§ 98.293 Calculating GHG emissions.

You must calculate and report the annual process CO₂ emissions from each soda ash manufacturing line using...
§ 98.293

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the procedures specified in paragraph (a) or (b) of this section.

(a) For each soda ash manufacturing line 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 soda ash manufacturing line that is not subject to the requirements in paragraph (a) of this section, calculate and report the process CO₂ emissions from the soda ash manufacturing line by using the procedure in either paragraphs (b)(1), (b)(2), or (b)(3) of this section; and the combustion CO₂ emissions using the procedure in paragraph (b)(4) of this section.

(1) 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).

(2) Use either Equation CC–1 or Equation CC–2 of this section to calculate annual CO₂ process emissions from each manufacturing line that calcines trona to produce soda ash:

\[
E_k = \sum_{n=1}^{12} \left[ (IC_T)_n \times (T_t)_n \right] \times \frac{2000}{2205} \times \frac{0.097}{1} 
\]

(Eq. CC-1)

\[
E_k = \sum_{n=1}^{12} \left[ (IC_{sa})_n \times (T_{sa})_n \right] \times \frac{2000}{2205} \times \frac{0.138}{1} 
\]

(Eq. CC-2)

Where:

- \( E_k \) = Annual CO₂ process emissions from each manufacturing line, k (metric tons).
- \((IC_T)_n \) = Inorganic carbon content (percent by weight, expressed as a decimal fraction) in trona input, from the carbon analysis results for month n. This represents the ratio of trona to trona ore.
- \((IC_{sa})_n \) = Inorganic carbon content (percent by weight, expressed as a decimal fraction) in soda ash output, from the carbon analysis results for month n. This represents the purity of the soda ash produced.
- \((T_t)_n \) = Mass of trona input in month n (tons).
- \((T_{sa})_n \) = Mass of soda ash output in month n (tons).
- \(2000/2205\) = Conversion factor to convert tons to metric tons.
- \(0.097/1\) = Ratio of ton of CO₂ emitted for each ton of trona.
- \(0.138/1\) = Ratio of ton of CO₂ emitted for each ton of soda ash produced.

(3) Site-specific emission factor method. Use Equations CC–3, CC–4, and CC–5 of this section to determine annual CO₂ process emissions from manufacturing lines that use the liquid alkaline feedstock process to produce soda ash. You must conduct an annual performance test and measure CO₂ emissions and flow rates at all process vents from the mine water stripper/evaporator for each manufacturing line and calculate CO₂ emissions as described in paragraphs (b)(3)(i) through (b)(3)(iv) of this section.

(i) During the performance test, you must measure the process vent flow from each process vent during the test and calculate the average rate for the test period in metric tons per hour.

(ii) Using the test data, you must calculate the hourly CO₂ emission rate using Equation CC–3 of this section:
$ER_{CO2} = \left[ \left( C_{CO2} \times 10000 \right) \times 2.59 \times 10^{-9} \times 44 \right] \times (Q \times 60) \times 4.53 \times 10^{-4}$  \hspace{1cm} (Eq. CC-3)

Where:
- $ER_{CO2}$ = CO$_2$ mass emission rate (metric tons/hour).
- $C_{CO2}$ = Hourly CO$_2$ concentration (percent CO$_2$) as determined by §98.294(c).
- 10000 = Parts per million per percent
- 2.59x10$^{-9}$ = Conversion factor (pounds-mole to dscf/ppm).
- 44 = Pounds per pound-mole of carbon dioxide.
- Q = Stack gas volumetric flow rate per minute (dscfm).
- 60 = Minutes per hour
- 4.53x10$^{-4}$ = Conversion factor (metric tons/pound)

(iii) Using the test data, you must calculate a CO$_2$ emission factor for the process using Equation CC–4 of this section:

$EF_{CO2} = \frac{ER_{CO2}}{\left( V_t \times 4.53 \times 10^{-4} \right)}$  \hspace{1cm} (Eq. CC-4)

Where:
- $EF_{CO2}$ = CO$_2$ emission factor (metric tons CO$_2$/metric ton of process vent flow from mine water stripper/evaporator).
- $ER_{CO2}$ = CO$_2$ mass emission rate (metric tons/hour).
- $V_t$ = Process vent flow rate from mine water stripper/evaporator during annual performance test (pounds/hour).
- 4.53x10$^{-4}$ = Conversion factor (metric tons/pound)

(iv) You must calculate annual CO$_2$ process emissions from each manufacturing line using Equation CC-5 of this section:

$E_k = EF_{CO2} \times (V_a \times 0.453) \times H$  \hspace{1cm} (Eq. CC-5)

Where:
- $E_k$ = Annual CO$_2$ process emissions for each manufacturing line, k (metric tons).
- $EF_{CO2}$ = CO$_2$ emission factor (metric tons CO$_2$/metric ton of process vent flow from mine water stripper/evaporator).
- $V_a$ = Annual process vent flow rate from mine water stripper/evaporator (thousand pounds/hour).
- H = Annual operating hours for the each manufacturing line.
- 0.453 = Conversion factor (metric tons/thousand pounds).

(4) Calculate and report under subpart C of this part (General Stationary Fuel Combustion Sources) the combustion CO$_2$, CH$_4$, and N$_2$O emissions in the soda ash manufacturing line according to the applicable requirements in subpart C.

§ 98.294 Monitoring and QA/QC requirements.

Section 98.293 provides three different procedures for emission calculations. The appropriate paragraphs (a) through (c) of this section should be used for the procedure chosen.

(a) If you determine your emissions using §98.293(b)(2) (Equation CC–1 of this subpart) you must:

(1) Determine the monthly inorganic carbon content of the trona from a weekly composite analysis for each soda ash manufacturing line, using a modified version of ASTM E359–00 (Reapproved 2005)e1, Standard Test Methods for Analysis of Soda Ash (Sodium Carbonate) (incorporated by reference, see §98.7). ASTM E359–00(Reapproved 2005) e1 is designed to measure the total alkalinity in soda ash not in trona. The modified method referred to above adjusts the regular ASTM method to express the results in terms of trona. Although ASTM E359–00 (Reapproved 2005) e1 uses manual titration, suitable autotitrators may also be used for this determination.

(2) Measure the mass of trona input produced by each soda ash manufacturing line on a monthly basis using belt scales or methods used for accounting purposes.