

**Underground Injection Control (UIC) Class VI Well
Fact Sheet for Draft Permit Number IN-135-6A-0001**

Public Comments Sought on Class VI UIC Injection Well Carbon Storage Draft Permit

Fact Sheet for Class VI Underground Injection Control (UIC) Injection Well Carbon Storage Draft Permit and Public Comment Opportunity

October 2025

Permit Applicant/Facility Information

One Carbon Partnership, LP, UIC Class VI Injection well

Randolph County, Indiana (IN-135-6A-0001)

Part I: Overview

Introduction under 40 C.F.R. § 124.8(b)(1) and (2)

The U.S. Environmental Protection Agency is accepting comments on its intent to issue a permit for One Carbon Partnership, LP (“One Carbon Partnership” or “OCP”) to inject carbon dioxide (CO₂) underground at its proposed injection well in Randolph County, Indiana. This injection would be part of a process that is often called “geologic sequestration” or “carbon sequestration.” All public comments must be submitted at the scheduled public hearing or through <https://www.regulations.gov/docket/EPA-R05-OW-2025-1613> by 11:59 PM Eastern Time on December 8, 2025. If you are unable to submit electronically, please contact Andrew Greenhagen at (312) 353-7648 for instructions on how to comment. In issuing a permit for a geologic sequestration project, the EPA has authority and responsibility to protect underground drinking water sources. Other federal, state, and local agencies have authority relevant to surface activities such as carbon capture and transportation, and to address protection of other resources such as surface water and air quality.

One Carbon Partnership proposes to construct an injection well at the Cardinal Ethanol facility in Randolph County, Indiana for the purpose of injecting captured CO₂ underground, at depths ranging from 3,100 to 3,659 feet (ft), for long-term storage. The proposed One Carbon Partnership project (“Project”) would have one deep monitoring well to monitor the injection zone, one above confining zone monitoring well to monitor groundwater in aquifers above the confining zone, one shallow monitoring well to monitor the lowermost Underground Source of Drinking Water (USDW), and 12 shallow monitoring wells to monitor groundwater in aquifers at a depth less than 300 ft below ground surface (BGS). The draft permit would allow One Carbon Partnership to inject up to 13.5 million metric tons of CO₂ in total at a rate of up to 450,000

metric tons per year via the well into the injection zone. For more detailed information on the proposed injection fluid, see Attachment C of the draft permit.

EPA is proposing to approve One Carbon Partnership's selected geologic location for the proposed well after reviewing extensive information about the Project site. EPA's information review has enabled EPA to determine that the injection well is placed in a site with suitable geology, that the CO₂ can be securely stored underground, and that the well will operate safely. The top of the rock formation where the CO₂ will be stored is about 3,100 ft BGS and extends down to 3,659 ft BGS. Studies of the site show that there is about 2,650 feet of sandstones, carbonates, and shales including about 487 ft of predominantly low permeability shale that makes up the primary confining zone between the deepest USDW in the area and the proposed CO₂ storage below. In making this proposed permitting decision, EPA has concluded that the well construction, intended operation and monitoring, and underlying geology is appropriate for carbon sequestration and prevents endangerment of USDWs.

Pursuant to the draft permit, One Carbon Partnership will be required to test and monitor the condition of the well, the injection pressure, and the location and size of the injected CO₂ during the twelve to thirty years of proposed CO₂ injection and for 50 years after injection is finished, known as the post-injection site care (PISC) period. This testing and monitoring requirement ensures that the injection well operates according to the permit, helps assess whether any changes in operation are needed to protect USDWs, allows EPA to observe how the movement of the CO₂ compares to modeled outcomes (both during and after injection), and is used to determine that it would be safe to close the Project site at the end of the PISC period.

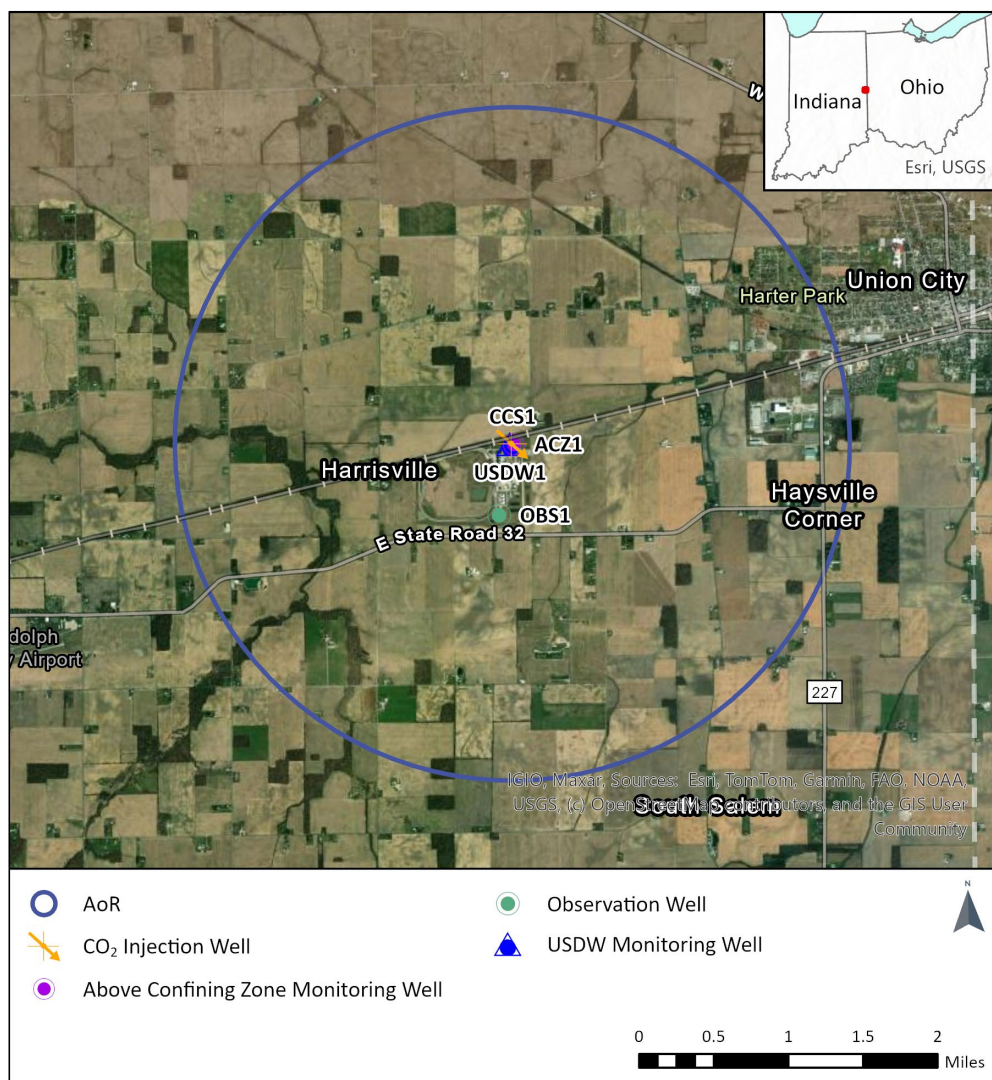


Figure 1. Locations of injecting and monitoring wells. CCS1 is the injection well, OBS1 is the deep observation well, USDW1 is the shallow groundwater monitoring well, and ACZ1 is the above confining zone well

Options for Participating in the Permitting Process and Procedures for Reaching a Final Decision (40 C.F.R. § 124.8(b)(6))

You can submit a public comment on the draft permit at <https://www.regulations.gov/docket/EPA-R05-OW-2025-1613>. The comment period ends December 8, 2025 at 11:59 PM Eastern Time.

The EPA will hold an availability session and public hearing on the One Carbon Partnership draft permit at:

Winchester Community High School Commons
700 N Union St
Winchester, IN 47394
December 4, 2025

Availability Session: 5:30 to 7:30 p.m.

Public Hearing: 7:30 to 9:00 p.m.

Oral and written comments will be recorded or accepted during the public hearing. The EPA will engage in conversation with attendees and answer questions during the availability session. EPA will neither accept nor respond to comments at the availability session. EPA will not answer questions or respond to comments during the hearing. You must either participate in a public hearing or send in written comments on the draft permit decision by the end of the comment period to preserve your right to appeal a final permitting decision.

Contact Andrew Greenhagen at (312) 353-7648 or greenhagen.andrew@epa.gov for additional information.

How did EPA make its tentative decision?

To reach its initial decision and prepare the draft permit, EPA reviewed the Project-specific technical, scientific, and financial information submitted by One Carbon Partnership in its permit application materials. Where appropriate, EPA also consulted other information sources to conduct a rigorous evaluation of the application materials and the suitability of the Project site. The goal of EPA's review and initial determination is to ensure that the Project will not endanger USDWs.

The EPA evaluated the geology at the site of the proposed injection well. An approximately 487 ft-thick confining zone, the Eau Claire Shale, was identified at One Carbon Partnership's injection well site. Based on regional data, the confining zone is composed of low permeability shale and will act as a barrier to fluid movement. The confining zone will prevent the injected CO₂ from moving upward out of the injection zone, thereby protecting USDWs. The geologic characteristics of the injection zone, the Mt. Simon Sandstone and Eau Claire Silt, were also evaluated. As noted later in the fact sheet, the EPA determined that the injection zone has appropriate characteristics to receive the quantities of CO₂ proposed to be injected without fracturing based on regional data. See Attachment B of the draft permit.

The Project's Area of Review (AoR) is the maximum extent of the subsurface area that may be affected by injection. The modeling data submitted shows the AoR, including the extent to where the injected CO₂ is expected to spread laterally. The injection zone within the AoR does not extend laterally to reach any USDWs. The AoR does not contain any potential conduits for fluid to travel upward. Site-specific well logs and core analyses completed as part of the Pre-Operational Testing Program specified in the draft permit will be used to further characterize the porosity and permeability of the proposed injection zone and confining zone to ensure that the siting criteria of 40 C.F.R. § 146.83(a) are met. One Carbon Partnership will also conduct a 3D seismic survey pursuant to the draft permit to ensure that there are no transmissive faults or fractures and ensure that the siting criteria of 40 C.F.R. § 146.83(a) are met. See Attachment B and Attachment G of the draft permit.

The EPA determined that the construction and operating specifications of the proposed injection well will not pose a risk of endangerment to USDWs. The materials proposed to construct the injection well would be compatible with the injected CO₂ stream. The design of the injection well includes a protective casing from the surface to the injection zone, as well as a surface casing that extends beneath the lowermost USDW. All casings will be cemented in place. The injection well's casings will be protective of USDWs by preventing the vertical movement of fluid along the hole drilled into the earth, known as the wellbore. As noted later in the fact sheet, the maximum injection pressure of the well would be set in the draft permit low enough

to prevent the fracturing of either the injection zone or confining zone. See Injection Well Construction Plan (Attachment H of the draft permit); the Testing and Monitoring Plan (Attachment C of the draft permit); the Emergency and Remedial Response Plan (Attachment F of the draft permit).

One Carbon Partnership will plug and abandon the injection and monitoring wells to prevent endangerment of USDWs, perform monitoring following cessation of injection to track the CO₂ plume and pressure front, and close the site. See the Injection Well Plugging Plan document (Attachment D of the draft permit); the Post-Injection Site Care (PISC) and Site Closure Plan (Attachment E of the Draft permit); One Carbon Partnership's Quality Assurance and Surveillance Plan (Attachment K of the draft permit).

The EPA also reviewed the degree of required testing and monitoring, including required monitoring of the physical condition of the well, the location and size of the CO₂ plume, the pressure changes in the subsurface, water quality in formations above the injection formation, and seismicity. See the Testing and Monitoring Plan (Attachment C of the draft permit); One Carbon Partnership's Quality Assurance and Surveillance Plan (Attachment K of the draft permit).

A non-exhaustive, general overview of the types of data and information the EPA reviewed for the key permit conditions and the key regulatory requirements are described below in part two of this document.

What happens next in the permit process?

The EPA will review all public comments received during the public comment period, including at the public hearing, before making a final decision on whether to issue the permit. The EPA will respond to all significant comments on the draft permit. This is the public's only opportunity to provide comments on the draft permit. If the EPA decides to issue a final permit, there will not be an additional opportunity to comment on the final permit, although the final permit may be appealed by any person who commented on the draft permit.

If the EPA's final decision is to issue a final permit, One Carbon Partnership would be authorized to construct the well. However, One Carbon Partnership would not be authorized to commence injection until it has complied with specific permit requirements including pre-operational testing found in Section J of the draft permit, a demonstration of mechanical integrity of the injection well found in Section L of the draft permit, identified any needed updates to the AoR and Corrective Action Plan, finalized AoR modeling and delineation, performance of any required corrective action found in Attachment B of the draft permit, completion of the construction of the injection well and required notice of construction completion found in

Section I of the draft permit, an approved demonstration of the alarm system and shut-off system found in Section K of the draft permit, and until the EPA reviews to ensure all requirements found in 40 C.F.R. § 146.82(c) are met and all submitted information is in compliance with conditions of the permit, and issues a written authorization to inject.

Additional Information and Right to Appeal

Additional Project Details

For more information about the One Carbon Partnership Project:

<https://www.epa.gov/node/88753#public-notice>

Legal Notice for Final Permit Decision Appeal

To preserve your right to appeal any final permit decision, you must either participate in the public hearing or submit written comments on the draft permit decision by the end of the comment period.

The first appeal must be made to the EAB; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals.

Part 2: Technical Background, One Carbon Partnership Project Information, and Permit Conditions

The EPA conducted a thorough review of One Carbon Partnership's permit application and other relevant information during evaluation of this proposed permitting decision. The data and information the EPA reviewed are publicly available as part of the administrative record for the draft permit. Title 40 of the Code of Federal Regulations (C.F.R.) Parts 144 and 146 ("The Class VI Rule," for the purposes of this fact sheet) require the EPA permits for CO₂ storage, known as UIC Class VI permits, to specify conditions for the siting, construction, operation, monitoring, reporting, plugging, post-injection, and site closure of Class VI injection wells to prevent the

movement of fluids into any USDWs. See 40 C.F.R. Parts 144 and 146 for the general provisions of underground injection permits.

This part of the draft permit fact sheet provides (1) references to the primary applicable statutory or regulatory provisions for each portion of the permit, (2) a brief summary of the key draft permit conditions, and (3) a brief summary of the basis for those conditions, including the technical background and information on the One Carbon Partnership Project and appropriate supporting references, to help the public better understand how the EPA reached the proposed permitting decision. See 40 C.F.R. § 124.8(b)(4). Within these sections, the principal facts and the significant factual, legal, methodological, and policy questions considered in preparing the draft permit are discussed, as appropriate. See 40 C.F.R. § 124.8(a).

The EPA's review of One Carbon Partnership's permit application and other information in the record indicates that the draft permit contains appropriate conditions to prevent endangerment of USDWs. In accordance with the UIC permit fact sheet requirements at 40 C.F.R. § 124.8, information and related permit conditions for the proposed well are presented below.

Site Characterization: Geology and Hydrogeology of the Injection Zone and Confining Zone

Federal Requirements under the Class VI Rule

Under 40 C.F.R. § 146.83(a), Class VI permit applicants must demonstrate to the EPA's satisfaction that the proposed Class VI injection well will be sited in an area with a suitable geologic system. The geologic system must include, at a minimum, (1) an injection zone of sufficient areal extent, thickness, porosity, and permeability to receive the total anticipated volume of the CO₂ stream; and (2) confining zone(s) free of transmissive faults or fractures and of sufficient areal extent and integrity to contain the injected CO₂ stream and displaced formation fluids and allow injection at proposed maximum pressures and volumes without initiating or propagating fractures in the confining zone(s).

Relevant to the geologic siting criteria at 40 C.F.R. § 146.83(a)(1) and (2), Class VI permit applicants must submit, and the EPA must consider, extensive information on the geologic structure and hydrogeologic characteristics of the proposed project site, as required by 40 C.F.R. § 146.82(a)(3). This information includes geologic and topographic maps and cross sections of the area; properties of known or suspected faults and fractures that may transect the confining zone and a determination that they would not interfere with containment; data on the depth, areal extent, thickness, mineralogy, porosity, permeability, and capillary pressure of the injection and confining zones; geomechanical information on fractures, stress, ductility, rock strength, and in situ fluid pressures within the confining zone; and information on the seismic history of the area and a determination that seismicity would not interfere with containment.

Class VI permit applicants also must submit, and the EPA must consider, data on the proposed CO₂ stream volume and/or mass, injection rates and pressure required by 40 C.F.R. § 146.82(a)(7); and a proposed pre-operational testing program as required by 40 C.F.R. § 146.82(a)(8). The pre-operational testing program must include site-specific logging, sampling, and testing as described at 40 C.F.R. § 146.87. Pursuant to 40 C.F.R. § 146.82(c)(4) and (7), the EPA must consider the results of the pre-operational testing program prior to granting approval for injection well operation.

This information is used to confirm the presence at the proposed injection well site of a subsurface rock layer or layers with a sufficient areal extent, thickness, porosity, and permeability (i.e., interconnected pore space) where the total volume of injected CO₂ can be received (the injection zone required by 40 C.F.R. § 146.83(a)(1)), as well as a dense, relatively impermeable rock layer above the injection zone that will act as a barrier preventing upward movement of the injected CO₂ or existing subsurface fluid out of the injection zone to other areas, including USDWs (the confining zone required by 40 C.F.R. § 146.83(a)(2)).

Also, as further described below under “Fault Stability Analysis, Fault Sealing Analysis, Fractures, and Seismicity,” the EPA uses this information to confirm, as required by 40 C.F.R. § 146.83(a)(2) that there are no faults or fractures in the confining zone that could serve as pathways for the injected CO₂ (or existing subsurface fluid) to move out of the injection zone, and that such fractures will not be created by the increased pressures caused by the CO₂ injection or by seismic activity.

Draft Permit Conditions

For draft permit conditions and further details related to site geology and hydrogeology, see Permit Authorization, Section A, Section F (1), Section I (2), Section J, Section K (2), Attachment B and Attachment G of the draft permit.

Injection of CO₂ for geologic sequestration is limited by the draft permit to the Mt. Simon Sandstone formation and Eau Claire Silt at a depth of between 3,100 to 3,659 ft BGS (referred to as “the injection zone”). The top of the injection zone is the top of the Eau Claire Silt (the basal portion of the larger Eau Claire Formation) at a depth of 3,100 ft BGS. Immediately underling the Eau Claire Silt is the top of the Mt. Simon Sandstone at a depth of 3,159 ft BGS. The bottom of the injection zone is the bottom of the Mt. Simon Sandstone at a depth of 3,659 ft BGS.

The injected CO₂ will be contained vertically in the injection zone by the Eau Claire Shale formation (referred to as “the primary confining zone”), which immediately overlies the Mt. Simon Sandstone and Eau Claire Silt at a depth of 2,613 to 3,100 ft BGS. The top of the primary

confining zone is approximately 2,163 ft below the lowermost USDW, which is expected to be within the Maquoketa Group at a depth of approximately 450 ft BGS.

One Carbon Partnership proposes to inject a maximum of approximately 13.5 million metric tons of CO₂ over a 30-year period into the Mt. Simon Sandstone and Eau Claire Silt. The maximum injection rate under the draft permit is 450,000 metric tons of CO₂ per year.

Site-specific pre-operational testing is required to confirm the geologic and hydrogeologic conditions at the injection well site prior to CO₂ injection. The pre-operational testing requirements are set forth at 40 C.F.R. § 146.87 and include, during the drilling and construction of the injection well, logging, surveying and testing to verify the depth, thickness, porosity, permeability, lithology, and formation fluid salinity of geologic formations; acquisition of whole or sidewall cores from the confining and injection zones; sampling and physical and chemical characterization of the injection zone fluids; determination of fracture pressure of the confining and injection zones; and hydrogeologic characterization of the injection zone. Required pre-operational testing also includes 3D seismic surveys of the proposed injection well site.

Application Review and Decision Process

The EPA reviewed information provided by One Carbon Partnership in its Project Application, including regional geologic maps and cross sections, regional geologic structure maps, well logs and data from multiple existing wells in the area and region, including fluid injection data from injection wells, and site specific two-dimensional (2D) surface seismic survey data. This information was used to assess the composition, depth, thickness, extent, porosity, permeability, and other properties of the geologic formations expected to be present at the injection site and to comprise the injection and confining zones. The Project Application also included information about the proposed CO₂ injection stream, and the results of computational modeling to assess the expected behavior of the injected CO₂ plume in the site subsurface. See AoR and Corrective Action Plan (Attachment B of the draft permit). One Carbon Partnership also submitted a proposed Pre-Operational Testing Program required to verify site subsurface conditions prior to injection well operation. See Pre-Operational Testing Program (Attachment G of the draft permit).

The EPA requested additional information from One Carbon Partnership to clarify or supplement the Project Application. The EPA asked questions about thickness and extent of geologic formations, injection zone location and storage capacity, details of proposed pre-operational testing regarding injection zone and confining zone properties, including geomechanical and petrophysical characteristics, and CO₂ plume modeling. The EPA believes it received sufficient additional information and clarification that appropriately addressed the concerns it raised in its questions and requests.

One Carbon Partnership is required to conduct pre-operational testing prior to injection to provide additional data on the injection and confining zones to supplement and verify the information in the Project Application. As required by 40 C.F.R. § 146.82(c)(4) and (7), prior to granting approval for operation of the injection well, the EPA will review and consider the additional information provided by the pre-operational testing.

The below table shows basic information for proposed injection zone and confining zone for the project.

Table 1: Summary of confining and injection zone basic information

Formation	Depth (feet)	Thickness (feet)	Areal Extent
Eau Claire Shale (confining zone)	2,613	487	Regionally extensive
Eau Claire Silt (injection zone)	3,100	59	Regionally extensive
Mt. Simon Sandstone (injection zone)	3,159	500	Regionally extensive

The proposed injection zone includes the Mt. Simon Sandstone and Eau Claire Silt. Geologic literature, regional geologic maps, and existing well log data show that the Mt. Simon Sandstone and the Eau Claire Silt are laterally extensive across a large region that includes eastern Indiana and western Ohio. The Eau Claire Silt is a glauconitic siltstone to very fine-grained sandstone that lies immediately above the Mt. Simon Sandstone. Interpretations of well log data from 17 area wells, including 2 wells between approximately 12 and 20 miles from the project site, indicate that at the proposed injection well site the Eau Claire Silt is expected to be found at a depth of approximately 3,100 ft BGS, with a thickness of approximately 59 feet. The Mt. Simon Sandstone is a quartz-rich, occasionally arkosic, fine to coarse-grained sandstone that is expected to be found at a depth of 3,159 ft BGS and a thickness of approximately about 500 feet at the proposed project site. Well logs, cores, and reservoir test data from four wells in the region were used to calculate an expected average porosity and permeability for the injection zone at the proposed well site of 10.9% and 31 millidarcy (mD), respectively. See Attachment B of the draft permit for additional information on these wells. Computational modeling using these geologic characteristics shows that the Mt. Simon Sandstone is expected to possess sufficient porosity and permeability at the One Carbon Partnership site to receive the total anticipated volume of the CO₂ stream (approximately 13.5 million metric tons of CO₂ over a 30-year period).

The proposed confining zone is the Eau Claire Shale, which immediately overlies the Eau Claire Silt. The same types of data that were used to assess characteristics of the injection zone were used to assess the Eau Claire Shale. As with the Mt. Simon Sandstone and Eau Claire Silt, regional geologic maps and existing well data show that the Eau Claire Shale is laterally extensive and continuous across the region. Interpretations of area well log data indicate that, at the proposed injection well site, the Eau Claire Shale is expected to be found at a depth of approximately 2,613 ft BGS and to be about 487 feet thick. The Eau Claire Shale in this region has low porosity and low permeability composed primarily of interbedded glauconitic shales that will serve as the primary confining layer. Data from 16 area wells was used to calculate an expected average porosity and permeability for the Eau Claire Shale of 2% and .0005 mD, respectively, at the proposed injection site. Computational modelling using these geologic characteristics showed that the total planned CO₂ injection plume would be contained in the injection zone by the Eau Claire Shale.

Based on this review, and subject to further consideration and confirmation following required site specific pre-operational testing, One Carbon Partnership has demonstrated to the EPA's satisfaction that the proposed injection well meets the geologic siting requirements of 40 C.F.R. § 146.83(a). The regional geology for the proposed One Carbon Partnership Class VI well is suitable for the geologic sequestration of carbon dioxide. The proposed injection zone in the Mt. Simon Sandstone and Eau Claire Silt is of sufficient areal extent, thickness, porosity, and permeability to receive the total volume of CO₂ that One Carbon Partnership proposes to inject, as required by 40 C.F.R. § 146.83(a)(1). The proposed confining zone of the Eau Claire Shale is of sufficient areal extent and integrity to contain the total proposed volume of the injected CO₂ and displaced formation fluids as required by 40 C.F.R. § 146.83(a)(2), preventing migration into other geologic formations, including USDWs. For discussion regarding the demonstration required by 40 C.F.R. § 146.83(a)(2) that the confining zone is free of transmissive faults and fractures and that injection of CO₂ at proposed maximum pressures and volumes will not initiate or propagate fractures in the confining zone, see "Fault Stability Analysis, Fault Sealing Analysis, Fracture, and Seismicity" below.

Well logging, core analysis, a 3D seismic survey, and other testing required as part of the pre-operational testing program will be used to further characterize and confirm the lithology, depth, thickness, areal extent, porosity, permeability, and geomechanical characteristics of the injection and confining zone in order to confirm that the geologic siting criteria of 40 C.F.R. § 146.83(a) are met, including that the confining zone is free of transmissive faults or fractures, and that fractures will not be initiated or propagated by injection of CO₂ at maximum proposed pressures and volumes, as further described under "Fault Stability, Fault Sealing Analysis, Fractures, and Seismicity" below.

Fault Stability Analysis, Fault Sealing Analysis, Fractures, and Seismicity

Federal Requirements under the Class VI Rule

The Class VI Rule requires the injection well to be sited where the geologic system can receive and contain the CO₂ (40 C.F.R. § 146.83). In particular, the owner or operator must demonstrate that the confining zone is free of faults or fractures that could allow fluid movement and that the authorized injection zone can contain the CO₂ (40 C.F.R. § 146.83(a)(2)). The Class VI Rule requires owners or operators to submit information regarding any faults or fractures that may transect the confining zone(s) in the AoR (see the following section for an explanation of the AoR) and provide a determination that any such faults or fractures will not interfere with containment (40 C.F.R. § 146.82(a)(3)(ii)). Under 40 C.F.R. § 146.82(a)(3)(v) the owner or operator must also submit information on the seismic history, including the presence and depth of seismic sources, and provide a determination that the seismicity will not interfere with containment. These determinations are made after analysis of fault stability, seismic history and sources, and whether there is a risk of natural or induced (injection-related) seismicity at the Project site.

If a fault is found, an analysis can be done to evaluate whether a fault will allow fluid to move along it, known as the fault sealing potential. Also, the owner or operator can perform a fault stability analysis to evaluate the potential for triggering seismic activity along existing faults during injection (induced seismicity).

Draft Permit Conditions

For details on the draft permit conditions relating to the fault stability analysis and fault sealing analysis, see Section N, Attachment G, and Attachment C of the draft permit.

The maximum injection pressure is limited by the draft permit to 2,015 pounds per square inch (psi) at the surface and 2,325 psi downhole in the injection zone. The EPA has concluded, based on regional data acquired from tests performed in nearby Class I injection wells, that the applicant properly determined that the maximum injection pressure is below an injection pressure that would fracture the confining zone or injection zone. This maximum injection pressure will be recalculated following construction of the well, using a fracture gradient measured from step rate tests that will be conducted in the injection well and the actual depth of the top of the injection zone. The maximum injection pressure limit in the permit will be revised as appropriate based on the recalculation.

As part of the testing and monitoring plan, One Carbon Partnership must record microseismic data on a continuous basis from a network of multiple seismic sensors within the AoR. One Carbon Partnership will be required to subscribe to notifications from the U.S. Geologic Survey

Notification Service for all seismic events within 100 km of the injection well. If a seismic event with a moment magnitude greater than 3.5 occurs within 100 km of the injection well, One Carbon Partnership will be required to initiate shutdown, notify the EPA, and monitor the well pressure, temperature, and annulus pressure of the injection well to verify well status and determine the extent of any failure. If there has been a failure of monitoring equipment or a loss of mechanical integrity, One Carbon Partnership must implement the response actions listed in Attachment F of the draft permit.

Seismic events at the Project site are infrequent and mild in strength (magnitude). The nearest epicenter to the One Carbon facility was approximately 20 miles from the site and occurred in 1990 with a magnitude of 3.0. The most recent earthquake occurred on June 12th, 2015, and was approximately 53 miles from the site and had a magnitude of 2.6. The largest recorded earthquake occurred within 100 miles occurred on March 9, 1937, with a magnitude of 5.4 and an epicenter of approximately 36 miles from the Project site. There have been no earthquakes identified that have an epicenter within the project AoR.

One Carbon Partnership analyzed 2D seismic survey data to identify structural features associated with the Precambrian surface. Structural features are changes to a rock formation that have been caused by stresses such as pressure, gravity, or temperature. One Carbon Partnership acquired 2D seismic data at and around the project site to provide information on the subsurface structural features. This data shows that no faults transect the Eau Claire Shale primary confining zone within the AoR. One Carbon Partnership and the EPA will further analyze these features using 3D seismic data that will be acquired as part of One Carbon's Pre-operational Testing Program. The EPA will review this survey to ensure that any faults or structures will not act as a pathway for injected fluid to migrate upward and endanger USDWs.

Draft permit requirements related to pre-operational testing and the Testing and Monitoring Plan that must be completed prior to the UIC Program Director authorizing injection include:

- a) Deviation checks that meet the requirements of 40 C.F.R. § 146.87(a)(1);
- b) Logs, surveys and tests to determine or verify the depth, thickness, porosity, permeability, lithology, and formation fluid salinity in all relevant geologic formations:
 - i. Before and after the installation of surface casing, pursuant to 40 C.F.R. § 146.87(a)(2);
 - ii. Before and after the installation of long string casing, pursuant to 40 C.F.R. § 146.87(a)(3); and
 - iii. Demonstrating internal and external mechanical integrity, pursuant to 40 C.F.R. § 146.87(a)(4);

- c) Whole cores or sidewall cores of the injection zone and confining system that meet the requirements of 40 C.F.R. § 146.87(b);
- d) Documentation of the measured fluid temperature, pH, conductivity, reservoir pressure, and static fluid level of the injection zone that meet the requirements of 40 C.F.R. § 146.87(c);
- e) Tests to determine well-specific data regarding the injection and confining zones. These tests must determine fracture pressure and the physical and chemical characteristics of the injection and confining zones and the formation fluids in the injection zone that meet the requirements of 40 C.F.R. § 146.87(d);
- f) Tests to verify hydrogeologic characteristics of the injection zone that meet the requirements of 40 C.F.R. § 146.87(e), including:
 - i. A pressure fall-off test; and
 - ii. A pump test or injectivity tests.
- g) Passive Monitoring: Deployment of a seismometer monitoring network to determine the locations, magnitudes, and focal mechanisms of any injection-induced seismic events in case they occur. This information will be used to address public concerns and to monitor changes in induced seismicity risks by reacting to the perceived risk through adjustment of well operations as needed; and
- h) Seismic Event Monitoring: Subscription to the U.S. Geological Survey Earthquake Notification Service to receive notification of seismic events (both natural and induced) within 100 kilometers (≈62 miles) from the well. The appropriate response to seismic events depends on the moment magnitude of the seismic event according to the protocol set out in Attachment F of the draft permit.

Application Review and Decision Process

The EPA requested that One Carbon Partnership commit to further assessment of fault geometry, transmissivity, stability and sealing potential, and impact on containment of faults identified within the AoR once more site-specific data has been acquired through the Pre-operational Testing Program (Attachment G of the draft permit). In response, One Carbon Partnership committed to conducting site-specific investigation using 3D seismic data to identify and characterize any faults or structural features. The 3D surface seismic data is expected to confirm that the Auglaize Fault is not present at the site. One Carbon Partnership will integrate any structural features identified into updated static models and computational simulations to

assess its influence on CO₂ plume migration and the pressure front. One Carbon Partnership will evaluate fault stability through geomechanical testing and analysis of in situ stress data and will analyze fault sealing potential to verify confining layer integrity. One Carbon Partnership will verify that siting criteria remain satisfied in light of any new data.

Based on the review of the information provided by One Carbon Partnership and additional information that will be provided prior to injection, the EPA determined the permit application demonstrates that seismic history including the presence and depth of seismic sources will not interfere with containment and meets the requirements of 40 C.F.R. § 146.82(a)(3)(v). Further data collected as part of One Carbon Partnership's Pre-operational Testing Program as well as operational testing and monitoring data including 3D seismic data and microseismic monitoring will be evaluated to verify that the requirements of 40 C.F.R. § 146.83 and 40 C.F.R. § 146.82(a)(3)(v) are met and there are no faults or fractures that could allow fluid movement or endangerment of USDWs. See Attachment B and Attachment G of the draft permit. One Carbon Partnership will also recalculate the proposed maximum injection pressure following construction of the well, using a fracture gradient measured from step-rate tests that will be conducted in the injection well and the actual depth of the top of the injection zone to ensure that it is below an injection pressure that would fracture the confining zone or injection zone.

Area of Review Determination

Federal Requirements under the Class VI Rule

40 C.F.R. § 146.82 and 40 C.F.R. § 146.84(a), (b), and (c) provide the requirements for delineating and reevaluating the Project's AoR. The Project's AoR is the maximum extent of the subsurface area that may be affected by injection. For Class VI wells, the AoR must be delineated using computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide and predict development of the injected fluid and area of elevated pressure underground. The injected fluid is sometimes referred to as the CO₂ plume once it is underground.

The applicant must conduct computational modeling that accounts for the physical and chemical properties of all phases of the injected CO₂ stream and is based on available site characterization, monitoring, and operational data. The modeling is used to predict the lateral and vertical migration of the injected CO₂ underground and to predict pressure increase in the injection zone. Determination of the AoR is a key aspect of a Class VI project, and the modeling provided by the permit applicant is expected to be robust and well-documented.

As required at 40 C.F.R. § 146.84(e), the applicant must also periodically reevaluate the AoR. Reevaluation involves evaluating monitoring and operational data at least every five years over

the duration of the Project, or when monitoring and operational conditions warrant, and by using any new information to update the computational modeling conducted to initially define the AoR for the permit application. The reevaluation will verify whether the CO₂ plume and pressure front are moving as predicted. If there are any significant changes from modeled predictions, the applicant must revise the Project-specific plans described here, and the EPA may need to modify the permit per 40 C.F.R. § 144.39. Additionally, the applicant must submit an amended AoR and Corrective Action Plan at the time of each reevaluation or demonstrate to the UIC Program Director through monitoring data and modeling results that no amendment to the AoR and Corrective Action Plan is needed per 40 C.F.R. § 146.84.

Draft Permit Conditions

For details on the draft permit conditions relating to the AoR determination, see Section G and Attachment B of the draft permit.

Consistent with the Class VI Rule, the draft permit requires One Carbon Partnership to reevaluate the AoR and provide any needed updates to the AoR and Corrective Action Plan to the EPA at least every five years or when monitoring and operational conditions warrant (40 C.F.R. § 146.84(e)). Alternatively, One Carbon Partnership must demonstrate to the UIC Program Director through monitoring data and modeling results that no amendment to the AoR and Corrective Action Plan is needed per 40 C.F.R. § 146.84(e)(4).

Draft permit conditions related to the AoR and Corrective Action Plan and the injection well operating conditions include:

- a) Verification of AoR: Verification of the project AoR once One Carbon Partnership has drilled the injection well and acquired site-specific data, per 40 C.F.R. § 146.84.
- b) Re-evaluation of AoR: At least every five years, as specified in the AoR and Corrective Action Plan, or more frequently when monitoring and operational conditions warrant, the applicant must reevaluate the AoR and perform corrective action in the manner specified in 40 C.F.R. § 146.84 and update the AoR and Corrective Action Plan or demonstrate to the UIC Program Director that no update is needed. Reevaluation of the AoR and Corrective Action Plan must meet the requirements of 40 C.F.R. § 146.84(e) and must include a new survey of wells within the existing or modified AoR.
- c) CO₂ Plume and Pressure Front Tracking: The applicant must track the extent of the CO₂ plume and pressure front using direct and indirect monitoring methods as described in the approved Testing and Monitoring Plan and in accordance with 40 C.F.R. § 146.90(g). The applicant is required to conduct this monitoring to detect and locate the CO₂ pressure front and the dissolved CO₂ plume, and the data will be used to calibrate the

AoR model to determine whether modifications to the AoR need to be made. The data collected will be used to monitor the location of the CO₂ plume and pressure front, evaluate its movement through time, and to compare to the CO₂ plume and pressure front predictions of the AoR model.

Application Review and Decision Process

The EPA requested that One Carbon Partnership expand the AoR computational modeling to evaluate the impact of additional sensitivities on CO₂ plume and pressure front behavior at the project site. In response, One Carbon Partnership assessed the impact of thermal effects, local grid refinement, and salt precipitation on injectivity, CO₂ plume, and pressure front behavior. One Carbon Partnership expanded the uncertainty and sensitivity analysis for a wider range of vertical-to-horizontal permeability ratios (kv/kh) and variable porosity and permeability distributions. One Carbon Partnership also added figures to help demonstrate CO₂ plume and pressure front stabilization. One Carbon Partnership committed to the integration of site-specific data from the Pre-operational Testing Program (Attachment G of the draft permit) into an updated static model and computational modeling to verify the AoR consistent with 40 C.F.R. §§ 146.83, 146.84, and 146.87.

The EPA reviewed the information provided by One Carbon Partnership, including the development of the numerical model, the inputs used, how simulations were run, the results, and additional site-specific data that will be used to update the AoR computational model prior to injection and during the operational phase of the project.

One Carbon Partnership used the calculated critical delta pressure and computational modeling to predict the maximum extent of the pressure front for the life of the project. The critical delta pressure is the pressure in the injection zone required to drive injection zone fluids up an open conduit, should it exist, to the lowermost USDW at the site. To be conservative, One Carbon Partnership added a 0.5-mile buffer to the pressure front to define the AoR for the project.

Based on this review, the EPA determined the permit application meets the requirements of 40 C.F.R. § 146.82 and 40 C.F.R. § 146.84(a), (b), and (c). See Attachment B and Attachment G of the draft permit.

Corrective Action and Wells Within the Area of Review

Federal Requirements under the Class VI Rule

40 C.F.R. § 146.82(a)(4) and 40 C.F.R. § 146.84(c), (d), and (e) require the applicant to identify all penetrations in the AoR, including active and abandoned wells and underground mines that may penetrate the injection or confining zones. The applicant must determine which

abandoned wells in the AoR have been plugged in a manner that prevents the movement of CO₂ or other fluids that may endanger USDWs. Owners or operators of Class VI wells must perform corrective action on all wells in the AoR that are determined to need corrective action. Much of this work is presented in the Corrective Action Plan (CAP), which identifies existing penetrations of the confining rock layer(s) in the AoR, such as other wells; whether they would pose a risk for CO₂ to migrate out of the injection formation and need remediation (e.g., plugging); and if so, how that corrective action will be performed.

Draft Permit Conditions

The draft permit conditions regarding corrective action for the One Carbon Partnership Project are in the AoR and Corrective Action Plan in Section G and Attachment B of the draft permit.

No existing artificial penetrations in the AoR require corrective action. There are no wells within the AoR that penetrate the confining zone depth (i.e., 2,613 ft BGS).

There are many different conditions that may require updates to the AoR and the Corrective Action Plan. One Carbon Partnership must reassess the AoR and the Corrective Action Plan every five years or when there are unexpected changes in: degree of pressure, pressure front migration, AoR interaction from other injection wells, temperature, fluid saturations measured by a Pulsed Neutron Log, and deep groundwater constituent concentrations that vary significantly from the baseline, per 40 C.F.R. § 146.84(e). Other conditions that would require updating the Corrective Action Plan include an exceedance of fracture pressure conditions, an exceedance of established baseline chemical and physical parameter patterns in the ACZ monitoring zone, an exceedance of any operating permit condition, a loss of injection well mechanical integrity, a seismic event with a moment magnitude greater than 3.5 within 100 km of the injection well, and changes in the computational model resulting in a new predicted CO₂ plume or pressure front that extends beyond the AoR.

Draft permit conditions related to the AoR and Corrective Action Plan include:

- a) AoR Reevaluation: At least every five years as specified in the AoR and CAP, or more frequently when monitoring and operational conditions warrant, the applicant must reevaluate the AoR and perform corrective action in the manner specified in 40 C.F.R. § 146.84 and update and submit the AoR and CAP or demonstrate to the UIC Program Director that no update is needed. Reevaluation of the AoR and CAP must meet the requirements of 40 C.F.R. § 146.84(e) and must include a new survey of wells within the existing or modified AoR.

- b) **Formation Testing:** Tests to determine site-specific data regarding the injection and confining zones. These tests must determine fracture pressure and the physical and chemical characteristics of the injection and confining zones and the formation fluids in the injection zone that meet the requirements of 40 C.F.R. § 146.87(d).
- c) **Injection Pressure Limitation:** The applicant must ensure that injection pressure does not exceed 90 percent of the fracture pressure of the injection zone to ensure that the injection does not initiate new fractures or propagate existing fractures in the injection zone. Under no circumstance shall injection pressure initiate fractures or propagate existing fractures in the confining zone or cause the movement of injection or formation fluids into a USDW. The maximum injection pressure limit is listed in Attachment A of the draft permit.
- d) **Continuous Monitoring:** The applicant must install and use continuous recording devices to monitor: the injection pressure (at surface), injection flow rate, injection mass, pressure on the annulus between the tubing and the long string of casing, annulus fluid level, and temperature (at surface). This monitoring must be performed as described in the Testing and Monitoring Plan to meet the requirements of 40 C.F.R. § 146.90(b).
- e) **External Mechanical Integrity Testing:** The applicant must demonstrate external mechanical integrity annually as described in the approved Testing and Monitoring Plan and must comply with Section L of the draft permit to meet the requirements of 40 C.F.R. §§ 146.89 and 146.90.
- f) **Mechanical Integrity for Confining Zone, Injection Zone, and Groundwater Monitoring Wells:** All monitoring wells must maintain internal and external mechanical integrity for the entirety of their operational life. Testing and demonstration of monitoring wells must be conducted on the same schedule as the injection well.
- g) **Passive Monitoring:** Deployment of a seismometer monitoring network to determine the locations, magnitudes, and focal mechanisms of any injection-induced seismic events in case they occur. This information will be used to address public concerns and to monitor changes in induced seismicity risks by reacting to the perceived risk through adjustment of well operations as needed.
- h) **Seismic Event Monitoring:** Subscribe to the U.S. Geological Survey Earthquake Notification Service to receive notification of seismic events (both natural and induced)

within 100 kilometers (≈62 miles) from the well. The appropriate response to seismic events depends on the Moment Magnitude of the seismic event according to the protocol set out in the Emergency and Remedial Response Plan (Attachment F of the draft permit).

- i) CO₂ Plume and Pressure Front Tracking: The applicant must track the extent of the CO₂ plume and pressure front using direct and indirect monitoring methods as described in the approved Testing and Monitoring Plan and in accordance with 40 C.F.R. § 146.90(g). The applicant is required to conduct this monitoring in order to detect and locate the CO₂ pressure front and the dissolved CO₂ plume and the data will be used to calibrate the AoR model to determine whether modifications to the AoR need to be made. The data collected will be used to monitor the location of the plume and pressure front, evaluate its movement through time, and to compare to the plume and pressure front predictions of the AoR model.

Application Review and Decision Process

The EPA posed questions regarding other infrastructure within AoR, which One Carbon Partnership addressed by providing a revised figure that consolidates location of all injection wells, producing wells, abandoned wells, plugged wells or dry holes, deep stratigraphic boreholes, state- or the EPA-approved subsurface cleanup sites, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells, other pertinent surface features including structures intended for human occupancy, state, tribal, and territory boundaries, and roads into a single, clearly defined map, per 40 C.F.R. §§ 146.82(a)(2) and 146.84. One Carbon Partnership also added a formal statement identifying which listed features do not occur within the AoR, for completeness.

Based on the review of the information provided by One Carbon Partnership, including data from the Indiana Geological and Water Survey (IGWS) and Indiana Department of Natural Resources identifying all penetrations within the AoR, and additional research on wells present in the AoR, the EPA determined the permit application meets the requirements of 40 C.F.R. § 146.82(a)(4) and 40 C.F.R. § 146.84(c), (d), and (e). There are no existing artificial penetrations in the AoR that require corrective action. There are also no wells within the proposed AoR that penetrate the confining zone depth (i.e., 2,613 ft BGS). See Attachment B of the draft permit.

Underground Sources of Drinking Water (USDWs)

Federal Requirements under the Class VI Rule

Class VI permit applicants are required to submit maps and cross sections showing all USDWs (as well as water wells and springs) within the AoR and where they are situated relative to the injection zone(s) and the direction of water movement, where known (40 C.F.R. § 146.82(a)(5)). Applicants must also submit baseline water chemistry data on all subsurface formations, including USDWs, within the AoR (40 C.F.R. § 146.82(a)(6)). This information is important to understand where the injection formation is located in relation to USDWs.

The EPA's Underground Injection Control (UIC) program protects current and future sources of drinking water by defining a USDW broadly. USDWs, by definition under 40 C.F.R. §§ 144.3 and 146.3, include aquifers currently used by public water supply systems or otherwise used to supply drinking water as well as those aquifers that meet certain criteria indicating they could be used as drinking water, even if they are not currently used. For example, the concentration of dissolved solids is an indicator of whether an aquifer has the potential to be drinking water, even if it is not currently used for drinking water. Typically, potable water generally contains less than 500 milligrams per liter (mg/L) of total dissolved solids; however, an aquifer or portion of an aquifer that contains fewer than 10,000 mg/L of total dissolved solids is considered a potential drinking water source and is therefore protected under the UIC program even if it is not in use. By considering USDWs to include water supplies that have more dissolved solids than potable drinking water, the EPA's UIC program protects current drinking water and USDWs that could be used in the future. The EPA reviews the locations of drinking water resources near the Project as well as how the applicant will ensure that the Project does not endanger these USDWs.

Draft Permit Conditions

For details on draft permit conditions relating to USDWs in the AoR, see Sections A, F(1), I(3), K(1), K(2), K(6), L(8)(b), N(9), P(6), and Q, and Attachments E and F of the draft permit.

The draft permit prohibits One Carbon Partnership from constructing, operating, plugging, abandoning, or conducting any other injection activity in a manner that allows the movement of injection, annulus, or formation fluids into USDWs. If any water quality monitoring of a USDW indicates that there may have been movement of any of these fluids into a USDW, One Carbon Partnership must initiate actions that are necessary to remediate and prevent such movement, and any actions that the EPA may require.

The construction and operation requirements in the draft permit will prevent endangerment of USDWs. The casing and cementing of the injection well will prevent the movement of fluids into

or between USDWs for the duration of the One Carbon Partnership project. The draft permit prohibits injection between the outermost casing and the well bore. One Carbon Partnership must limit injection pressure to prevent the movement of injection or formation fluids into a USDW.

In the event of adverse events at the injection well, One Carbon Partnership must take appropriate actions to prevent endangerment of USDWs. If there is a loss of mechanical integrity of the well, One Carbon Partnership must take all steps necessary to determine if there is evidence of potential endangerment of USDWs and implement the Emergency and Remedial Response Plan in the draft permit.

Draft permit conditions related to the injection well construction and operating conditions and the Testing and Monitoring Plan conditions include:

- a) Casing and Cementing: The well must be cased and cemented per 40 C.F.R. §§ 146.82 and 146.86. Casing, cement, or other materials used in the construction of the well must have sufficient structural strength for the life of the geologic sequestration project. All well materials must be compatible with all fluids with which the materials may be expected to come into contact and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the UIC Program Director. The well must be cased and cemented to prevent the movement of fluids into or between USDWs for the expected duration of the geologic sequestration project in accordance with 40 C.F.R. § 146.86.
- b) Monitoring Well Construction: 40 C.F.R. §§ 146.84 and 146.90(g) require monitoring of the CO₂ plume and pressure front of the confining and injection zones and 40 C.F.R. § 146.90(d) requires monitoring of groundwater located above the injection zone. These sections are incorporated by reference into this draft permit. Groundwater, confining zone, and injection zone monitoring wells must be constructed as depicted in the application referenced in Attachment H of this draft permit using materials compatible with the injected fluids.
- c) Loss of Mechanical Integrity: If the applicant or the UIC Program Director finds that the well fails to demonstrate mechanical integrity during a test, or fails to maintain mechanical integrity during operation, or that a loss of mechanical integrity as defined by 40 C.F.R. § 146.89(a)(1) or (2) is suspected during operation (such as a significant unexpected change in the annulus or injection pressure), the applicant must take all steps reasonably necessary to determine whether there may have been a release of the injected CO₂ stream or formation fluids into any unauthorized zone. If there is evidence

of potential USDW endangerment, the Emergency and Remedial Response Plan must be implemented (Attachment F).

- d) Groundwater Monitoring Above the Confining Zone: The applicant shall monitor groundwater quality and geochemical changes above the confining zone that may be a result of CO₂ movement through the confining zone and additional identified geologic units. All monitoring conducted must be performed for the parameters identified in the approved Testing and Monitoring Plan in Attachment C of the draft permit at the locations and depths, and at frequencies described in the Testing and Monitoring Plan to meet the requirements of 40 C.F.R. § 146.90(d).

Application Review and Decision Process

The EPA posed questions relating to USDWs, which One Carbon Partnership addressed by providing additional information about the USDWs overlying the proposed injection zone, per 40 C.F.R. §§ 146.83(a)(1) and 146.86. All of the USDW aquifers are separated vertically from the injection zone by over 2,100 feet, which ensures protection of drinking water resources through multiple confining layers. One Carbon Partnership will confirm the lowermost USDW during the Pre-operational Testing Program (Attachment G of the draft permit), per 40 C.F.R. § 146.82(a)(6).

The EPA reviewed the permit application and other relevant information regarding USDWs in the AoR, including maps, cross sections, well logs, groundwater withdrawal reports, and water quality analyses. Within the Project AoR, there are three primary USDWs: 1) glacially derived sediment of the New Castle Till and Bluffton Till Aquifer System, 2) Silurian and Devonian carbonates, and 3) the Ordovician Maquoketa Group. Based on available data from the Indiana Department of Natural Resources, the lowermost USDW at the Project site is at 450 feet depth within the Maquoketa Group (IGS Well ID/ PDMS 14486GS Well ID/ PDMS 144860). The lowermost USDW at the Project site is expected to be 2,163 feet above the top of the Eau Claire Shale primary confining zone. Throughout Randolph County, Indiana, the Maquoketa Group has variable thickness, containing up to 900 feet of shale and carbonates, with carbonate content increasing upward throughout the group. Generally, the upper 100 feet of the Maquoketa Group are accessed for domestic water use throughout the county. The surface casing for the injection well will extend through the base of this lowermost USDW within the AoR pursuant to 40 C.F.R. § 146.86(b)(2). Table 2 summarizes the characteristics of the USDWs within the AoR. Total dissolved solid (TDS) values for the New Castle Till and Bluffton Aquifer System and the Silurian Devonian carbonate aquifer system come from select water wells that have been sampled within the AoR.

Table 2: Summary of the characteristics of the USDWs within the AoR

Aquifer	Depth (feet)	Thickness (feet)	Vertical Distance from Top Confining Zone (feet)	TDS (mg/ L)	Laterally Extensive	Currently in Use
New Castle and Bluffton Till	0	<150 ft	~2,500	290 – 390	Yes	Yes
Silurian and Devonian carbonate system	100 – 150	0 – 50	~2,400	300 – 320	No	Yes
Maquoketa	450	900	2,163	<10,000	Yes	Yes

Based on the review of the information provided by One Carbon Partnership and additional research, the EPA determined the permit application satisfies the requirement for describing USDWs in the AoR and submitting maps and cross sections required under 40 C.F.R.

§ 146.82(a)(5) and geochemical data under 40 C.F.R. § 146.82(a)(6) using regional data. All of the USDW aquifers are separated vertically from the injection zone by over 2,100 feet, which ensures protection of drinking water resources through multiple confining layers. This data will be verified and updated with site-specific baseline geochemical data as part of One Carbon Partnership's Pre-Operational Testing Program that includes all USDWs to ensure that the project will not endanger any USDWs. For information on how the proposed construction and operation requirements in the draft permit will prevent endangerment of USDWs, see Well Construction Requirements, Characteristics of the CO₂ Stream, Injection Fluid Volume and Injection Rates, and Maximum Injection Pressure sections below. See Attachment A, Attachment G, and Attachment H of the draft permit. This data will be verified and updated with site-specific baseline geochemical data as part of One Carbon Partnership's Pre-Operational Testing Program that includes all USDWs to ensure that the project will not endanger any USDWs. For information on how the proposed construction and operation requirements in the draft permit will prevent endangerment of USDWs, see Well Construction Requirements, Characteristics of the CO₂ Stream, Injection Fluid Volume and Injection Rates, and Maximum Injection Pressure sections below. See Attachment A, Attachment G, and Attachment H of the draft permit.

Well Construction Requirements

Federal Requirements under the Class VI Rule

The regulatory criteria for Class VI well construction are provided at 40 C.F.R. § 146.86. All Class VI wells must be constructed with materials (e.g., steel casings, liners, coatings, and cement) that are compatible with the fluids they will come in contact with. Materials expected to be exposed to CO₂ and a mixture of CO₂ and water need to be corrosion resistant.

Class VI wells must be cased and cemented to prevent the movement of fluids into or between USDWs or into unauthorized zones. Requirements include a long-string casing (inner pipe) for the portion of the well that extends down into the injection zone. An additional surface casing (outermost pipe) is required for the portion of the well that travels through the lowermost USDW. Casings must be cemented in place with the cement extending the full length of the casing all the way to the surface. The EPA reviews both the proposed well construction design and plans for well plugging after injection.

Draft Permit Conditions

For details on draft permit conditions relating to injection well construction, see Section I and Attachment H of the draft permit.

The draft permit specifies that the injection well (CCS1) will be completed to inject into the Mt. Simon Sandstone and Eau Claire Silt with perforations at depths of 3,179 to 3,562 ft. The well construction will include (i) two casing strings, (ii) a near-surface conductor casing, (iii) corrosion resistant materials in the full length of the long-string casing (from the surface to 3,609 ft) and in the full length of the injection tubing (from the surface to 3,184 ft), and (iv) a packer made from corrosion resistant materials set at 3,144 ft BGS to isolate the injection formation.¹

The draft permit requires the following monitoring wells: one deep monitoring well in the Mt. Simon Sandstone below the confining zone, referred to as OBS1, one deep monitoring well in the Knox Group above the confining zone, referred to as ACZ1, one shallow monitoring well to monitor the lowermost USDW, referred to as USDW1, and 12 shallow monitoring wells to monitor groundwater in shallow aquifers. The draft permit specifies that the deep monitoring well OBS1 will be completed at a depth of 3,709 ft BGS. OBS1 will be located approximately 2,600 ft south of the injection well. The draft permit requires the deep monitoring well (OBS1) be constructed of the same corrosion-resistant materials as the injection well and use multiple casing strings. The draft permit specifies that the deep monitoring well ACZ1 will be completed

¹ In its application documents, One Carbon Partnership also refers to the long-string casing as the production casing. The two terms are synonymous.

in the Knox Group at a depth between 1,625 to 1,702 ft BGS, above the confining zone, and will be constructed using multiple casing strings. It is not expected to encounter any corrosive fluids. The draft permit specifies that the lowermost USDW monitoring well (USDW1) will be completed at a depth of about 600 ft BGS. The twelve shallow monitoring wells will be distributed throughout the AoR at various depths less than 300 ft BGS.

The injection well will be equipped with an automatic surface shut-off system that would shut off the well if any permitted operating parameters—such as injection pressure—diverge from permit limitations. To confirm that the injection well is operating within permitted limits and to demonstrate internal mechanical integrity, it will be equipped with continuous recording devices to monitor the injection pressure; the rate, volume and/or mass, and temperature of the CO₂ being injected; the pressure on the annulus (space) between the tubing and the long string casing; and the volume of fluid in the annulus.

Once a final permit has been issued and is effective, One Carbon Partnership has received the EPA's authorization to commence well construction. One Carbon Partnership is not authorized to inject until it has complied with specific permit requirements including submitting the results of the formation testing and logging program (found in Section J of the draft permit), demonstrating mechanical integrity of the well (found in Section L of the draft permit), reviewing and updating the AoR and Corrective Action Plan, Testing and Monitoring, Well Plugging, Post-Injection Site Care and Closure, and Emergency and Remedial Response Plans (found in Section R of the draft permit), completing well construction (found in Section R of the draft permit), demonstrating functionality the alarm system and shut-off system (found in Section K of the draft permit), and until the EPA reviews to ensure construction is in compliance with Section I of the draft permit and that all submitted information is in compliance with the conditions of the draft permit, and issues a written authorization to inject.

Application Review and Decision Process

The EPA requested additional information related to well construction and pre-operational testing and sent questions and comments to One Carbon Partnership. One Carbon Partnership provided a set of updates and clarifications across multiple aspects of the injection and monitoring well construction plans to demonstrate compliance with 40 C.F.R. § 146.86. One Carbon Partnership confirmed that CO₂ injection will not occur into the Middle Run Formation due to its unsuitability for storage and clarified that the well section drilled into the Precambrian basement will be fully cemented upon well completion. One Carbon Partnership also provided additional information to support the conclusion that casing, cement, and other well-construction materials have sufficient structural strength, are designed for the life of the project, are compatible with fluids the materials may be expected to come into contact with,

and meet acceptable standards, consistent with 40 C.F.R. § 146.86(b)(1). One Carbon Partnership provided further explanation and documentation for the coating material and EverCRETE cement. Finally, One Carbon Partnership clarified cement types, locations, and circulation plans. The EPA believes it received sufficient additional information, including the information required by 40 C.F.R. § 146.86(b)(1)(i)-(ix), and clarification that appropriately addressed the concerns the EPA raised in its questions.

The EPA evaluated information on proposed construction procedures, casing and cementing programs, well schematics, mechanical integrity testing procedures, continuous monitoring, and emergency shut-off procedures to determine whether they are suitable for CO₂ injection at the planned operating conditions and whether all casing are set and cemented at depths appropriate to relevant formations (e.g., the lowermost USDW and the injection and confining zones); this evaluation included an assessment of the characteristics of the CO₂ stream and the formation fluid and conditions (e.g., pressures, temperatures, and lithology), per 40 C.F.R. §§ 146.86(c)(3)(ii) and 146.86(b)(1).

Based on the EPA's review of the information provided by One Carbon Partnership and additional research including appropriate industry standards, the EPA determined the permit application satisfies all the construction requirements of 40 C.F.R. § 146.86 and will prevent the movement of fluids into or between USDWs or into any unauthorized zones. The EPA finds that the designs of all wells for this project meet the requirements for both casing and cementing of Class VI wells in accordance with 40 C.F.R. § 146.86(b) and tubing and packer in accordance with 40 C.F.R. § 146.86(c), as demonstrated in the permit application, verified by the EPA, and reflected in the draft permit conditions.

The EPA concluded, in accordance with 40 C.F.R. §§ 146.86(b)(2)-(4), that the surface casing will extend through the base of the lowermost USDW and be cemented to the surface, and the long string casing will extend to the injection zone and be cemented by circulating cement to the surface. The injection well construction requires a surface casing that will extend beneath the base of the lowermost USDW sufficiently to isolate the lowermost USDW and a long string casing that will be constructed of corrosion resistant materials and cemented to the surface using corrosion resistant cement throughout the injection and confining zones. One Carbon Partnership confirmed that it will use conductor casing in the injection and deep observation wells.

Consistent with material compatibility requirements under 40 C.F.R. § 146.86(b)(5) and requirements for tubing and packer under 40 C.F.R. §§ 146.86(c)(1) through (3), the draft permit requires the long-string casing materials in the injection well (CCS1) and deep monitoring well (OBS1) include 25 Chrome (25cr) alloy casing from the injection zone through the top of the

confining zone, including a 25cr joint of tubing below the packer and coated tubing used above the packer, and 13cr casing in the long string casing above the confining zone to the surface. All proposed materials are compatible with the fluids with which they may be expected to come into contact. Both 13Cr and 25Cr are more resistant to corrosion than standard carbon steel. The use of these materials within the injection well and the OBS1 deep observation well will resist corrosion, which will prevent a loss of external mechanical integrity and movement of fluids into or between USDWs or into any unauthorized zones. Additionally, the EPA evaluated the quantity and type of cement and depth and placement of casings within the injection well and concluded that it will prevent the movement of fluids into or between USDWs or into any unauthorized zones.

The EPA will further evaluate the compatibility of the CO₂ stream with the formation fluids and minerals and well construction materials based on results of One Carbon Partnership's Pre-operational Testing Program, including its formation testing program, consistent with 40 C.F.R. § 146.87.

Characteristics of the CO₂ Stream

Federal Requirements under the Class VI Rule

The Class VI Rule at 40 C.F.R. § 146.82(a)(7)(iii), (iv) requires the applicant to submit information on the source(s) of the CO₂ stream and an analysis of the chemical and physical characteristics of the CO₂ stream. The Class VI Rule defines a CO₂ stream as "carbon dioxide that has been captured from an emission source (e.g., a power plant), plus incidental associated substances derived from the source materials and the capture process, and any substances added to the stream to enable or improve the injection process." 40 C.F.R. § 146.81(d).

40 C.F.R. § 146.86(c)(3)(ii) requires the applicant to submit information on the characteristics of the CO₂ stream (chemical content, corrosiveness, temperature, and density) so that the UIC Program Director can determine and specify requirements for the injection tubing and packer.

Draft Permit Conditions

For details on draft permit conditions related to the sources and physical and chemical characteristics of the CO₂ stream, see Section N(2) and Attachments A and C of the draft permit.

Application Review and Decision Process

The EPA reviewed the proposed physical and chemical characteristics of the CO₂ to be injected. Specifically, the EPA reviewed information in the permit application including a CO₂ stream analysis of the composition and source of the CO₂ stream, the proposed operational procedures of the injection well, and other relevant information including a CO₂ analysis report and industry

standards regarding the proposed injection fluid and composition including casing, cementing, tubing, and packer specifications and the suitability of each based on the characteristics provided per 40 C.F.R. § 146.86.

The composition of the CO₂ stream will be at least 98.75% pure CO₂, <2,000 ppm oxygen, <7,500 ppm nitrogen, <1 ppm hydrogen sulfide, <1,000 ppm total hydrocarbons, <1 ppm total sulfur, and <2,000ppm water. One Carbon Partnership will sample and analyze the CO₂ stream quarterly. One Carbon Partnership identified the CO₂ stream source as biogenic CO₂ from the corn fermentation process at the Cardinal ethanol production facility in Randolph County, Indiana, which will travel via dedicated pipeline to the Project site. One Carbon Partnership expects to inject approximately 450,000 metric tons of CO₂ per year for thirty years; a total of approximately 13.5 million metric tons of CO₂.

The EPA also evaluated the CO₂ injectate physical and chemical composition and characteristics (i.e., chemical content, corrosiveness, temperature, and density) in relation to the injection zone formation and fluid geochemistry to determine the potential for adverse reactions that could lead to USDW endangerment, per 40 C.F.R. §§ 146.82(a)(7)(iv) and 146.86(c)(3)(ii). Attachment C of the draft permit provides relevant information about the injection fluid.

Based on the review of the information provided by One Carbon Partnership and additional information including the EPA guidance and appropriate industry standards, the EPA determined that the proposed CO₂ stream meets the definition provided in 40 C.F.R. § 146.81(d) and will be compatible with the proposed materials to prevent the movement of fluids into or between USDWs per 40 C.F.R. § 146.86. The EPA determined the permit application meets the requirements for characterization of the injectate per 40 C.F.R. §§ 146.82 and 146.86. See Attachment C and Attachment H of the draft permit.

The EPA did not have specific questions or comments for the permit applicant related to characteristics of the CO₂ stream. The EPA will further evaluate the compatibility of the CO₂ stream with the injection zone fluids and minerals and well construction materials period based on results of One Carbon Partnership's Pre-operational Testing Program, consistent with 40 C.F.R. § 146.87.

Injection Fluid Volume and Injection Rates

Federal Requirements under the Class VI Rule

The Class VI Rule at 40 C.F.R. § 146.83(a)(1) requires an injection zone of sufficient areal extent, thickness, porosity, and permeability to receive the total anticipated volume of the CO₂ stream. Thus, the proposed volume of CO₂ to be injected must be consistent with the storage capacity of the injection zone.

The Class VI Rule at 40 C.F.R. § 146.82(a)(7)(i) requires the applicant to submit information on the CO₂ injection rate and volume and the total amount of CO₂ that will be injected over the lifetime of the Project.

Draft Permit Conditions

For details on draft permit conditions relating to injection fluid volume and injection rate, see Attachment A of the draft permit.

The maximum injection rate under the draft permit is 450,000 metric tons of CO₂ per year, which is on average, 1,232 metric tons per day. One Carbon Partnership will inject a maximum of 13.5 million metric tons of CO₂ over a 30-year period into the Mt. Simon Sandstone and Eau Claire Silt, which is the injection zone formation capable of receiving the proposed amount of CO₂.

For information on draft permit conditions that help ensure that the injection zone is of sufficient thickness, porosity, and permeability to receive the total anticipated volume of the CO₂ stream, see Site Characterization: Geology and Hydrogeology of the Injection Zone(s) and Confining Zone(s), above. For information on draft permit conditions that relate to CO₂ injection rate and volume, see Attachment A of the draft permit.

Draft permit conditions related to the injection fluid volume and injection rates include:

- a) Storage Capacity: Once the injection well is drilled and One Carbon Partnership has acquired site-specific data, One Carbon Partnership and the EPA will confirm storage capacity of the injection zone for the proposed injection rate, volume, and total amount of CO₂ to be injected over the lifetime of the project in accordance with 40 C.F.R. § 146.83(a)(1).
- b) Continuous Monitoring: Section N of the draft permit requires installation and use continuous recording devices to monitor injection flow rate, injection mass, pressure on the annulus between the tubing and the long string of casing to meet the requirements of 40 C.F.R. § 146.90(b).

Application Review and Decision Process

The EPA reviewed the proposed operating technologies and parameters (injection rate and volume as well as pressure, which is discussed in the next section) and how they would allow for safe operation. The EPA reviewed information in the permit application, including the proposed injection rates and volumes, the estimated fracture gradient of the Mt. Simon Sandstone obtained from minifrac tests and step-rate tests performed for nearby Class I injection wells, and porosity and permeability of the injection zone from these wells. This

information will be updated during the pre-operational phase of the project using a step-rate test at the project site to determine the fracture gradient, and other relevant information regarding the proposed injection fluid and composition. For information on the EPA's review of how the injection zone is of sufficient thickness, porosity, and permeability to receive the total anticipated volume of the CO₂ stream per 40 C.F.R. § 146.83(a)(1)), see Site Characterization: Geology and Hydrogeology of the Injection Zone(s) and Confining Zone(s), above.

Based on the EPA's review of the information provided by One Carbon Partnership and additional information, the EPA determined the injection zone is of sufficient areal extent, thickness, porosity, and permeability to receive the total anticipated volume of the CO₂ stream, per 40 C.F.R. § 146.83(a)(1). One Carbon Partnership will acquire, and submit to the EPA for review, data to verify the regional geologic information with site-specific geologic information to ensure that the requirements of 40 C.F.R. § 146.83(a)(1) continue to be met. See Attachment A, Attachment B and Attachment C of the draft permit.

The EPA did not have specific questions or comments for the permit applicant related to injection fluid volume and injection rates.

Maximum Injection Pressure

Federal Requirements under the Class VI Rule

The pressure during injection must not initiate fractures in the injection or confining zones, as required under 40 C.F.R. § 146.88(a). Such fractures, especially those in the confining zone, could become conduits for the movement of injection or formation fluids into a USDW, which is prohibited. See 40 C.F.R. §§ 146.83(a)(2); 146.88(a); 144.12.

To maintain safe injection, wells must be equipped with continuous recording devices to monitor the injection pressure; the rate, volume and/or mass, and temperature of the CO₂ being injected; the pressure on the annulus (space) between the tubing and the long string casing, and the volume of fluid in the annulus, as required by 40 C.F.R. § 146.88(e)(1).

Injection wells must also be equipped with an automatic surface shut-off system that would shut off the well if any permitted operating parameters—such as injection pressure—diverge from permit limitations, as required by 40 C.F.R. § 146.88(e)(2).

Draft Permit Conditions

For details on draft permit conditions relating to the maximum injection pressure, see Section K(2) and Attachment A of the draft permit.

The draft permit requires One Carbon Partnership to ensure that injection pressure does not exceed 90 percent of the fracture pressure of the injection zone and does not initiate new fractures or propagate existing fractures in the injection zone, per 40 C.F.R. § 146.88(a). The maximum injection rate under the draft permit is 450,000 metric tons per year. Based on tests at nearby Class I wells, the 90% fracture pressure gradient is expected to be 0.75 pounds per square inch per foot (psi/foot), which results in a maximum allowable bottomhole flowing pressure of 2,325 psi at a depth of 3,100 feet, which is the projected top of the injection zone.

Draft permit conditions related to the Testing and Monitoring Plan and the Injection Well Operations Plan conditions include:

- a) Injection Pressure Limitation: The applicant must ensure that injection pressure does not exceed 90 percent of the fracture pressure of the injection zone to ensure that the injection does not initiate new fractures or propagate existing fractures in the injection zone. Under no circumstance shall injection pressure initiate fractures or propagate existing fractures in the confining zone or cause the movement of injection or formation fluids into a USDW. The maximum injection pressure limit is listed in Attachment A of this permit. Maximum allowable injection pressure must be re-assessed once the injection well is drilled, and site-specific data has been acquired at the site.
- b) Continuous Monitoring: The applicant must install and use continuous recording devices to monitor: the injection pressure (at surface and at injection interval), injection flow rate, injection mass, pressure on the annulus between the tubing and the long string of casing, annulus fluid level, and temperature (at surface and at injection interval). This monitoring must be performed as described in the Testing and Monitoring Plan to meet the requirements of 40 C.F.R. § 146.90(b).
- c) Automatic Surface Shut-off System: Install, continuously operate, and maintain an automatic alarm and automatic shut-off system or, at the discretion of the UIC Program Director, down-hole shut-off systems, or other mechanical devices that provide equivalent protection.

Application Review and Decision Process

To evaluate operating procedures, the EPA asked clarifying questions about how One Carbon Partnership determined the proposed operating parameters, including maximum allowable injection pressure, pressure definitions and calculations, appropriate designation of the injection zone top, and justification for annulus pressure management, per 40 C.F.R. § 146.88(c). In response, One Carbon Partnership recalculated the maximum allowable injection pressure and fracture pressure using the top of the Eau Claire Silt and integrated these values

consistently across the permit application documents. See Attachment A and Attachment B of the draft permit. One Carbon Partnership also updated the Well Operations Plan to include a revised discussion on annulus pressure to provide evidence that the annulus pressure remains appropriate and protective of well integrity and USDWs. One Carbon Partnership will verify fracture pressure and maximum allowable injection pressure once it acquires site specific data during the Pre-operational Testing Program (Attachment G of the draft permit).

The EPA reviewed information in the permit application and other relevant information regarding the maximum proposed injection pressure and proposed injection well operations to determine if they meet Class VI requirements, as noted below.

One Carbon Partnership's permit application included a fracture pressure of 2,583 psi based on a fracture gradient of 0.75 pounds per square inch per foot (psi/ft), and a proposed maximum injection pressure of 2,325 psi based on data from nearby Class I wells. The EPA reviewed the proposed maximum injection pressure and found it to be appropriate based on regional geomechanical data and with a required safety factor below that of the calculated site fracture pressure, to ensure that the pressure during injection does not initiate fractures in the injection or confining zones, pursuant to 40 C.F.R. § 146.88(a).

The EPA will review One Carbon Partnership's revised fracture pressure for the injection zone again using site-specific data following the planned step-rate testing during the Pre-operational Testing Program (Attachment G of the draft permit) and ensure the recalculation for fracture pressure is done properly, targets the correct interval, and that the data is interpreted correctly.

The EPA reviewed One Carbon Partnership's application to ensure that wells are equipped with continuous recording devices as required by 40 C.F.R. § 146.88(e)(1) and automatic shutdown systems as required by 40 C.F.R. § 146.88(e)(2). See Attachment J of the draft permit for the procedures One Carbon Partnership must follow should future stimulation activities be proposed. Based on the above information, the EPA's draft permit limits the maximum injection pressure to 2,325 psi to ensure that the pressure during injection does not initiate fractures in the injection or confining zones, pursuant to 40 C.F.R. § 146.88(a). See the Summary of Operating Requirements (Attachment A of the draft permit), and the AoR and Corrective Action Plan (Attachment B of the draft permit).

Testing and Monitoring Requirements

Federal Requirements under the Class VI Rule

The Class VI Rule at 40 C.F.R. § 146.90 requires the owner or operator of a Class VI well to conduct several types of testing and monitoring during CO₂ injection and through site closure. The proposed testing and monitoring procedures are described in a required Testing and

Monitoring (T&M) Plan, which is part of the permit application and will be incorporated as an enforceable attachment to the permit, if issued. The draft permit requires that the T&M Plan be periodically updated during the Project lifetime and requires One Carbon Partnership to review the plan at least once every five years. The testing and monitoring must, at a minimum, include:

1. Analysis of the CO₂ stream with sufficient frequency to yield data representative of its chemical and physical characteristics, as required by 40 C.F.R. § 146.90(a).
2. Continuous monitoring of the injection pressure, rate, and volume, and pressure on the annulus (space) between the tubing and long string casing, and the volume of annulus fluid added in order to detect the development of any leaks in the casing, tubing, or packer, as required by 40 C.F.R. § 146.90(b).
3. Quarterly monitoring of well materials for corrosion as required by 40 C.F.R. § 146.90(c).
4. Monitoring groundwater quality and geochemical changes above the confining zone(s) to check for changes that could be due to migration of CO₂, as required by 40 C.F.R. § 146.90(d). This is done through sampling from deep monitoring wells and shallow groundwater utilization wells. This will indicate any changes in water quality, such as changes in pH, major ions, or mobilization of metals or organic compounds that could be caused by injection.
5. Testing of the physical condition of the injection well and whether there are leaks in the casing that would allow movement of fluid along the outside of the well (“external mechanical integrity testing”), as required by 40 C.F.R. § 146.90(e). The initial baseline test is done prior to injection, and testing must be done at least once per year until the well is plugged. The approved testing methods are specified in 40 C.F.R. § 146.89(c).
6. Testing for changes in the hydrogeologic properties of the injection formation (“pressure fall-off testing”) at least once every five years to determine how the formation is responding to injection, as required by 40 C.F.R. § 146.90(f).
7. Tracking the plume of injected CO₂ and the changes in pressure in the injection formation to verify that the CO₂ plume and pressure are developing as predicted, as required by 40 C.F.R. § 146.90(g)(1), (2). This is done through a combination of direct measurements (e.g., pressure measurements) and indirect measurements (e.g., using methods such as seismic surveys) to determine the extent of the CO₂ plume.
8. The UIC Program Director may require surface air and soil gas monitoring to detect CO₂ movement, pursuant to 40 C.F.R. § 146.90(h). The design of such monitoring must be based on potential risks to USDWs within the AoR.
9. The UIC Program Director may require any additional monitoring necessary to support, upgrade, and improve computational modeling of the AoR evaluation and to determine

compliance with the prohibition of movement of fluid into USDWs, pursuant to 40 C.F.R. §§ 144.12, 146.90(i).

10. A Quality Assurance and Surveillance Plan (QASP) for all testing and monitoring requirements, as required by 40 C.F.R. § 146.90(k).

Most testing and monitoring results must be submitted in semi-annual reports, as required by 40 C.F.R. § 146.91(a). Mechanical integrity test results must be submitted within 30 days, as required by 40 C.F.R. § 146.91(b). Evidence that the injected CO₂ or pressure could cause endangerment to a USDW, triggering of a shut-off device, a mechanical integrity failure, possible fluid movement into USDWs, or evidence of a carbon dioxide surface leak, must be reported within 24 hours, as required by 40 C.F.R. § 146.91(c).

Draft Permit Conditions

1. Section N(2) and the T&M Plan found in Attachment C of the draft permit require One Carbon Partnership to analyze the CO₂ stream quarterly for its chemical and physical characteristics.
2. Sections L(1) and N(3) and Attachments A and C of the draft permit require One Carbon Partnership to conduct continuous monitoring for injection pressure, rate, and volume, and pressure on the annulus (space) between the tubing and long string casing, and the volume of annulus fluid added, and temperature of the carbon dioxide stream, as required by 40 C.F.R. § 146.90(b) and 40 C.F.R. § 146.88(e).
3. Section N(6) and Attachments A and C of the draft permit require One Carbon Partnership to perform quarterly corrosion monitoring. One Carbon Partnership will monitor coupons of material used in the construction of the compression equipment, pipeline, and injection well that come into contact with the carbon dioxide stream for signs of corrosion and loss of mass.
4. Section N(4) and Attachments A and C of the draft permit require One Carbon Partnership to monitor groundwater quality above the confining zone with a monitoring well screened within the Knox Group at depths to be identified during the Pre-Operational Testing Program. Samples will be taken semiannually and analyzed for cation and anion concentrations, dissolved carbon dioxide, total dissolved solids, alkalinity, pH, conductivity/resistivity, stable isotopes of carbon-13 content, water density, and temperature.
5. Sections L(2)(a) and N(7) and Attachment C of the draft permit require One Carbon Partnership to test external mechanical integrity annually by temperature logging. One Carbon Partnership must obtain UIC Program Director approval before it may employ an alternative method for external mechanical integrity testing.

6. Section N(8) and Attachments A and C of the draft permit require One Carbon Partnership to perform pressure fall-off testing at least once every five years and at the end of operation.
7. Section N(5) and Attachment C of the draft permit require One Carbon Partnership to track the movement of the CO₂ plume and pressure front using direct methods such as continuous pressure and temperature in the injection zone and indirect methods such as annual pulsed neutron logs of the ACZ monitoring interval, confining zone, and injection zone, continuous microseismic monitoring of the confining zone and injection zone, and 3D seismic surveys every five years, as summarized in the table below:

Table 3 Summary of direct and indirect methods used to monitor the CO₂ plume and pressure front

Target Formation	Monitoring Activity	Monitoring Location(s)	Frequency
Direct CO₂ plume and pressure front monitoring			
Mt. Simon Sandstone	Pulsed Neutron Log (PNL)	CCS1 OBS1	Once/year until fully saturated with CO ₂ Once/year
	Downhole Pressure	CCS1 (Injection Zone) OBS1 (Injection Zone)	Continuous
	Downhole temperature	CCS1 (Injection Zone) OBS1 (Injection Zone)	Continuous
Indirect CO₂ Plume Monitoring			
Entire interval	Time-lapse 3D surface seismic data	Over project CO ₂ plume	Every 5 years (Q1 or Q4)

8. Section N(9) of the draft permit states that in addition to the testing and monitoring outlined in the draft permit and in the applicable regulations, the EPA may require surface air monitoring and/or soil gas monitoring to detect potential movement of CO₂ that could endanger a USDW.

9. Section N(11) of the draft permit states that, if required by the EPA, One Carbon Partnership must perform any additional monitoring determined to be necessary to support, upgrade, and improve computational modeling of the AoR evaluation.
10. Attachment C of the draft permit requires One Carbon Partnership to conduct continuous microseismic monitoring of the AoR using a minimum of five surface seismic stations.
11. The QASP found in Attachment K of the draft permit outlines One Carbon Partnership's quality assurance and surveillance plan for all of the above testing and monitoring requirements.

The shallow groundwater monitoring program will use shallow groundwater wells spatially distributed within the AoR in near-surface groundwater aquifers and one dedicated groundwater monitoring well drilled into the lowermost USDW, per 40 C.F.R. § 146.90(d). One Carbon Partnership will acquire baseline groundwater samples from these wells to help characterize the variations in water quality within the AoR prior to the start of CO₂ injection. The water samples will be analyzed for their geochemical compositions.

The Project site is located in an area with low rates of natural seismic activity and risk. It is not expected that natural seismicity will affect the Project. This Project will monitor related microseismic activity to accurately determine the locations and magnitudes of seismic events and identify activity that may indicate failure of the confining zone and possible containment loss.

In accordance with 40 C.F.R. § 144.54 and 40 C.F.R. § 146.91, and as required by Sections L(7) and O(2) and Attachment A of the draft permit, One Carbon Partnership will submit results of these monitoring requirements to the EPA semiannually, or within 30 days of the completion of a mechanical integrity test or any other testing of the injection well if required by the EPA. Section O(3) of the draft permit requires reporting to the EPA within 24 hours of events where the injected CO₂ or pressure could cause endangerment to a USDW, triggering of a shut-off device, a mechanical integrity failure, possible fluid movement into an unauthorized zone, or evidence of a surface CO₂ leak.

Application Review and Decision Process

The EPA reviewed the T&M Plan and requested clarifying information about groundwater sampling, CO₂ plume and pressure front tracking locations, mechanical integrity testing procedures, passive seismic monitoring, and associated quality assurance procedures. One Carbon Partnership updated the T&M Plan (Attachment C of the draft permit) and the QASP (Attachment K of the draft permit) to meet the requirements of 40 C.F.R. § 146.90. One Carbon Partnership provided detailed construction specifications, coordinates, and schematics for

monitoring wells OBS1 and ACZ1, which use corrosion-resistant materials such as 25Cr and 13Cr casing and coated tubing. One Carbon Partnership clarified corrosion monitoring and compliance with industry standards. One Carbon Partnership removed radioactive tracer logging as an external mechanical integrity test and included a five-year schedule for time-lapse 3D seismic surveys in the T&M Plan and the QASP. One Carbon Partnership identified the privately owned shallow groundwater wells it will use for aspects of the above confining zone groundwater quality monitoring and confirmed its long-term access to these wells for the duration of the permit. One Carbon Partnership also clarified the methodology for the shallow and deep fluid sampling and added specific geochemical triggers for isotopic analysis.

The EPA reviewed One Carbon Partnership's proposed T&M Plan and other relevant information to determine whether the T&M Plan meets Class VI requirements.

Based on the above information, the EPA has concluded that One Carbon Partnership's T&M Plan as reflected in the draft permit Sections L, N, and O and Attachments A, C, and K, meets the requirements at 40 C.F.R. §§ 146.90 and 146.91. See the relevant permit application documents with information related to the T&M Plan as part of the administrative record: Testing and Monitoring Plan (Attachment C of the draft permit) and the Quality Assurance and Surveillance Plan (Attachment K of the draft permit). Monitoring after injection has ended, as part of "post injection site care," is discussed in a separate section further below.

Emergency and Remedial Response

Federal Requirements under the Class VI Rule

The Emergency and Remedial Response Plan (ERRP) establishes requirements for the operator to respond to potential injection-related compliance issues that could endanger USDWs, should they arise. Requirements for the ERRP (40 C.F.R. § 146.94) specify that the plan must describe what the owner or operator will do in the unanticipated circumstance where unintended movement of the injected fluids or formation fluids occurs during the construction, operation, or PISC periods. The ERRP is an enforceable part of the permit that describes the response actions that the permit applicant must take to address adverse events related to the unintended fluid movement. If the owner or operator obtains evidence that the injected CO₂ stream and associated pressure front may endanger a USDW, the owner or operator must stop injection, identify and characterize any release, notify the UIC Program Director within 24 hours, and implement the approved emergency and remedial response plan. The plan identifies the staff and equipment available to support emergency and remedial response events. The emergency and remedial response provisions of the permit will facilitate expedient responses and prevent or mitigate harm to USDWs.

Draft Permit Conditions

Section O(3) of the draft permit requires reporting to the EPA within 24 hours of events where the injected CO₂ stream or associated pressure front could cause endangerment to a USDW, such as triggering of a shut-off device, a mechanical integrity failure, possible fluid movement into an unauthorized zone, or evidence of a surface leak.

Section Q of the draft permit contains the requirement that the applicant must take actions to address movement of the injection or formation fluids that may cause an endangerment to a USDW and must maintain and comply with an approved ERRP and 40 C.F.R. § 146.94.

Attachment F of the draft permit is the ERRP itself and contains required actions that the permittee must implement in the event of various emergency scenarios.

For details on the permit conditions related to the Emergency and Remedial Response Plan, see Sections O(3) and Q and Attachment F of the draft permit.

Application Review and Decision Process

The EPA posed questions regarding the ERRP, which One Carbon Partnership addressed by several updates to the ERRP. One Carbon Partnership identified local resources and infrastructure that may be affected as a result of an emergency event within the AoR, which includes the pressure front with an additional approximate 0.5-mile buffer to be conservative. One Carbon Partnership identified all public infrastructure including sensitive receptors such as schools, hospitals, and nursing homes within this area. One Carbon Partnership defined bottomhole flowing pressure and provided proposed alarm set points and automatic shutdown triggers. One Carbon Partnership clarified that injection operations will cease during electric grid outages, automatic shutdown procedures will ensure safe system deactivation, and manual shutdown will only be required if automatic systems fail. One Carbon Partnership committed to replacing any damaged shallow groundwater utilization wells. One Carbon Partnership committed to notify the UIC Program Director within 24 hours of any equipment failure caused by a mechanical integrity failure, regardless of repair status, per 40 C.F.R. § 146.91(c). The EPA also recommended changes to One Carbon Partnership's ERRP. One Carbon Partnership submitted a revised plan in light of these recommendations.

The EPA reviewed One Carbon Partnership's ERRP and concluded that it identifies key resources and infrastructure in and around the project area, including USDWs, surface bodies of water, population centers, sensitive receptors, infrastructure related to oil and gas production, and public infrastructure including a park, pool, church, and the Cardinal Ethanol plant within the AoR. The plan identifies procedures for potential risk scenarios that may occur during construction, operation, and post-injection site care periods, including a well construction

event, well integrity failure, monitoring equipment failure, severe weather disaster, evidence suggesting potential leakage to a USDW or other unauthorized zone (including the surface), and seismic events. The ERRP also identifies the staff and equipment available to support emergency and remedial response events, includes contact information for local/state authorities, discusses the emergency communications plans, and includes procedures for periodic review of the ERRP. The plan requires One Carbon Partnership to initiate a shutdown plan for the affected well if One Carbon Partnership obtains any evidence that the injected carbon dioxide stream and/or associated pressure front may cause an endangerment to a USDW. The plan also identifies circumstances when One Carbon Partnership must provide 24-hour notification to the EPA. Finally, consistent with 40 C.F.R. § 146.94(d), One Carbon Partnership will be required to review the ERRP periodically, no less than every five years, but also following any reevaluation of the AoR or significant facility changes or as otherwise required by the UIC Program Director.

The EPA has determined that the ERRP meets all applicable Class VI Rule requirements. See Attachment F of the draft permit.

Financial Responsibility

Federal Requirements under the Class VI Rule

The Class VI Rule at 40 C.F.R. § 146.85 requires owners and operators to demonstrate and maintain financial responsibility for their Class VI projects. Maintaining financial responsibility ensures that the private costs of the Project, including possible costs after injection ends and the well is plugged through site closure, are not passed along to the public. The financial coverage must be sufficient to address endangerment of USDWs. Under the Class VI Rule, an owner or operator must demonstrate that its qualifying financial responsibility instruments cover the cost of corrective action, injection well plugging, post-injection site care and site closure, and emergency and remedial response. 40 C.F.R. § 146.85(a)(2). The Class VI Rule provides a list of financial instruments to choose from and describes the protective conditions of coverage required in each financial instrument, pursuant to 40 C.F.R. § 146.85(a)(1).

During the injection period of the Project, the owner or operator must adjust the cost estimate for inflation annually and provide this adjustment to the UIC Program Director. 40 C.F.R. § 146.85(c)(2). The owner or operator must also provide to the UIC Program Director adjustments to the cost estimate after any amendments to the AoR and Corrective Action Plan (40 C.F.R. § 146.84), the Injection Well Plugging and Abandonment Plan (40 C.F.R. § 146.92), the Post-Injection Site Care and Site Closure Plan (40 C.F.R. § 146.93), and the ERRP (40 C.F.R. § 146.94). The UIC Program Director must approve any decrease or increase to the cost estimate. 40 C.F.R. § 146.85(c)(3). Whenever the cost estimate increases beyond the face amount of a financial instrument currently in use, the owner or operator must either increase

the amount of the financial instrument to equal the current cost estimate or obtain other financial responsibility instruments to cover the increase, pursuant to 40 C.F.R. § 146.85(c)(4).

Draft Permit Conditions

For details on draft permit conditions relating to financial responsibility, see Section H and Attachment I of the draft permit.

One Carbon Partnership must maintain financial responsibility that meets the requirements of 40 C.F.R. § 146.85 for the life of this permit until site closure is approved by the UIC Program Director. One Carbon Partnership must use financial instruments as listed in 40 C.F.R. § 146.85(a)(1) to cover all costs associated with the requirements of this permit. Cost estimates must be prepared by a third party that is independent from the corporate structure of the applicant and must be approved by the UIC Program Director, per 40 C.F.R. § 146.85(c).

The cost estimates for the covered activities would be required to be updated for inflation within 60 days prior to the anniversary date of the establishment of the financial instruments. If there are other updates to the financial responsibility instruments, this information must be submitted on an annual basis. These provisions ensure that resources are available to perform these USDW-protective activities without using public/taxpayer money.

The draft permit requires, and One Carbon Partnership has secured, over a three-year pay-in period consistent with the EPA Class VI Guidance, financial coverage of \$8,687,704 via a funded escrow account and associated standby trust that will cover corrective action, injection well plugging, post-injection site care, and site closure, and coverage of \$8,300,000 via a third-party insurance policy that will cover emergency and remedial response, for a total of \$16,987,704. Consistent with 40 C.F.R. §§ 146.85(a)(1) and (6), which list insurance and escrow accounts (with a standby trust) as qualifying instruments and provide requirements for using such qualifying financial instruments, One Carbon Partnership procured an insurance policy with Ascot Specialty Insurance Company to cover emergency-and-remedial-response costs and set up a segregated escrow account with Computershare Trust Company, National Association, to cover corrective action, injection well plugging, post-injection site care, and site closure costs.

Application Review and Decision Process

The EPA asked clarifying questions about financial information and financial responsibility. See the Financial Assurance Demonstration (Attachment I of the draft permit). One Carbon Partnership revised the corrective action cost estimate to reflect a 50-year post-injection timeline to ensure that the financial instrument is sufficient to cover the cost of corrective action that meets the requirements of 40 C.F.R. § 146.84, per 40 C.F.R. § 146.85(a)(2)(i). One Carbon Partnership provided updated cost estimates that include plugging costs for all

monitoring wells, to ensure that the financial assurance is sufficient to cover the cost of injection well plugging that meets the requirements of 40 C.F.R. § 146.92, per 40 C.F.R. § 146.85(a)(2)(ii). One Carbon Partnership revised the cost estimates to reflect a 50-year post injection timeline, to ensure that the financial assurance is sufficient to cover the cost of post injection site care and site closure that meets the requirements of 40 C.F.R. § 146.93, per 40 C.F.R. § 146.85(a)(2)(iii). Moreover, regarding post injection site care and site closure, One Carbon Partnership added operation and maintenance costs for the monitoring wells to the PISC cost estimate and split out pressure monitoring costs, to provide additional detail, ensuring that site closure estimates include plugging costs for all relevant wells. One Carbon Partnership provided additional information on the site-specific information it used in the Monte Carlo analysis for emergency and remedial response costs, and for increasing the emergency and remedial response cost estimates to cover the cost of pump and treat groundwater remediation, to ensure that the financial responsibility instrument is sufficient to cover the cost of emergency and remedial response costs that meets the requirements of 40 C.F.R. § 146.94, per 40 C.F.R. § 146.85(a)(2)(iii). One Carbon Partnership added appendices with third party cost estimates, the insurance policy, and details of the segregated escrow account, and provided investment details for the escrow account and a Certificate of Corporate Existence and Fiduciary Powers for the escrow agent. One Carbon Partnership provided updated insurance policy renewal language including the commitment that the EPA will receive any policy nonrenewal letter no later than 120 days prior to the policy expiration date. One Carbon Partnership provided updated third-party cost estimates and clarifications. Finally, One Carbon Partnership updated all costs to 2025 dollars, consistent with 40 C.F.R. § 146.85(c)(1).

The EPA reviewed the financial resources One Carbon Partnership is required to have available to responsibly operate, monitor, and close the Project. The EPA reviewed information in the permit application and other relevant information regarding One Carbon Partnership's financial responsibility demonstration to determine if they meet Class VI requirements. The EPA further reviewed One Carbon Partnership's financial responsibility instruments and determined they were sufficient to meet the requirements of the Class VI Rule.

Based on the above information, the EPA has concluded that One Carbon Partnership demonstrated that the financial instruments meet the required conditions by confirming that the financial instruments provided conditions for continuation, renewal, and cancellation consistent with 40 C.F.R. § 146.85(a)(4), and are financially secure. See Attachment I of the draft permit.

Plugging and Abandonment

Federal Requirements under the Class VI Rule

The requirements for an Injection Well Plugging and Abandonment Plan (Plugging and Abandonment Plan) are found at 40 C.F.R. § 146.92. The Plugging and Abandonment Plan is a required permit application component that the EPA reviews. It must include certain elements required by regulation, and it will be incorporated as an enforceable attachment to the permit, if issued. The plan must include the measurement of pressure in the injection formation and mechanical integrity testing. The description of the plugging procedures must include the numbers and types of plugs that will be used and where in the well they will be placed, the type, grade, and quantity of material that will be used, and the method that will be used to place the plugs.

Draft Permit Conditions

For details on draft permit conditions related to the Plugging and Abandonment Plan, see Section P and Attachment D of the draft permit.

One Carbon Partnership must maintain and comply with the approved Injection Well Plugging and Abandonment Plan (Attachment D of the draft permit) and the approved PISC and Site Closure Plan (Attachment E of the draft permit) and must comply with the requirements of 40 C.F.R. §§ 146.92 and 146.93.

The draft permit specifies that the injection well will be entirely plugged to the surface using seven plugs with bottom depths of 3,569, 3,100, 2,600, 2,100, 1,600, 1,100, and 600 ft BGS, for a total uninterrupted plug from 3,569 BGS to the surface. Plugs 1-3 are made of CO₂ resistant cement and plugs 4-7 are made of Class A cement. The plugs will be placed by the balance method, which is a common technique used during well plugging. Prior to plugging, One Carbon Partnership must determine the bottomhole pressure in the injection formation by using bottomhole pressure devices and must verify external mechanical integrity using appropriate testing methods as specified in 40 C.F.R. § 146.89.

Draft permit conditions related to the injection well plugging and abandonment include:

- a) Well Plugging Plan Revisions: If data indicates and the applicant deems it necessary, or if the UIC Program Director requires the approved plans in Attachments D (Well Plugging Plan) and Attachment E (PISC and Site Closure Plan) of this draft permit to be modified, revised plan(s) must be submitted in an electronic format to the UIC Program Director for review and written approval. Any amendments to the Attachment D (Well Plugging Plan) and/or Attachment E (PISC and Site Closure Plan) must be approved by the UIC

Program Director and must be incorporated into the draft permit and are subject to the draft permit modification requirements at 40 C.F.R. §§ 144.39 and/or 144.41.

- b) Required Activities Prior to Plugging: As required by 40 C.F.R. § 146.92(a) and reflected in Section P of the draft permit, One Carbon Partnership must flush the injection well with an inert buffer fluid, determine the post-injection bottom hole pressure, and perform final internal and external mechanical integrity tests prior to injection well plugging. The internal and external mechanical integrity tests must be performed as required by Section L of the draft permit.
- c) Notice of Plugging and Abandonment: The applicant must notify the UIC Program Director in writing in an electronic format pursuant to 40 C.F.R. § 146.92(c), at least 60 days before plugging, conversion, or abandonment of the well.
- d) Plugging Approval: The Permittee must receive written approval from the Director before plugging the well and must plug and abandon the well as required by 40 C.F.R. § 146.92, as described in Attachment D of the draft Permit.
- e) Plugging Report: Within 60 days after plugging, the Permittee must submit in an electronic format a plugging report to the Director. The report must be signed and certified by the Permittee per 40 C.F.R. § 144.32 and by the person who performed the plugging operation (if other than the Permittee). The Permittee must retain the well plugging report in an electronic format for 10 years following site closure. The report must include:
 - a. A statement that the well was plugged in accordance with the approved Well Plugging Plan (Attachment D of this Permit); or
 - b. If the actual plugging differed from the approved plan, a statement describing the actual plugging and an updated plan specifying the differences from the plan previously submitted and explaining why the Director should approve such deviation. If the Director determines that a deviation from the plan incorporated in this Permit may endanger underground sources of drinking water, the Permittee must replug the well as required by the Director.

Application Review and Decision Process

The EPA asked clarifying questions about One Carbon Partnership's proposed plugging procedures (including the placement of plugs). One Carbon Partnership submitted detailed plugging procedures and associated schematics for all monitoring wells.

The EPA reviewed information in the permit application regarding One Carbon Partnership's Plugging and Abandonment Plan, contained in Attachment D of the draft permit, to determine if they meet Class VI requirements.

The requirements for an Injection Well Plugging Plan are found at 40 C.F.R. § 146.92. Consistent with 40 C.F.R. § 146.92(b)(1) and (2), the information One Carbon Partnership provided demonstrates the permit applicant's plan to utilize an appropriate method for determining bottomhole pressure and ensure external mechanical integrity with an approved method as specified under 40 C.F.R. § 146.89. Consistent with 40 C.F.R. § 146.92(b)(3)-(6), the Injection Well Plugging Plan includes One Carbon Partnership's proposed pre-plugging testing procedures and the cements and plugs to be used, their resistance to corrosion, their location relative to the lowermost USDW and to the injection and confining zones.

Based on the review, the EPA has determined that the Plugging and Abandonment Plan meets all applicable Class VI Rule requirements including information regarding appropriate tests, type and number of plugs to be used, plug placement, plugging materials, and method of plug placement. See Attachment D of the draft permit.

Post-Injection Site Care (PISC) and Site Closure

Federal Requirements under the Class VI Rule

The requirements for PISC and Site Closure Plan are found at 40 C.F.R. § 146.93.

Following the cessation of injection, One Carbon Partnership must plug the injection well according to its approved Plugging and Abandonment Plan and begin the PISC period. Activities during the PISC period are performed according to the Project's PISC and Site Closure Plan, Attachment E of this permit. The PISC and Site Closure Plan must include certain elements required by regulation and it is incorporated as an enforceable attachment to the permit, if issued.

The PISC and Site Closure Plan must include, among other information, predictions about the maximum extent of the increased pressure front in the AoR underground, where the CO₂ plume is expected to be, and how the site will be monitored after injection and for how long. Monitoring during the PISC period is needed to demonstrate non-endangerment of USDWs. The types of monitoring during the PISC period will be similar to monitoring during injection under the T&M Plan and will involve monitoring groundwater quality and tracking the CO₂ plume and pressure in the injection zone. This will enable confirmation of predictions about plume migration and pressure, including that they will not pose a risk of endangerment to any USDWs.

At the end of the PISC period, to receive authorization to close the site, the owner or operator must demonstrate to the UIC Program Director that the site will not endanger USDWs. The owner or operator must plug monitoring wells, submit a notice of intent for site closure, and upon closure, restore the site.

Draft Permit Conditions

For details on draft permit conditions relating to the PISC and Site Closure Plan, see Section P and Attachment E of the draft permit.

The PISC and Site Closure Plan requires monitoring to define the position of the CO₂ plume and pressure front, provide a comparison of data collected to the predictions made by the AoR model, and demonstrate that USDWs are not being endangered per 40 C.F.R. §§ 146.90 and 146.93. As specified in 40 C.F.R. § 146.93, the draft permit contains a PISC period of 50 years. During the PISC period, monitoring will continue according to ongoing monitoring plans. These plans include monitoring shallow groundwater, above confining zone aqueous geochemistry, pulsed neutron capture logging every second year, pressure monitoring in ACZ1 continuously, time-lapse 3D surface seismic data in years zero and eight, pressure monitoring of the Mt. Simon Sandstone continuously, and microseismic monitoring of the AoR continuously. At the end of the PISC period, when it has been demonstrated that the site no longer poses a risk of endangerment to USDWs, and that no additional monitoring is needed to ensure that the project does not pose an endangerment to USDWs, per 40 C.F.R. § 146.93(b)(3), the draft permit requires One Carbon Partnership to plug monitoring wells using multiple plugs of CO₂-resistant cement or Class A cement as described above and the retainer and balance methods. To complete site closure, One Carbon Partnership will remove all drilling and production equipment, machinery, and debris from the site, will weld steel plates over the plugged and abandoned wells, and will fill all excavations, holes, and pits. The draft permit requires One Carbon Partnership to obtain the EPA approval for site closure. Table 4 below summarizes the PISC monitoring plans to begin following the cessation of injection.

Table 4 Summary of PISC monitoring activities

Monitoring Activity	PISC Frequency	Location	Depth Range (MD feet)
Groundwater Monitoring			
Shallow Groundwater Sampling	Biannual: Years 1-5 Annual thereafter (Q2 of each year)	USDW1 Privately owned groundwater wells	Varying

Monitoring Activity	PISC Frequency	Location	Depth Range (MD feet)
Deep groundwater sampling	Annual: Years 1 – 5, Every 5 years (Q2 of each year)	ACZ1	Knox Formation
Pressure Monitoring			
Downhole Pressure:		CCS1	Above Packer
Years 1-5	Continuous		
Years 6 – 50	Annual static survey	OBS1	Above Packer
Wellhead Pressure		CCS1	Surface
Years 1-5	Continuous (10 s to 60 min)	OBS1	Surface
Years 6 – 50	Every 24 hours	ACZ1	Surface
Annulus Pressure		CCS1	Surface
Years 1-5	Continuous (10 s)	OBS1	Surface
Years 6 – 50	Every 24 hours		
Mechanical Integrity Tests ⁴			
External MIT:	Annual	CCS1	Surface to well bottom
Temperature Logging	Annual for first five years	OBS1	Surface to well bottom
CO₂ Plume Verification Monitoring			
Pulsed Neutron Logging (PNL)	Year 1, Year 3, Year 6, then five-year intervals to Year 50	CCS1 OBS1	ACZ Interval Confining Zone Injection Zone
Microseismic Monitoring		Minimum five surface stations	Injection Zone Confining Zone
Years 1 - 2	Continuous		
Time-lapse 3D Surface Seismic Data	Q2 Year 1 Q2 Year 8 Q2 Year 48	Area sufficient to image an CO ₂ plume	Imaging of CO ₂ plume and overburden

Application Review and Decision Process

The EPA asked clarifying questions related to One Carbon Partnership's proposed alternative PISC timeframe, injection zone pressure monitoring, microseismic monitoring, and conversion of the injection well. In response, One Carbon Partnership revised the plan to align with the default 50-year monitoring period required by 40 C.F.R. § 146.93(b)(1). One Carbon Partnership modified the plan to include conversion of the injection well to an additional monitoring well for the PISC period, clarified the pressure monitoring strategy, and explained the transition from continuous monitoring using a supervisory control and data acquisition (SCADA) system to yearly static pressure measurements using analog pressure gauges. One Carbon Partnership provided depth estimates for the downhole pressure gauges as well as a plan to address possible downhole pressure gauge failure. One Carbon Partnership provided a technical basis for the timeframe of microseismic monitoring in the PISC period. One Carbon Partnership included confirmation that it revised financial assurance instruments and associated cost estimates in parallel to support the 50-year PISC, per 40 C.F.R. § 146.85.

The EPA reviewed One Carbon Partnership's proposed PISC Plan and other relevant information to determine whether the PISC Plan meets Class VI requirements. Consistent with 40 C.F.R. § 146.93(a)(2), the PISC and Site Closure Plan included information showing that the pre- and post-injection pressure differential and the predicted position of the CO₂ plume and associated pressure front at site closure are consistent with the AoR delineation modeling results; a description of post-injection monitoring location, methods, and proposed frequency; a proposed schedule for submitting post-injection site care monitoring results to the Director pursuant to § 146.91(e); and the duration of the PISC timeframe. Under the draft permit, One Carbon Partnership will plug all monitoring wells and restore the site to its pre-operational condition consistent with 40 C.F.R. § 146.93(e). The PISC Plan also includes details of monitoring OCP must perform of the site following the cessation of injection to show the position of the carbon dioxide plume and pressure front and demonstrate that USDWs are not being endangered per 40 C.F.R. § 146.93(b). The post-cessation monitoring will continue as specified in the PISC Plan for a 50-year period unless a demonstration is made under 40 C.F.R. § 146.93(b)(2). Based on the review of the information provided by One Carbon Partnership and other relevant information, the EPA determined the permit application satisfies all the requirements of 40 C.F.R. § 146.93(a)-(b). See the relevant permit application documents with information related to the PISC and Site Closure Plan (Attachment E of the draft permit).

Other Permit Information

Variances or alternatives to required standards under 40 C.F.R. § 124.8(b)(5)

The draft permit has no proposed alternatives to required standards.

National Environmental Policy Act

UIC permits, issued pursuant to the Safe Drinking Water Act, are functionally equivalent to and therefore are not subject to the environmental impact statement requirements of section 102(2)(C) of the National Environmental Policy Act (NEPA). 42 U.S.C. § 4321. See 40 C.F.R. § 124.9(b)(6). Courts have held that where an agency is “engaged primarily in an examination of environmental questions, where substantive and procedural standards ensure full and adequate consideration of environmental issues, then formal compliance with NEPA is not necessary, but functional compliance is sufficient.” *Env’tl. Defense Fund, Inc. v. EPA*, 489 F.2d 1247 (D.C. Cir. 1973). See also *Western Nebraska Resources Council v. United States EPA*, 943 F.2d 868, 871-72 (8th Cir. 1991) (finding that SDWA’s procedures for considering the environment effects are functionally equivalent to NEPA’s impact statement process). Region 5 is engaged in an orderly review of the environmental impacts under SDWA and in carefully considering the environmental issues involved for the draft permit with the assistance of opportunities for meaningful public participation. Region 5 plans to complete its orderly review and consideration prior to issuance of any final permit.

Endangered Species Act (ESA)

40 C.F.R. § 144.4 provides a list of Federal laws that may apply to the issuance of Class VI permits, including that “[t]he Endangered Species Act, 16 U.S.C. 1531 et seq. Section 7 of the Act and implementing regulations (50 C.F.R. Part 402) require the Regional Administrator to ensure, in consultation with the Secretary of the Interior or Commerce, that any action authorized by the EPA is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat.” Regulations directing the ESA interagency consultation process can be found at 50 C.F.R. Part 402.

The EPA determined that the One Carbon Partnership Project is “not likely to adversely affect” federally endangered, threatened, or proposed species. There is no identified or proposed critical habitat within the project area. The EPA submitted a letter seeking concurrence on its determination to the U.S. Fish and Wildlife Service. For more information about the EPA’s determination, see the One Carbon Partnership Project Biological Assessment Report, which includes the list of federally listed species identified using the U.S. Fish and Wildlife Service’s Information for Planning and Consultation (IPaC) tool, and the EPA’s letter to the U.S. Fish and

Wildlife Service seeking concurrence on the Agency's "not likely to adversely affect" determination."

National Historic Preservation Act (NHPA)

40 C.F.R. § 144.4 provides a list of federal laws that may apply to the issuance of Class VI permits, including that "[t]he National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq. Section 106 of the Act and implementing regulations (36 C.F.R. Part 800) require the Regional Administrator, before issuing a license, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. The Act's requirements are to be implemented in cooperation with State Historic Preservation Officers and upon notice to, and when appropriate, in consultation with the Advisory Council on Historic Preservation." Regulations directing the NHPA consultation process can be found at 36 C.F.R. Part 800. For more information on the EPA's proposed determination, see the file in the administrative record titled "NHPAMemo ORC." The report in the administrative record titled "One Carbon Partnership Project Cultural Resources Desktop Review - 07312025-c" includes the list of potential historic properties found near the undertaking's area of potential effects (APE).

The EPA has proposed that, under the NHPA, the One Carbon Partnership project is an undertaking that will have no adverse effect on historic properties as set forth at 36 C.F.R. § 800.4(d)(1). The Indiana State Historic Preservation Office (SHPO) concurred with this proposed determination on August 28, 2025, see the letter in the administrative record "2025-06-27_One Carbon SHPO Letter 20251318-c."

Issuance and Effective Date of Permits

In accordance with 40 C.F.R. § 124.15, the final permit would become effective immediately upon issuance if no public comments were received that requested a change in the draft permit. However, in the event that public comments are received requesting changes, and the EPA decides to issue final permit, then the permit would become effective 30 days after the date of issuance unless a different effective date is specified in the decision, or the permit is appealed.

Duration of Permit

In accordance with 40 C.F.R. § 144.36(a), the permit would be in effect for the duration of the Project unless it is otherwise modified, revoked and reissued, or terminated as provided at 40 C.F.R. §§ 144.39, 144.40, and 144.41.

Modification, Revocation and Reissuance, and Termination

Section B(1) of the draft permit states some conditions that may warrant modification, revocation and reissuance, or termination of the permit. The EPA may modify, revoke and reissue, or terminate this permit in accordance with 40 C.F.R. §§ 124.5, 144.12, 146.86(a), 144.39, and 144.40 and any other applicable law. The permit is also subject to minor modifications as specified in 40 C.F.R. § 144.41.

Expiration upon Failure to Construct

The permit would expire in two years if One Carbon Partnership does not commence construction, unless a written request for an extension of this two-year period has been approved by the EPA.

Authorization to Inject

One Carbon Partnership is prohibited from commencing injection without authorization. The EPA may grant authorization to inject under the permit following well construction and compliance with additional requirements as outlined in the permit and regulations at 40 C.F.R. §§ 146.82, 146.86, 146.87, and 146.89.

Frequently Used Acronyms

AoR	Area of Review
CO ₂	Carbon dioxide
EAB	Environmental Appeals Board
EPA	Environmental Protection Agency
ERRP	Emergency Remedial Response Plan
T&M	Testing and Monitoring
PISC	Post-injection site care
UIC	Underground Injection Control
USDW	Underground Source of Drinking Water