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MEMORANDUM

TO: Regional Directors
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Central Office Air Managers

CC: Jeffery A. Steers, Director of Central Operations

FROM: Michael G. Dowd, Director, Air and Renewable Energy Division [per email]

SUBJECT: Air Permitting Guidance Memo No. APG-110 – Air Permit Guidance for Condensable Emissions in Particulate Pollutants

DATE: 8/28/2020

Purpose:
This document briefly recounts this history, focusing on the current state of particulates regulation for Virginia's Regulations for the Abatement and Control of Air Pollution. The air pollutant family "particulate matter" (hereafter referred to as particulates) has a long history that has created confusion with the regulated community, the public, and Agency personnel. The majority of this confusion is due to differing uses of the term, particulate matter or PM, for example in National Ambient Air Quality Standards (NAAQS), New Source Performance Standard (NSPS), and Virginia's Regulations. This document summarizes the recent history of particulates. Currently there are three types of particulates described and discussed in this guidance document.

Electronic Copy:
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- The Virginia Regulatory Town Hall under the Department of Environmental Quality (http://www.townhall.virginia.gov/L/gdocs.cfm?agencynumber=440);

Contact Information:
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Certification:
As required by Subsection B of § 2.2-4002.1 of the APA, the agency certifies that this guidance document conforms to the definition of a guidance document in § 2.2-4101 of the Code of Virginia.

Disclaimer:
This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, it does not mandate any particular method nor does it prohibit any alternative method. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

APG-110 – Air Permit Guidance for Condensable Emissions in Particulate Pollutants

A. Introduction

This document contains a discussion of permitting with regard to the particulate matter family (PM, PM10, PM2.5) referred to generally as particulates, including a summary of the pollutants, viable approaches for reviewing applications, and writing permit limits associated with these pollutants. There has been a variety of statements by EPA regarding the condensable fraction of particulates that have further confused the topic; therefore, this guidance is intended to resolve the confusion regarding this pollutant.

The background for the following discussion is from Virginia and EPA rulemakings. The full and complete documents are found at the following locations:

- Virginia Rev. A13: http://townhall.virginia.gov/L/ViewAction.cfm?actionid=3923
- EPA 10/25/2012 Rule - https://www.govinfo.gov/content/pkg/FR-2012-10-25/pdf/2012-25978.pdf
- EPA 3/16/2012 Rule - https://www.govinfo.gov/content/pkg/FR-2012-03-16/pdf/2012-6429.pdf
- EPA 5/16/2008 Rule - https://www.govinfo.gov/content/pkg/FR-2008-05-16/pdf/E8-10768.pdf

B. Terms

The terms in this section are defined by the regulations at 9VAC5-10-10. The language here attempts to summarize these definitions and their usage to clarify the topic as a whole.

Particulate Matter – This term is defined in Chapter 10 but can is used in different ways depending on the context of the speaker. For the purpose of this document, it describes the whole gamut of particulate pollutants (i.e., any particulate that is less than 100 microns aerodynamic diameter). This term is also used to describe each class of particulate – (e.g., PM10 is particulate matter less than or equal to 10 microns). "Particulate Matter" has been used informally to refer to whichever particulate size being discussed at the time. It is generally considered to consist of two "fractions": filterable particulate matter (particulate matter that would be collected by a Method 5 or 201A filter sampling gas within a stack) and condensable particulate matter (particulate matter that would be collected by a Method 202 sampling train and exists in the gaseous phase within a stack but which then condenses to form solid or liquid particles after exiting a stack). These two forms of particulate matter are often referred to as filterable PM or the filterable fraction (of the total amount of particulate matter) and condensable PM or the condensable fraction. Caution is urged when using the term condensable PM; either condensables or the condensable fraction is suggested over "condensable PM." Also, it may be clearer in discussions of the topic to use "particulates" in lieu of particulate matter when referring to the family of particulate pollutants (PM, PM10, PM2.5).

TSP – Total Suspended Particulate – This pollutant was the original National Ambient Air Quality Standard (NAAQS) particulate pollutant. There was never an approved stack testing method for this pollutant, simply ambient air monitoring. EPA used PM as a surrogate for

TSP and promulgated Method 5 as the compliance determination method. Therefore, regardless of the nomenclature in any permit, limitations in permits are always for PM and never for TSP. TSP ceased being a regulated pollutant after promulgation of the PM10 standard[1].

PM – This term is frequently used to describe the whole gamut of particulate pollutants, which may cause confusion. In permitting (and throughout this document), PM refers to "Particulate Matter emissions" and describes the original stack test particulate pollutant that was a surrogate for total suspended particulate (TSP). This pollutant is often referenced in the current version of Article 6 as "Particulate Matter (PM)." Once TSP was removed as a criteria pollutant (pollutant with a NAAQS), the only reason PM continues to be regulated for new source review is because it is regulated by the Clean Air Act (PM is the pollutant regulated by NSPS, MACT, and Chapter 40). Article 6 continues to regulate PM[2] in accordance with APG-354. The PM compliance determination method is Method 5. This pollutant consists of only the filterable fraction of particulate with the exception of Wool Fiberglass Insulation facilities (NSPS PPP). NSPS PPP uses Method 5E, which collects some condensable particulate; however, the method is not equivalent to Method 202.

PM10 – Particulate Matter less than or equal to 10µm – This is a criteria pollutant (pollutant with a NAAQS). Regulated as a health-based pollutant (unlike the non-criteria pollutant PM), PM10 includes both forms of particulate, filterable and condensable. This pollutant is often referenced in the current version of Article 6 as "Particulate Matter (PM10)". While this pollutant includes both types of particulate, most control technologies do not affect the condensable fraction so some limitations may need to denote that they apply to "filterable only" to be accurate. If a "filterable only" limit is needed, a second limit that covers both the filterable and condensable fraction is necessary[3]. It is unlikely to be appropriate or necessary to limit only the condensable fraction.

PM2.5 – Particulate Matter less than or equal to 2.5µm – This is a criteria pollutant (pollutant with a NAAQS). As a health-based pollutant (unlike PM), PM2.5 includes all forms of particulate, filterable and condensable. This pollutant is often referenced in the current version of Article 6 as "Particulate Matter (PM2.5)". While this pollutant includes both types of particulate, most control technologies do not affect the condensable fraction so some limitations may need to denote that they apply to "filterable only" to be accurate. If a "filterable only" limit is needed, a second limit that covers both the filterable and condensable fraction is necessary[4]. It is generally not appropriate or necessary to limit only the condensable fraction. All condensable particulate emissions are assumed to be less than or equal to 2.5µm.

[1] The TSP ambient air quality standard in 9VAC5-30-20 was repealed effective April 1, 1999. In 1987, EPA had replaced the TSP standard with the PM10 standard.
[2] Title V applicability with regard to PM is determined by APG-103.
[3] As of 1/1/2011, permits need to limit the entire pollutant so a combination of limitations may be warranted.
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C. Discussion

Since the initial promulgation of PM10 as a pollutant, there has been inconsistent implementation. Until EPA's 2008 rulemaking regarding PM2.5, there was no clear requirement the condensable fraction of PM10 be included in permit limits; therefore, many emission limits only considered the filterable fraction. However, certain permit actions before 2008 recognized, estimated, and included the condensable fraction for PM10 emission limits (usually where condensable fraction emission factors were available from AP-42). In either situation, it is likely the resulting emission limit only refers to "PM10" emissions and does not add a clarifier such as "total," "filterable only," or "filterable+condensable." EPA made the differences between particulate species less clear with its 5/16/2008 rulemaking. In this rule, EPA indicated condensable emissions were also to be accounted for in estimating PM emissions. This error was corrected in the 10/25/2012 rulemaking which clarified that PM does not include the condensable fraction.

9VAC5-80-1100M provides that consideration of the condensable fraction for PM10 and PM2.5 is dependent in part on the age of the emission limit, with the important date being January 1, 2011. For emission limits issued prior to this date, the permit writer should examine the development of the limit to see if the condensable fraction was considered. This examination should be conducted on an emission limit by emission limit basis because a single permit approval may have resulted in multiple emission limits that each addressed condensables differently. It is recognized that certain source categories (concrete batch plants, non-metallic mineral processing, etc.) are unlikely to emit condensables. This review of the permit record would include the application and any DEQ analysis of that application. If the record review clearly demonstrates the condensable fraction was included in the development of the emission limit, then the condensable fraction must also be used in determining compliance. However, if only the filterable fraction was considered or if there is no clear evidence that the condensable fraction was considered, that emission limit only pertains to the filterable portion of PM10 and/or PM2.5. When a permit is undergoing a change (e.g., due to an amendment or project) but the PM10 and PM2.5 emission limits are not the subject of the action, it may be appropriate to clarify the older limit by adding (filterable only) after the pollutant. This clarification of the pollutant considered by the emission limit may be accomplished via administrative amendment upon the source's request because it does not impact the permit. This approach does not enable any other changes, such as numeric changes, to the emission limit.

Any permits for PM10 and PM2.5 that have been issued after January 1, 2011 must include both the filterable and condensable fractions. Remember that, based upon the current regulations, simply listing PM10 or PM2.5 requires condensable inclusion based on the definition of each pollutant. It is not necessary to add any clarifying language that the emission limit includes the condensable fraction. For PM10 and PM2.5 emission limits after January 1, 2011, the only special modifier needed is "filterable only." This circumstance may occur due to a control device that only removes the filterable fraction of the pollutant, such as a baghouse. In certain circumstances, a permit writer may determine additional specificity is necessary. In such a case, the permit may have two limits: one PM2.5 (filterable only) after baghouse control and one PM2.5 that includes both fractions.

Where condensable emissions are not expected from an emission unit, an emission limit should still cover the entire pollutant (by default, this is the case) and should not exclude condensable emissions.

Prior to 2011, sources and the Agency often presumed that PM emissions were equal to PM10 emissions (i.e., PM=PM10). This was an acceptable practice as condensable emissions were not often considered, but the inclusion of condensables for PM10 and PM2.5 (but not PM) now requires special consideration of each pollutant. Proper communication with the source is needed when a source proposes emissions estimations where PM=PM10=PM2.5. The permit writer should get confirmation, or additional information, from the source such that the final PM10 and PM2.5 calculations and emission limits, if needed, include the condensable fraction. The permit writer should also confirm that the PM emissions do not include the condensable fraction except where the NSPS requires it (e.g., NSPS PPP).

When working on a project that is subject to permitting for PM10 and/or PM2.5 and the "current" permit contains pre-2011 emission limits for that pollutant, care must be taken to ensure the project undergoing review at this time considers the condensable fraction. The new permit approval must have an emission limit that includes the condensable fraction. The handling of the previous emission limit is highly case-specific and likely ranges from leaving the prior emission limit as-is to 'superseding' that emission limit with the new emission limit that includes both fractions. Case-specific considerations will range from control technologies in use to interaction of the limit with major NSR applicability.

Chapter 40, NSPS, and MACT regulate particulate matter in many rules. These regulations pertain to PM emissions, not PM10 or PM2.5. Therefore, these rules do not include the condensable fraction except where the rule's compliance method requires it (e.g., NSPS PPP).

When determining BACT and writing the resulting emission limit, it is important to understand the control device's impact on the condensable fraction, if any.

D. Summary of Actions to Be Taken

- References to TSP in existing emission limits are changed to PM at the next issuance/amendment of a permit. This would qualify as an administrative amendment as PM was and is the pollutant regulated by the permit regulations (Chapter 80 and its predecessors) for stack emissions. Newly created emission limits should never reference or address TSP.
- Any references to PM (or Particulate Matter (PM)) are calculated using only the filterable fraction. Any new emission limits should only limit PM (or Particulate Matter (PM)). References to Total PM, or PM (filterable+condensable), in existing emission limits should be revised to remove the condensable fraction at the next issuance/amendment of a permit[5]. The emission limit should be calculated based on

[5] This is dependent on the timeframe and scope associated with each particular action and may not be appropriate for every action.

the filterable fraction only and the revised emission limit should list "PM" instead of Total PM or any variant thereof. Any future compliance determination would utilize the applicable NSPS reference method. It is not appropriate to just delete the word 'Total' without lowering the limit by removing the condensable fraction.

- The treatment of PM10 and PM2.5 emission limits is dependent on the date the limit was issued.
    - Newly created PM10 and PM2.5 emission limits include filterable and condensable emissions unless otherwise noted (see final item in list).
    - References to Total PM10 and Total PM2.5 in existing emission limits are revised to PM10 and PM2.5 at the next issuance/amendment of a permit.
    - If a permit is being re-issued or amended and contains pre-2011 PM10 or PM2.5 emission limits, the permit writer should review the record to determine each limit's basis (filterable only or filterable+condensable). If a limit pertains to only one portion, that emission limit retains the extra designation (filterable only or condensable only). The permit writer needs to consider, on a case-by-case basis, if the re-issued or amended emission limit should be updated to include both the filterable and condensable fractions or remain filterable only. In either case, the emission limit should use the proper nomenclature.
- Where pre-2011 emission limits, or emissions calculations, for PM10 or PM2.5 did not include the condensable fraction and are part of a current project review, it is proper to add the condensable fraction when calculating CUE so the permit applicability comparison (NUE-CUE) is "apples to apples." At no point should the NUE exclude the condensable fraction for PM10 and PM2.5 emissions calculations.
- Filterable only PM10 or PM2.5 emission limits may still be necessary on a case-by-case basis, such as representing filterable control as BACT in certain cases. It may also be possible, but unlikely, that a need to regulate condensable only is necessary.

<u>Example 1</u>

Assuming an emissions unit has the following breakdown of particulates:
filterable PM (> 10 microns) = 8 lb/hr
filterable PM (> 2.5 but < 10 microns) = 4 lb/hr
filterable PM (< 2.5 microns) = 1 lb/hr
Condensable PM = 10 pph

The resulting pollutant emission rates are as follows:
PM = 13 lb/hr
PM10 = 15 lb/hr
PM2.5 = 11 lb/hr

Example 2
A permit issued in 2007 contains the following emissions limits:

1. The natural gas boiler emissions shall not exceed the following:

PM	2 lb/hr
Total PM10	8 lb/hr

2. The diesel engine emissions shall not exceed the following:

PM/PM10	2 lb/hr

In this case, it is clear the emission limit in Condition 1 includes the condensable fraction for PM10. Condition 2 utilized the PM=PM10 approach and includes only the filterable fraction. When reissuing the permit for a change to the boiler but not the engine, the limits should end up as follows:

1. The natural gas boiler emissions shall not exceed the following:

PM	2 lb/hr
PM10	8 lb/hr

2. The diesel engine emissions shall not exceed the following:

PM	2 lb/hr
PM10 (filterable only)	2 lb/hr

The above source submits an application for installation of an asphalt dryer. BACT is applicable for PM and PM10 and results in fabric filter control. The permit writer determines specification of the different fractions is appropriate based on the case-specific circumstances. The following Condition 3 is added to the permit:

3. The asphalt dryer emissions shall not exceed the following:

PM	0.01 gr/dscf	0.8 lb/hr
PM10 (filterable only)	0.01 gr/dscf	
PM10		2.8 lb/hr

The preceding example is provided to show the proper nomenclature to use based on this guidance document. It is not intended to promote any particular case-by-case outcome.