Met One BAM-1020 monitor as an Automated Equivalent Method with designation number "EQPM-0308-170." This designation was published in Volume 73 of the Federal Register; see page 13224 on March 12, 2008. This is the first automated FEM for PM_{2.5} and others may follow or additionally monitoring agencies may eventually seek and receive approval of ARMs. Unlike non-approved PM_{2.5} continuous methods, monitors that utilize approved FEM or ARM methods produce data that are eligible for comparison to the PM_{2.5} national ambient air quality standards (NAAQS). With this in mind, I am providing a technical note which describes how to address implementation, reporting, and use of the data from FEMs and ARMs in the SLAMS network.

Please pass along this information to your staff members that work on review and approval of annual monitoring network plans as well as your leads for AQS data reporting. Also, ensure that this information is communicated to the appropriate monitoring managers and contacts in State, local, or Tribal air monitoring agencies that are already using or considering purchasing PM_{2.5} continuous monitors as FEMs or ARMs.

If you have specific questions on implementing PM_{2.5} continuous monitors as FEMs or ARMs, please contact Lewis Weinstock, Group Leader of the Ambient Air Monitoring Group in my Division. Lew can be reached at (919) 541-3661 or via email at: weinstock.lewis@epa.gov.

Attachment

cc: Tim Hanley – OAQPS
Ed Lillis – OAQPS
Phil Lorang – OAQPS
Jonathan Miller – OAQPS
Mike Papp – OAQPS
Mark Schmidt – OAQPS
Jake Summers – OAQPS
Richard Payton – EPA Region 8
Lewis Weinstock – OAQPS
Regional Monitoring Air Program Managers

**Technical Note on
Use of PM_{2.5} Federal Equivalent Methods (FEMs) and Approved Regional Methods
(ARMs) in State or Local Air Monitoring Station (SLAMS) Networks**

Summary:

A PM_{2.5} continuous monitor approved as an FEM may be designated as the primary monitor at a SLAMS, in which case, the Federal Reference Method (FRM) sampler can be discontinued, unless otherwise required (e.g., for QA purposes). Alternatively, the FEM can be collocated with SLAMS filter-based FRMs for an evaluation period and designated as a Special Purpose Monitor (SPM), or the FEM can be collocated as a SLAMS and used in calculations for comparison to the NAAQS on days that the primary sampler did not operate or was invalidated. ARMs can also be designated as a primary SLAMS, collocated SLAMS, or SPM; however, ARMs should not need an evaluation period since, by the nature of their testing and approval procedure, a 1-year study period demonstrating acceptable performance compared to collocated FRMs would already be completed in the network in which they are to be used. This technical note describes the applicable monitoring regulations that apply to each of these scenarios as well as the expected AQS reporting procedures.

Use of an FEM or ARM PM_{2.5} continuous monitor as the primary SLAMS monitor:

If an agency wishes to implement an automated FEM or ARM for PM_{2.5} monitoring for purposes of comparison to the NAAQS¹, it may do so at any SLAMS station at any time during the year. However, monitoring agencies are to notify their Regional Office through the network modification process prior to changing the designation of a station's *primary*² monitor. Once designated as the primary monitor, the agency is to submit all data from the FEM or ARM to AQS under parameter code 88101 – PM_{2.5} at local conditions, monitor type of "SLAMS," POC 3, and with the "Primary Monitor Periods" screen³ for this monitor populated with the applicable start date. If necessary, according to the QA requirements in Appendix A to 40 CFR Part 58, an FRM or second FEM would be collocated at the station. In cases where there are collocated

¹ Note: specific rules apply on the applicability of the PM_{2.5} NAAQS depending on the scale of representation and if the station is "population oriented." See §58.30 Special considerations for data comparisons to the NAAQS.

² "Primary" monitor refers to the FRM/FEM/ARM that is intended to be used for comparison to the NAAQS. Use of a "primary" monitor is provided for in Appendix N to Part 50, section 3.0(d)(1) which reads "The default data for a site shall consist of the measured concentrations recorded from the designated primary FRM/FEM/ARM monitor. The primary monitor shall be designated in the appropriate State or local agency PM Monitoring Network Description... All daily values produced by the primary sampler are considered part of the site record (i.e., that site's daily value); this includes all creditable samples and all extra samples."

³ The "Primary Monitor Periods" screen is planned for August 2008. A system user notification will be issued prior to implementing this screen. This screen will be available at the site level in AQS.

monitors being submitted to 88101 – PM_{2.5} at local conditions and precision statistics are desired, the “Collocation” screen in AQS will need to be populated.

Use of an FEM or ARM PM_{2.5} continuous monitor as a collocated SLAMS monitor:

If an agency wishes to collocate an automated FEM or ARM for PM_{2.5} monitoring as a SLAMS monitor, but retain the FRM for purposes of comparison to the NAAQS, it may do so at any SLAMS station at any time during the year. Once designated as SLAMS, but not the primary monitor, data from the FEM or ARM are eligible for use in calculations for comparison to the NAAQS on days that the primary monitor was either invalid or any day that the primary monitor did not operate. For this scenario, the agency is to submit all data from the FEM or ARM to AQS under parameter code 88101 – PM_{2.5} at local conditions, monitor type of “SLAMS,” POC 3, but keep the FRM as the primary monitor. Note: no edits are needed to the “Primary Monitor Periods” screen as the FRM is being retained as the primary monitor. Also, this type of collocation (FRM as the primary and FEM/ARM as a collocated monitor) does not meet any collocation requirements for QA purposes.

Use of an FEM PM_{2.5} continuous monitor as an SPM for purposes of evaluating the method:

The use of an evaluation period is optional at the discretion of the monitoring agency. We are recommending agencies perform an evaluation of an FEM method in one of the following two ways:

- I. Agencies that have experience with a method - For agencies that already have experience with a method and want to ensure a newly acquired monitor(s) is/are working correctly, a short “burn-in” period may be warranted. This period could be used by the monitoring agency for a number of purposes, such as time for monitoring staff to install, familiarize, perform necessary checks, write/edit SOP’s - including validation procedures, and train staff on the FEM; for quality assurance staff to audit the site including comparison to siting criteria and performing instrument audits such as temperature and flow rate; and for assessment staff to perform initial comparisons of the data produced by the FEM to collocated instruments and site to site comparisons. For some agencies, a burn-in period of a few weeks may be adequate to complete all the necessary activities. For other agencies, a minimum of 2 to 3 months may be necessary; however, no more than 90 days are to be used for a burn-in period. While data comparisons are encouraged during the burn-in period to ensure the specific FEM is performing well, these data comparisons should not be viewed as a substitute for a thorough evaluation across multiple seasons. If the FEM is installed at a SLAMS, a filter-based FRM must continue to operate as the primary monitor at the approved sample frequency until the FEM is designated as the primary monitor. During the burn-in period, data are not expected to be reported to AQS.
- II. Agencies that are new to a method - For those agencies that are operating a method for the first time (or operating existing monitors that have been newly upgraded to FEM status), a longer evaluation period may be warranted before transitioning from the FRM

to the FEM. In this case, an agency may evaluate one or more automated FEM(s) for PM_{2.5} monitoring at any monitoring station(s) at any time during the year. However, the following protocols are to be followed:

1. Evaluation periods are normally expected to run for 12 months following the date of installation or upgrading; however, in accordance with 40 CFR Part 58.20, agencies may use up to 24 months by continuing to designate their FEM as an SPM. FEMs designated as an SPM may not count toward minimally-required FRM/FEMs.
2. The classification of continuous PM_{2.5} monitors in an agency's network should be documented in the next annual monitoring network plan required by July 1 of each year. The plan should also describe the rationale and strategy for reclassifying such SPMs as SLAMS following the completion of the evaluation period.
3. During the evaluation period, a filter-based FRM must continue to operate as the primary monitor at the approved sampling frequency.
4. During the period of evaluation, the FEM is to be reported to AQS with parameter code 88101, monitor type "Special Purpose," POC 3.
5. Agencies should work closely with their EPA Regional Offices on evaluating the performance of the methods as compared with established performance criteria such as the Class III equivalency criteria stated in Subpart C of Part 53, section 53.35. For convenience, a spreadsheet-based tool is available to assist in this analysis. See: <http://www.epa.gov/ttn/amtic/pm25fem/>.
6. Prior to notifying the EPA Regional Office of switching the primary monitor to an FEM from the filter-based FRM, the monitoring agency will have appropriately updated their Quality Assurance Project Plan⁵.
7. Following completion of an evaluation period, monitoring agencies may implement the FEM as the primary monitor at any time during the year; however, for convenience, starting on January 1 or the beginning of a calendar quarter is preferred. When implementing the FEM as the primary monitor, agencies are to notify their Regional Office through the network modification process prior to changing the designation of a stations primary monitor. In AQS, the monitor type is to be changed from "SPECIAL PURPOSE" to "SLAMS" as well as updating the primary monitor periods screen, if necessary.

⁵ Quality Assurance Project Plans may be updated by including an addendum such as a Standard Operating Procedure (SOP). In some cases, approval of a QAPP has been delegated to the applicable monitoring agency by the EPA Regional Office.

The following table summarizes the applicable codes for AQS under each scenario:

Table – Applicable AQS Codes for Implementing FEM or ARM Methods

Scenario	Parameter Code	Populate “Primary Monitor Periods” Screen	Monitor Type	POC	Notes
Using the FEM or ARM as the Primary Monitor	88101	Yes	SLAMS	3 ¹	Region to be notified prior to date of implementing as primary.
Retaining the FRM as the Primary Monitor while using the FEM or ARM as a collocated monitor. Store Collocated FEM or ARM as:	88101	No	SLAMS	3 ²	Data from the FEM or ARM are eligible for comparison to the NAAQS on days that the FRM did not operate or have a valid sample.
Codes for a collocated FRM at a station that now has an FEM or ARM as the primary	88101	No	QA Collocated	1 or 2	Appropriate to keep same POC for the FRM at the site from prior to FEM implementation
Codes for a collocated FEM at a station that now has an FEM or ARM as the primary	88101	No	QA Collocated	4	See Appendix A of §58 for QA requirements
Short-term field implementation of an FEM		NA			Only intended to ensure method is up and running correctly as part of a burn-in period; i.e., not for method evaluation. Typical period < 90 days.
Long-term field evaluation of an FEM or ARM	88101	No	Special Purpose	3	Generally 12 months, but up to 24 months allowed ³

¹ The use of POC 3 for an FEM was not expected when a memo on Use of Collocated PM_{2.5} Data and Parameter Occurrence Codes was issued in December 1999. Today’s technical note supersedes the December 1999 memorandum where they are inconsistent.

² When performing NAAQS calculations, valid data from the “primary monitor” will be used. On days when the primary monitor is invalid or did not operate, collocated FRM/FEM/ARM data will be used in comparison to the NAAQS, with the exception that SPM data operating for less than 24 months will not be used.

³ Note: In accordance with §58.20, (c), “All data from an SPM using an FRM, FEM, or ARM which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the conditions of §58.30...”.