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(2) Content of request. A request for discontinuation of reporting must contain either paragraph (b)(2)(i) or (b)(2)(ii) of this section.

(i) For wells permitted as Class VI under the Underground Injection Control program, a copy of the applicable Underground Injection Control program Director’s authorization of site closure.

(ii) For all other wells, and as an alternative for wells permitted as Class VI under the Underground Injection Control program, a demonstration that current monitoring and model(s) show that the injected CO\(_2\) stream is not expected to migrate in the future in a manner likely to result in surface leakage.

(3) Notification. The Administrator will issue a final decision on the request to discontinue reporting within a reasonable time. Any appeal of the Administrator’s final decision is subject to the provisions of part 78 of this chapter.

§ 98.442 GHGs to report.

You must report:

(a) Mass of CO\(_2\) received.

(b) Mass of CO\(_2\) injected into the subsurface.

(c) Mass of CO\(_2\) produced.

(d) Mass of CO\(_2\) emitted by surface leakage.

(e) Mass of CO\(_2\) emissions from equipment leaks and vented emissions of CO\(_2\) from surface equipment located between the injection flow meter and the injection wellhead.

(f) Mass of CO\(_2\) emissions from equipment leaks and vented emissions of CO\(_2\) from surface equipment located between the production flow meter and the production wellhead.

(g) Mass of CO\(_2\) sequestered in subsurface geologic formations.

(h) Cumulative mass of CO\(_2\) reported as sequestered in subsurface geologic formations in all years since the facility became subject to reporting requirements under this subpart.


§ 98.443 Calculating CO\(_2\) geologic sequestration.

You must calculate the mass of CO\(_2\) received using CO\(_2\) received equations (Equations RR–1 to RR–3 of this section), unless you follow the procedures in §98.444(a)(4). You must calculate CO\(_2\) sequestered using injection equations (Equations RR–4 to RR–6 of this section), production/recycling equations (Equations RR–7 to RR–9 of this section), surface leakage equations (Equation RR–10 of this section), and sequestration equations (Equations RR–11 and RR–12 of this section). For your first year of reporting, you must calculate CO\(_2\) sequestered starting from the date set forth in your approved MRV plan.

(a) You must calculate and report the annual mass of CO\(_2\) received by pipeline using the procedures in paragraphs (a)(1) or (a)(2) of this section and the procedures in paragraph (a)(3) of this section, if applicable.

(1) For a mass flow meter, you must calculate the total annual mass of CO\(_2\) in a CO\(_2\) stream received in metric tons by multiplying the mass flow by the CO\(_2\) concentration in the flow, according to Equation RR–1 of this section. You must collect these data quarterly. Mass flow and concentration data measurements must be made in accordance with §98.444.

\[
\text{CO}_2T_r = \sum_{p=1}^{4} (Q_{r,p} - S_{r,p}) \cdot C_{\text{CO}_2,p_r} \quad (\text{Eq. RR–1})
\]

where:

- \(\text{CO}_2T_r\) = Net annual mass of CO\(_2\) received through flow meter \(r\) (metric tons).
- \(Q_{r,p}\) = Quarterly mass flow through a receiving flow meter \(r\) in quarter \(p\) (metric tons).
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\( S_{r,p} = \) Quarterly mass flow through a receiving flow meter \( r \) that is redelivered to another facility without being injected into your well in quarter \( p \) (metric tons).

\( C_{CO_2,p,r} = \) Quarterly \( CO_2 \) concentration measurement in flow for flow meter \( r \) in quarter \( p \) (wt. percent \( CO_2 \), expressed as a decimal fraction).

\( p = \) Quarter of the year.
\( r = \) Receiving flow meter.

(2) For a volumetric flow meter, you must calculate the total annual mass of \( CO_2 \) in a \( CO_2 \) stream received in metric tons by multiplying the volumetric flow at standard conditions by the \( CO_2 \) concentration in the flow and the density of \( CO_2 \) at standard conditions, according to Equation RR–2 of this section. You must collect these data quarterly. Volumetric flow and concentration data measurements must be made in accordance with §98.444.

\[
CO_{2T,r} = \sum_{p=1}^{4} (Q_{r,p} - S_{r,p}) \ast D \ast C_{CO_2,p,r} \quad \text{(Eq. RR–2)}
\]

where:

\( CO_{2T,r} = \) Net annual mass of \( CO_2 \) received through flow meter \( r \) (metric tons).

\( Q_{r,p} = \) Quarterly volumetric flow through a receiving flow meter \( r \) in quarter \( p \) at standard conditions (standard cubic meters).

\( S_{r,p} = \) Quarterly volumetric flow through a receiving flow meter \( r \) that is redelivered to another facility without being injected into your well in quarter \( p \) (standard cubic meters).

\( D = \) Density of \( CO_2 \) at standard conditions (metric tons per standard cubic meter): 0.0018682.

\( C_{CO_2,p,r} = \) Quarterly \( CO_2 \) concentration measurement in flow for flow meter \( r \) in quarter \( p \) (vol. percent \( CO_2 \), expressed as a decimal fraction).

\( p = \) Quarter of the year.
\( r = \) Receiving flow meter.

(3) If you receive \( CO_2 \) through more than one flow meter, you must sum the mass of all \( CO_2 \) received in accordance with the procedure specified in Equation RR–3 of this section.

\[
CO_2 = \sum_{r=1}^{g} CO_{2T,r} \quad \text{(Eq. RR–3)}
\]

where:

\( CO_2 = \) Total net annual mass of \( CO_2 \) received (metric tons).

\( CO_{2T,r} = \) Net annual mass of \( CO_2 \) as calculated in Equation RR–1 or RR–2 for flow meter \( r \).
\( r = \) Receiving flow meter.

(b) You must calculate and report the annual mass of \( CO_2 \) received in containers using the procedures in paragraphs (b)(1) or (b)(2) of this section.

(1) If you are measuring the mass of contents in a container under the provisions of §98.444(a)(2)(i), you must calculate the \( CO_2 \) received for injection in containers using Equation RR–1 of this section.

where:

\( CO_{2T,r} = \) Net annual mass of \( CO_2 \) received in containers \( r \) (metric tons).

\( C_{CO_2,p,r} = \) Quarterly \( CO_2 \) concentration measurement of contents in containers \( r \) in quarter \( p \) (wt. percent \( CO_2 \), expressed as a decimal fraction).

\( Q_{r,p} = \) Quarterly mass of contents in containers \( r \) in quarter \( p \) (metric tons).

\( S_{r,p} = \) Quarterly mass of contents in containers \( r \) redelivered to another facility without being injected into your well in quarter \( p \) (metric tons).

\( p = \) Quarter of the year.
\( r = \) Containers.

(2) If you are measuring the volume of contents in a container under the provisions of §98.444(a)(2)(ii), you must calculate the \( CO_2 \) received for injection in containers using Equation RR–2 of this section.
where:

\( \text{CO}_2_{T,r} \) = Net annual mass of CO\(_2\) received in containers \( r \) (metric tons).

\( \text{C}_{\text{CO}_2,p,r} \) = Quarterly CO\(_2\) concentration measurement of contents in containers \( r \) in quarter \( p \) (vol. percent CO\(_2\), expressed as a decimal fraction).

\( Q_{r,p} \) = Quarterly volume of contents in containers \( r \) in quarter \( p \) (standard cubic meters).

\( S_{r,p} \) = Quarterly mass of contents in containers \( r \) redelivered to another facility without being injected into your well in quarter \( p \) (metric tons).

\( D \) = Density of the CO\(_2\) received in containers at standard conditions (metric tons per standard cubic meter): 0.0018682.

\( p \) = Quarter of the year.

\( r \) = Containers.

(c) You must report the annual mass of CO\(_2\) injected in accordance with the procedures specified in paragraphs (c)(1) through (c)(3) of this section.

(1) If you use a mass flow meter to measure the flow of an injected CO\(_2\) stream, you must calculate annually the total mass of CO\(_2\) (in metric tons) in the CO\(_2\) stream injected each year in metric tons by multiplying the mass flow by the CO\(_2\) concentration in the flow, according to Equation RR–4 of this section. Mass flow and concentration data measurements must be made in accordance with §98.444.

\[ \text{CO}_2,u = \sum_{p=1}^{4} Q_{p,u} * C_{\text{CO}_2,p,u} \quad \text{(Eq. RR–4)} \]

where:

\( \text{CO}_2,u \) = Annual CO\(_2\) mass injected (metric tons) as measured by flow meter \( u \).

\( Q_{p,u} \) = Quarterly mass flow rate measurement for flow meter \( u \) in quarter \( p \) (metric tons per quarter).

\( C_{\text{CO}_2,p,u} \) = Quarterly CO\(_2\) concentration measurement in flow for flow meter \( u \) in quarter \( p \) (wt. percent CO\(_2\), expressed as a decimal fraction).

\( p \) = Quarter of the year.

\( u \) = Flow meter.

(2) If you use a volumetric flow meter to measure the flow of an injected CO\(_2\) stream, you must calculate annually the total mass of CO\(_2\) (in metric tons) in the CO\(_2\) stream injected each year in metric tons by multiplying the volumetric flow at standard conditions by the CO\(_2\) concentration in the flow and the density of CO\(_2\) at standard conditions, according to Equation RR–5 of this section. Volumetric flow and concentration data measurements must be made in accordance with §98.444.

\[ \text{CO}_2,u = \sum_{p=1}^{4} Q_{p,u} * D * C_{\text{CO}_2,p,u} \quad \text{(Eq. RR–5)} \]

where:

\( \text{CO}_2,u \) = Annual CO\(_2\) mass injected (metric tons) as measured by flow meter \( u \).

\( Q_{p,u} \) = Quarterly volumetric flow rate measurement for flow meter \( u \) in quarter \( p \) at standard conditions (standard cubic meters per quarter).

\( D \) = Density of CO\(_2\) at standard conditions (metric tons per standard cubic meter): 0.0018682.

\( C_{\text{CO}_2,p,u} \) = CO\(_2\) concentration measurement in flow for flow meter \( u \) in quarter \( p \) (vol. percent CO\(_2\), expressed as a decimal fraction).

\( p \) = Quarter of the year.

\( u \) = Flow meter.

(3) To aggregate injection data for all wells covered under this subpart, you must sum the mass of all CO\(_2\) injected through all injection wells in accordance with the procedure specified in Equation RR–6 of this section.

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\[ CO_{21} = \sum_{u=1}^{U} CO_{2,u} \quad \text{(Eq. RR-6)} \]

where:
- \( CO_{21} \) = Total annual \( CO_2 \) mass injected (metric tons) through all injection wells.
- \( CO_{2,u} \) = Annual \( CO_2 \) mass injected (metric tons) as measured by flow meter \( u \).
- \( u \) = Flow meter.

(d) You must calculate the annual mass of \( CO_2 \) produced from oil or gas production wells or from other fluid wells for each separator that sends a stream of gas into a recycle or end use system in accordance with the procedures specified in paragraphs (d)(1) through (d)(3) of this section. You must account for any \( CO_2 \) that is produced and not processed through a separator. You must account only for wells that produce the \( CO_2 \) that was injected into the well or wells covered by this source category.

(1) For each gas-liquid separator for which flow is measured using a mass flow meter, you must calculate annually the total mass of \( CO_2 \) produced from an oil or other fluid stream in metric tons that is separated from the fluid by multiplying the mass gas flow by the \( CO_2 \) concentration in the gas flow, according to Equation RR-7 of this section. You must collect these data quarterly. Mass flow and concentration data measurements must be made in accordance with §98.444.

\[ CO_{2,w} = \sum_{p=1}^{4} Q_{p,w} * C_{CO_2,p,w} \quad \text{(Eq. RR-7)} \]

Where:
- \( CO_{2,w} \) = Annual \( CO_2 \) mass produced (metric tons) through separator \( w \).
- \( Q_{p,w} \) = Quarterly gas mass flow rate measurement for separator \( w \) in quarter \( p \) (metric tons).
- \( C_{CO_2,p,w} \) = Quarterly \( CO_2 \) concentration measurement in flow for separator \( w \) in quarter \( p \) (wt. percent \( CO_2 \), expressed as a decimal fraction).
- \( p \) = Quarter of the year.
- \( w \) = Separator.

(2) For each gas-liquid separator for which flow is measured using a volumetric flow meter, you must calculate annually the total mass of \( CO_2 \) produced from an oil or other fluid stream in metric tons that is separated from the fluid by multiplying the volumetric gas flow at standard conditions by the \( CO_2 \) concentration in the gas flow and the density of \( CO_2 \) at standard conditions, according to Equation RR-8 of this section. You must collect these data quarterly. Volumetric flow and concentration data measurements must be made in accordance with §98.444.

\[ CO_{2,w} = \sum_{p=1}^{4} Q_{p,w} * D * C_{CO_2,p,w} \quad \text{(Eq. RR-8)} \]

Where:
- \( CO_{2,w} \) = Annual \( CO_2 \) mass produced (metric tons) through separator \( w \).
- \( Q_{p,w} \) = Volumetric gas flow rate measurement for separator \( w \) in quarter \( p \) at standard conditions (standard cubic meters).
- \( D \) = Density of \( CO_2 \) at standard conditions (metric tons per standard cubic meter): 0.0018682.
- \( C_{CO_2,p,w} \) = \( CO_2 \) concentration measurement in flow for separator \( w \) in quarter \( p \) (vol. percent \( CO_2 \), expressed as a decimal fraction).
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p = Quarter of the year.
w = Separator.

(3) To aggregate production data, you must sum the mass of all of the CO₂ separated at each gas-liquid separator in accordance with the procedure specified in Equation RR-9 of this section. You must assume that the total CO₂ measured at the separator(s) represents a percentage of the total CO₂ produced. In order to account for the percentage of CO₂ produced that is estimated to remain with the produced oil or other fluid, you must multiply the quarterly mass of CO₂ measured at the separator(s) by a percentage estimated using a methodology in your approved MRV plan. If fluids containing CO₂ from injection wells covered under this source category are produced and not processed through a gas-liquid separator, the concentration of CO₂ in the produced fluids must be measured at a flow meter located prior to reinjection or reuse using methods in §98.444f(1). The considerations you intend to use to calculate CO₂ from produced fluids for the mass balance equation must be described in your approved MRV plan in accordance with §98.448(d)(5).

\[
CO_{2P} = (1+X) \sum_{w=1}^{W} CO_{2,w} \quad (\text{Eq. RR-9})
\]

Where:
- \( CO_{2P} \) = Total annual CO₂ mass produced (metric tons) through all separators in the reporting year.
- \( CO_{2,w} \) = Annual CO₂ mass produced (metric tons) through separator \( w \) in the reporting year.
- \( X \) = Entrained CO₂ in produced oil or other fluid divided by the CO₂ separated through all separators in the reporting year (weight percent CO₂, expressed as a decimal fraction).
- \( w \) = Separator.

(e) You must report the annual mass of CO₂ that is emitted by surface leakage in accordance with your approved MRV plan. You must calculate the total annual mass of CO₂ emitted from all leakage pathways in accordance with the procedure specified in Equation RR-10 of this section.

\[
CO_{2E} = \sum_{x=1}^{V} CO_{2,x} \quad (\text{Eq. RR-10})
\]

Where:
- \( CO_{2E} \) = Total annual CO₂ mass emitted by surface leakage (metric tons) in the reporting year.
- \( CO_{2,x} \) = Annual CO₂ mass emitted (metric tons) at leakage pathway \( x \) in the reporting year.
- \( x \) = Leakage pathway.

(f) You must report the annual mass of CO₂ that is sequestered in subsurface geologic formations in the reporting year in accordance with the procedures specified in paragraphs (f)(1) and (f)(2) of this section.

(1) If you are actively producing oil or natural gas or if you are producing any other fluids, you must calculate the annual mass of CO₂ that is sequestered in the underground subsurface formation in the reporting year in accordance with the procedure specified in Equation RR-11 of this section.

\[
CO₂ = CO₂I - CO₂P - CO₂E - CO₂FI - CO₂FP \quad (\text{Eq. RR-11})
\]

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where:

$\text{CO}_2 = \text{Total annual CO}_2 \text{ mass sequestered in subsurface geologic formations (metric tons) at the facility in the reporting year.}$

$\text{CO}_2I = \text{Total annual CO}_2 \text{ mass injected (metric tons) in the well or group of wells covered by this source category in the reporting year.}$

$\text{CO}_2E = \text{Total annual CO}_2 \text{ mass emitted (metric tons) by surface leakage in the reporting year.}$

$\text{CO}_2FI = \text{Total annual CO}_2 \text{ mass emitted (metric tons) from equipment leaks and vented emissions of CO}_2 \text{ from equipment located on the surface between the flow meter used to measure injection quantity and the injection wellhead, for which a calculation procedure is provided in subpart W of this part.}$

$\text{CO}_2FP = \text{Total annual CO}_2 \text{ mass emitted (metric tons) from equipment leaks and vented emissions of CO}_2 \text{ from equipment located on the surface between the production wellhead and the flow meter used to measure production quantity, for which a calculation procedure is provided in subpart W of this part.}$

(2) If you are not actively producing oil or natural gas or any other fluids, you must calculate the annual mass of CO$_2$ that is sequestered in subsurface geologic formations in the reporting year in accordance with the procedures specified in Equation RR–12 of this section.

\[
\text{CO}_2 = \text{CO}_2I - \text{CO}_2E - \text{CO}_2FI
\]  
\hspace{1cm} (\text{Eq. RR–12})

where:

$\text{CO}_2 = \text{Total annual CO}_2 \text{ mass sequestered in subsurface geologic formations (metric tons) at the facility in the reporting year.}$

$\text{CO}_2I = \text{Total annual CO}_2 \text{ mass injected (metric tons) in the well or group of wells covered by this source category in the reporting year.}$

$\text{CO}_2E = \text{Total annual CO}_2 \text{ mass emitted (metric tons) by surface leakage in the reporting year.}$

$\text{CO}_2FI = \text{Total annual CO}_2 \text{ mass emitted (metric tons) from equipment leaks and vented emissions of CO}_2 \text{ from equipment located on the surface between the flow meter used to measure injection quantity and the injection wellhead.}$


§ 98.444 Monitoring and QA/QC requirements.

(a) CO$_2$ received.

(1) Except as provided in paragraph (a)(4) of this section, you must determine the quarterly flow rate of CO$_2$ received by pipeline by following the most appropriate of the following procedures:

(i) You may measure flow rate at the receiving custody transfer meter prior to any subsequent processing operations at the facility and collect the flow rate quarterly.

(ii) If you took ownership of the CO$_2$ in a commercial transaction, you may use the quarterly flow rate data from the sales contract if it is a one-time transaction or from invoices or manifests if it is an ongoing commercial transaction with discrete shipments.

(iii) If you inject CO$_2$ received from a production process unit that is part of your facility, you may use the quarterly CO$_2$ flow rate that was measured at the equivalent of a custody transfer meter following procedures provided in subpart PP of this part. To be the equivalent of a custody transfer meter, a meter must measure the flow of CO$_2$ being transported to an injection well to the same degree of accuracy as a meter used for commercial transactions.

(2) Except as provided in paragraph (a)(4) of this section, you must determine the quarterly mass or volume of contents in all containers if you receive CO$_2$ in containers by following the most appropriate of the following procedures:

(i) You may measure the mass of contents of containers summed quarterly using weigh bills, scales, or load cells.

(ii) You may determine the volume of the contents of containers summed quarterly.

(iii) If you took ownership of the CO$_2$ in a commercial transaction, you may use the quarterly mass or volume of contents from the sales contract if it is