

July 2024

EPA Oversight of Carbon Capture and Storage (CCS)

The Environmental Protection Agency (EPA) plays a role in the implementation of Carbon Capture and Sequestration (CCS) technology. With the expansion of the 45Q tax credit and other federal supports for CCS set to greatly increase deployment of the technology, there is increased attention on whether the EPA's oversight of CCS sufficiently protects communities and taxpayers.

- **Underground Injection Control (UIC) Program:** The EPA is responsible for reviewing the injection of carbon dioxide (CO₂) through its UIC program and associated regulations. This program is designed to protect underground sources of drinking water. The agency establishes minimum standards and criteria for UIC programs, and most states have the responsibility of regulating and permitting Class II wells injecting CO₂ for Enhanced Oil Recovery (EOR). The EPA's Class VI injection well program is also part of the UIC program and is specifically designed to regulate the injection of CO₂ for long-term storage through geological sequestration.
- **Reporting and Regulation of CO₂ Emissions:** The Greenhouse Gas Reporting Program (GHGRP), codified as 40 C.F.R. Part 98 and administered by the EPA, requires large greenhouse gas (GHG) emission sources, fuel and industrial gas suppliers, and CO₂ injection sites to report their GHG emissions. The EPA also has the authority to set CO₂ emissions standards for new and existing power plants.
- **Section 45Q Tax Credit:** The Internal Revenue Code Section 45Q provides a tax credit for every metric ton of carbon captured and stored through geological sequestration, used as a tertiary injectant for EOR, or for other designated uses. While the EPA does not directly administer this tax credit, Internal Revenue Service (IRS) guidance on 45Q relies heavily on EPA regulations. The EPA's UIC program and GHGRP play a significant role in demonstrating secure geological storage to be eligible for this tax credit.

Safe Drinking Water Act and Underground Injection Control (UIC) Program

The EPA's authority to oversee the injection of CO₂ for geologic sequestration and EOR is provided by the Safe Drinking Water Act (SDWA), which is administered by the EPA. This involves setting guidelines and providing support for state implementation of UIC programs. The EPA directly administers these programs in some states and has established minimum requirements for state UIC programs and permits for injection wells. These requirements cover various aspects such as well construction, operation, maintenance, monitoring, testing, reporting, recordkeeping, site closure, financial responsibility, and post-injection site care.

The EPA categorizes injection wells into six classes based on the type of fluid injected and the potential risk to underground sources of drinking water (USDWs).

- Class I wells are for the injection of hazardous and non-hazardous wastes into deep, isolated rock formations.
- Class II wells are for the injection of fluids associated with oil and natural gas production (including CO₂-EOR and produced water disposal).
- Class III wells are for the injection of fluids for solution mining (e.g. extracting uranium or salt)
- Class IV wells are for the injection of hazardous or radioactive wastes through shallow wells into or above formations that contain an underground source of drinking water (USDW) and are banned unless authorized under a federal or state groundwater remediation project.
- Class V wells are any well used to inject non-hazardous fluids underground that does not fall under the other five classes, like storm water drainage, septic system leach fields, aquifer storage and recovery wells, and experimental wells.
- Class VI classes are for the injection of CO₂ into geologic formations for long-term storage or geologic sequestration.

UIC provisions serve to prevent endangerment of USDWs from injection activities. In 2010, the EPA established Class VI, solely for the geologic sequestration of CO₂. EOR, including CO₂-EOR, uses Class II wells for disposal of fluids associated with oil and gas production. Class VI requirements may also apply to CO₂ injection for EOR using Class II wells when the EPA or the delegated state deems there is an increased risk to USDWs.

Class II wells are primarily used for injecting fluids related to oil and gas production, including CO₂ for EOR (known as CO₂-EOR). The United States has over 118,425 EOR wells, mainly in Texas, California, Kansas, Illinois, and Oklahoma.¹ These include wells that inject CO₂ captured from anthropogenic sources as well as those using naturally derived CO₂. Class VI wells, on the other hand, are designated for injecting CO₂ for geologic sequestration. Currently, four EPA-permitted Class VI wells are operational in the United States, two at an ADM corn processing facility in Illinois and two obtained by Wabash Carbon Services, LLC. in Indiana to store CO₂ from offsite fertilizer production.² The EPA is also reviewing 58 additional geological sequestration project applications, which include a total of 169 class VI wells. More than two thirds of these proposed projects were submitted after the passage of the Inflation Reduction Act (IRA) in September 2022.³

Primacy

The SDWA authorizes states to administer federal UIC programs in lieu of the EPA, known as “primacy”. The states of North Dakota, Wyoming, and Louisiana have primacy for Class VI wells, while the EPA implements Class VI wells in all other states, territories, and tribes. All three states have primacy for all well classes. In 2022, North Dakota issued two CO₂ injection permits for geologic sequestration.⁴ Wyoming approved its first three Class VI well permits in 2023, three years

¹ EPA, UIC Injection Well Inventory. FY2022 State UIC Inventory. <https://www.epa.gov/uic/uic-injection-well-inventory>

² EPA, Table of EPA's Draft and Final Class VI Well Permits. Accessed June 2024. <https://www.epa.gov/uic/table-epas-draft-and-final-class-vi-well-permits>

³ Environmental Integrity Project, Flaws in EPA's Monitoring and Verification of Carbon Capture and Projects. December 2023. https://environmentalintegrity.org/wp-content/uploads/2023/12/EIP_Report_CarbonCapture12.14.23.pdf

⁴ CRS, CO₂ Underground Injection Regulations: Selected Differences for Enhanced Oil Recovery and Geologic Sequestration. June 2020. <https://crsreports.congress.gov/product/pdf/IF/IF11578>

after gaining primacy.⁵ And Louisiana, which was most recently awarded primacy by EPA in December 2023, has yet to issue a permit. Texas, West Virginia, and Arizona are also in the process of requesting primacy for their Class VI programs.

States may request primacy for Class II oil-and gas-related injection operation programs under SDWA Section 1422 or Section 1425. Section 1422 mandates that state programs meet EPA requirements promulgated under Section 1421 and prohibits underground injection that is not authorized by permit or rule. Section 1425 allows states to administer their Class II UIC programs using state rules in lieu of EPA regulations, provided the state demonstrates that it has an effective program preventing any underground injection that endangers drinking water sources. Forty states have Class II primacy, with 16 having primacy under section 1422 and 24 under section 1425.

Clean Air Act and Greenhouse Gas Reporting Program

In addition to the SDWA authority to oversee the injection of CO₂, the EPA has the authority to require certain sources of GHG above a given threshold to report GHG emissions data under the Clean Air Act. In 2010, the EPA promulgated a rule to include all wells that inject CO₂ for EOR (Class II) and geologic sequestration (Class VI) in the GHGRP. In this rule, the agency clarified that facilities that inject CO₂ underground, including for long-term sequestration, fall within the GHGRP covered source categories. Therefore, reporting requirements apply to both Class VI and Class II wells that inject CO₂. The EPA collects this information to track CO₂ emissions and to quantify the sequestered CO₂.⁶ The GHGRP establishes separate requirements for most GHG source categories in Subpart B to Subpart UU. Subpart RR and UU apply to facilities that inject CO₂ underground.

Subpart RR

Subpart RR applies to facilities with wells injecting CO₂ for long-term geologic sequestration. This includes all wells classified by the EPA as UIC Class VI geologic sequestration wells. Subpart RR regulations require facilities injecting CO₂ for geologic sequestration to have an EPA-approved monitoring, reporting, and verification (MRV) plan and report the amount of CO₂ sequestered.

Subpart UU

Subpart UU applies to facilities with wells used to inject CO₂ during EOR operations or for purposes other than geologic sequestration. Facilities must report the volume of received CO₂ and its origin, if known. An MRV plan is not mandatory, but facilities may submit one. Nearly 130 facilities have reported to the EPA under Subpart UU since the first year of required reporting in 2011, including three facilities that received research and development exemptions from Subpart RR reporting.⁷ Subpart UU does not require reporting the amount of CO₂ sequestered.

⁵ National Wildlife Federation, Geologic Sequestration of Carbon Dioxide: The State of Responsible Primacy. February 2024. <https://www.nwf.org/-/media/Documents/PDFs/Climate/Geologic-Sequestration-of-Carbon-Dioxide-Primacy-Brief.pdf>

⁶ CRS, EPA's Greenhouse Gas Reporting Program. March 2023. <https://crsreports.congress.gov/product/pdf/IF/IF11754>

⁷ EPA, Facility Level GHG Emissions Data.

<https://ghgdata.epa.gov/ghgp/main.do#/listFacility/?q=Find%20a%20Facility%20or%20Location&st=&bs=&fid=&sf=11001100&ds=A&yr=2022&tr=current&cyr=2022&ol=0&sl=0&rs=ALL>

EPA and IRS Coordination on the Implementation of 45Q

The IRS administers the carbon oxide sequestration credit, known as 45Q. The 45Q tax credit offers a per-metric-ton credit for qualified carbon oxide captured and sequestered. The amount of the credit and various features depend on when the qualifying capture equipment was placed in service and the method of storage. The 2021 IRS rulemaking on 45Q includes separate requirements for geologic sequestration and EOR operations.

To claim the 45Q credit for geologic sequestration of CO₂, claimants must dispose of carbon oxides in secure geological storage so that no qualified carbon oxides escape into the atmosphere. To meet secure geological storage conditions, taxpayers must comply with Subpart RR requirements, including calculating the volume of carbon oxides sequestered and an EPA-approved MRV plan, along with other applicable Subpart RR provisions. All UIC Class VI wells are already subject to Subpart RR, so the 2021 IRS rule adds no new requirements for the owners or operators of these wells seeking the 45Q tax credit.

To demonstrate secure geological storage for carbon oxides stored during EOR operations, taxpayers can comply with either Subpart RR or a standard adopted by the International Organization for Standardization (CSA/ANSI ISO 27916:19). The 2021 regulation allows EOR facilities to self-certify carbon oxide volumes claimed for the tax credit if they choose to demonstrate secure geological storage by complying with Subpart RR. The EPA performs basic checks on data submitted under GHGRP but does not carry out on-site verification of CO₂ amounts reported by EOR facilities. If a facility uses the ISO standard, the documentation must be certified annually by a qualified independent engineer or geologist.

Taxpayer Concerns

The fossil fuel industry has been very public in their support of CCS and is eager to capitalize on generous federal subsidies. Federal support could lead to widespread investments in oil and gas infrastructure and pipelines, as well as an increase in sequestration sites which may carry significant long-term liabilities. The Treasury Department estimated that the 45Q tax credit alone could cost taxpayers over \$36.2 billion over the next 10 years.⁸ As the federal government moves forward with billions of dollars in tax credits and direct subsidies for CCS, current EPA regulations fail to offer sufficient safeguards for taxpayers and communities from this expansion.

Current requirements for monitoring, reporting, and verification (MRV) plans, which are needed to comply with GHGRP subpart RR and are a vital component of CCS oversight, are insufficient to ensure carbon injected underground will remain sequestered over the long term. Specifically, the EPA does not require particular monitoring strategies or technologies, allowing the companies to devise their own standards. Nor does the MRV require explicit monitoring timelines or activities, or third-party verification of data submitted in the MRV.⁹ Requiring specific technological standards and monitoring timelines for the MRV would help ensure taxpayers and communities are protected.

⁸ OMB, Analytical Perspective. The President's FY2025 Budget. https://www.whitehouse.gov/wp-content/uploads/2024/03/spec_fy2025.pdf

⁹ Environmental Integrity Project, Flaws in EPA's Monitoring and Verification of Carbon Capture and Projects. December 2023. https://environmentalintegrity.org/wp-content/uploads/2023/12/EIP_Report_CarbonCapture12.14.23.pdf

The EPA should assess whether its current regulatory framework is sufficient to verify the amount of carbon sequestered, especially when current IRS rules rely on EPA regulatory framework for tax credit claimants to demonstrate eligibility to claim the 45Q credit. As the IRS allows EOR facilities to self-certify volumes, billions of dollars can be claimed without verification of the amount of carbon stored or that carbon will remain sequestered. Requiring on-site verification of subpart RR data reported to the EPA would better protect taxpayer funds and shield against potential fraud and abuse of the tax credit.

Fast-tracking class VI well program primacy to states can expose taxpayers to more risks. In states with substantial oil and gas production, such as Wyoming and North Dakota, the industry has hailed the acquisition of primacy while some communities and stakeholders have raised concerns about certain states' capacity to manage Class VI programs and enforce regulations effectively.¹⁰

Under the Clean Air Act, the EPA also has the authority to set CO₂ emissions standards for new and existing power plants. The EPA recently proposed performance standards based on CCS technologies, among other pathways to ensure coal and gas-fired power plants reduce their GHG emissions.¹¹ Without stronger rules governing CCS to ensure the verification of the quantity and safe storage of captured carbon, taxpayers are exposed to great financial and environmental risks while paying for billions of dollars' worth of subsidies.

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¹⁰ National Wildlife Federation, Geologic Sequestration of Carbon Dioxide: The State of Responsible Primacy. February 2024. <https://www.nwf.org/-/media/Documents/PDFs/Climate/Geologic-Sequestration-of-Carbon-Dioxide-Primacy-Brief.pdf>

¹¹ EPA, NSPS for GHG Emissions from New, Modified, and Reconstructed Electric Utility Generating Units. <https://www.epa.gov/stationary-sources-air-pollution/nsps-ghg-emissions-new-modified-and-reconstructed-electric-utility>