CLEAN AIR TASK FORCE

Why Subpart RR?

The role of subpart RR of EPA's Greenhouse Gas Reporting Rule in validating secure geologic storage

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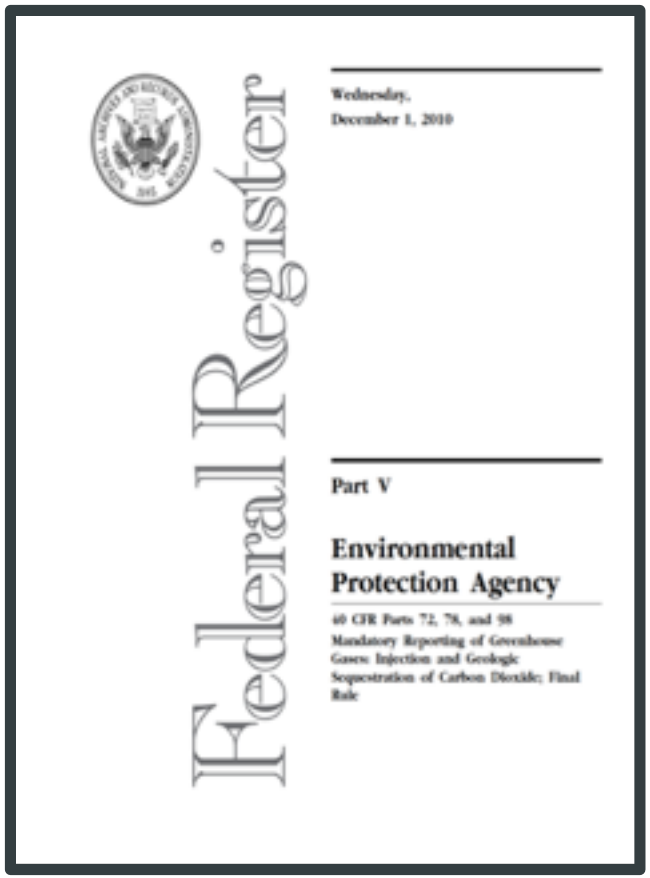
June, 2018

Greenhouse Gas Reporting Rule Subpart RR & UU

Greenhouse Gas Reporting Rule
75 Fed. Reg. 75,065
(December 1, 2010)



EPA Subpart RR home page: http://www.epa.gov/ghgreporting/reporters/subpart/rr.html

Subpart RR EOR Opt-in

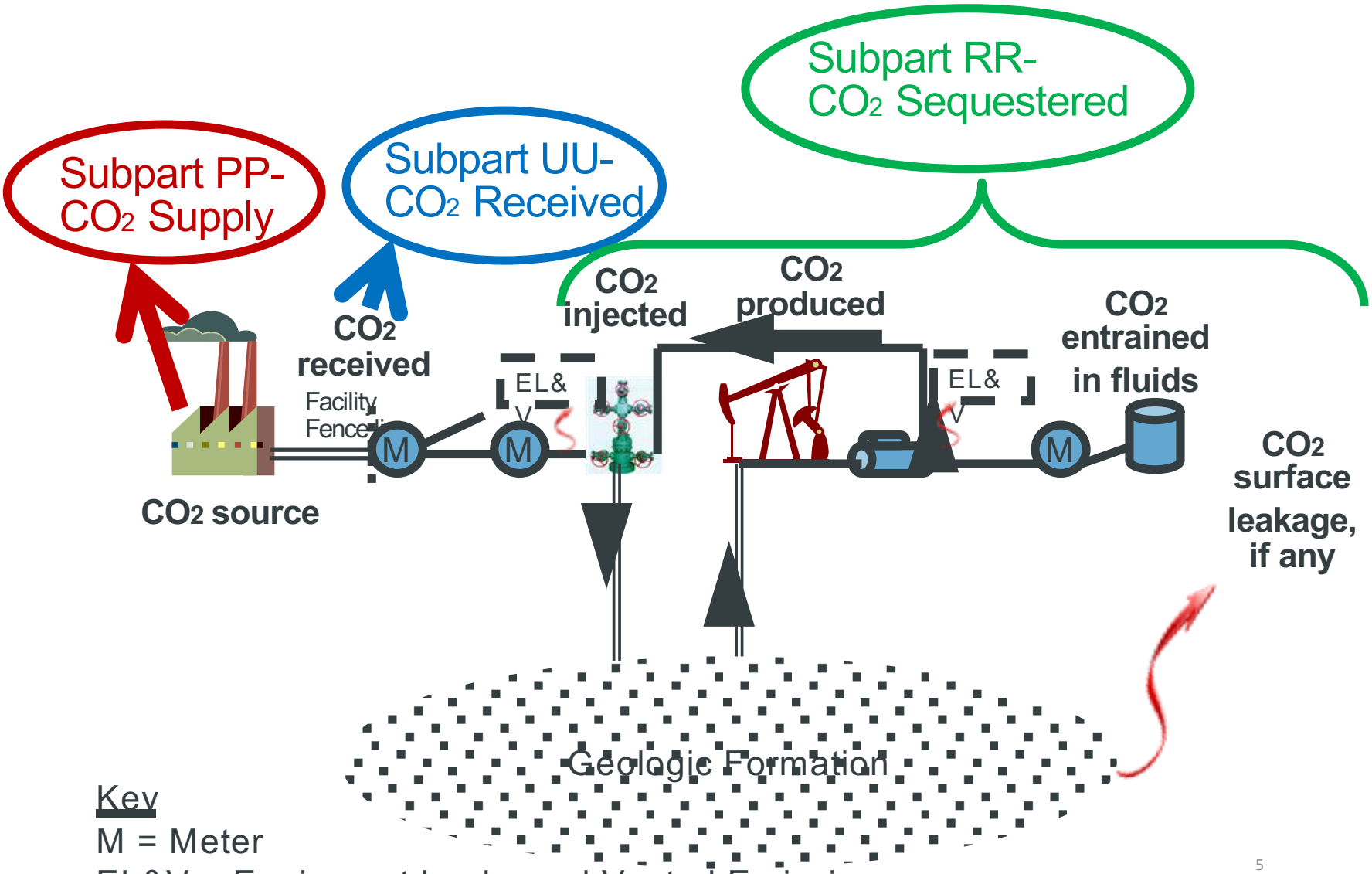
EPA requires Greenhouse Gas Reporting Program Subpart RR reporting for all sources opting in to/getting credit for storage. But some have argued that EOR projects undertaking storage should be able to report under UU. This presentation makes a case for why RR is integral to all storage projects. As EPA states:

"This source category does not include a well or group of wells where a CO2 stream is being injected in subsurface geologic formations to enhance the recovery of oil or natural gas unless…the owner or operator injects the CO2 stream for long-term containment in subsurface geologic formations and has chosen to submit a proposed monitoring, reporting, and verification (MRV) plan to EPA and received an approved plan from EPA." 75 Fed. Reg. at 75,078.

Greenhouse Gas Reporting Program (GGRP) Subpart RR

- Greenhouse Gas Reporting Program (GGRP) is *only a reporting program.*
- GGRP is an air program.
- Subpart RR requires monitoring and verification and subsequent *reporting* of mass balance of stored CO2, and CO2 emitted to the atmosphere.
- Subpart RR by itself does not include any specified provisions to ensure well integrity, remediation in case of leakage, nor does it enforce emissions reductions nor penalize facilities for leakage events that result in releases of CO2 to the atmosphere. That's why it is combined with UIC rules.
- Subpart RR *is a must* because it requires a monitoring and verification plan for the purposes of tracking and assurance of storage of any CO2 for which value is received. *Neither UU nor Class II UIC, or a combination, can provide this function.*

How RR works. (EPA, 2013)



Key
M = Meter
EL&V = Equipment Leaks and Vented Emissions

Monitoring , Reporting and Verification "MRV" plan

1. RR requires a Monitoring, Reporting and Verification (MRV) plan.
2. Identify active and maximum monitoring area.
3. Identify surface leakage pathways (EOR focus: wells).
4. Describe the strategy for leak detection.
5. Take baseline measurements (establish pre-injection conditions).
6. Explain calculation methodologies and accounting.
7. Continue Post Injection Monitoring until the well is plugged and abandoned, and the Administrator has approved a request to discontinue monitoring.

Subpart UU

- Subpart UU only requires reporting of volumes (mass) of CO2 RECEIVED at a facility and basic information about the CO2 received and injected.
- UU includes no MRV provisions to ensure CO2 storage integrity or enable assessment of CO2 volumes leaked to the atmosphere from legacy wells, or geologic pathways.

UIC Rules

- Underground Injection Control (UIC) rules (Class II/EOR, Class VI/saline storage) are solely to mitigate the risk of *drinking water* contamination due to injected CO2 or brine incursion.
- UIC rules include requirements (*variable between UIC classes) such as studies of project area, well construction and mechanical integrity, injection requirements, identification of legacy wells, remediation actions if leakage to groundwater, etc. (see Class II-VI comparison slide 14, below).
- States may apply for UIC primacy to operate their own programs.

UIC Class II and Class VI

- UIC Class II is a 1980s-era rule that is specific to projects undertaking enhanced recovery of oil and/or gas.
- Class II does not require tracking or monitoring and verification of volumes (mass) of CO2 stored.
- UIC Class VI was promulgated by EPA in 2010 to apply to saline storage of CO2, based on the Class I hazardous waste rule approach, and is much more rigorous that Class II; Class VI permit holders will likely meet MRV plan requirements.
- (see Class II-VI comparison slide 14, below).

Why EPA Combined UIC Class II and RR

- UIC drinking water rules work together with Subpart RR air reporting to ensure storage integrity and accounting.
- In 2010 EPA acknowledged the industry's 4 decades of CO2 injection experience, and provided for storage in EOR via UIC Class II in order to allow existing EOR projects to get credit for stored CO2, without the need to rebuild infrastructure.
- Subpart RR requirements supplement UIC to allow CO2 to be counted as stored.
  - UIC Class II program provides some basic requirements including (limited) site investigation, injection operations, mechanical integrity, well integrity etc.
  - RR requires identification of potential leakage pathways, monitoring, verification and accounting for CO2 storage.

Appendix slides

- Subpart RR MRV Preamble and Rule Language.
- Subpart RR Annual Monitoring Report Requirements.
- UIC Class II vs Class VI chart.

Preamble and rule: MRV Plans

"5. Subpart RR Geologic Sequestration Monitoring, Reporting, and Verification (MRV) Plans

Facilities must develop an MRV plan, submit the MRV plan to EPA, receive an approved MRV plan from EPA, implement the EPA-approved plan, and submit annual reports.

The MRV plan must include five major components:

- Delineation of the maximum monitoring area (MMA) and the active monitoring area (AMA).
- Identification and evaluation of the potential surface leakage pathways and an assessment of the likelihood, magnitude, and timing, of surface leakage of CO2 through these pathways in the MMA.
- A strategy for detecting and quantifying any surface leakage of CO2 in the event leakage occurs.
- An approach for establishing the expected baselines for monitoring CO2 surface leakage.
- A summary of considerations made to calculate site-specific variables for the mass balance equation."

75 Fed. Reg. at 75,065, *see also* 75,085 (40 C.F.R. § 98.448) (2010).

Subpart RR Annual Monitoring report

Must include:

"(i) A narrative history of the monitoring effort conducted over the past year, ….

(ii) A description of any [non-material] changes to the monitoring program ….

(iii) A narrative history of any monitoring anomalies that were detected in the previous calendar year and how they were investigated and resolved.

(iv) A description of surface leakages of CO2, including a discussion of all methodologies and technologies involved in detecting and quantifying [them]."

75 Fed. Reg. at 75,084 (40 C.F.R. § 98.446(f)(12)).

Rule Requirement	Class II	Class VI
Area of Review (AoR)	0.25 mi	Computational modeling of plume and pressure front; must be revaluated max 5 yrs.
Evaluation of AoR	Define zone of "endangering influence"	Comprehensive geologic study, identifying confining zone, identification of faults, fracture zones.
Geologic Review	Confining zone must separate injection zone from USDW & must be free of faults & fractures	Must have Suitable geologic system with a confining zone free of transmissive faults.
Legacy Wells	Review reasonably available well data	Identify & take corrective action on all wells at risk of leakage.
Mechanical Integrity Tests	Every 5 years	Every year, casing inspection log or temperature log; continuous annular pressure.
Baseline Monitoring	None	USDW/ groundwater, subsurface injection zone.
CO2 Testing & Monitoring	None.	Groundwater monitoring; tracking plume and pressure front.
Well Construction	Cased and cemented to prevent movment of fluids into USDW & Designed for life expectancy of well	Must be prevent movement of fluids into or between USDWs compatible with CO2 injectate for life of project.
Well Evaluation	Wireline logs through drinking water (USDW) zones and confining zone.	Wireline logs, including CEL.
Injection Pressure	Pressure shall not exceed frac pressure.	Must not Exceed 90% of frac pressure
Injection Monitoring	Injection rate, pressure, nature of injectate.	Injection rate, pressure, nature of injectate. Must maintain a pressure on the annulus. Alarms, downhole shut off.
Reporting	Annual	Semi Annual
Emergency Response	Must report in 24 hours.	Cease injection; carry out pre-approved remedial response plan. Report 24 hrs.
Plugging	Well plugging must be acceptable to Director	Injection well plugging plan
Post Injection Site Care/Financial Responsibility	None	Closure / monitoring plume and pressure front. 50 year presumption

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Appendix

Class II vs Class VI