

EPA's Greenhouse Gas Reporting Program: Geologic Sequestration and Injection of Carbon Dioxide

Mark de Figueiredo
Climate Change Division
U.S. Environmental Protection Agency

Presentation for:
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- Background of Greenhouse Gas Reporting Program
- Summary of Subpart UU (Injection of CO₂)
- Summary of Subpart RR (Geologic Sequestration of CO₂)

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Background of GHG Reporting Program



- In response to the FY2008 Consolidated Appropriations Act, EPA issued the Mandatory Reporting of Greenhouse Gases Rule (40 CFR Part 98)
 - Reporting only, no control or use requirements
- Requires annual reporting of greenhouse gases (GHGs) and other relevant information from:
 - Certain direct emitting source categories
 - Certain suppliers of fuel and industrial GHGs
 - Facilities that inject CO₂ underground for geologic sequestration or other purposes
- Purpose of the GHG Reporting Program is to collect accurate and timely GHG data to inform future policy decisions
- Data collection for some subparts began in 2010 and other subparts in 2011

Overview of Subparts RR and UU



- On December 1, 2010, EPA finalized GHG reporting mechanisms for:
 - Facilities that conduct geologic sequestration (40 CFR Part 98, Subpart RR)
 - All other facilities that inject CO₂ underground, such as for enhanced oil and gas recovery or any other purpose (40 CFR Part 98, Subpart UU)
- Information obtained through this rule will inform Agency decisions under the Clean Air Act related to the use of CCS for mitigating GHGs

Electronic Data Reporting (e-GGRT)



- Information collected through the GHG Reporting Program must be reported electronically via EPA's Electronic Greenhouse Gas Reporting Tool (e-GGRT)
- e-GGRT is a web based application for annual data reporting
 - Does not support recordkeeping
- All Subpart RR and UU data (including Subpart RR MRV plans and R&D project exemption requests) must be submitted via e-GGRT
 - Except the one-time Electronic Signature Agreement (ESA) which is submitted on paper
- Note: You must register 60 days prior to submitting data to e-GGRT



e-GGRT Registration: Login Page



Context sensitive help on every page

As a new e-GGRT user you will start at the e-GGRT login page:
<https://ghgreporting.epa.gov>

United States Environmental Protection Agency

e-GGRT
Electronic Greenhouse Gas Reporting Tool

e-GGRT Help

Welcome to EPA's electronic Greenhouse Gas Reporting Tool

About e-GGRT

EPA's electronic Greenhouse Gas Reporting Tool (e-GGRT) supports facility and supplier reporting for the [Mandatory Reporting of Greenhouse Gases Rule](#). The rule requires electronic reporting of greenhouse gas (GHG) emissions from large sources and suppliers in the United States.

Additional information on [e-GGRT](#)

Warning Notice

EPA's e-GGRT Registration procedure is part of a United States Environmental Protection Agency (EPA) computer system, which is for authorized use only. Unauthorized access or use of this computer system may subject violators to criminal, civil, and/or administrative action. All information on this computer system may be monitored, recorded, read, copied, and disclosed by and to authorized personnel for official purposes, including law enforcement. Access or use of this computer system by any person, whether authorized or unauthorized, constitutes consent to these terms.

e-GGRT LOGIN

User name:

Password:

LOGIN

Forgot your [User name](#) or [Password](#)?

New e-GGRT Users Must Register

New users must complete a one-time registration process. After establishing a user account you can register your facility.

NEW USER REGISTRATION

You are already registered if...

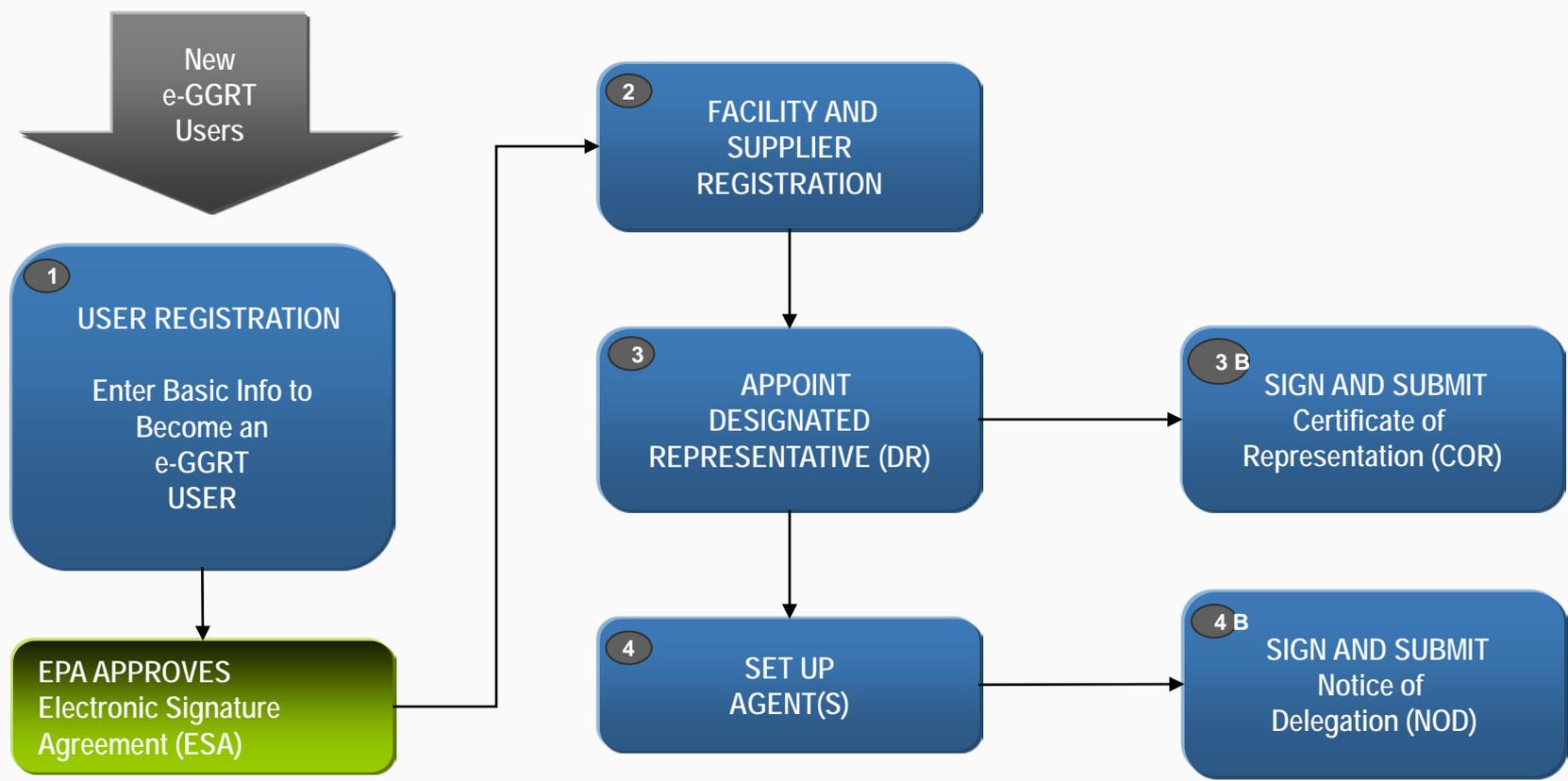
You have a CDX Account

If you have an existing CDX Web account, login above with your CDX Username and Password.

If you have a CDX account then log in with your CDX credentials here

Otherwise, click the green NEW USER REGISTRATION button

Overview of e-GGRT Registration



Injection of Carbon Dioxide (Subpart UU)



- The Subpart UU source category includes any well or group of wells that inject a CO₂ stream into the subsurface that does not report under Subpart RR
 - Example: UIC Class II enhanced oil and gas recovery projects
- Any facility reporting under Subpart UU does **not** have to report under Subpart RR

Subpart UU - Data Collection and Reporting Requirements



- The amount of CO₂ received for injection, data used to calculate the amount, and the source of CO₂ (if known) must be reported annually
 - Data collection for Subpart UU began in 2011, and 2011 data will be reported to EPA in 2012
- The Subpart UU requirements for data collection of CO₂ received mirror the Subpart RR requirements
- A facility must continue to report annually under Subpart UU unless either:
 - Mass of CO₂ received for injection is <25,000 metric tons/yr for 5 consecutive years, OR
 - Mass of CO₂ received for injection is <15,000 metric tons/yr for 3 consecutive years

Geologic Sequestration of Carbon Dioxide (Subpart RR)



- The Subpart RR source category includes:
 - Any well or group of wells that inject a CO₂ stream for long-term containment in subsurface geologic formations
 - All wells permitted as UIC Class VI wells
- Facilities that conduct enhanced oil and gas recovery are **not** required to report geologic sequestration under Subpart RR unless:
 - The owner or operator chooses to opt-in to Subpart RR, or
 - The facility holds a UIC Class VI permit for the well or group of wells used to enhance oil and gas recovery
- All facilities subject to Subpart RR must develop and implement an EPA-approved monitoring, reporting and verification (MRV) plan

Relationship of Subpart RR to UIC Program



- Subpart RR is complementary to and builds on EPA's Class VI Underground Injection Control (UIC) permit requirements
- Examples:
 - Data on the amount of CO₂ injected
 - Site characterization
 - Modeling and monitoring of the CO₂ plume over time
 - Plan for detecting potential surface emissions, if required by UIC director

Subpart RR – R&D Project Exemption: Review Process



Reporter registers facility and submits Certificate of Representation (COR)

Reporter submits Subpart RR R&D project exemption request via e-GGRT

EPA reviews request (EPA may seek clarification from reporter)

EPA decision: Does the project meet the Subpart RR definition of R&D project?

Yes: Reporter is subject to Subpart UU and collects basic information on CO₂ received during 2011

No: Reporter must submit a Subpart RR MRV plan

Reporter submits annual report under Subpart UU in 2012



- R&D projects may receive an exemption from Subpart RR provided they meet the eligibility requirements
- A project is eligible for the exemption if it meets the Subpart RR definition of R&D project:
 - *“a project for the purpose of investigating practices, monitoring techniques, or injection verification, or engaging in other applied research, that will enable safe and effective long-term containment of a CO₂ stream in subsurface geologic formations, including research and short duration CO₂ injection tests conducted as a precursor to long-term storage”*
- R&D projects that are exempt from Subpart RR **are** required to report under Subpart UU*

* Unless the R&D Project also meets the separate definition of exempt “research and development” under 40 CFR Part 98, Subpart A

Subpart RR – R&D Project Exemption: Content of Request



- A submission in support of an exemption as an R&D project must contain the following information:
 - The planned duration of CO₂ injection for the project
 - The planned annual CO₂ injection volumes during this time period
 - The research purposes of the project
 - The source and type of funding for the project
 - The class and duration of UIC permit or, for an offshore facility not subject to the Safe Drinking Water Act, a description of the legal instrument authorizing geologic sequestration

Subpart RR – R&D Project Exemption: Content of Request (cont'd)



- The research purpose in the reporter's request provides a key piece of information on which EPA will base its decision to grant or deny the R&D project exemption request
 - EPA encourages reporters applying for an exemption to provide detailed information about the research purpose
 - Examples:
 - Description of monitoring technologies tested at the GS project
 - Citations for published research at the site, if they exist
 - How the research is moving the science of monitoring GS sites forward
 - Description of the short-term injectivity testing, if this is the purpose of the exemption request
- Other aspects of the submission also provide relevant information on the project
 - For example, the estimated duration of the project will aid in determining the length of time of the exemption

Subpart RR – R&D Project Exemption: Example Submission Page



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e-GGRT Electronic Greenhouse Gas Reporting Tool

HOME FACILITY REGISTRATION FACILITY MANAGEMENT DATA REPORTING

MY FACILITIES FACILITY SUMMARY Hello, Peter Kobylarek | My Profile | Logout

Facility ABC
Subpart RR: Geologic Sequestration of Carbon Dioxide
[Facility Summary](#) » [Subpart RR Overview](#) » [R&D Project Exemption Request](#)

R&D PROJECT EXEMPTION REQUEST OVERVIEW

A geologic sequestration research and development (R&D) project will be granted an exemption from Subpart RR provided the project meets the eligibility requirements. To request a Subpart RR R&D Project Exemption, the facility must complete the form below, then SUBMIT and CERTIFY. EPA will review and respond to the submitted request.

* Denotes a required field. Note, all fields must be complete to Submit and Certify.

R&D PROJECT EXEMPTION REQUEST

Name of Project *

Estimated CO₂ injection Start Date

Estimated CO₂ injection End Date

Class of Underground Injection Control permit

Underground Injection Control permit Start Date

Underground Injection Control permit End Date

Source and type of funding

Research Purpose - Include Planned Annual CO₂ Injection Volumes

[← Facility Summary](#) [CANCEL](#) [SAVE](#)

SUBMIT and CERTIFY R&D PROJECT EXEMPTION REQUEST

If you have completed and are satisfied with your R&D Project Exemption Request you may proceed to certify and submit. This process includes applying your electronic signature (entering your password and answering a challenge/security question).

[SUBMIT and CERTIFY](#)

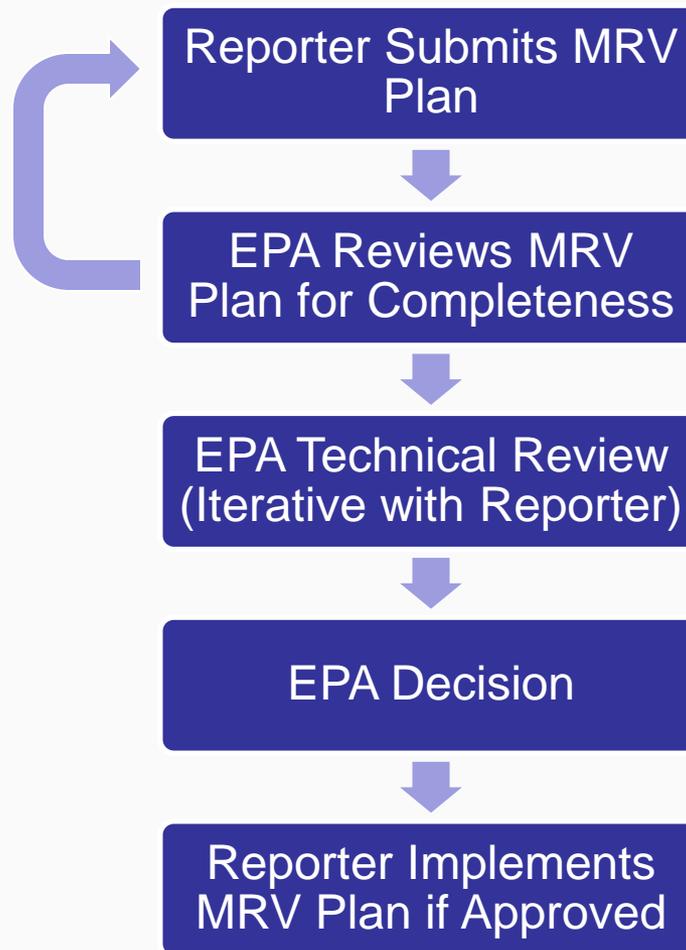
Paperwork Reduction Act Burden Statement | Contact Us

e-GGRT RY2010.R.57 | RR(rdexmpt)

MRV Plan: Review Process



If incomplete, Reporter resubmits MRV Plan



MRV Plan Submission Page (example)



EPA United States Environmental Protection Agency

e-GGRT Electronic Greenhouse Gas Reporting Tool

HOME FACILITY REGISTRATION FACILITY MANAGEMENT DATA REPORTING

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[e-GGRT Help](#)

Facility ABC (2010)

Subpart RR: Geologic Sequestration of Carbon Dioxide

[Facility Summary](#) » [Subpart RR Overview](#)

OVERVIEW OF SUBPART RR

Subpart RR requires reporting of greenhouse gases (GHGs) from facilities that inject carbon dioxide underground for geologic sequestration. Deadlines for submitting a proposed Monitoring, Reporting, and Verification (MRV) Plan (or extension request) or Research and Development (R&D) Project Exemption Request can be found using the e-GGRT Help and information resources links on the left.

R&D PROJECT EXEMPTION REQUEST

Name of Project	Certified Date	Status
none		

[+ ADD a R&D Project Exemption Request](#)

MRV PLAN EXTENSION REQUEST

Name of Project	Certified Date	Status
none		

[+ ADD a MRV Plan Extension Request](#)

MRV PLAN

MRV Plan Submission	Certified Date	Status
none		

To submit (or resubmit) an MRV Plan, please **UPLOAD** the entire contents of your MRV Plan as a single ZIP file. After upload you must proceed to **SUBMIT** and **CERTIFY** the plan, a process that includes applying your electronic signature (entering your password and answering a challenge/security question).

Paperwork Reduction Act Burden Statement | Contact Us

e-GGRT RY2010.R.48 | RR(overview)

Upload MRV plan as a single zip file, submit and certify

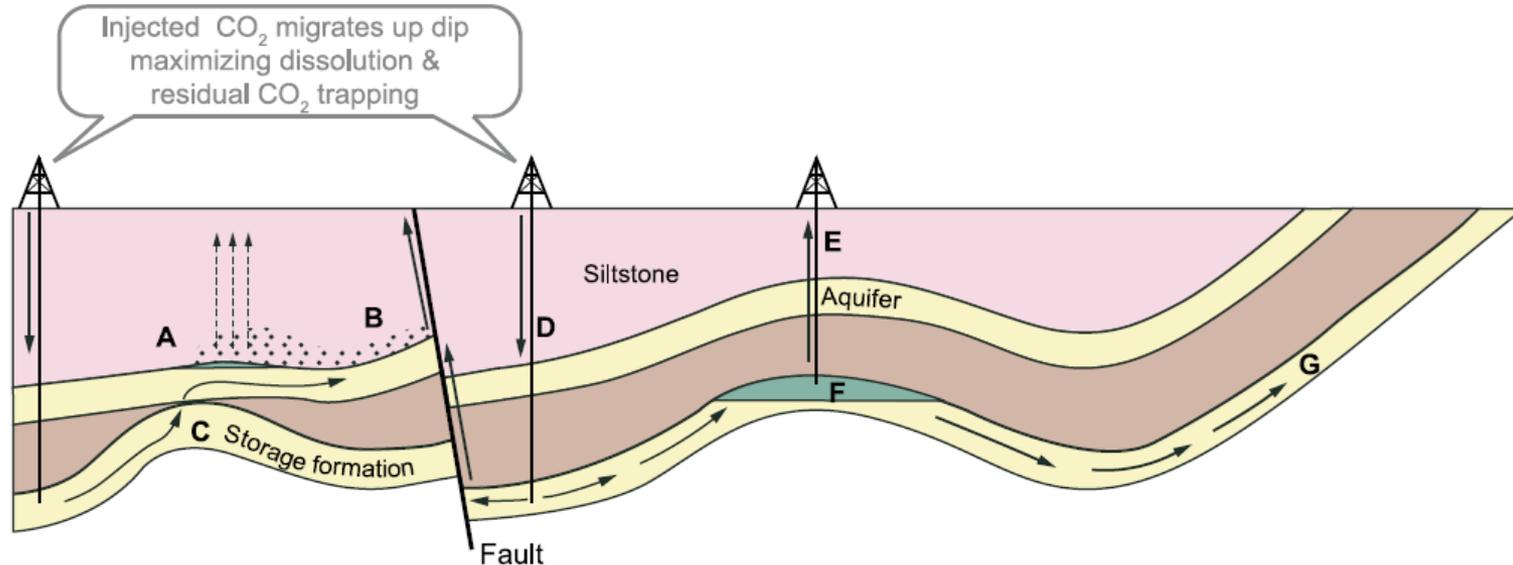


1. Delineation of the maximum monitoring area (MMA) and active monitoring areas (AMAs)
2. Identification of potential surface leakage pathways for CO₂ in the MMA
3. A strategy for detecting and quantifying surface leakage of CO₂
4. A strategy for establishing the expected baseline for monitoring CO₂ surface leakage
5. Site-specific variables for the mass balance equation



- **Maximum monitoring area** is the area expected to contain the free phase CO₂ plume until the CO₂ plume has stabilized plus an all-around buffer zone of at least one-half mile
- **Active monitoring area** is the area that will be monitored over a specific time interval from the first year of the period (n) to the last year in the period (t)
 - This allows operators to phase in monitoring so that during any given time interval, only that part of the MMA in which potential surface leakage might occur needs to be monitored

Identification of Potential Surface Leakage Pathways



Potential Escape Mechanisms

A. CO₂ gas pressure exceeds capillary pressure & passes through siltstone

B. Free CO₂ leaks from A into upper aquifer up fault

C. CO₂ escapes through 'gap' in cap rock into higher aquifer

D. Injected CO₂ migrates up dip, increases reservoir pressure & permeability of fault

E. CO₂ escapes via poorly plugged old abandoned well

F. Natural flow dissolves CO₂ at CO₂ / water interface & transports it out of closure

G. Dissolved CO₂ escapes to atmosphere or ocean

Surface Leakage Detection, Verification, and Quantification Strategy



- Detection
 - Addresses potential surface leakage pathways and can be phased-in using AMA
 - May include continuous measurements and/or regular periodic surveys
 - Detection capability should be described in the MRV plan
- Verification
 - Allows reporter to confirm the location and source of surface leakage that has been detected
 - MRV plan may describe the methods and criteria for determining how an anomalous reading will be evaluated to determine if it represents a surface leak
- Quantification
 - MRV plan must include a discussion of how a surface leak will be quantified if it is detected and verified
 - Should identify the accuracy of the quantification method, e.g. in terms of rate of leakage, the leakage area, and duration of the surface leak
 - May use multiple techniques to address different surface leakage pathways



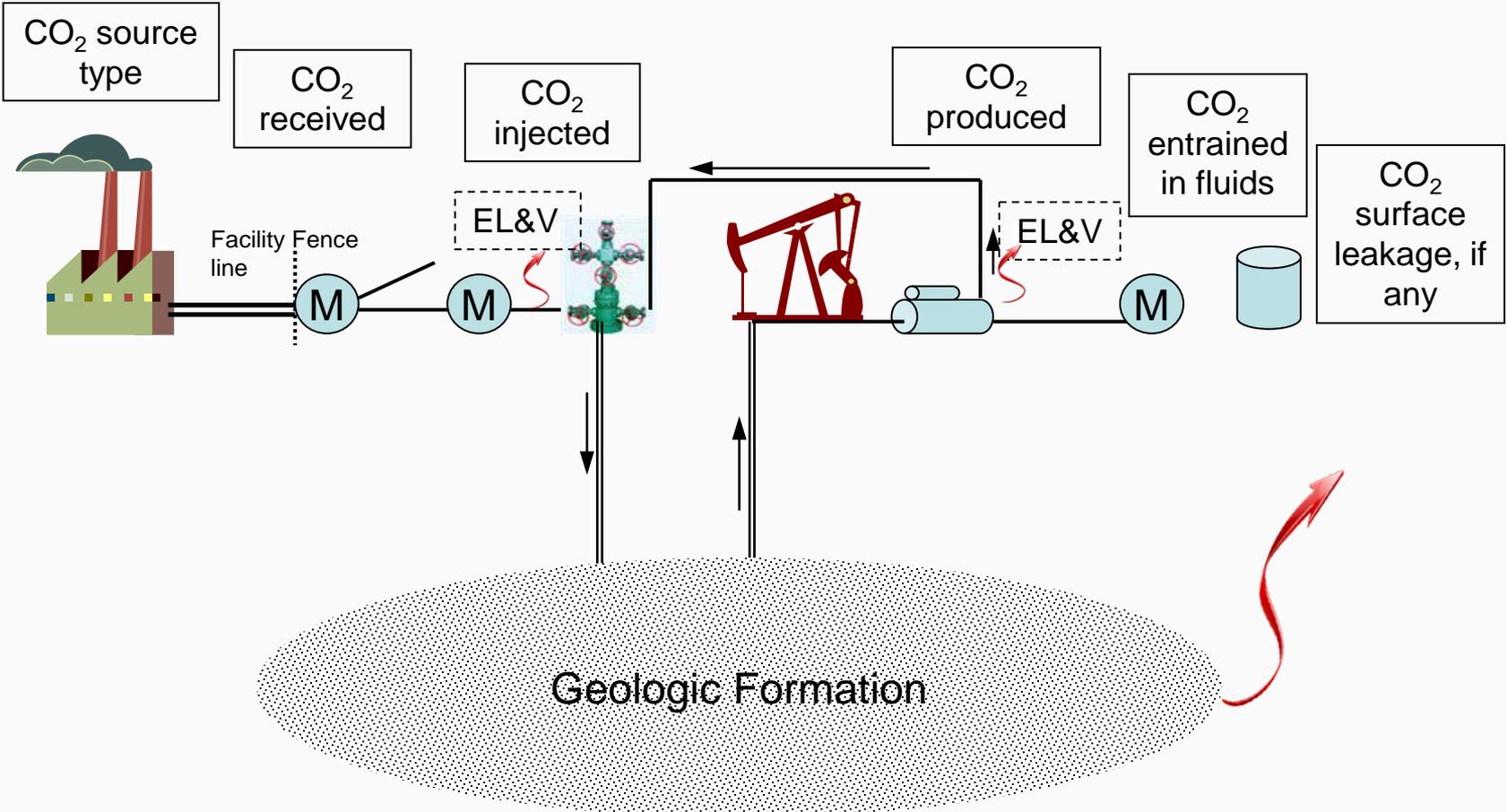
- Baseline measurements are needed to discern whether the results of monitoring are attributable to leakage of injected CO₂
- The baseline must be reliable, representative of the site conditions, and provide enough resolution to minimize false negative or false positive results
- Methods that can be used to develop baselines
 - Pre-injection monitoring
 - Contemporaneous monitoring
 - Using predictive models

Subpart RR - Data Collection and Reporting Requirements



- The following quantities are required to be reported annually:
 - CO₂ received
 - CO₂ injected
 - CO₂ produced
 - CO₂ emitted by surface leakage
 - CO₂ emitted from equipment leaks
- These quantities (with the exception of CO₂ received) are used to calculate the amount of CO₂ sequestered, which is reported annually and cumulatively over the Subpart RR reporting lifetime of the facility.
- The source of the received CO₂, if known, must also be reported.
- Facilities must submit an annual monitoring report, which includes: a narrative history of monitoring efforts; non-material changes to MRV Plan; a narrative history of monitoring anomalies; and a description of surface leakage of CO₂, if any

Illustrative Example of GHGs to be Reported for Subpart RR



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

Calculating CO₂ Sequestered



Facilities actively producing oil or other fluids

$$CO_2 = CO_{2I} - CO_{2P} - CO_{2E} - CO_{2FI} - CO_{2FP}$$

Eq. RR-11

Facilities NOT actively producing oil or other fluids

$$CO_2 = CO_{2I} - CO_{2E} - CO_{2FI}$$

Eq. RR-12

CO ₂	Total annual CO ₂ mass sequestered in subsurface geologic formations (metric tons) at the facility in the reporting year
CO _{2I}	Total annual CO ₂ mass injected (metric tons) in the well or group of wells covered by this source category in the reporting year
CO _{2P}	Total annual CO ₂ mass produced (metric tons) in the reporting year
CO _{2E}	Total annual CO ₂ mass emitted (metric tons) by surface leakage in the reporting year
CO _{2FI}	Total annual CO ₂ mass emitted (metric tons) from equipment leaks and vented emissions of CO ₂ 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
CO _{2FP}	Total annual CO ₂ mass emitted (metric tons) from equipment leaks and vented emissions of CO ₂ 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

Subpart RR - Cease Reporting Provisions



1. Plug and abandon all well(s) in accordance with applicable requirements, **AND**
2. Submit a request that must contain either:
 - a. For Class VI wells - a copy of the applicable UIC program Director's authorization of site closure for the UIC Class VI well(s)
 - b. For non-Class VI wells and as an alternative for Class VI wells - a demonstration that current monitoring and model(s) show that the injected CO₂ stream is not expected to migrate in the future in a manner likely to result in surface leakage

Subpart RR - Appeals



- EPA final decisions under Subpart RR are appealable by the Reporter or any interested person to EPA's Environmental Appeals Board (EAB)
- Final decisions that may be appealed include:
 - Determination of eligibility for a R&D project exemption
 - Approval or disapproval of Subpart RR MRV plan
 - Approval or disapproval of a request to discontinue Subpart RR reporting
- See Subpart RR webpage for more information, including:
 - Copies of EPA final decisions
 - How to be included on interested persons list to appeal an EPA final decision

Subpart RR - Confidential Business Information



- EPA intends to undertake an action to determine the confidentiality status for data elements reported under Subpart RR
- Until that action is finalized, EPA will evaluate confidential business information (CBI) claims regarding Subpart RR submissions on a case-by-case basis
 - Reporters should indicate any CBI claims in the Subpart RR submission
- For more information:
<http://www.epa.gov/climatechange/emissions/CBI.html>

Subpart RR Key Dates



- Submit a proposed MRV plan, MRV plan submission extension request (up to 180 day extension), or R&D project exemption request through e-GGRT **within 180 days of receiving the final UIC permit**
- Data collection for Subparts RR began in 2011, and 2011 data will be reported to EPA in 2012

For More Information



Electronic Greenhouse Gas Reporting Tool (e-GGRT):

<https://ghgreporting.epa.gov>

Subpart RR:

<http://www.epa.gov/climatechange/emissions/subpart/rr.html>

Subpart UU:

<http://www.epa.gov/climatechange/emissions/subpart/uu.html>

GHG Reporting Program Help Center:

<http://www.epa.gov/climatechange/emissions/help.html>