

Subpart J - Standards of Performance for Petroleum Refineries

Applicability - §60.100

General	<ol style="list-style-type: none"> 1.) The provisions of this subpart are applicable to the following affected facilities in petroleum refineries: fluid catalytic cracking unit catalyst regenerators, fuel gas combustion devices, and all Claus sulfur recovery plants except Claus plants of 20 long tons per day (LTD) or less. The Claus sulfur recovery plant need not be physically located within the boundaries of a petroleum refinery to be an affected facility, provided it processes gases produced within a petroleum refinery. 2.) Any fluid catalytic cracking unit catalyst regenerator or fuel gas combustion device under paragraph (1) of this section which commences construction or modification after June 11, 1973, or any Claus sulfur recovery plant under paragraph (1) of this section which commences construction or modification after October 4, 1976, is subject to the requirements of this subpart except as provided under paragraphs (3) and (4) of this section. 3.) Any fluid catalytic cracking unit catalyst regenerator under paragraph (2) of this section which commences construction or modification on or before January 17, 1984, is exempted from §60.104(b). 4.) Any fluid catalytic cracking unit in which a contact material reacts with petroleum derivatives to improve feedstock quality and in which the contact material is regenerated by burning off coke and/or other deposits and that commences construction or modification on or before January 17, 1984, is exempt from this subpart. 5.) For purposes of this subpart, under §60.15, the "fixed capital cost of the new components" includes the fixed capital cost of all depreciable components which are or will be replaced pursuant to all continuous programs of component replacement which are commenced within any 2-year period following January 17, 1984. For purposes of this paragraph, "commenced" means that an owner or operator has undertaken a continuous program of component replacement or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of component replacement
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Emission Standards

Source	SOx - §60.104
General	<ol style="list-style-type: none"> 1.) Facilities shall comply with the emission limitations set forth in this section on and after the date on which the initial performance test, is completed, but not later than 60 days after achieving the maximum production rate at which the affected facility will be operated, or 180 days after initial startup, whichever comes first. 2.) Facility may not burn in any fuel gas combustion device any fuel gas that contains hydrogen sulfide (H₂S) in excess of 230 mg/dscm (0.10 gr/dscf). 3.) The combustion in a flare of process upset gases or fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this paragraph. 4.) Compliance is determined daily on a 7-day rolling average basis using the appropriate procedures outlined in §60.106. 5.) A minimum of 22 valid days of data shall be obtained every 30 rolling successive calendar days when complying with paragraph (2) of this section. 6.) Each process in the fluid catalytic cracking unit fresh feed must have a total sulfur content no greater than 0.30 percent by weight.

Emission Standards Cont.

General	SO _x - §60.104	CO - §60.104	PM - §60.102
Fluid catalytic cracking unit catalyst regenerator		<ol style="list-style-type: none"> 1.) Facility shall not emit any gases that contain carbon monoxide (CO) in excess of 500 ppm by volume (dry basis). 2.) Facility shall comply with the emission limitations after the date on which the initial performance test, required by §60.8, is completed, but not later than 60 days after achieving the maximum production rate, or 180 days after initial startup, whichever comes first. 	<ol style="list-style-type: none"> 1.) Facility shall comply with the emission limitations after the date on which the initial performance test, required by §60.8, is completed, but not later than 60 days after achieving the maximum production rate, or 180 days after initial startup, whichever comes first. 2.) Facility shall not emit particulate matter in excess of 1.0 kg/1000 kg (1.0 lb/1000 lb) of coke burn-off in the catalyst regenerator. 3.) Facility shall not emit gases exhibiting greater than 30 percent opacity, except for one six-minute average opacity reading in any one hour period.
Any Claus sulfur recovery plant using an oxidation control system or a reduction control system followed by incineration.	Facility may not emit any gases greater than 250 ppm by volume (dry basis) of sulfur dioxide (SO ₂) at zero percent excess air		
Any Claus sulfur recovery plant using a reduction control system not followed by incineration.	Facility may not emit any gases greater than 300 ppm by volume of reduced sulfur compounds and 10 ppm by volume of hydrogen sulfide (H ₂ S), each calculated as ppm SO ₂ by volume (dry basis) at zero percent excess air		
Fluid catalytic cracking unit catalyst regenerator with an add-on control device	Facility must reduce sulfur dioxide emissions to the atmosphere by 90 percent or maintain sulfur dioxide emissions to the atmosphere less than or equal to 50 ppm by volume (vppm), whichever is less stringent.		
Fluid catalytic cracking unit catalyst regenerator without the use of an add-on control device	Facility must maintain sulfur oxides emissions calculated as sulfur dioxide to the atmosphere less than or equal to 9.8 kg/1,000 kg coke burn-off		

Facilities where the gases discharged by the fluid catalytic cracking unit catalyst regenerator pass through an incinerator or waste heat boiler in which auxiliary or supplemental liquid or solid fossil fuel is burned			Facility may emit to the atmosphere 1.0 kg/1000 kg (1.0 lb/1000 lb) , except that the incremental rate of particulate matter emissions shall not exceed 43.0 g/MJ (0.10 lb/million Btu) of heat input attributable to such liquid or solid fossil fuel.
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Monitoring of Emissions and Operations - §60.105

Source	SO _x	CO	PM
General	For periods of excess emissions all averages, shall be determined as the arithmetic average of the applicable 1-hour averages, e.g., the rolling 3-hour average shall be determined as the arithmetic average of three contiguous 1-hour averages.	<ol style="list-style-type: none"> 1.) For periods of excess emissions, all averages shall be determined as the arithmetic average of the applicable 1-hour averages, e.g., the rolling 3-hour average shall be determined as the arithmetic average of three contiguous 1-hour averages. 2.) For periods of excess carbon monoxide emissions all 1-hour periods during which the average CO concentration as measured by the CO continuous monitoring system under §60.105(a)(2) exceeds 500 ppm. 	<ol style="list-style-type: none"> 1.) For periods of excess opacity, all averages shall be determined using all 1-hour periods that contain two or more 6- minute periods during which the average opacity exceeds 30 percent. 2.) For periods of excess carbon monoxide emissions, all 1-hour periods during which the average CO concentration as measured by the CO continuous monitoring system under §60.105(a)(2) exceeds 500 ppm.

<p>Fuid catalytic cracking unit catalyst regenerators</p>	<ol style="list-style-type: none"> 1.) Facility shall install, calibrate, maintain, and operate a continuous monitoring system to monitor and record concentrations of SOx. 2.) The continuous monitoring systems are operated and data recorded during all periods of operation including periods of startup, shutdown, or malfunction, except for continuous monitoring system breakdowns, repairs, calibration checks, and zero and span adjustments. 3.) The owner or operator shall follow appendix F, Procedure 1, including quarterly accuracy determinations and daily calibration drift tests, for the continuous monitoring system. 4.) When emission data are not obtained because of continuous monitoring system breakdowns, repairs, calibration checks and zero and span adjustments, emission data will be obtained by using one of the following methods to provide emission data for a minimum of 18 hours per day in at least 22 out of 30 rolling successive calendar days. 5.) The average coke burn-off rate (thousands of kilograms per hour) and hours of operation shall be recorded daily 6.) See §60.105 (d) (1-13) for specific requirements. 	<p>The average coke burn-off rate (thousands of kilograms per hour) and hours of operation shall be recorded daily</p>	<ol style="list-style-type: none"> 1.) Facility shall install, calibrate, maintain, and operate a continuous monitoring system for continuously monitoring and recording the opacity. The span values shall be 60, 70, or 80 percent opacity. 2.) The average coke burn-off rate (thousands of kilograms per hour) and hours of operation shall be recorded daily
<p>Fuel gas combustion devices</p>	<ol style="list-style-type: none"> 1.) Facility shall install, calibrate, maintain, and operate an instrument for continuously monitoring and recording the concentration by volume (dry basis, zero percent excess air) of SO2 emissions into the atmosphere 2.) The monitor shall include an oxygen monitor for correcting the data for excess air. 3.) In place of the SO2 monitor the facility may use an instrument for continuously monitoring and recording the concentration (dry basis) of H2S in fuel gases before being burned. *see §60.105 (a) (3 and 4) for specific requirements. 4.) Periods of excess emissions shall be determined and reported as found in §60.105 (e) (3). 		

<p>Claus sulfur recovery plants with oxidation control systems or reduction control systems followed by incineration</p>	<ol style="list-style-type: none"> 1.) Facility shall install, calibrate, maintain, and operate an instrument for continuously monitoring and recording the concentration (dry basis, zero percent excess air) of SO₂ emissions into the atmosphere. The monitor shall include an oxygen monitor for correcting the data for excess air.*see §60.105 (a) (5) for specific requirements. 2.) Periods of excess emissions shall be determined and reported as found in §60.105 (e) (4). 		
<p>Claus sulfur recovery plants with reduction control systems not followed by incineration</p>	<ol style="list-style-type: none"> 1.) Facility shall install, calibrate, maintain, and operate an instrument for continuously monitoring and recording the concentration of reduced sulfur and O₂ emissions into the atmosphere. The reduced sulfur emissions shall be calculated as SO₂ (dry basis, zero percent excess air). 2.) In place of the reduced sulfur monitor, facility may install an instrument using an air or O₂ dilution and oxidation system to convert the reduced sulfur to SO₂ for continuously monitoring and recording the concentration (dry basis, zero percent excess air) of the resultant SO₂. The monitor shall include an oxygen monitor for correcting the data for excess oxygen. *see §60.105 (a) (6 and 7) for specific requirements. 3.) Periods of excess emissions shall be determined and reported as found in §60.105 (e) (3). 		

Test Methods and Procedures - §60.106

Source	SO _x	CO	PM
General	<ol style="list-style-type: none"> 1.) Facility shall determine compliance with the SO₂ and the H₂S and reduced sulfur standards using Method 6 to determine the SO₂ concentration see §60.106(f) (1) for specific requirements. 2.) Facility shall determine compliance with the H₂S standard using the methods found in §60.106(e). 3.) Facility shall use Method 15 to determine the reduced sulfur and H₂S concentrations. see §60.106 (f) (2). 4.) The oxygen concentration used to correct the emission rate for excess air shall be obtained by the integrated sampling and analysis procedure of Method 3. See §60.106 (f) (3). 5.) Each performance test conducted for the purpose of determining compliance with the SO_x standard shall consist of all testing performed over a 7-day period using the applicable test methods and procedures specified in this section. 6.) For the purpose of determining compliance with § 60.104(b)(1) the calculation procedures found in §60.106 (h) (1-6) shall be used. 7.) For the purpose of determining compliance with §60.104(b)(2), the reference methods and calculation procedures found in §60.106 (i) (1-12) shall be used. 8.) For the purpose of determining compliance with §60.104(b)(3), the analytical methods and calculation procedures found in §60.106 (j) (1-3) shall be used. 9.) The test methods used to supplement continuous monitoring system data to meet the minimum data requirements in §60.104(d) will be used as described in §60.106 (k) or as otherwise approved by the Administrator. 	<p>Facility shall determine compliance with the CO standard by using the integrated sampling technique of Method 10 to determine the CO concentration (dry basis).The sampling time for each run shall be 60 minutes.</p>	<ol style="list-style-type: none"> 1.) Facility shall determine compliance with the particulate matter emission rate using the equation found in §60.106 (b) (1). 2.) Facility shall use Method 5B or 5F to determine particulate matter emissions and associated moisture content from affected facilities without wet FGD systems. see §60.106 (b) (2) for specific requirements. 3.) Facility shall compute the coke burn-off rate using the equation found in §60.106 (b) (3). 4.) Facility shall use Method 9 and the procedures of §60.11 to determine opacity. 5.) If auxiliary liquid or solid fossil-fuels are burned in in incinerator-waste heat boiler, the owner or operator shall determine the emission rate of PM permitted in §60.102(b) using the equations found in §60.106 (c).

Reporting and Record Keeping - §60.107

Source	SOx
General	<ol style="list-style-type: none"> 1.) Each facility subject to §60.104(b) shall notify the Administrator of the specific provisions of §60.104(b) with which the owner or operator seeks to comply. Notification shall be submitted with the notification of initial startup required by §60.7(a)(3). If an owner or operator elects at a later date to comply with an alternative provision of §60.104(b), then the Administrator shall be notified by the owner or operator in the quarterly (or semiannual) report described in paragraphs (3) and (4) of this section for the quarter during which the change occurred. 2.) Facility shall record and maintain each 7-day rolling average compliance determination. 3.) Facility shall submit a report each quarter except as provided by paragraph (d) of this section. The information found in §60.107 (c) shall be contained in each quarterly report. 4.) If no exceedances occur in a quarter, and if the owner or operator has not changed the standard under §60.104(b) under which compliance is obtained, then the owner or operator may submit a semiannual report in which a statement is included that states that no exceedances had occurred during the affected quarter(s). If the owner or operator elects to comply with an alternative provision of §60.104(b), a quarterly report must be submitted for the quarter during which a change occurred. 5.) For any periods for which sulfur dioxide or oxides emissions data are not available, the owner or operator of the affected facility shall submit a signed statement indicating if any changes were made in operation of the emission control system during the period of data unavailability which could affect the ability of the system to meet the applicable emission limit. Operations of the control system and affected facility during periods of data unavailability are to be compared with operation of the control system and affected facility before and following the period of data unavailability. 6.) The owner or operator of the affected facility shall submit a signed statement certifying the accuracy and completeness of the information contained in the report.
Fluid catalytic cracking unit catalyst regenerator with an add-on control device	<p>Facility shall record and maintain the following information:</p> <ol style="list-style-type: none"> 1.) All data and calibrations from continuous monitoring systems located at the inlet and outlet to the control device, including the results of the daily drift tests and quarterly accuracy assessments required under appendix F, Procedure 1; 2.) Measurements obtained by supplemental sampling (refer to §60.105(a)(13) and §60.106(k)) for meeting minimum data requirements; and 3.) The written procedures for the quality control program required by appendix F, Procedure 1.
Fluid catalytic cracking unit catalyst regenerator without an add-on control device	<p>Facility shall record and maintain the measurements obtained in the daily Method 8 testing, or those obtained by alternative measurement methods, if §60.106(i)(12) applies.</p>
Fluid catalytic cracking unit catalyst regenerator; with processes in the unit fresh feed that has a total sulfur content of less than 30 percent.	<p>Facility shall record and maintain the data obtained from the daily feed sulfur tests.</p>

Performance test and Compliance Provisions - §60.108

Source	All Emissions
General	<ol style="list-style-type: none">1.) Section 60.8(d) shall apply to the initial performance test specified under paragraph (3) of this section, but not to the daily performance tests required thereafter as specified in §60.108(d). Section 60.8(f) does not apply when determining compliance with the standards specified under §60.104(b). Performance tests conducted for the purpose of determining compliance under §60.104(b) shall be conducted according to the applicable procedures specified under §60.106.2.) Owners or operators who seek to comply with §60.104(b)(3) shall meet that standard at all times, including periods of startup, shutdown, and malfunctions.3.) The initial performance test shall consist of the initial 7-day average calculated for compliance with §60.104(b)(1), (b)(2), or (b)(3).4.) After conducting the initial performance test prescribed under §60.8, the owner or operator of a fluid catalytic cracking unit catalyst regenerator subject to §60.104(b) shall conduct a performance test for each successive 24-hour period thereafter. The daily performance tests shall be conducted according to the appropriate procedures specified under §60.106. In the event that a sample collected under §60.106(i) or (j) is accidentally lost or conditions occur in which one of the samples must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operators' control, compliance may be determined using available data for the 7- day period.5.) Each owner or operator subject to §60.104(b) who has demonstrated compliance with one of the provisions of §60.104(b) but at a later date seeks to comply with another of the provisions of §60.104(b) shall begin conducting daily performance tests as specified under paragraph (4) of this section immediately upon electing to become subject to one of the other provisions of §60.104(b). The owner or operator shall furnish the Administrator a written notification of the change in a quarterly report that must be submitted for the quarter in which the change occurred.