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(11) If a facility uses solid feedstock, the carbon content of the solid feedstock, for month n, (kg C per kg of feedstock).

(12) Annual urea production (metric tons) and method used to determine urea production.

(13) CO₂ from the steam reforming of a hydrocarbon or the gasification of solid and liquid raw material at the ammonia manufacturing process unit used to produce urea and the method used to determine the CO₂ consumed in urea production.

[74 FR 56374, Oct. 30, 2009, as amended at 75 FR 79157, Dec. 17, 2010]

§ 98.77 Records that must be retained.

In addition to the records required by § 98.3(g), you must retain the following records specified in paragraphs (a) and (b) of this section for each ammonia manufacturing unit.

(a) If a CEMS is used to measure emissions, retain records of all feedstock purchases in addition to the requirements in § 98.37 for the Tier 4 Calculation Methodology.

(b) If a CEMS is not used to measure process CO₂ emissions, you must also retain the records specified in paragraphs (b)(1) through (b)(2) of this section:

(1) Records of all analyses and calculations conducted for reported data as listed in § 98.76(b).

(2) Monthly records of carbon content of feedstock from supplier and/or all analyses conducted of carbon content.

§ 98.78 Definitions.

All terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

Subpart H—Cement Production

§ 98.80 Definition of the source category.

The cement production source category consists of each kiln and each in-line kiln/raw mill at any portland cement manufacturing facility including alkali bypasses, and includes kilns and in-line kiln/raw mills that burn hazardous waste.

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§ 98.81 Reporting threshold.

You must report GHG emissions under this subpart if your facility contains a cement production process and the facility meets the requirements of either § 98.2(a)(1) or (2).

§ 98.82 GHGs to report.

You must report:

(a) CO₂ process emissions from calcination in each kiln.

(b) CO₂ combustion emissions from each kiln.

(c) CH₄ and N₂O combustion emissions from each kiln. You must calculate and report these emissions under subpart C of this part (General Stationary Fuel Combustion Sources) by following the requirements of subpart C.

(d) CO₂, CH₄, and N₂O emissions from each stationary combustion unit other than kilns. You must report these emissions under subpart C of this part (General Stationary Fuel Combustion Sources) by following the requirements of subpart C.

§ 98.83 Calculating GHG emissions.

You must calculate and report the annual process CO₂ emissions from each kiln using the procedure in paragraphs (a) and (b) of this section.

(a) For each cement kiln that meets the conditions specified in § 98.33(b)(4)(ii) or (b)(4)(iii), you must calculate and report under this subpart the combined process and combustion CO₂ emissions by operating and maintaining a CEMS to measure CO₂ emissions according to the Tier 4 Calculation Methodology specified in § 98.33(a)(4) and all associated requirements for Tier 4 in subpart C of this part (General Stationary Fuel Combustion Sources).

(b) For each kiln that is not subject to the requirements in paragraph (a) of this section, calculate and report the process and combustion CO₂ emissions from the kiln by using the procedure in either paragraph (c) or (d) of this section.

(c) Calculate and report under this subpart the combined process and combustion CO₂ emissions by operating and maintaining a CEMS to measure CO₂ emissions according to the Tier 4 Calculation Methodology specified in

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§ 98.83(a)(4) and all associated requirements for Tier 4 in subpart C of this part (General Stationary Fuel Combustion Sources).

(d) Calculate and report process and combustion CO₂ emissions separately

using the procedures specified in paragraphs (d)(1) through (d)(4) of this section.

(1) Calculate CO₂ process emissions from all kilns at the facility using Equation H-1 of this section:

$$CO_{2CMF} = \sum_{m=1}^k CO_{2Cli,m} + CO_{2rm} \quad (\text{Eq. H-1})$$

Where:

CO_{2 CMF} = Annual process emissions of CO₂ from cement manufacturing, metric tons.
 CO_{2 Cli,m} = Total annual emissions of CO₂ from clinker production from kiln m, metric tons.
 CO_{2 rm} = Total annual emissions of CO₂ from raw materials, metric tons.

k = Total number of kilns at a cement manufacturing facility.

(2) CO₂ emissions from clinker production. Calculate CO₂ emissions from each kiln using Equations H-2 through H-5 of this section.

$$CO_{2 Cli,m} = \sum_{j=1}^p \left[(Cli_{,j}) * (EF_{Cli,j}) * \frac{2000}{2205} \right] + \sum_{i=1}^r \left[(CKD_{,i}) * (EF_{CKD,i}) * \frac{2000}{2205} \right] \quad (\text{Eq. H-2})$$

Where:

Cli_{,j} = Quantity of clinker produced in month j from kiln m, tons.
 EF_{Cli,j} = Kiln specific clinker emission factor for month j for kiln m, metric tons CO₂/metric ton clinker computed as specified in Equation H-3 of this section.
 CKD_{,i} = Cement kiln dust (CKD) not recycled to the kiln in quarter i from kiln m, tons.
 EF_{CKD,i} = Kiln specific CKD emission factor for quarter i from kiln m, metric tons CO₂/metric ton CKD computed as specified in Equation H-4 of this section.

p = Number of months for clinker calculation, 12.

r = Number of quarters for CKD calculation, 4.

2000/2205 = Conversion factor to convert tons to metric tons.

(i) *Kiln-Specific Clinker Emission Factor*. (A) Calculate the kiln-specific clinker emission factor using Equation H-3 of this section.

$$EF_{Cli} = (Cli_{CaO} - Cli_{ncCaO}) * MR_{CaO} + (Cli_{MgO} - Cli_{ncMgO}) * MR_{MgO} \quad (\text{Eq. H-3})$$

Where:

Cli_{CaO} = Monthly total CaO content of Clinker, wt-fraction.
 Cli_{ncCaO} = Monthly non-calcined CaO content of Clinker, wt-fraction.
 MR_{CaO} = Molecular-weight Ratio of CO₂/CaO = 0.785.
 Cli_{MgO} = Monthly total MgO content of Clinker, wt-fraction.
 Cli_{ncMgO} = Monthly non-calcined MgO content of Clinker, wt-fraction.

MR_{MgO} = Molecular-weight Ratio of CO₂/MgO = 1.092.

(B) Non-calcined CaO is CaO that remains in the clinker in the form of CaCO₃ and CaO in the clinker that entered the kiln as a non-carbonate species. Non-calcined MgO is MgO that remains in the clinker in the form of

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MgCO₃ and MgO in the clinker that entered the kiln as a non-carbonate species.

(ii) *Kiln-Specific CKD Emission Factor.*

(A) Calculate the kiln-specific CKD

emission factor for CKD not recycled to the kiln using Equation H-4 of this section.

$$EF_{CKD} = (CKD_{CaO} - CKD_{ncCaO}) * MR_{CaO} + (CKD_{MgO} - CKD_{ncMgO}) * MR_{MgO} \quad (\text{Eq. H-4})$$

Where:

CKD_{CaO} = Quarterly total CaO content of CKD not recycled to the kiln, wt-fraction.

CKD_{CaO} = Quarterly non-calcined CaO content of CKD not recycled to the kiln, wt-fraction.

MR_{CaO} = Molecular-weight Ratio of CO₂/CaO = 0.785.

CKD_{MgO} = Quarterly total MgO content of CKD not recycled to the kiln, wt-fraction.

CKD_{MgO} = Quarterly non-calcined MgO content of CKD not recycled to the kiln, wt-fraction.

MR_{MgO} = Molecular-weight Ratio of CO₂/MgO = 1.092.

(B) Non-calcined CaO is CaO that remains in the CKD in the form of CaCO₃ and CaO in the CKD that entered the kiln as a non-carbonate species. Non-calcined MgO is MgO that remains in the CKD in the form of MgCO₃ and MgO in the CKD that entered the kiln as a non-carbonate species.

(3) *CO₂ emissions from raw materials.* Calculate CO₂ emissions from raw materials using Equation H-5 of this section:

$$CO_{2,rm} = \sum_{i=1}^m rm * TOCrM * \frac{44}{12} * \frac{2000}{2205} \quad (\text{Eq. H-5})$$

Where:

rm = The amount of raw material i consumed annually, tons/yr (dry basis) or the amount of raw kiln feed consumed annually, tons/yr (dry basis).

CO_{2,rm} = Annual CO₂ emissions from raw materials.

TOCrM = Organic carbon content of raw material i or organic carbon content of combined raw kiln feed (dry basis), as determined in §98.84(c) or using a default factor of 0.2 percent of total raw material weight.

M = Number of raw materials or 1 if calculating emissions based on combined raw kiln feed.

44/12 = Ratio of molecular weights, CO₂ to carbon.

2000/2205 = Conversion factor to convert tons to metric tons.

(4) Calculate and report under subpart C of this part (General Stationary Fuel Combustion Sources) the combustion CO₂ emissions from the kiln according to the applicable requirements in subpart C.

[74 FR 56374, Oct. 30, 2009, as amended at 75 FR 66461, Oct. 28, 2010]

§ 98.84 Monitoring and QA/QC requirements.

(a) You must determine the weight fraction of total CaO and total MgO in CKD not recycled to the kiln from each kiln using ASTM C114–09, Standard Test Methods for Chemical Analysis of Hydraulic Cement (incorporated by reference, see §98.7). The monitoring must be conducted quarterly for each kiln from a CKD sample drawn either as CKD is exiting the kiln or from bulk CKD storage.

(b) You must determine the weight fraction of total CaO and total MgO in clinker from each kiln using ASTM C114–09 Standard Test Methods for Chemical Analysis of Hydraulic Cement (incorporated by reference, see §98.7). The monitoring must be conducted monthly for each kiln from a monthly clinker sample drawn from bulk clinker storage if storage is dedicated to the specific kiln, or from a monthly arithmetic average of daily