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(Adopted December 16, 2015)

6-5-100 GENERAL

6-5-101 **Description:** This rule limits the emissions of particulate matter, including filterable and condensable particulate matter ~~emissions~~ from petroleum refinery fluidized catalytic cracking units (FCCUs) as well as emissions of precursors of secondary particulate matter. Regulation 6, Rule 1 addresses filterable particulate emissions from FCCUs. For the purposes of this rule, commingled ~~ammonia, condensable particulate and sulfur dioxide~~ emissions from an FCCU and one or more other sources from a single exhaust point shall all be considered to be FCCU emissions as described in District Regulation 1, Section 107.

6-5-110 EXEMPTIONS

6-5-111 **Limited Exemption, Emissions Abated by Wet Scrubber:** The emission limit for ammonia in Section 6-5-301.1 ~~requirements of this rule~~ shall not apply to sources that are abated by a wet scrubber that is required to be operated by a District permit and that constitutes best available control technology (BACT) for any pollutant when permitted or constructed.

Amended December 19, 2018

6-5-112 **Limited Exemption, Emissions during Startup or Shutdown Periods:** The emission limit for ammonia in Section 6-5-301.1 and short-term seven-day rolling average emission limit for sulfur dioxide in ~~requirements of~~ Section 6-5-301.2.2 shall not apply to emissions during an FCCU startup or shutdown period. FCCU startup and shutdown periods shall be as defined in this rule, unless a different period is specified in a District Permit to Operate for an FCCU, in which case the Permit to Operate shall take precedence. This exemption is also applicable to a non-FCCU source with startup or shutdown provisions specified in a Permit to Operate, if that source is subject to the requirements of Section 6-5-301 because the source emissions are commingled with those of an FCCU at a single exhaust point; the startup or shutdown provisions specified in the Permit to Operate shall be the basis for this exemption. Whenever this exemption applies to any source, it shall apply to all sources with commingled emissions.

6-5-113 **Deleted [date of adoption]** ~~**Limited Exemption, Installation of Wet Scrubber:** The emission limit effective date for ammonia in Section 6-5-301 may be extended to a later date specified in a District Authority to Construct for an existing FCCU to be controlled with a new wet scrubber, but may not be extended by more than 36 months.~~

6-5-114 **Limited Exemption, FCCU without Nitrogen-Based Additives:** The emission limit for ammonia in Section 6-5-301.1 shall not apply to an FCCU where ammonia, urea or any other nitrogen-based additive is not used in a way that contributes to ammonia or condensable particulate FCCU emissions.

6-5-115 **Limited Exemption, Ammonia Optimization:**

115.1 Before [5 years after date of adoption], ~~T~~the ammonia emission limit in Section 6-5-301.1 shall not apply to the owner/operator of a petroleum refinery that implements an optimization of ammonia and/or urea injection in accordance with Section 6-5-403.

115.2 Effective [5 years after date of adoption], the ammonia emission limit in Section 6-5-301.1 shall apply to all owner/operators previously exempt under Section 6-5-115.1.

6-5-200 **DEFINITIONS**

6-5-201 **Ammonia Slip:** Ammonia slip is the amount of unreacted ammonia emitted to the atmosphere from the FCCU, regardless of the source of the ammonia.

6-5-202 **Catalyst Regeneration Unit (CRU):** A catalyst regeneration unit regenerates spent FCCU catalyst by burning off the coke that has deposited on the catalyst surface. The resulting CRU flue gas is the primary emission source addressed by this rule.

6-5-203 **Condensable Particulate Matter:** Liquid droplets that coalesce, or gaseous emissions that condense to form liquid or solid particles. These liquid and/or solid particles are identified as condensable organic or condensable inorganic particulate matter using EPA Test Method 202.

6-5-204 **Daily Average:** The arithmetic mean of the measured ammonia emissions subject to Section 6-5-301.1 on any calendar day that the FCCU operates.

6-5-205 **FCCU Shutdown:** Unless otherwise specified in a District Permit to Operate, FCCU shutdown is a period which begins when fresh feed flow to the FCCU reactor stops and ends when the main blower for catalyst recirculation is shutdown.

6-5-206 **FCCU Startup:** Unless otherwise specified in a District Permit to Operate, FCCU startup is a period not exceeding 120 hours which begins with the startup of the main blower for introduction of catalyst and ends after fresh feed is introduced to the FCCU reactor, when the process reaches steady state.

6-5-207 **Fluidized Catalytic Cracking Unit (FCCU):** A fluidized catalytic cracking unit (FCCU) is a processing unit that converts heavy petroleum fractions, typically from crude oil distillation units, into lighter fuel intermediates by using a fine, powdered catalyst to promote a chemical reaction in which the heavy petroleum molecules are broken into smaller molecules. In addition to the cracking reactor, an FCCU includes a catalyst regeneration unit (CRU), ancillary equipment including blowers, and all equipment for controlling air pollutant emissions and recovering heat.

6-5-208 **Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties that processes crude oil to produce more usable products such as gasoline, diesel fuel, aviation fuel, lubricating oils, asphalt or petrochemical feedstocks. petroleum refinery processes include separation processes (e.g., atmospheric or

vacuum distillation, and light ends recovery), petroleum conversion processes (e.g., cracking, reforming, alkylation, polymerization, isomerization, coking, and visbreaking) petroleum treating processes (e.g., hydrodesulfurization, hydrotreating, chemical sweetening, acid gas removal, and deasphalting), feedstock and product handling (e.g., storage, blending, loading, and unloading), auxiliary facilities (e.g., boilers, waste water treatment, hydrogen production, sulfur recovery plant, cooling towers, blowdown systems, compressor engines, and power plants).

6-5-209 **Primary Particulate Matter:** Material emitted to the atmosphere as filterable or condensable particulate matter.

6-5-210 **Secondary Particulate Matter:** Material emitted to the atmosphere in a gaseous form that will not coalesce or condense to a solid or liquid form at atmospheric temperature and pressure, but that may react in the atmosphere into a solid or liquid form. For the purposes of this rule, precursors of Secondary Particulate Matter shall include sulfur dioxide (SO_2) and ammonia.

6-5-211 **Wet Scrubber:** A device that removes air pollutants from gas streams by contacting the gas stream with a scrubbing liquid.

6-5-212 **Total Particulate Matter 10 Microns or Less in Diameter (Total PM_{10}):** Material emitted to the atmosphere as filterable particulate matter or condensable particulate matter less than 10 microns in diameter.

6-5-213 **Total Particulate Matter 2.5 Microns or Less in Diameter (Total $PM_{2.5}$):** Material emitted to the atmosphere as filterable particulate matter or condensable particulate matter less than 2.5 microns in diameter.

6-5-300 STANDARDS

6-5-301 **Fluidized Catalytic Cracking Unit (FCCU) Emission Limits:** The owner/operator of a petroleum refinery that includes an FCCU shall not cause emissions to the atmosphere from the FCCU that exceed the limits in Table 1 on or after the indicated effectiveness date:

Table 1 – FCCU Emission Limits

Section	Pollutant	Emission Limit		Effective Date
301.1	Ammonia	10 ppmvd at 3% O_2 as a daily average		January 1, 2018 or [5 years after date of adoption] for an owner/operator previously exempt under Section 6-5-115.1
301.2	Sulfur Dioxide	2.1	25 ppmvd at 0% O_2 on a 365-day rolling average basis; and	[5 years after date of adoption]
		2.2	50 ppmvd at 0% O_2 on a 7-day rolling average basis	[5 years after date of adoption]

301.3	Total PM_{10}	0.010 gr/dscf at 5% O_2 on a rolling four-quarter average basis	[5 years after date of adoption]

Amended December 19, 2018

6-5-400 ADMINISTRATIVE REQUIREMENTS

6-5-401 Ammonia Control Plan and Permit Applications: No later than January 1, 2017, the owner/operator of a petroleum refinery subject to the ammonia emission limit in Section 6-5-301.1 shall submit to the APCO a control plan detailing the measures, if any, to be taken in order to meet the requirements of Section 6-5-301.1, and also applications for all Authorities to Construct necessary for compliance with Section 6-5-301.1.

6-5-402 Ammonia Monitoring Plan: No later than January 1, 2017, the owner/operator of a petroleum refinery that includes an FCCU subject to the ammonia emission limit in Section 6-5-301 shall submit to the APCO a plan for the installation of an ammonia monitoring system to perform monitoring as required by Section 6-5-501. This plan shall identify the proposed monitoring technique, monitoring equipment, installation details and installation schedule.

6-5-403 Ammonia Optimization: Effective until [5 years after date of adoption], a~~A~~s an alternative to compliance with the ammonia emission limit of Section 6-5-301 per the limited exemption in Section 6-5-115.1, the owner/operator of a petroleum refinery may instead establish an enforceable ammonia emission limit for the FCCU that results in the minimization of total FCCU $PM_{2.5}$ emissions (including all condensable particulate matter), as follows:

403.1 No later than March 1, 2016, the petroleum refinery owner/operator shall submit to the APCO an Optimization and Demonstration Protocol for the purpose of establishing the minimum rate of ammonia and/or urea injection necessary to minimize total $PM_{2.5}$ FCCU emissions (including all condensable particulate matter) while complying with all existing permit requirements, excluding permit requirements that are not based on District BACT requirements, on District prohibitory rule limits or on federal consent decrees. The Optimization Protocol shall include the ammonia and/or urea injection rates to be evaluated and the criteria for selecting these rates, and also the criteria for determining the Optimized Ammonia Emissions Concentration that minimizes total FCCU $PM_{2.5}$ emissions.

403.2 Within 60 days, the APCO shall either approve or disapprove the Optimization and Demonstration Protocol.

403.3 The petroleum refinery owner/operator shall commence and complete the Optimization and Demonstration Protocol, approved by the APCO, no later than June 30, 2017.

403.4 The petroleum refinery owner/operator shall report to the APCO the results of the Optimization and Demonstration Protocol and the proposed Optimized Ammonia Emissions Concentration no later than August 31, 2017. No later than this same date, the petroleum refinery owner/operator shall submit a District permit application to 1) establish the Optimized Ammonia Emissions Concentration as an enforceable permit requirement, and to 2) relax any

existing permit conditions that are not based on District BACT requirements, on District prohibitory rule limits or on federal consent decrees to the extent necessary to minimize total FCCU $PM_{2.5}$ emissions.

403.5 Disapproval of an Optimization and Demonstration Protocol, or a failure to meet any requirement or deadline in this section shall not constitute a violation of this rule, but shall preclude the applicability of the limited exemption in Section 6-5-115.1.

6-5-404 Reporting Requirements: The owner/operator of a petroleum refinery that includes an FCCU subject to the requirements in Section 6-5-301 shall submit a written report for each calendar month to the APCO. The report shall be due by the 30th day following the end of the calendar month. The report shall be submitted electronically in an APCO approved format and shall include a summary of the data obtained from the monitoring systems required or source testing conducted pursuant to Sections 6-5-501 and 6-5-503.

6-5-500 MONITORING AND RECORDS

6-5-501 Ammonia Monitoring: The owner/operator of a petroleum refinery that includes an FCCU subject to the ammonia emission limit in Section 6-5-301.1 shall, no later than January 1, 2018, operate one of the following:

501.1 A mass-balance monitoring system that includes all of the following:

1.1 Parametric monitors that comply with District Regulation 1, Section 523 to continuously measure the injection or addition rate (pounds per hour) of ammonia, urea or any other nitrogen-based additive into the emission stream, and;

1.2 Continuous emission monitors that comply with District Regulation 1, Section 522 to continuously measure NOx and oxygen concentrations at appropriate locations to allow a calculation of the amount of ammonia and/or urea consumed in NOx-reduction reactions, and therefore the remaining, emitted amount of non-consumed ammonia.

501.2 Any other ammonia emission monitoring system approved in writing by the APCO.

6-5-502 Sulfur Dioxide Monitoring: No later than [5 years after the date of adoption], the owner/operator of a petroleum refinery that includes an FCCU subject to the sulfur dioxide limits in Section 6-5-301.2 shall comply with the monitoring requirements of District Regulation 1: General Provisions and Definitions, Sections 1-520 and 522.

6-5-503 Total PM_{10} and Total $PM_{2.5}$ Monitoring: No later than [5 years after the date of adoption], the owner/operator of a petroleum refinery that includes an FCCU subject to the Total PM_{10} emission limit in Section 6-5-301.3 shall implement one of the following:

503.1 A source testing protocol that includes, at a minimum, one source test each calendar quarter for Total PM_{10} and Total $PM_{2.5}$ emissions in accordance with the test methods listed in Sections 6-5-604 and 605. During each source test, the owner/operator shall monitor and record, at a minimum, all operating data

for the selected operating parameters of the FCCU control equipment, fresh feed rate, and flue gas flow rate.

503.2 Any other Total PM_{10} and Total $PM_{2.5}$ emission monitoring system approved in writing by the APCO.

6-5-~~502~~504 ~~Ammonia~~ Records: The owner/operator of a petroleum refinery subject to the ~~ammonia emission limit~~ requirements in Section 6-5-301 shall maintain records of the data required to be measured in Sections 6-5-501, 502, and 503. These records shall be kept for a period of at least five years and shall be made available to the APCO on request.

6-5-600 MANUAL OF PROCEDURES

6-5-601 Compliance Determination: All compliance determinations shall be made in the as-found operating condition. Source tests shall meet the requirements set forth in District Manual of Procedures, Volume IV, Source Test Policy and Procedures. No compliance determinations shall be made for the emission limit for ammonia in Section 6-5-301.1 and short-term seven-day rolling average emission limit for sulfur dioxide in Section 6-5-301.2.2 during periods subject to the exemption in Section 6-5-112.

6-5-602 Determination of Ammonia and Oxygen: Determination of ammonia shall be by Regulation 1, Section 522 NOx monitors or other APCO approved ammonia monitoring systems that have been installed pursuant to Section 6-5-501 and that meet the applicable requirements for ammonia monitoring set forth in the District Manual of Procedures. Determination of oxygen shall be by Regulation 1, Section 522 oxygen monitor. Compliance with the ammonia limits in Section 6-5-301.1 shall be determined by the monitoring systems that have been installed pursuant to Section 6-5-501.

6-5-603 Determination of Sulfur Dioxide: Compliance with the sulfur dioxide limits in Section 6-5-301.2 shall be determined by a monitoring system that meets the requirements of District Regulation 1, Section 522.

6-5-604 Determination of Total Particulate Matter 10 Microns or Less in Diameter (Total PM_{10}): Determination of Total PM_{10} shall be by the summation of filterable PM_{10} as measured by EPA Test Method 201A and condensable PM as measured by EPA Test Method 202. Compliance with the Total PM_{10} limit in Section 6-5-301.3 shall be determined by the time-weighted average of all source tests conducted in accordance with the District Manual of Procedures during the previous four calendar quarters.

6-5-605 Determination of Total Particulate Matter 2.5 Microns or Less in Diameter (Total $PM_{2.5}$): Determination of Total $PM_{2.5}$ shall be by the summation of filterable $PM_{2.5}$ as measured by EPA Test Method 201A and condensable PM as measured by EPA Test Method 202.