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# Carbon Storage Requirements in the 45Q Tax Credit

The Internal Revenue Code Section 45Q tax credit is intended to promote investment in carbon capture and sequestration (CCS), a process designed to reduce emissions of greenhouse gases (GHGs) from power plants and other industrial sources. Geologic sequestration of carbon dioxide ($CO_2$), a type of carbon storage, is a process aiming to permanently store the captured gases deep underground. The Section 45Q tax credit can be claimed for the capture and sequestration of carbon oxides, categorized as (1) $CO_2$ captured directly from industrial facilities originally placed in service before February 9, 2018; (2) $CO_2$ and other carbon oxides captured directly from industrial facilities originally placed in service on or after February 9, 2018; and (3) $CO_2$ captured directly from the ambient air ("direct air capture"). In 2020, Section 45Q provides tax credits of $31.77 per ton for carbon oxide that is geologically sequestered and $20.22 per ton for carbon oxide that is sequestered during enhanced oil recovery (EOR), or used in other qualified industrial processes. These tax credits increase to $50 and $35 per ton, respectively, by 2026.

In June 2020, the Internal Revenue Service (IRS) issued a notice of proposed rulemaking, "Credit for Carbon Oxide Sequestration," which includes proposed requirements for demonstrating the "secure geological storage" of carbon oxides in underground formations needed to qualify for 45Q tax credits (85 *Federal Register* 34050). Section 45Q and this proposed rule cover a larger set of chemical substances (i.e., carbon oxides) compared to some other federal GHG-related rules, which specifically target $CO_2$.

## Secure Geological Storage in 45Q

Section 45Q tax credits were enacted as part of the Energy Extension and Improvement Act of 2008 (P.L. 110-343, Division B). Section 45Q(f)(2) of the act required the Department of the Treasury, in consultation with the Environmental Protection Agency (EPA), the Department of Energy, and the Department of the Interior, to establish regulations for the secure geological storage of qualified carbon oxide to prevent release into the atmosphere. Further, the provision defined *secure geological storage locations* to include "deep saline formations, oil and gas reservoirs, and unmineable coal seams," under conditions as determined in regulations. Secure geological storage is required whether the taxpayer is claiming the credit for carbon oxides used as a tertiary injectant and consequently stored during EOR operations or injected into underground formations solely for geologic sequestration.

## Connection to EPA's Greenhouse Gas Reporting Program Requirements

In 2009, IRS Notice 2009-83 provided interim guidance on specific requirements for secure geological storage, pending issuance of regulations. The guidance established that taxpayers claiming the 45Q tax credits must demonstrate secure geological storage by calculating the amount of $CO_2$ at the source of capture using methodologies contained in EPA's 2009 Mandatory Reporting of Greenhouse Gases Rule (40 C.F.R. Part 98). This rule does not regulate GHG emission levels but requires facilities designated as GHG sources to report annual GHG emissions as part of EPA's Greenhouse Gas Reporting Program (GHGRP) and to follow monitoring, recordkeeping, and verification requirements. Title 40, Part 98, Subparts RR and UU, of the *Code of Federal Regulations*, added in 2010, apply to GHG sources associated with the underground injection and sequestration of $CO_2$.

### Subpart RR

Subpart RR applies to facilities with wells that inject $CO_2$ for long-term geologic sequestration. This includes all wells classified by EPA as Underground Injection Control (UIC) Class VI geologic sequestration wells. The facilities must calculate and report (1) the mass of $CO_2$ received; (2) the mass of $CO_2$ injected into the subsurface; (3) the mass of $CO_2$ produced (mixed with produced oil, gas, or other fluids); (4) the mass of $CO_2$ emitted by surface leakage; (5) the mass of $CO_2$ emitted as equipment leakage or vented from surface equipment; (6) the mass of $CO_2$ sequestered in subsurface geologic formations; and (7) the cumulative mass of $CO_2$ sequestered since the start of required reporting. Subpart RR also requires facilities to submit a proposed monitoring, reporting, and verification (MRV) plan meeting certain requirements to EPA (**Table 1**). Once approved, EPA issues a final MRV plan.

**Table 1. Subpart RR MRV Plan Requirements**

- Delineation of the maximum and active monitoring areas
- Identification of potential $CO_2$ leakage pathways in the maximum monitoring area and the likelihood, magnitude, and timing of surface leakage through these pathways
- Strategy to detect and quantify $CO_2$ surface leakage
- Strategy to establish the expected baselines for monitoring $CO_2$ surface leakage
- Considerations intended to be used to calculate site-specific variables in the mass balance equation
- UIC well number, if permitted under the UIC program
- Proposed date to begin collecting data for calculating the total amount of $CO_2$ sequestered

**Source:** 40 C.F.R. Part 98, Subpart RR.

From 2016, the first year of reporting, through 2018, the latest year for which GHGRP data are available, five facilities injecting $CO_2$ have reported $CO_2$ data to EPA under Subpart RR. This includes one facility in Illinois

injecting industrial $CO_2$ into a saline aquifer. As of 2018, the facility reported that 1,031,652 tons of $CO_2$ had been sequestered at the site. The other reporting facilities injecting $CO_2$ do not qualify for the 45Q tax credit because the $CO_2$ originates from natural, underground formations, so sequestration does not reduce net $CO_2$ emissions into the atmosphere. Although it is not required for the latter facilities, all of the above facilities have EPA-approved MRV plans.

### Subpart UU

Subpart UU applies to GHG source facilities with wells used to inject $CO_2$ during EOR operations or for any purpose other than geologic sequestration. These facilities are required to report the volume of $CO_2$ received and its origin (if known). An MRV plan is not required, but facilities may choose to submit a plan.

Nearly 120 facilities have reported to 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. These facilities have reported a total of 2,764,386 tons of $CO_2$ received for injection from 2011 through 2018. Subpart UU does not require facilities to report the amount of $CO_2$ sequestered.

## 2020 45Q Proposed Rule

Section 1-45Q-3 of the IRS proposed rule would require taxpayers to demonstrate "secure geological storage." The rule would establish that compliance with relevant provisions of the EPA's Mandatory Reporting of Greenhouse Gases Rule satisfies the 45Q secure storage demonstration requirements. In addition, the proposal would require that carbon oxides must also be injected into a well that complies with applicable EPA UIC regulations to be considered secure geological storage.

The IRS rule proposes separate requirements for geologic sequestration and EOR operations. Previous IRS guidance on secure geological storage, issued prior to both the 2010 EPA Mandatory Reporting of Greenhouse Gases Rule Subparts RR and UU and EPA's 2010 regulations on underground injection of $CO_2$ for geologic sequestration, did not distinguish between the two types of injection or GHG sources.

### Requirements for Geologic Sequestration

The proposed rule would require taxpayers seeking the 45Q credit for geologic sequestration of $CO_2$ to dispose of carbon oxides in secure geological storage so that no qualified carbon oxides escape into the atmosphere. Under the proposal, to meet the conditions of secure geological storage, carbon oxide storage must be in compliance with Subpart RR requirements. Therefore, a taxpayer who fulfills Subpart RR requirements for calculating the volume of carbon oxides sequestered and has an EPA-approved MRV plan, along with other applicable Subpart RR provisions, would meet the requirements for secure geological storage. All UIC Class VI wells are already subject to Subpart RR, so the proposal would not add any new requirements for the owners or operators of these wells.

### Requirements for Enhanced Oil Recovery

The proposed rule would establish two options for demonstrating secure geological storage for carbon oxides stored during EOR operations. Taxpayers could meet the requirements by either (1) storing carbon oxides in compliance with Subpart RR requirements or (2) storing carbon oxides in compliance with a standard adopted by the International Organization for Standardization (ISO) and endorsed by the American National Standards Institute (CSA/ANSI ISO 27916:19). According to the Treasury Department, the methodology of this standard is similar to the Subpart RR methodology in that both "require an assessment and monitoring of potential leakage pathways; qualification of inputs, losses and storage through a mass balance approach; and documentation of steps and approaches." In the preamble to the proposed rule, the department observes that many stakeholders requested flexibility in the requirements and suggested this standard as an alternative for demonstrating secure geological storage.

The IRS also proposes that EOR facilities can self-certify carbon oxide volumes claimed for the tax credit if they choose to demonstrate secure geological storage through compliance with Subpart RR. If the facility uses the ISO standard, however, the documentation must be certified annually by a qualified independent engineer or geologist.

## Issues for Congress

Many proponents of CCS view clarification of $CO_2$ secure storage requirements as a critical step in the development and commercial deployment of large-scale CCS projects in the United States. Clear regulatory requirements for secure geological storage may lead to increased interest in the 45Q tax credit and further development of CCS projects, which some in Congress see as necessary to meet GHG emissions reduction targets. Clearer regulatory guidance may also help the IRS identify improper claims for the 45Q tax credit.

To date, five facilities have reported volumes of $CO_2$ sequestered under Subparts RR and UU. One facility is currently required to have an MRV plan under Subpart RR and Class VI UIC regulations. If growth in commercial-scale CCS expands in the coming years, as some anticipate, more facilities throughout the United States may begin to sequester $CO_2$, report $CO_2$ sequestration data to EPA, and claim the 45Q tax credit. Notwithstanding the regulations discussed above, some stakeholders have expressed concerns about the long-term security of geologic sequestration of $CO_2$—concerns that could be heightened as both the number of CCS projects and the volume of $CO_2$ injected increase. Congress may consider expanding oversight of implementation of its directives for 45Q and the GHGRP as part of an overall GHG reporting policy. Congress may also consider whether EPA and the IRS have sufficient resources to effectively manage potential increases in GHG reporting and MRV plans submitted for approval and oversee 45Q tax credit claims and other programmatic needs associated with the new regulations.

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