

Particulate Matter Emissions Summary Sheet

BACKGROUND:

- Particulate matter smaller than 2.5 micrometers in diameter (PM_{2.5}) emitted from stationary sources has two components, particles that are solid regardless of stack temperature (filterable) and gases that condense shortly after exiting the stack (condensable).
- PM-CON may be present any time the stack's temperature is greater than the ambient temperature, but most notably in stacks from combustion processes. With the exception of flue gas desulfurization (FGD), most air pollution control devices designed to control particulates do not control condensable particulate matter emissions. As a result, condensable PM emissions can easily out-weigh the filterable particulate matter emissions at the stack's exit. PM-CON emissions must be reported if available.
- Combustion, metallurgical & wood product sources emit large quantities of vapors that condense to form PM_{2.5}
 - Acids (e.g., sulfuric acid from coal combustion)
 - Neutralized acids (e.g., [NH₄]₂[SO₄], NH₄Cl)
 - Organic materials (e.g., alkanes, PAHs, PCBs, PCDDs, acids)
 - Metals (e.g., As, Se, Sb, Pb compounds) primary and secondary metals production
- Not all sources will have PM-CON emissions.
- A small fraction of point sources is responsible for the majority of CON-PM emissions. However, for applicable sources the condensable fraction of direct PM_{2.5} can be significant.
 - 10-50% of PM_{2.5} emissions depending on control measures, temp., and other source-specific conditions.
- For electric generating units (EGUs) burning oil or natural gas, condensable particulate matter (CPM) emissions can be greater than filterable emissions.

REPORTING REQUIREMENTS

Within the AERR, [40 CFR 51.15\(a\)\(1\)\(vi\)](#) and [PM SIP Requirement Rule \(81 FR 58033\)](#) states (with regard to what must be reported): "*Primary PM_{2.5}. As applicable, also report filterable and condensable components.*" The term "also" implies "in addition to total primary PM" and the phrase "as applicable" is intended to mean when such emissions are emitted from the source.

Species of PM that are valid pollutants and must be reported:

1. PM- Filterable (**PM-FIL**): PM that can be measured by being captured on a filter. By definition, not in the vapor state (Material in a vapor state will pass through a filter). Typical stack testing techniques will have either an in-stack filter or a filter located out of the stack but heated to near stack conditions.
2. PM₁₀-Filterable (**PM₁₀-FIL**): Filterable PM less than or equal to 10 microns in diameter.
3. PM_{2.5}-Filterable (**PM_{2.5}-FIL**): Filterable PM less than or equal to 2.5 microns in diameter.
4. PM-Condensable (**PM-CON**): Condensable PM that matter which exists as a vapor(gas) at stack conditions but condenses into liquid or solid particles after exiting the stack and being cooled by ambient conditions.

5. PM-Primary (**PM-PRI**): the sum of filterable and condensable. Report PM-PRI when you don't have anything else. (*EPA gap filled using PM Augmentation to estimate PM-CON*)

In former NEI datasets, where PM-CON emissions had not been provided by the facility, EPA had made their own condensable estimates to gap fill these data.

A combination of various estimation methods, such as AP-42 and the PM Calculator, now called the "PM Augmentation Tool", were used to estimate PM filterable and condensable emissions when site-specific stack test data is not available. Although emissions factors estimates are generated using well-established approaches, there are limitations over its consistency, accuracy that weakens data reliability in the inventory.

In more reliable estimating methods such as stack test data or vendor control device design guarantees are preferred over the use of AP-42 emission factors. If PM-CON stack test data has been collected using an appropriate EPA Reference Method, using those measured rates is the preferred method for creating a source-specific PM-CON emission factor. It is far better for facility estimates to be provided than it is for the EPA to make them. [Notice of EPA Re-designation of Certain Equivalent Methods for PM2.5 December 18, 2006](#). This methodology allows the EPA to derive missing PM10-FIL or PM25-FIL emissions from incomplete S/L/T agency submissions based on the source classification code (SCC) and PM controls that describe the emissions process.

Consistency QA checks in EIS_ Critical Checks - ALL pollutants for emissions process will be rejected IF:

- PM25-FIL > PM25-PRI
- PM10-FIL > PM10-PRI
- PM-CON > either PRI
- PM25-FIL > PM10-FIL
- PM25-PRI > PM10-PRI
- **Warning Check**
- Sum of FIL + CON not equal to PRI

It would be much more difficult for the EPA to assess (as part of evaluating an attainment plan) whether states have met the requirement to include condensable emissions, and thus a complete PM inventory, without the states providing condensable emissions as something separate and distinct from filterable and total PM.

In addition, having a complete emission inventory of filterable and condensable PM emissions will enable a state to better identify contributing sources and develop a more effective plan when needed.

How to measure CON-PM

PM-CON emissions data collected recently were measured using EPA Reference Method 202

In Method 202, an effluent gas stream, after passing through a filter to remove solid particulate, is bubbled through a series of impingers to collect CPM. In measuring CPM from combustion of fuels containing sulfur, it has been shown by EPA that SO₂ collected in the impingers can be oxidized to sulfate and produce a variable sulfate artifact that results in overestimation of condensable emissions. In this example, if impingers are not purged with nitrogen, errors associated with the sulfate artifact may be inflated. for more information on Method 202 and the nitrogen purge:

<http://www.epa.gov/ttn/emc/methods/method202.html>.

New electric generating units (EGU)s that are subject to (40 CFR part 60, subpart Da) without PM continuous emissions monitors (CEMs) have to conduct annual testing for condensable PM using Method 202 of appendix M of part 51.

HELPFUL LINKS

AERR [40 CFR 51.15\(a\)\(1\)\(vi\)](#)

[PM SIP Requirement Rule \(81 FR 58009, August 24, 2016\)](#)

Sources types expected to include PM-CON- Table 15,p.66 - [Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards \(NAAQS\) and Regional Haze Regulations-](#)

[April 2020 Release of 2017 NEI Technical Support Document \(TSD\) \(PDF\)](#)

[Air Emission Measurement Center EMC](#)

[Method 202 Revisions – Fact Sheet](#)

[Method 202 revisions Rule text](#)

[Methods for Measurement of Filterable PM10 and PM2.5 and Measurement of Condensable PM Emissions from Stationary Sources](#)

[Notice of EPA Re-designation of Certain Equivalent Methods for PM2.5 December 18, 2006](#)

[Interim Guidance on the treatment of condensable PM Test results in the PSD and NNSR permitting programs](#)

Selected Relevant Reporting requirements as per 40 CFR Part 51, Subpart A (Air Emissions Reporting Rule)

§ 51.15 What data does my state need to report to EPA?

(a) **Pollutants.** Report actual emissions of the following:
 (1) Required pollutants for triennial reports of annual (12-month) emissions for all sources and every-year reports of annual emissions from Type A sources:
 (i) Sulfur dioxide (SO₂).
 (ii) Volatile organic compounds (VOC).
 (iii) Nitrogen oxides (NO_x).
 (iv) Carbon monoxide (CO).
 (v) Lead and lead compounds.
 (vi) Primary PM_{2.5}. As applicable, also report filterable and condensable components.
 (vii) Primary PM₁₀. As applicable, also report filterable and condensable components.
 (viii) Ammonia (NH₃).

§ 51.20 What are the emission thresholds that separate point and nonpoint sources?

Sources that meet the definition of point source in this subpart must be reported as point sources. **All pollutants specified in § 51.15(a) must be reported for point sources, not just the pollutant(s) that qualify the source as a point source.**

All states are required to report two basic types of emission inventories to the EPA: An every-year inventory; and a triennial inventory.

(a) **Every-year inventory.** See Tables 2a and 2b of Appendix A of this subpart for the specific data elements to report every year.
 (1) All states are required to report every year the annual (12-month) emissions data described in § 51.15 from Type A (large) point sources, as defined in Table 1 of Appendix A of this subpart. The first every-year cycle inventory will be for the 2009 inventory year and must be submitted to the EPA within 12 months, i.e., by December 31, 2010.
 (2) In inventory years that fall under the triennial inventory requirements, the reporting required by the triennial inventory satisfies the every-year reporting requirements of paragraph (a) of this section.

(b) **Triennial inventory.** See Tables 2a and 2b to Appendix A of subpart A for the specific data elements that must be reported for the triennial inventories.
 (1) All states are required to report for every third inventory year the annual (12-month) emissions data as described in § 51.15. The first triennial inventory will be for the 2011 inventory and must be submitted to the EPA within 12 months, i.e., by December 31, 2012. Subsequent triennial inventories (2014, 2017, etc.) will be due 12 months after the end of the inventory year, i.e., by December 31 of the following year.

Appendix A to Subpart A of Part 51 - Tables

TABLE 1 TO APPENDIX A OF SUBPART A - EMISSION THRESHOLDS ¹ BY POLLUTANT FOR TREATMENT AS POINT SOURCE UNDER 40 CFR 51.30

Pollutant	Every-year	Triennial	
	Type A sources ²	Type B sources	NAA sources ³
(1) SO ₂	≥2500	≥100	≥100. PM _{2.5} (Serious) ≥70.
(2) VOC	≥250	≥100 within OTR ⁴ ≥50	≥100. within OTR ≥50. O ₃ (Serious) ≥50. O ₃ (Severe) ≥25. O ₃ (Extreme) ≥10. PM _{2.5} (Serious) ≥70.
(3) NO _x	≥2500	≥100	≥100. O ₃ (Serious) ≥50. O ₃ (Severe) ≥25. O ₃ (Extreme) ≥10. PM _{2.5} (Serious) ≥70.
(4) CO	≥2500	≥1000	≥1000. CO (all areas) ≥100.
(5) Lead		≥0.5 (actual)	≥0.5 (actual).
(6) Primary PM ₁₀	≥250	≥100	≥100. PM ₁₀ (Serious) ≥70.
(7) Primary PM _{2.5}	≥250	≥100	≥100. PM _{2.5} (Serious) ≥70.
(8) NH ₃	≥250	≥100	≥100. PM _{2.5} (Serious) ≥70.

¹ Thresholds for point source determination shown in tons per year of potential to emit as defined in 40 CFR part 70, with the exception of lead. Reported emissions should be in actual tons emitted for the required time period.
² Type A sources are a subset of the Type B sources and are the larger emitting sources by pollutant.
³ NAA = Nonattainment Area. The point source reporting thresholds vary by attainment status for SO₂, VOC, NO_x, CO, PM₁₀, PM_{2.5}, and NH₃.