Geologic Sequestration of Carbon Dioxide

Subpart RR, Greenhouse Gas Reporting Program

OVERVIEW

Subpart RR of the Greenhouse Gas Reporting Program (GHGRP) (40 CFR 98.440 – 98.449) applies to any facility that conducts geologic sequestration (GS) of carbon dioxide (CO_2) and meets the Subpart RR source category definition. Some subparts have thresholds that determine applicability for reporting, and some do not. To decide whether your facility must report under this subpart, please refer to 40 CFR 98.441 and the GHGRP Applicability Tool.

This Information Sheet is intended to help facilities reporting under Subpart RR understand how the source category is defined, what greenhouse gases (GHGs) must be reported, how GHG emissions must be calculated and shared with EPA, and where to find more information.

How is This Source Category Defined?

The Subpart RR source category comprises any well or group of wells that inject a carbon dioxide (CO_2) stream for long-term containment in subsurface geologic formations. It includes, but is not limited to, all wells permitted as Class VI under the Underground Injection Control (UIC) program.

Wells that conduct enhanced oil and gas recovery (EOR) are not subject to this source category unless (1) the owner or operator chooses to opt-in to the Subpart RR source category by submitting a proposed monitoring, reporting, and verification (MRV) plan to EPA and receiving an approved plan from EPA, or (2) the well is permitted as Class VI under the UIC program.

Facilities conducting geologic sequestration (GS) research and development (R&D) projects may be granted an exemption from Subpart RR reporting for the duration of the R&D activity.

- A project is eligible for the Subpart RR R&D exemption if it is investigating practices, monitoring techniques, injection verification or is engaged in other applied research that will enable safe and effective long-term containment of a CO_2 stream in subsurface geologic formations, including research conducted as a precursor to long-term storage.
- To receive a Subpart RR R&D exemption, the reporter must submit to EPA the following information on the project:
    - Planned duration of CO_2 injection for the project.
    - Planned annual CO_2 injection volumes during this time period.
    - Research purposes of the project.
    - Source and type of funding for the project.
    - Class and duration of the UIC permit or, for an offshore facility not subject to the Safe Drinking Water Act (SDWA), a description of the legal instrument authorizing GS.
- Facilities that receive an R&D exemption from Subpart RR are not automatically exempted from other source categories of the Greenhouse Gas Reporting Program (GHGRP), including Subpart UU (Injection of CO_2). For other source categories of the GHGRP, R&D is defined at 40 CFR 98.6.

What GHGs Must Be Reported?

Facilities that conduct GS, including facilities that opt-in to the monitoring and reporting requirements for this source category, must report:

- Mass of CO_2 received.
- Mass of CO_2 injected into the subsurface.
- Mass of CO_2 produced.
- Mass of CO_2 emitted by surface leakage.
- 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.
- 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.
- Mass of CO_2 sequestered in subsurface geologic formations.
- Cumulative mass of CO_2 reported as sequestered in subsurface geologic formations in all years since the facility became subject to reporting requirements under Subpart RR.

If multiple GHGRP source categories are co-located at a facility, the facility may also need to report greenhouse gas (GHG) emissions or quantities of GHGs supplied by the facility under a different subpart. Please refer to the relevant information sheet for a summary of the rule requirements for any other source categories located at the facility.

How Must GHG Emissions Be Calculated?

EPA-Approved MRV Plan

Each GS facility must develop and implement an EPA-approved MRV plan that contains the following:

- Delineation of the maximum monitoring area and active monitoring areas.
- Identification of potential surface leakage pathways for CO_2 in the maximum monitoring area and the likelihood, magnitude, and timing, of surface leakage of CO_2 through these pathways.
- A strategy for detecting and quantifying any surface leakage of CO_2.
- A strategy for establishing the expected baselines for monitoring CO_2 surface leakage.
- A summary of the considerations you intend to use to calculate site-specific variables for the mass balance equation. This includes, but is not limited to, considerations for calculating CO_2 emissions from equipment leaks and vented emissions of CO_2 between the injection flow meter and injection well and/or the production flow meter and production well, and considerations for calculating CO_2 in produced fluids.
- For onshore injection wells, the well identification number used for the UIC permit and the UIC permit class in the UIC permit or permit application.
- For offshore injection wells not subject to the SDWA, any well identification number and any facility identification number used for the legal instrument authorizing GS. For purposes of Subpart RR, offshore means seaward of the terrestrial borders of the United States, including waters subject to the ebb and flow of the tide, as well as adjacent bays, lakes or other normally standing waters, and extending to the outer boundaries of the jurisdiction and control of the United States under the Outer Continental Shelf Lands Act.

- Proposed date to begin collecting data for calculating total amount sequestered according to Equations R-11 or R-12.

Mass of CO_2 Received

All GS facilities must calculate the mass of CO_2 received. The CO_2 stream may be transferred to the facility via pipeline or in containers.

Pipeline: If the CO_2 stream is received by pipeline, the facility must use either a mass or volumetric flow meter to measure the quantity of CO_2 stream received.

Containers: If CO_2 is received in containers, the reporter must measure either the mass or volume of the containers received.

Mass: If measuring mass, calculate the CO_2 received by multiplying the mass of the CO_2 stream received (minus the mass of CO_2 stream delivered to another facility (if any)) by the CO_2 concentration of the CO_2 stream.

Volume: If measuring volume, calculate the CO_2 received by multiplying the volume of the CO_2 stream received (minus the mass of CO_2 stream delivered to another facility (if any)) by the density and CO_2 concentration of the CO_2 stream.

Quantity of CO_2 Stream Injected and Produced

GS facilities must measure the quantity of CO_2 stream injected and the quantity of any CO_2 stream produced by oil/gas production wells or other fluid wells using either mass or volumetric flow meters. The mass of CO_2 is calculated by either:

(1) Multiplying the mass of the CO_2 stream by the concentration of CO_2 in the stream (if a mass flow meter is used); or

(2) Multiplying the volume of the CO_2 stream by the density and concentration of CO_2 in the stream (if a volumetric flow meter is used).

Where CO_2 is produced from oil/gas production or other wells, the facility must multiply the mass of CO_2 by one minus the fraction of CO_2 in the fluid to account for CO_2 that remains in the produced oil or other fluid.

Mass of CO_2 Emitted from Surface Leakage

GS facilities must also calculate the mass of CO_2 that is emitted each year from surface leakage using the site-specific method(s) specified in the facility's MRV plan.

What Information Must Be Reported?

In addition to the information required by the General Provisions in Subpart A, found at 40 CFR 98.3(c), the following must be reported:

- Total net mass of CO_2 received by pipeline and by containers (as applicable).
- The mass or volumetric flow of CO_2 stream received by pipeline.
- The mass or volumetric flow delivered to another facility (by facilities receiving CO_2 by pipeline).
- Mass or volume of CO_2 containing material received in containers and the mass or volume that is delivered to another facility (if CO_2 is received in containers).
- CO_2 concentration of the pipeline flow or containers.
- Mass, flow rate, and CO_2 concentration of CO_2 injected.
- The mass, flow rate, and CO_2 concentration of any CO_2 streams produced from oil or gas production

wells or from other fluid wells.

- The fraction of entrained CO_2 in any produced oil or other fluid.
- The mass of CO_2 emitted from surface leakage and the numerical identifier for each leakage pathway.
- The mass of CO_2 emissions from equipment leaks and vented emissions of CO_2 from sources between the injection flow meter and the injection wellhead and between the production flow meter and the production wellhead.
- The mass of CO_2 sequestered in subsurface geologic formations, by subtracting total CO_2 emissions from CO_2 injected in the reporting year.
- The cumulative mass of CO_2 reported as sequestered in subsurface geologic formations in all years since the facility became subject to Subpart RR.
- Date the facility began collecting data on the amount of CO_2 sequestered.
- Standards or methods used to measure the quantity and CO_2 concentration of each CO_2 stream received.
- A numerical identifier for each flow meter and the type of flow meter (mass or volumetric flow meter) used to measure CO_2 received by pipeline, CO_2 injected, and CO_2 produced from oil/gas production wells and other fluid wells.
- Location of each flow meter used to measure CO_2 injection.
- Number of times substitute date procedures were used.
- The source of the CO_2 received, from the following categories:
    - CO_2 production wells;
    - Electric generating unit;
    - Ethanol (C_2H_6O) plant;
    - Pulp and paper mill;
    - Natural gas processing;
    - Gasification operations;
    - Other anthropogenic source;
    - Discontinued enhanced oil and gas recovery project; or
    - Unknown.
- Date the MRV plan was approved by EPA and the MRV plan approval number issued by EPA.
- Identification number for each injection well in the UIC permit and the UIC Control permit class (for facilities permitted under the UIC program).
- Identification number for each injection well and any identification number used for the legal instrument authorizing GS (for offshore wells not subject to the SDWA).

Facilities must also submit an annual monitoring report to EPA which contains the following information:

- A narrative history of the monitoring efforts conducted over the previous calendar year, including a listing of all monitoring equipment that was operated, its period of operation, and any relevant tests or surveys that were conducted.
- A description of any changes to the monitoring program that the reporter concluded were not material changes warranting submission of a revised MRV plan.
- A narrative history of any monitoring anomalies that were detected in the previous calendar year and how they were investigated and resolved.

- A description of any surface leakages of CO_2, including a discussion of all methodologies and technologies involved in detecting and quantifying the surface leakages and any assumptions and uncertainties involved in calculating the amount of CO_2 emitted.

What Records Must Be Maintained?

Reporters are required to retain records that pertain to their annual GHGRP report for at least three years after the date the report is submitted. Please see the Subpart A Information Sheet and 40 CFR 98.3(g) for general recordkeeping requirements. Specific recordkeeping requirements for Subpart RR are listed at 40 CFR 98.447.

When and How Must Reports Be Submitted?

Reporters must submit their annual GHGRP reports for the previous calendar year to the EPA by March 31st, unless the 31st falls on a Saturday, Sunday, or federal holiday, in which case reports are due on the next business day. Annual reports must be submitted electronically using the electronic Greenhouse Gas Reporting Tool (e-GGRT), the GHGRP's online reporting system.

Additional information on setting up user accounts, registering a facility, and submitting annual reports is available on the GHGRP Help webpage.

When Can a Facility Stop Reporting?

A facility may discontinue reporting under several scenarios, which are summarized in Subpart A (found at 40 CFR 98.2(i)) and the Subpart A Information Sheet.

For More Information

For additional information on Subpart RR, please visit the Subpart RR webpage. For additional information on the GHGRP, please visit the GHGRP website, which includes additional information sheets, data previously reported to the GHGRP, training materials, and links to Frequently Asked Questions (FAQs). For questions that cannot be answered through the GHGRP website, please contact us at: GHGreporting@epa.gov.

This Information Sheet is provided solely for informational purposes. It does not replace the need to read and comply with the regulatory text contained in the rule. Rather, it is intended to help reporting facilities and suppliers understand key provisions of the GHGRP. It does not provide legal advice; have a legally binding effect; or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits with regard to any person or entity.