

APPENDIX A: WEB CHAPTER 14, SECTION 2 MONITORING PROTOCOLS

Protocol WEB-1: SO₂ Monitoring of Fuel Gas Combustion Devices

1. Applicability

(a) The provisions of this protocol are applicable to fuel gas combustion devices at petroleum refineries.

(b) Fuel gas combustion devices include boilers, process heaters, and flares used to burn fuel gas generated at a petroleum refinery.

(c) Fuel gas means any gas which is generated and combusted at a petroleum refinery. Fuel gas does not include: (1) natural gas, unless combined with other gases generated at a petroleum refinery, (2) gases generated by a catalytic cracking unit catalyst regenerator, (3) gases generated by fluid coking burners, (4) gases combusted to produce sulfur or sulfuric acid, or (5) process upset gases generated due to startup, shutdown, or malfunctions.

2. Monitoring Requirements

(a) Except as provided in paragraphs (b) and (c) of this Section 2, fuel gas combustion devices shall use a continuous fuel gas monitoring system (CFGMS) to determine the total sulfur content (reported as H₂S) of the fuel gas mixture prior to combustion, and continuous fuel flow meters to determine the amount of fuel gas burned.

(1) Fuel gas combustion devices having a common source of fuel gas may be monitored for sulfur content at one location, if monitoring at that location is representative of the sulfur content of the fuel gas being burned in any fuel gas combustion device.

(2) The CFGMS shall meet the performance requirements in Performance Specification 2 in Appendix B to 40 CFR part 60, and the following:

(i) Continuously monitor and record the concentration by volume of total sulfur compounds in the gaseous fuel reported as ppmv H₂S.

(ii) Have the span value set so that the majority of readings fall between 10 and 95% of the range.

(iii) Record negative values of zero drift.

(iv) Calibration drift shall be 5.0% of the span.

(v) Methods 15A, 16, or approved alternatives for total sulfur, are

the reference methods for the relative accuracy test. The relative accuracy test shall include a bias test in accordance with paragraph 4(c) of this section.

(3) All continuous fuel flow meters shall comply with the applicable provisions of Appendix D to 40 CFR part 75.

(4) The hourly mass SO₂ emissions shall be calculated using the following equation:

$$E = (C_S)(Q_f)(K)$$

where:

E = SO₂ emissions in lbs/hr

C_S = Sulfur content of the fuel gas as H₂S(ppmv)

Q_f = Fuel gas flow rate (scfh)

$K = 1.660 \times 10^{-7}$ (lb/scf)/ppmv

(b) In place of a CFGMS in paragraph (a) of this Section 2, fuel gas combustion devices having a common source of fuel gas may be monitored with an SO₂ CEMS and flow CEMS at only one location, if the CEMS monitoring at that location is representative of the SO₂ emission rate (lb SO₂/scf fuel gas burned) of all applicable fuel gas combustion devices. Continuous fuel flow meters shall be used in accordance with paragraph (b), and the fuel gas combustion device monitored by a CEMS shall have separate fuel metering.

(1) Each CEMS for SO₂ and flow shall comply with the operating requirements, performance specifications, and quality assurance requirements of 40 CFR part 75.

(2) All continuous fuel flow meters shall comply with the applicable provisions of Appendix D to 40 CFR part 75.

(3) The SO₂ mass emissions for all the fuel gas combustion devices monitored by this approach shall be determined by the ratio of the amount of fuel gas burned by the CEMS-monitored fuel gas combustion device to the total fuel gas burned by all applicable fuel gas combustion devices using the following equation:

$$E_t = (E_m)(Q_t)/(Q_m)$$

where: E_t = Total SO₂ emissions in lbs/hr from applicable fuel gas combustion devices.

E_m = SO₂ emissions in lbs/hr from the CEMS-monitored fuel gas combustion device.

Q_t = Fuel gas flow rate (scfh) from applicable fuel gas combustion devices.

Q_m = Fuel gas flow rate (scfh) from the CEMS-monitored fuel gas combustion device.

(c) In place of a CFGMS in paragraph (a) of this section, fuel gas combustion

devices having a common source of fuel gas may be monitored with an SO₂ - diluent CEMS at only one location, if the CEMS monitoring at that location is representative of the SO₂ emission rate (lb SO₂/mmBtu) of all applicable fuel gas combustion devices. If this option is selected, the owner or operator shall conduct fuel gas sampling and analysis for gross calorific value (GCV), and shall use continuous fuel flow metering in accordance with paragraph (a) of this Section 2, with separate fuel metering for the CEMS-monitored fuel gas combustion device.

(1) Each SO₂-diluent CEMS shall comply with the applicable provisions for SO₂ monitors and diluent monitors in 40 CFR part 75, and shall use the procedures in section 3 of Appendix F to part 75 for determining SO₂ emission rate (lb/mmBtu) by substituting the term SO₂ for NO_x in that section.

(2) All continuous fuel flow meters and fuel gas sampling and analysis for GCV to determine the heat input rate from the fuel gas shall comply with the applicable provisions of Appendix D to 40 CFR part 75.

(3) The SO₂ mass emissions for all the fuel gas combustion devices monitored by this approach shall be determined by the ratio of the fuel gas heat input to the CEMS-monitored fuel gas combustion device to the total fuel gas heat input to all applicable fuel gas combustion devices using the following equation:

$$E_t = (E_m)(H_t)/(H_m)$$

where: E_t = Total SO₂ emissions in lbs/hr from applicable fuel gas combustion devices.

E_m = SO₂ emissions in lb/mmBtu from the CEMS - monitored fuel gas combustion device.

H_t = Fuel gas heat input (mmBtu/hr) from applicable fuel gas combustion devices.

H_m = Fuel gas heat input (mmBtu/hr) from the CEMS - monitored fuel gas combustion device.

3. Certification/Recertification Requirements

All monitoring systems are subject to initial certification and recertification testing as follows:

(a) The owner or operator shall comply with the initial testing and calibration requirements in Performance Specification 2 in Appendix B of 40 CFR part 60 and paragraph 2 (a)(2) of this section for each CFGMS.

(b) Each CEMS for SO₂ and flow or each SO₂-diluent CEMS shall comply with the testing and calibration requirements specified in 40 CFR part 75, section 75.20 and Appendices A and B, except that each SO₂-diluent CEMS shall meet the relative accuracy requirements for a NO_x-diluent CEMS (lb/mmBtu).

(c) A continuous fuel flow meter shall comply with the testing and calibration

requirements in 40 CFR part 75, Appendix D.

4. Quality Assurance/Quality Control Requirements

(a) A quality assurance/quality control (QA/QC) plan shall be developed and implemented for each CEMS for SO₂ and flow or the SO₂-diluent CEMS in compliance with Appendix B of 40 CFR part 75.

(b) A QA/QC plan shall be developed and implemented for each continuous fuel flow meter and fuel sampling and analysis in compliance with Appendix B of 40 CFR part 75.

(c) A QA/QC plan shall be developed and implemented for each CFGMS in compliance with sections 1 and 1.1 of Appendix B of 40 CFR part 75, and the following:

(1) Perform a daily calibration error test of each CFGMS at two gas concentrations, one low level and one high level. Calculate the calibration error as described in Appendix A to 40 CFR part 75. An out of control period occurs whenever the error is greater than 5.0% of the span value.

(2) In addition to the daily calibration error test, an additional calibration error test shall be performed whenever a daily calibration error test is failed, whenever a monitoring system is returned to service following repairs or corrective actions that may affect the monitor measurements, or after making manual calibration adjustments.

(3) Perform a linearity test once every operating quarter. Calculate the linearity as described in Appendix A to 40 CFR part 75. An out of control period occurs whenever the linearity error is greater than 5.0 percent of a reference value, and the absolute value of the difference between average monitor response values and a reference value is greater than 5.0 ppm.

(4) Perform a relative accuracy test audit once every four operating quarters. Calculate the relative accuracy as described in Appendix A to 40 CFR part 75. An out of control period occurs whenever the relative accuracy is greater than 20.0% of the mean value of the reference method measurements.

(5) Using the results of the relative accuracy test audit, conduct a bias test in accordance with Appendix A to 40 CFR part 75, and calculate and apply a bias adjustment factor if required.

5. Missing Data Procedures

(a) For any period in which valid data are not being recorded by an SO₂ CEMS or flow CEMS specified in this section, missing or invalid data shall be replaced with substitute data in accordance with the requirements in Subpart D of 40 CFR part 75.

(b) For any period in which valid data are not being recorded by an SO₂-diluent CEMS specified in this section, missing or invalid data shall be replaced with substitute data on a rate basis (lb/mmBtu) in accordance with the requirements for SO₂ monitors in Subpart D of 40 CFR part 75.

(c) For any period in which valid data are not being recorded by a continuous fuel flow meter or for fuel gas GCV sampling and analysis specified in this section, missing or invalid data shall be replaced with substitute data in accordance with missing data requirements in Appendix D to 40 CFR part 75.

(d) For any period in which valid data are not being recorded by the CFGMS specified in this section, hourly missing or invalid data shall be replaced with substitute data in accordance with the missing data requirements for units performing hourly gaseous fuel sulfur sampling in section 2.4 of Appendix D to 40 CFR part 75.

6. Monitoring Plan and Reporting Requirements

In addition to the general monitoring plan and reporting requirements of Section 2(h) of Chapter 14, the owner or operator shall meet the following additional requirements:

(a) The monitoring plan shall identify each group of units that are monitored by a single monitoring system under this Protocol WEB-1, and the plan shall designate an identifier for the group of units for emissions reporting purposes. For purpose of submitting emissions reports, no apportionment of emissions to the individual units within the group is required.

(b) If the provisions of paragraphs 2(b) or (c) are used, provide documentation and an explanation to demonstrate that the SO₂ emission rate from the monitored unit is representative of the rate from non-monitored units.

Protocol WEB-2: Predictive Flow Monitoring Systems for Kilns with Positive Pressure Fabric Filter

1. Applicability

The provisions of this protocol are applicable to cement kilns or lime kilns that (1) are controlled by a positive pressure fabric filter, and (2) have operating conditions upstream of the fabric filter that the WEB source documents would reasonably prevent reliable flow monitor measurements.

2. Monitoring Requirements

(a) A cement or lime kiln with a positive pressure fabric filter shall use a predictive flow monitoring system (PFMS) to determine the hourly kiln exhaust gas flow.

(b) A PFMS is the total equipment necessary for the determination of exhaust gas

flow using process or control device operating parameter measurements and a conversion equation, a graph, or computer program to produce results in cubic feet per hour.

(c) The PFMS shall meet the following performance specifications:

(1) The PFMS must allow for the automatic or manual determination of failed monitors. At a minimum a daily determination must be performed.

(2) The PFMS shall have provisions to check the calibration error of each parameter that is individually measured. The owner or operator shall propose appropriate performance specifications in the initial monitoring plan for all parameters used in the PFMS comparable to the degree of accuracy required for other monitoring systems used to comply with this Rule. The parameters shall be tested at two levels, low: 0 to 20% of full scale, and high: 50 to 100% of full scale. The reference value need not be certified.

(3) The relative accuracy of the PFMS must be $\leq 10.0\%$ of the reference method average value, and include a bias test in accordance with paragraph 4(c) of this section.

3. Certification Requirements

The PFMS is subject to initial certification testing as follows:

(a) Demonstrate the ability of the PFMS to identify automatically or manually a failed monitor.

(b) Provide evidence of calibration testing of all monitoring equipment. Any tests conducted within the previous 12 months of operation that are consistent with the QA/QC plan for the PFMS are acceptable for initial certification purposes.

(c) Perform an initial relative accuracy test over the normal range of operating conditions of the kiln. Using the results of the relative accuracy test audit, conduct a bias test in accordance with Appendix A to 40 CFR part 75, and calculate and apply a bias adjustment factor if required.

4. Quality Assurance/Quality Control Requirements

A QA/QC plan shall be developed and implemented for each PFMS in compliance with sections 1 and 1.1 of Appendix B of 40 CFR part 75, and the following:

(a) Perform a daily monitor failure check.

(b) Perform calibration tests of all monitors for each parameter included in the PFMS. At a minimum, calibrations shall be conducted prior to each relative accuracy test audit.

(c) Perform a relative accuracy test audit and accompanying bias test once every four operating quarters. Calculate the relative accuracy (and bias adjustment factor) as described in Appendix A to 40 CFR part 75. An out of control period occurs whenever the flow relative accuracy is greater than 10.0% of the mean value of the reference method.

5. Missing Data

For any period in which valid data are not being recorded by the PFMS specified in this section, hourly missing or invalid data shall be replaced with substitute data in accordance with the flow monitor missing data requirements for non-load based units in Subpart D of 40 CFR part 75.

6. Monitoring Plan Requirements

In addition to the general monitoring plan requirements of Section 2(h) of Chapter 14, the owner or operator shall meet the following additional requirements:

(a) The monitoring plan shall document the reasons why stack flow measurements upstream of the fabric filter are unlikely to provide reliable flow measurements over time.

(b) The initial monitoring plan shall explain the relationship of the proposed parameters and stack flow, and discuss other parameters considered and the reasons for not using those parameters in the PFMS. The State of Wyoming may require that the subsequent monitoring plan include additional explanation and documentation for the reasonableness of the proposed PFMS.