§ 98.424 Monitoring and QA/QC requirements.

(a) Determination of quantity.

(1) Reporters following the procedures in §98.423(a) shall determine quantity using a flow meter or meters located in accordance with this paragraph.

(i) If the CO₂ stream is segregated such that only a portion is captured for commercial application or for injection, you must locate the flow meter according to the following:

(A) For reporters following the procedures in §98.423(a)(3)(i), you must locate the flow meter(s) after the point of segregation.

(B) For reporters following the procedures in paragraph (a)(3)(ii) of §98.423, you must locate the main flow meter(s) on the captured CO₂ stream(s) prior to the point of segregation and the subsequent flow meter(s) on the CO₂ stream(s) for on-site use after the point of segregation. You may only follow the procedures in paragraph (a)(3)(i) of §98.423 if the CO₂ stream(s) for on-site use is/are the only diversion(s) from the main, captured CO₂ stream(s) after the main flow meter location(s).

(ii) Reporters that have a mass flow meter or volumetric flow meter installed to measure the flow of a CO₂ stream that meets the requirements of paragraph (a)(1)(i) of this section shall base calculations in §98.423 of this subpart on the installed mass flow or volumetric flow meters.

(iii) Reporters that do not have a mass flow meter or volumetric flow meter installed to measure the flow of the CO₂ stream that meets the requirements of paragraph (a)(1)(i) of this section shall base calculations in §98.423 of this subpart on the flow of gas transferred off site using a mass flow meter or a volumetric flow meter located at the point of off-site transfer.

(2) Reporters following the procedures in paragraph (b) of §98.423 shall determine quantity in accordance with this paragraph.

(i) Reporters that supply CO₂ in containers using weigh bills, scales, or load cells shall measure the mass of contents of each CO₂ container to which the CO₂ stream is delivered, sum the mass of contents supplied in all containers to which the CO₂ stream is delivered during each quarter, sample

\[ \text{CO}_2 = \sum_{p=1}^{l} Q \]  

(Eq. PP-4)

where:

\( Q = \) Quarterly mass of CO₂ (metric tons).

\( p = \) Quarter of the year.

\( u = \) CO₂ stream that delivers to containers.

(3) To aggregate data, sum the mass of CO₂ supplied in containers delivered by all CO₂ streams in accordance with Equation PP–3a of this section.

\[ \text{CO}_2 = \sum_{p=1}^{l} Q \]

where:

\( Q = \) Annual mass of CO₂ (metric tons) supplied in containers delivered by all CO₂ streams.

\( Q_{p} = \) Quarterly volume of contents supplied in all containers delivered by CO₂ stream \( u \) in quarter \( p \) (standard cubic meters).

\( D_{p} = \) Quarterly CO₂ density determination for CO₂ stream \( u \) in quarter \( p \) (metric tons per standard cubic meter) if CO₂ \( p \) is measured as volume % CO₂, or density of CO₂ stream \( u \) (metric tons per standard cubic meter) if CO₂ \( p \) is measured as weight % CO₂.

\( p = \) Quarter of the year.

\( u = \) CO₂ stream that delivers to containers.

\[ \text{CO}_2 = \sum_{p=1}^{l} Q \]
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the CO₂ stream delivering CO₂ to containers on a quarterly basis to determine the composition of the CO₂ stream, and apply Equation PP-1.

(ii) Reporters that supply CO₂ in containers using loaded container volumes shall measure the volume of contents of each CO₂ container to which the CO₂ stream is delivered, sum the volume of contents supplied in all containers to which the CO₂ stream is delivered during each quarter, sample the CO₂ stream on a quarterly basis to determine the composition of the CO₂ stream, determine the density quarterly, and apply Equation PP-2.

(3) Importers or exporters that import or export CO₂ in containers shall measure the mass in each CO₂ container using weigh bills, scales, or load cells and sum the mass in all containers imported or exported during the reporting year.

(4) All flow meters, scales, and load cells used to measure quantities that are reported in §98.423 of this subpart shall be operated and calibrated according to the following procedure:

(i) You shall use an appropriate standard method published by a consensus-based standards organization if such a method exists. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB).

(ii) Where no appropriate standard method developed by a consensus-based standards organization exists, you shall follow industry standard practices.

(iii) You must ensure that any flow meter calibrations performed are NIST traceable.

(5) Reporters using Equation PP-2 of this subpart and measuring CO₂ concentration as weight % CO₂ shall determine the density of the CO₂ stream on a quarterly basis in order to calculate the mass of the CO₂ stream according to one of the following procedures:


(ii) You may follow an industry standard method.

(b) Determination of concentration. (1) Reporters using Equation PP-1 or PP-2 of this subpart shall sample the CO₂ stream on a quarterly basis to determine the composition of the CO₂ stream.

(2) Methods to measure the composition of the CO₂ stream must conform to applicable chemical analytical standards. Acceptable methods include, but are not limited to, the U.S. Food and Drug Administration food-grade specifications for CO₂ (see 21 CFR 184.1240) and ASTM standard E1747–95 (Reapproved 2005) Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications (ASTM International, 100 Barr Harbor Drive, P.O. Box CB700, West Conshohocken, Pennsylvania 19428–B2959, (800) 262–1373, http://www.astm.org).

(c) You shall convert the density of the CO₂ stream(s) and all measured volumes of carbon dioxide to the following standard industry temperature and pressure conditions: Standard cubic meters at a temperature of 60 degrees Fahrenheit and at an absolute pressure
§ 98.425 Procedures for estimating missing data.

(a) Whenever the quality assurance procedures in §98.424(a)(1) of this subpart cannot be followed to measure quarterly mass flow or volumetric flow of CO₂, the most appropriate of the following missing data procedures shall be followed:

1. A quarterly CO₂ mass flow or volumetric flow value that is missing may be substituted with a quarterly value measured during another quarter of the current reporting year.

2. A quarterly CO₂ mass flow or volumetric flow value that is missing may be substituted with a quarterly value measured during the same quarter from the past reporting year.

3. If a mass or volumetric flow meter is installed to measure the CO₂ stream, you may substitute data from a mass or volumetric flow meter measuring the CO₂ stream transferred for any period during which the installed meter is inoperable.

4. The mass or volumetric flow used for purposes of product tracking and billing according to the reporter’s established procedures may be substituted for any period during which measurement equipment is inoperable.

(b) Whenever the quality assurance procedures in §98.424(b) of this subpart cannot be followed to determine concentration of the CO₂ stream, the most appropriate of the following missing data procedures shall be followed:

1. A quarterly concentration value that is missing may be substituted with a quarterly value measured during another quarter of the current reporting year.

2. A quarterly concentration value that is missing may be substituted with a quarterly value measured during the same quarter from the past reporting year.

3. The quarterly quantity of CO₂ in containers recorded for purposes of product tracking and billing according to the reporter’s established procedures may be substituted for any period during which measurement equipment is inoperable.

4. The standard used to measure CO₂ concentration.

5. The location of the flow meter in your process chain in relation to the points of CO₂ stream capture, dehydra- tion, compression, and other processing.

(b) If you use Equation PP–2 of this subpart, report the following information for each volumetric flow meter or...