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Where:

C_s = Annual net contribution to calculated emissions from carbon in solid materials (kg/yr).

$(F_{sf})_{i,n}$ = Mass of solid feedstock i introduced in month “ n ” (kg).

$(CC_{sf})_{i,n}$ = Average carbon content of solid feedstock i for month “ n ” (kg C per kg of feedstock).

$(P_{sp})_{i,n}$ = Mass of solid product i produced in month “ n ” (kg).

$(CC_{sp})_{i,n}$ = Average carbon content of solid product i in month “ n ” (kg C per kg of product).

j = Number of feedstocks.

k = Number of products.

(iv) *Annual emissions.* Use the results from Equations X-1 through X-3 of this section, as applicable, in Equation X-4 of this section to calculate annual CO₂ emissions.

$$CO_2 = 0.001 * \frac{44}{12} * (C_g + C_l + C_s) \quad (\text{Eq. X-4})$$

Where:

CO₂ = Annual CO₂ mass emissions from process operations and process off-gas combustion (metric tons/year).

0.001 = Conversion factor from kg to metric tons.

44 = Molecular weight of CO₂ (kg/kg-mole).

12 = Atomic weight of carbon (C) (kg/kg-mole).

(d) *Optional combustion methodology for ethylene production processes.* For any ethylene production process, calculate CO₂ emissions from combustion of fuel that contains ethylene process off-gas using the Tier 3 or Tier 4 methodology in subpart C of this part, and calculate CH₄ and N₂O emissions using the applicable procedures in § 98.33(c) (use the emission factors for “Petroleum” in Table C-2 of subpart C of this part (General Stationary Fuel Combustion Sources)). You are not required to use the same Tier for each stationary combustion unit that burns ethylene process off-gas. For each flare, calculate CO₂, CH₄, and N₂O emissions using the methodology specified in § 98.253(b)(1) through (b)(3).

§ 98.244 Monitoring and QA/QC requirements.

(a) If you use CEMS to determine emissions from process vents, you must comply with the procedures specified in § 98.34(c).

(b) If you use the mass balance methodology in § 98.243(c), use the procedures specified in paragraphs (b)(1) through (b)(4) of this section to determine feedstock and product flows and carbon contents.

(1) Operate and maintain belt scales or other weighing devices as described in Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices NIST Handbook 44 (2009) (incorporated by reference, *see* § 98.7) or follow procedures specified by the measurement device manufacturer. Calibrate the measurement device according to the procedures specified by the method, the procedures specified by the manufacturer, or § 98.3(i). Recalibrate either biennially or at the minimum frequency specified by the manufacturer.

(2) Operate and maintain all flow meters for gas and liquid feedstocks and products by following the procedures in § 98.3(i) and using any of the flow meter methods specified in paragraphs (b)(2)(i) through (b)(2)(xv) of this section, as applicable, use a standard method published by a consensus-based standards organization (e.g., ASTM, API, etc.), or follow procedures specified by the flow meter manufacturer or § 98.3(i). Recalibrate each flow meter either biennially or at the minimum frequency specified by the manufacturer.

(i) ASME MFC-3M-2004 Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi (incorporated by reference, *see* § 98.7).

(ii) ASME MFC-4M-1986 (Reaffirmed 1997) Measurement of Gas Flow by Turbine Meters (incorporated by reference, *see* § 98.7).

(iii) ASME MFC-5M-1985 (Reaffirmed 1994) Measurement of Liquid Flow in Closed Conduits Using Transit-Time Ultrasonic Flowmeters (incorporated by reference, *see* § 98.7).

(iv) ASME MFC-6M-1998 Measurement of Fluid Flow in Pipes Using Vortex Flowmeters (incorporated by reference, *see* § 98.7).

(v) ASME MFC-7M-1987 (Reaffirmed 1992) Measurement of Gas Flow by Means of Critical Flow Venturi Nozzles (incorporated by reference, *see* § 98.7).

(vi) ASME MFC-9M-1988 (Reaffirmed 2001) Measurement of Liquid Flow in Closed Conduits by Weighing Method (incorporated by reference, *see* § 98.7).

(vii) ASME MFC-11M-2006 Measurement of Fluid Flow by Means of Coriolis Mass Flowmeters (incorporated by reference, *see* § 98.7).

(viii) ASME MFC-14M-2003 (Reaffirmed 2008), Measurement of Fluid Flow Using Small Bore Precision Orifice Meters (incorporated by reference, *see* § 98.7).

(ix) ASME MFC-16-2007 Measurement of Liquid Flow in Closed Conduits with Electromagnetic Flowmeters (incorporated by reference, *see* § 98.7).

(x) ASME MFC-18M-2001 (Reaffirmed 2006), Measurement of Fluid Flow Using Variable Area Meters (incorporated by reference, *see* § 98.7).

(xi) ASME MFC-22-2007 Measurement of Liquid by Turbine Flowmeters (incorporated by reference, *see* § 98.7).

(xii) AGA Report No. 3: Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids, Part 1: General Equations and Uncertainty Guidelines (1990), Part 2: Specification and Installation Requirements (2000) (incorporated by reference, *see* § 98.7).

(xiii) AGA Transmission Measurement Committee Report No. 7: Measurement of Natural Gas by Turbine Meter (2006)/February (incorporated by reference, *see* § 98.7).

(xiv) AGA Report No. 11: Measurement of Natural Gas by Coriolis Meter (2003) (incorporated by reference, *see* § 98.7).

(xv) ISO 8316: Measurement of Liquid Flow in Closed Conduits—Method by Collection of the Liquid in a Volumetric Tank (1987-10-01) First Edition (incorporated by reference, *see* § 98.7).

(3) Perform tank level measurements (if used to determine feedstock or product flows) according to any standard method published by a consensus-based standards organization (e.g., ASTM, API, etc.) or follow procedures speci-

fied by the measurement device manufacturer or § 98.3(i). Calibrate the measurement devices prior to the effective date of the rule, and recalibrate either biennially or at the minimum frequency specified by the manufacturer or § 98.3(i).

(4) Use any of the standard methods specified in paragraphs (b)(4)(i) through (b)(4)(x) of this section, as applicable, to determine the carbon content or composition of feedstocks and products and the average molecular weight of gaseous feedstocks and products. Calibrate instruments in accordance with the method and as specified in paragraphs (b)(4)(i) through (b)(4)(x), as applicable. For coal used as a feedstock, the samples for carbon content determinations shall be taken at a location that is representative of the coal feedstock used during the corresponding monthly period. For carbon black products, samples shall be taken of each grade or type of product produced during the monthly period. Samples of coal feedstock or carbon black product for carbon content determinations may be either grab samples collected and analyzed monthly or a composite of samples collected more frequently and analyzed monthly. Analyses conducted in accordance with methods specified in paragraphs (b)(4)(i) through (b)(4)(x) of this section may be performed by the owner or operator, by an independent laboratory, or by the supplier of a feedstock.

(i) ASTM D1945-03, Standard Test Method for Analysis of Natural Gas by Gas Chromatography (incorporated by reference, *see* § 98.7).

(ii) ASTM D6060-96 (Reapproved 2001) Standard Practice for Sampling of Process Vents With a Portable Gas Chromatograph (incorporated by reference, *see* § 98.7).

(iii) ASTM D2505-88 (Reapproved 2004)e1 Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography (incorporated by reference, *see* § 98.7).

(iv) ASTM UOP539-97 Refinery Gas Analysis by Gas Chromatography (incorporated by reference, *see* § 98.7).

(v) ASTM D3176-89 (Reapproved 2002) Standard Practice Method for Ultimate

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Analysis of Coal and Coke (incorporated by reference, *see* § 98.7).

(vi) ASTM D5291-02 (Reapproved 2007) Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants (incorporated by reference, *see* § 98.7).

(vii) ASTM D5373-08 Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal (incorporated by reference, *see* § 98.7).

(viii) Methods 8031, 8021, or 8015 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication No. SW-846, Third Edition, September 1986, as amended by Update I, November 15, 1992.

(ix) Method 18 at 40 CFR part 60, appendix A-6.

(x) Performance Specification 9 in 40 CFR part 60, appendix B for continuous online gas analyzers. The 7-day calibration error test period must be completed prior to the effective date of the rule.

§ 98.245 Procedures for estimating missing data.

For missing feedstock flow rates, product flow rates, and carbon contents, use the same procedures as for missing flow rates and carbon contents for fuels as specified in § 98.35.

§ 98.246 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the information specified in paragraphs (a), (b), or (c) of this section, as appropriate for each process unit.

(a) If you use the mass balance methodology in § 98.243(c), you must report the information specified in paragraphs (a)(1) through (a)(10) of this section for each type of petrochemical produced, reported by process unit.

(1) The petrochemical process unit ID number or other appropriate descriptor.

(2) The type of petrochemical produced, names of other products, and names of carbon-containing feedstocks.

(3) Annual CO₂ emissions calculated using Equation X-4 of this subpart.

(4) Each of the monthly volume, mass, and carbon content values used

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in Equations X-1 through X-3 of this subpart (i.e., the directly measured values, substitute values, or the calculated values based on other measured data such as tank levels or gas composition) and the molecular weights for gaseous feedstocks and products used in Equation X-1 of this subpart. Indicate whether you used the alternative to sampling and analysis specified in § 98.243(c)(4).

(5) Annual quantity of each type of petrochemical produced from each process unit (metric tons).

(6) Name of each method listed in § 98.244 used to determine a measured parameter (or description of manufacturer's recommended method).

(7) The dates and summarized results (e.g., percent calibration error) of the calibrations of each measurement device.

(8) Identification of each combustion unit that burned both process off-gas and supplemental fuel.

(9) If you comply with the alternative to sampling and analysis specified in § 98.243(c)(4), the amount of time during which off-specification product was produced, the volume or mass of off-specification product produced, and if applicable, the date of any process change that reduced the composition to less than 99.5 percent.

(10) You may elect to report the flow and carbon content of wastewater, and you may elect to report the carbon content of hydrocarbons in fugitive emissions and in process vents that are not controlled with a combustion device. These values may be estimated based on engineering analyses. These values are not to be used in the mass balance calculation.

(b) If you use CEMS to measure CO₂ emissions in accordance with § 98.243(b), then you must report the relevant information required under § 98.36 for the Tier 4 Calculation Methodology and the information listed in paragraphs (b)(1) through (b)(6) of this section.

(1) For CEMS used on stacks for stationary combustion units, report the relevant information required under § 98.36 for the Tier 4 calculation methodology.

(2) For CEMS used on stacks that are not used for stationary combustion