ENVIRONMENTAL APPEALS BOARD
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.

In re	)	
Wabash Carbon Services, LLC	)	**UIC Appeal No. 24-01**
Permit Nos. IN-165-6A-0001 (Vermillion) and IN-167-6A-0001 (Vigo)	)	

RESPONSE OF WABASH CARBON SERVICES, LLC TO PETITION FOR REVIEW

ATTACHMENT 4

REGION 5
CHICAGO, IL 60604

Response to Comments
U.S. Environmental Protection Agency
Underground Injection Control
Class VI Underground Injection Permits
IN-165-6A-0001 (Vermillion County) and IN-167-6A-0001 (Vigo County), Indiana
Wabash Carbon Services, LLC

I. Introduction

This response is issued in accordance with Section 124.17(a), (b), and (c) of Title 40 of the Code of Federal Regulations (40 C.F.R. § 124.17(a), (b), and (c)). These provisions require that at the time any final United States Environmental Protection Agency (EPA) permit decision is issued, the Agency shall: (1) briefly describe and respond to all significant comments on the draft permit decision raised during the public comment period; (2) specify which provisions, if any, of the draft decision have been changed and the reasons for the change; (3) include in the administrative record any documents cited in the response to comments; and (4) make the response to comments available to the public.

II. Background

On July 7, 2023, EPA issued two draft Class VI permits to inject carbon dioxide for permanent sequestration, numbered IN-165-6A-0001 (CCS-1, Vermillion County, Indiana) and IN-167-6A-0001 (CCS-2, Vigo County, Indiana) to Wabash Carbon Services, LLC (WCS) and invited public comment. A public meeting and hearing regarding the draft permits were held in Terre Haute, Indiana on August 10, 2023. The paired event was well attended and covered by local media.

During the public meeting, EPA gave a brief presentation summarizing the draft permits and conducted a question-and-answer period, which lasted approximately 1.5 hours, with the attendees. The meeting's question-and-answer period was followed by a public hearing where participants were able to provide comments regarding the draft permits and lasted for approximately 1.5 hours. The comments provided during the hearing were recorded and transcribed by a court reporter.

The public comment period was originally set from July 7 to August 11, 2023. Due to significant public interest, EPA extended the public comment period to August 21, 2023 (with published public notice of the extension) for a total comment period of 45 days.

III. General and Out-of-Scope Comments

EPA regulations at 40 C.F.R. Parts 124, 144, and 146 state the requirements and standards that

must be met by permit applicants for an Underground Injection Control (UIC) permit application to be approved. These regulations define the general scope of EPA's authority and the permit application review process, including standards for geologic siting, well engineering, operation, injection system monitoring, well plugging and abandonment, post closure site care, financial assurance, and site restoration for deep injection wells. The regulations also set requirements for the terms and conditions of permits. Relevant comments address these requirements.

EPA received many comments directed at matters outside the scope of the UIC Program's purview, as set forth above. EPA is not obligated to respond to such "out-of-scope" comments because they do not relate to the UIC permitting process, or to any regulatory standards applicable to Class VI carbon sequestration projects. A summary of these out-of-scope comments appears below without response. Please note that due to the strong public interest in these draft permits, EPA was expansive in determining the comments to which to respond.

Following the discussion of the out-of-scope comments are summaries of comments that address topics that are relevant to this permitting decision ("in-scope" significant comments) along with EPA responses. Although EPA is not responding to general statements of support and opposition to the draft permits individually, the Agency did consider them in making the decision of whether or not to issue the final permits.

The comments falling into the "out-of-scope" category are listed below without response. As indicated above, EPA's permit review is limited to the factors specified at 40 C.F.R. Parts 124, 144, and 146. Comments regarding the following topics are out-of-scope with respect to this permitting action:

1) Concerns regarding property values in the area;

2) Expression of general concern regarding the carbon dioxide generating facility;

3) Concerns with the health impacts from the process at the facility that will generate the carbon dioxide for subsequent sequestration;

4) Concerns regarding the past uses of the carbon dioxide generating facility and the disposal of coal ash at the site;

5) Comments stating that the project will not help climate change due to other sources and continuation of reliance on fossil fuels;

6) Comments related to pipeline (and other methods of) transport from the point of carbon dioxide generation to the proposed injection well locations;

7) Concerns related to existing, non-carbon dioxide pipelines in the area;

8) Concerns related to the WCS business (profit, corporate structure, lack of accountability, change of corporate name, corporate greed, etc.);

9) Concerns regarding the safety of protesters of the project;

10) Concerns regarding truck traffic and noise/light pollution;

11) Concerns regarding State of Indiana legislation for the project (pore space rights, eminent domain, and indemnity to WCS);

12) Statements that there are other sources of carbon dioxide in the area of the project;

13) Concerns regarding economic benefit to the community;

14) Concerns regarding the amount of carbon that will be emitted to construct the injection wells;

15) Concerns regarding the other permits that will need to be obtained (building permits, pipeline permits, zoning);

16) Concerns regarding the training and response capacity of local emergency responders;

17) Concerns regarding the lack of local hospital capacity in a catastrophe;

18) Concerns regarding the lack of public outreach and notification by WCS, and local and state governments;

19) Concerns regarding the impact on agribusiness, surface structures, elementary schools, the convent, and sensitive populations;

20) Concerns regarding financial compensation to landowners;

21) Concerns regarding the cost of the project;

22) Statements that there are better alternatives to address carbon dioxide in the atmosphere than sequestration;

23) Concerns that WCS will capture carbon dioxide but do nothing to reduce the amount produced;

24) Statements that the project will not reduce carbon dioxide in the atmosphere because it will assist in continued use of fossil fuels as an offset;

25) Statements that there are better ways and locations to sequester carbon dioxide;

26) Statements that the project should be relocated to another area with less population;

27) Concerns that the industrial process that will generate carbon dioxide is harmful to human health and the environment;

28) Concerns that the act of conducting carbon capture and storage has already impacted water quality in the area;

29) Concerns regarding insurance companies no longer covering groundwater contamination in the area;

30) Concerns about the area air quality;

31) Statements that renewable energy use should increase so that carbon sequestration would not be needed;

32) Concerns that carbon dioxide is being produced just to be sequestered;

33) Concerns regarding carbon dioxide releases to the atmosphere;

34) Concerns regarding damage to public lands;

35) Concerns regarding OSHA workplace safety rules such as Permissible Exposure Limits at the facility;

36) Statements providing examples of environmental contamination not related to carbon dioxide sequestration;

37) Concerns that the carbon dioxide generating facility will use too much water;

38) Statements that the project will provide no benefit to the community;

39) Comments regarding the operating Class VI wells at the Archer Daniels Midland facility in Illinois;

40) General distrust of WCS;

41) Comments regarding the number of active Class VI permits and applications in the country (EPA maintains a list of Class VI applications and operating injection wells for all Regions at https://www.epa.gov/uic/current-class-vi-projects-under-review-epa)

42) Concerns regarding a lack of transparency between WCS and other federal agencies; and

43) General concerns regarding government corruption and corporate payoffs.

IV. In Scope Comments

Below are EPA responses to the in-scope comments received during the public comment period and public hearing.

Comment #1: Numerous comments were received regarding the suitability of the geology of the area for carbon sequestration and the manner in which the two proposed injection well locations were chosen.

Response #1: EPA evaluates the siting (location) of proposed injection wells and surrounding geology in accordance with 40 C.F.R. Part 146, Subpart H. EPA does not choose the injection well sites but considers the regulatory requirements for geology and siting of Class VI UIC wells

and whether or not the proposed injection sites outlined in the permit application meet those requirements. Upon review of the permit applications EPA finds that all regulatory requirements have been met and the proposed injection sites are suited for carbon dioxide sequestration.

The Area of Review (AoR) for Class VI wells is the region surrounding the geologic sequestration project where potential risks to Underground Sources of Drinking Water (USDWs; defined below) are evaluated. The extent of the AoR is defined by computational modeling conducted to estimate the maximum extent of the carbon dioxide plume and pressure front (i.e., the area where pressure is greater than the natural pressure of the geologic formation). See Response #4 for more detailed information.

Injection at the project sites is planned to occur below the lowest identified USDW, and the following criteria have been met (40 C.F.R. § 146.83):

- An injection zone(s) of sufficient areal extent, thickness, porosity, and permeability to receive the total anticipated volume of the carbon dioxide stream; and
- Geologic confining zone(s) free of transmissive faults or fractures and of sufficient areal extent and integrity to contain the injected carbon dioxide stream and displaced formation fluids and allow injection at proposed maximum pressures and volumes without initiating or propagating fractures in the confining zone(s).

The AoRs for the two injection wells are located within the Illinois Basin. The basin is approximately 15,000 feet thick (from the top of the uppermost bedrock to the top of the igneous Precambrian basement rock). The shallowest bedrock (under recent glacial and alluvial sediments) of Pennsylvanian age extends to an approximate depth of 750 feet below ground surface (bgs) and contains coal seams. The remainder of the geologic basin contains rock in age from the Mississippian to the Cambrian (top to bottom) and are alternating layers of shale, limestone, dolomite, and sandstone.

The Illinois Basin formed due to rifting (tectonic plates pulling apart) that began in the late Precambrian and ended in the early Cambrian Eras. Once rifting ceased, the rocks cooled and massive subsidence and deposition occurred. Sediment was deposited and rocks lithified over millions of years resulting in the geology that is seen today. The remnants of the rifting can be seen in the New Madrid Rift System.

Most of the Illinois Basin is seismically stable and free of cross-formational faults and fractures, except for the New Madrid and Wabash Valley Seismic areas. These areas contain subvertical, normal faults that can be associated with seismic activity (see Response #3).

The injection zone is both the Ordovician Oneota Formation and the Cambrian Potosi Formation. Permeability estimates for the injection interval of the Potosi Formation (from 4396 to 5037 feet bgs) calculated through analysis of regional data and data obtained from the test well range from 24,000 millidarcy (mD)-ft or higher. These data indicate that the injection zone has sufficient thickness and permeability to accept the maximum carbon dioxide injection mass outlined in the permits.

Two USDWs were identified. USDWs are conservatively defined by UIC regulations as aquifers or portions thereof which contain less than 10,000 milligrams per liter of total dissolved solids and are being used, or could be used, as a source of drinking water. The shallower USDW is identified as the Mcleansboro/Carbondale Group aquifer system. The USDW appears to be hydrologically connected from the near surface glacial sediments and extends to a depth of approximately 730 feet bgs. The lowermost USDW in the AoRs are comprised of Silurian age limestone and dolomite extending to a depth of approximately 2,400 feet bgs. EPA uses the depth to the bottom of the lowermost USDW when making determinations regarding compliance of the permit application to the regulations and protection of USDWs.

40 C.F.R. Part 146, Subpart H, requires that the injection activities must occur below the depth of the lowermost USDW with a geologic confining unit(s) free of faults and fractures between it and the injection zone. The confining zone is identified as the Shakopee Formation which directly overlies the injection zone. There is approximately 2,100 feet of confining rock (comprised of the Maquoketa Group, Trenton Formation, Plattin Formation, Ancell Group, and Shakopee Formation) between the top of the injection zone and the bottom of the lowermost USDW. Studies conducted within the AoRs indicate that the confining units are free of faults and fractures.

Based on these factors, EPA has determined that the carbon sequestration characteristics outlined in 40 C.F.R. Part 146, Subpart H, and that the siting requirements of 40 C.F.R. § 146.83 have been met.

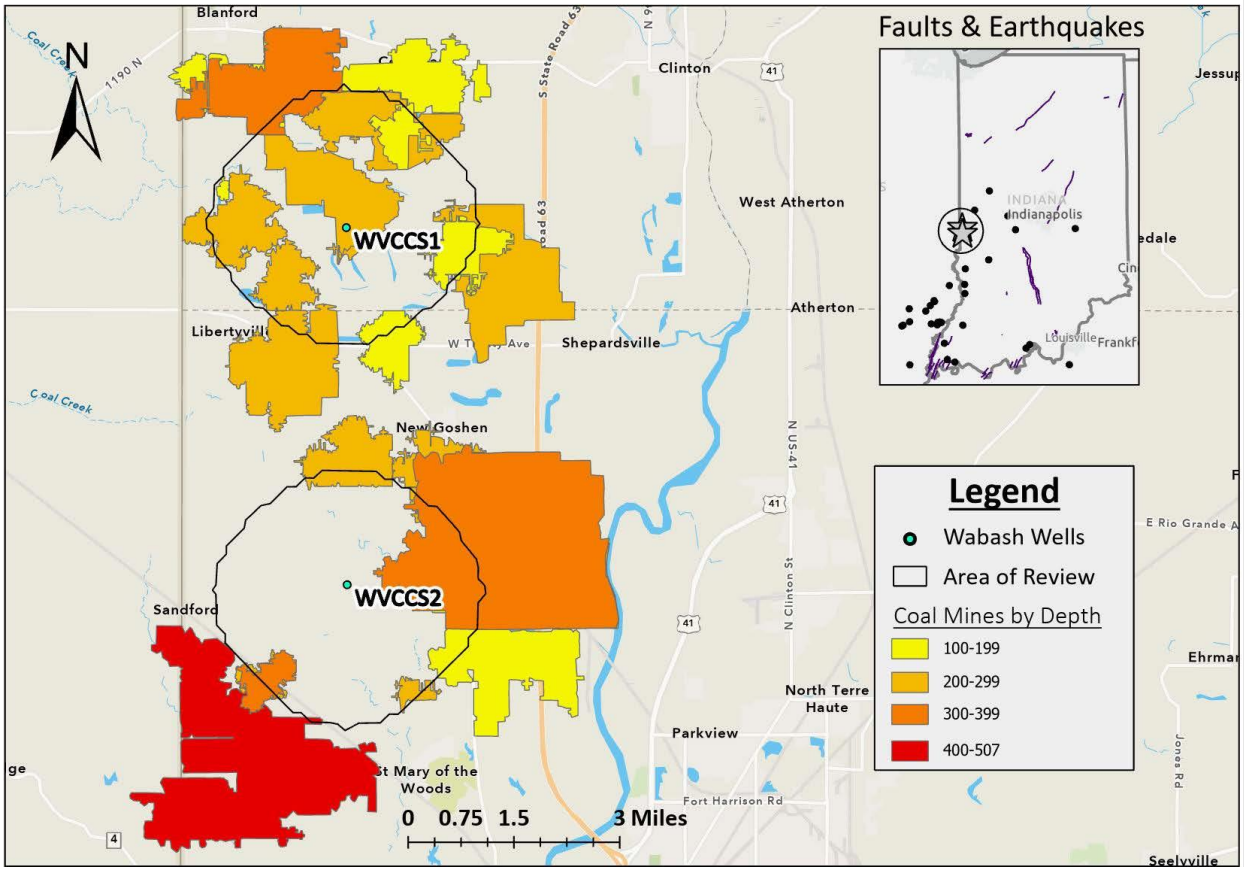
Comment #2: Numerous comments were received regarding subsurface coal mines in the area and how they may impact the safety of the proposed injection.

Response #2: EPA conducted an evaluation of the location and depth of coal mines in the AoRs and their potential impact or interaction with the proposed injection.

Coal mining (both surface and underground mines) has been conducted in Indiana continuously since the early 19th century. The Indiana Department of Natural Resources (IDNR) regulates coal mining and mine reclamation in the State. According to State of Indiana databases, there are no active underground coal mines in Vermillion or Vigo Counties. There are two active surface mines in southern Vigo County.

In the part of Indiana that encompasses the AoRs, coal is mined from seams in the Pennsylvanian System rocks that extend to an approximate depth of 750 feet bgs. Using State of Indiana databases, the locations and depths of inactive coal mines is depicted in the following figure:

Underground Coal Mines Within Areas of Review



As indicated in the diagram, there are no underground mines at the WCS WVCCS2 wellsite, and there is a potential for an underground mine to exist in the area of the WCS WVCCS1 injection well. Injection wells can be safely constructed with the existence of underground mines such as those present in the vicinity of the proposed injection wells. If subsurface mine void space is encountered, the well construction must include a mine casing string to seal the mine void space from the inner casings of the injection wells. EPA has modified Section I(3) of both permits to include the mine string requirement.

Since the worst-case maximum mine bottom depth is approximately 600 feet bgs, which is above the lowermost USDW, there is virtually no chance that carbon dioxide or displaced fluids would reach the mines from the injection zone. Additionally, the injection will occur within tubing that will be located within three different casing pipe strings. That in combination with vigorous injection well mechanical integrity testing (MIT) and corrosion monitoring requirements in the permits ensure that carbon dioxide will not escape from the well to the mines. Based on these factors, EPA has determined that the existence of underground coal mines will not adversely impact the proposed injection or compromise the protection of USDWs.

Comment #3: Numerous commenters expressed concerns regarding geologic faults, seismicity, earthquakes, and seismic monitoring. The comments included the topics of the inherent

seismicity in the area of the injection wells (existing seismicity) and seismicity that may be caused by injection activities (induced seismicity). The comments also addressed damage caused by earthquakes to the injection wells and surface or near surface structures, as well as the competency of the confining rock layers (i.e., breaching that could cause USDWs to be contaminated).

Response #3: The subject of protection of USDWs is covered in the response to Comment #12; also refer to Comments #1, #10, and #13.

EPA considered seismic risk (existing and induced) as part of its technical review of the permit application and WCS addressed the issue of seismicity, earthquakes, and faults in its permit application. The EPA's technical review of the permit application included an assessment of faults and fractures, existing (historic) seismicity in the area, and the probability of induced seismicity due to injection activities as required by 40 C.F.R. § 146.82(a)(3)(v).

Fault Evaluation

As part of the review, WCS conducted 2-D seismic and core analyses to identify faults and fractures in the vicinity of the injection wells. The only faults identified in this study occurred in the upper Precambrian and lower Cambrian Mt. Simon Formation and no faults or factures were identified that transect the injection formation or the overlying confining rock units. Based upon the test boring conducted by WCS, the bottom of the injection zone (Potosi Formation) occurs at an approximate depth of 5,162 feet. There is approximately 2,700 feet of vertical separation from the bottom of the Postosi Formation and the subvertical faults in the lower Mt. Simon Formation. The Eau Claire Formation lies between the bottom of the Potosi Formation and the top of the Mt. Simon Formation and will serve as a barrier to restrict injection fluid migration downward toward the Mt. Simon Formation.

Additionally, reviews of published literature by WCS and EPA indicate that the nearest named fault of tectonic origin is the Mt. Carmel Fault approximately 64 kilometers southeast of the proposed injection sites outside of the Illinois Basin.

Historic Earthquake Data and Existing Seismicity

Recorded earthquakes serve as a general indicator of seismic activity and the potential existence of a stressed fault. A record of past earthquakes would be evidence of the presence of stressed faults in the area, a common criteria EPA considers when evaluating the potential for seismic activity and induced seismicity.

EPA reviewed the United States Geological Survey (USGS) historic seismic events database in the southeastern portion of the Illinois Basin, including the States of Illinois and Indiana, the two injection well sites, and the Wabash Valley Seismic Zone. A total of 55 earthquakes greater than magnitude (Mw) 3.0 have occurred in the search area from 1817 through 2023 as depicted below.

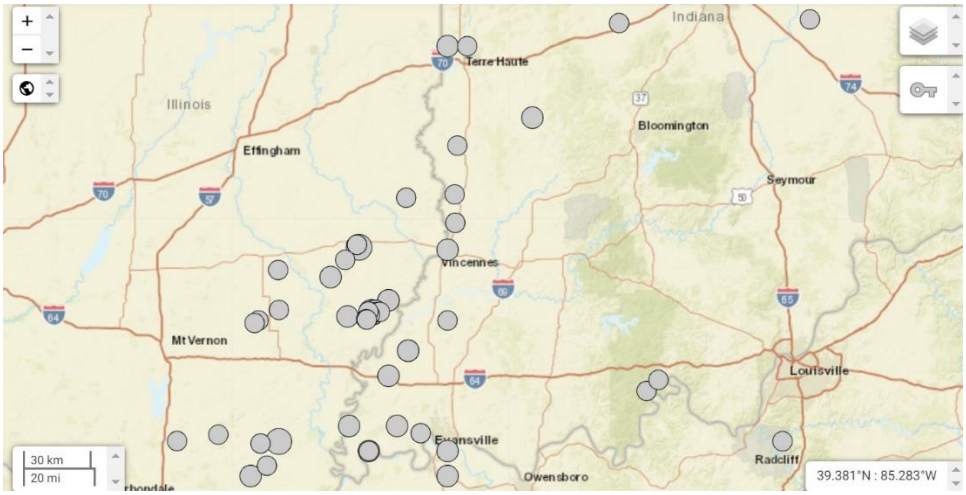


Figure from USGS showing earthquake locations, and magnitude https://earthquake.usgs.gov/earthquakes/map/

According to USGS data, six historical earthquakes occurred within approximately 50 km of the injection well sites as follows:

DATE	LATITUDE	LONGITUDE	MAGNITUDE	DEPTH (km)	LOCATION
6/7/2021	39.8305	-87.2866667	3.82	6.26	Illinois-Indiana border region
9/27/1909	39.8	-87.2	5.10	UNK	4 km NNE of Rockville, Indiana
12/16/1996	39.5	-87.4	3.10	5	3 km NNE of Terre Haute, Indiana
3/4/1921	39.5	-87.5	4.40	UNK	3 km WSW of Saint Mary-of-the-Woods, Indiana
8/29/1984	39.11	-87.45	3.10	10	Illinois-Indiana border region
7/28/1984	39.22	-87.07	4.00	10	6 km SE of Middlebury, Indiana

Figure from USGS showing earthquake locations, and magnitude https://earthquake.usgs.gov/earthquakes/map/

Mw 3.0 is the benchmark used for historic earthquake evaluation because it is the level of shaking that can typically be felt by humans. USGS characterizes earthquakes ranging from Mw 2.5 to 5.4 as those that can be felt and cause only minor damage to structures. The permits include requirements for operator response to seismic events in Section M. For seismic events greater than Mw 5.0, the permits require immediate cessation of injection activities paired with inspection and testing of the injection wells for integrity. These requirements apply regardless of whether the earthquake is natural or induced.

There are two tectonic seismic zones identified by the USGS in the midwestern portion of the United States: The New Madrid Seismic Zone and the Wabash Valley Seismic Zone as depicted below.

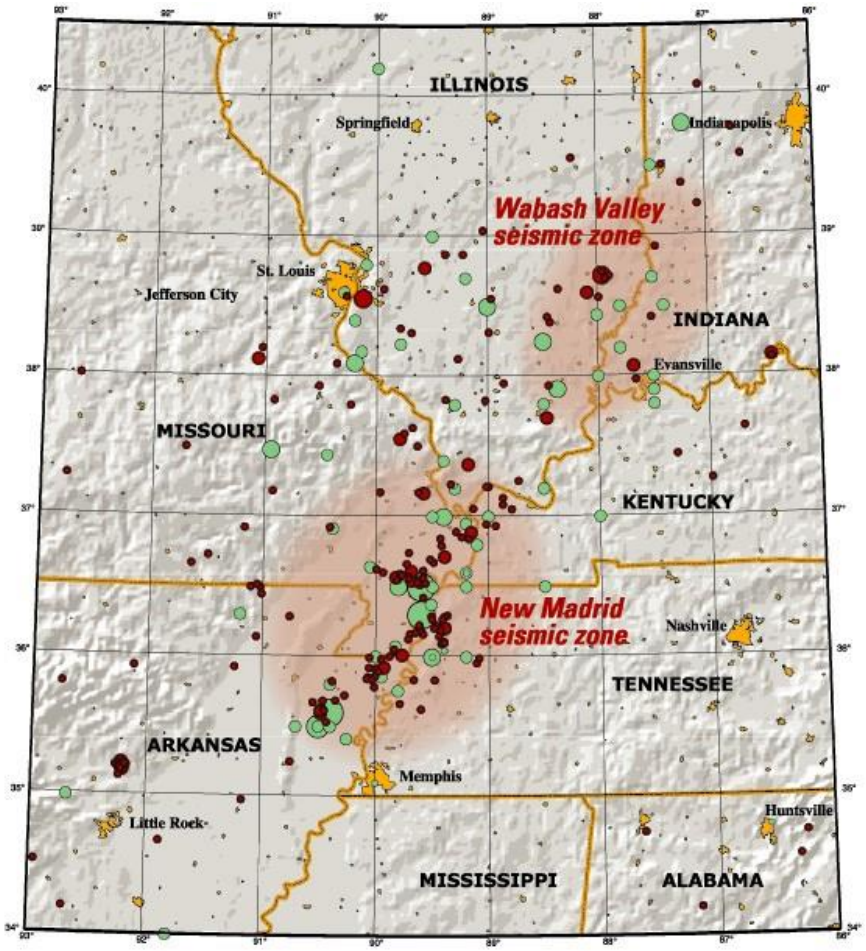
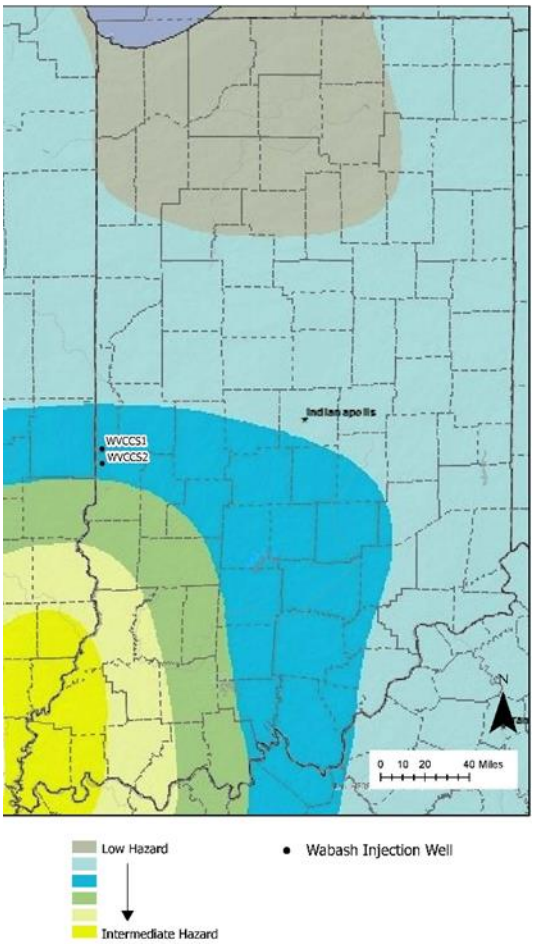


Figure from USGS showing seismic zones, earthquake locations, and magnitude https://pubs.usgs.gov/fs/fs-131-02/fs-131-02.html

The proposed injection well locations and associated AoRs are located north of the Wabash Valley Seismic Zone. The USGS earthquake hazard zone map indicates that the AoRs are located between the low and intermediate risk zones for future seismic activity as depicted below:



Large earthquakes may cause shifting of strata immediately adjacent to a fault that has been disrupted by an earthquake. Even near major faults, such as the San Andreas of California, or in the New Madrid and Wabash Valley Seismic zones, disruption of geologic strata is confined to a zone a few meters from the fault where offset of strata can occur. There are no faults near enough to the injection wells to cause such disruption at the injection sites. Therefore, EPA finds that there is almost no threat of breaching the confining zone rocks due to seismic activity.

The permits include conditions in Section M that outline procedures the applicant is required to complete in the event of a specified seismic event. This includes monitoring, mechanical integrity testing (MIT), well shut-in, well repair, and reporting requirements.

Determination of the occurrence and magnitude of seismic events will be based upon USGS seismic recording stations. The USGS Global Seismographic Network is a permanent digital network of state-of-the-art seismological and geophysical sensors connected by a telecommunications network. This network is designed to detect and measure the strength of earthquakes and other seismic events and is linked to the free notification system operated by the USGS. EPA believes that it is best to design seismic event detection and response around a scientifically designed seismic network that can notify the company and EPA of seismic events in the area of the injection wells.

EPA has determined that the permits meet regulatory requirements for the evaluation and consideration of existing seismicity and no changes to the permits are proposed.

Induced Seismicity

Induced seismicity refers to seismic events that are partially or fully caused by human activity. Scientists have long recognized that human activities, such as construction of dams and water reservoirs, mining, and oil and gas production, can trigger seismic events, including those that are felt by people. Under certain conditions, disposal of fluids through injection wells has the potential to cause induced seismicity. However, in most areas of the country with injection wells, induced seismicity associated with fluid injection is uncommon, as additional conditions necessary to cause seismicity often are not present. Earthquakes caused by injection wells may occur when the following conditions are present: (1) stressed faults; (2) unusual pressure build up due to injection activities; and (3) a pathway for increased pressure to communicate with a fault. None of these conditions are known to be present in the AoRs for the WCS proposed injection wells. Additionally, the permits limit the maximum injection pressure to 90% of the fracture pressure of the rock in the injection zone so that injection activities will not cause artificial fractures.

According to the USGS earthquake database, induced seismic events in Indiana are largely associated with underground mining activities. No induced seismic events due to underground injection could be found in the USGS database.

Therefore, EPA is confident that the proposed injection activities will not cause induced seismic events due to the geology present, the lack of transecting faults and fractures in the AoRs, and the limitation of injection pressure to be less than the fracture pressure of the rock comprising the injection zone.

Comment #4: Numerous comments were received regarding the three-dimensional computational model, its accuracy, and its use and the determination of the AoR, AoR re-evaluation, displacement of pre-existing fluid, and release of methane.

Response #4: To evaluate the behavior of the injected carbon dioxide in the subsurface over time, WCS performed computational modeling using site-specific variables.

The model used was Subsurface Transport of Multiple Phase (STOMP) dynamic subsurface simulation software (Version 3.0). The model provides multidimensional, multiphase modeling of subsurface flow and reactive transport phenomena.

The multiphase flow of water and carbon dioxide was modeled to predict the movement of water, carbon dioxide, and pressure evolution within the reservoir. Carbon dioxide saturation and spatial pressure differentials over time were used to delineate the AoR.

WCS outlined the model domain in the permit application and listed the variables used for the mathematical computations. Site specific geologic data was used for most of the variable inputs to dynamically simulate the behavior and extent (vertical and horizontal) of the carbon dioxide plume and pressure front during the operating period of the injection wells, as well as their

behavior in a 50-year post injection period scenario. The model simulates the growth of the carbon dioxide plume and pressure front over time (they will grow quicker at the beginning of injection, growth will plateau, and will stop growing shortly after injection ceases). As the injectate occupies pore space in the injection zone, it will displace existing fluids (brine water) and vapor phase gasses. The brine will be slowly pushed to other portions of the rock formation. The results of the modeling indicate that at the maximum extent, the carbon dioxide plume and pressure front will be contained within the lowest portion of the Oneota Formation (will not contact the bottom of the confining formation) and will extend laterally in an approximate 2-mile radius from the injection wells. While methane may exist in the subsurface coal mines in the area (see Response #2), displacement of methane from the mines due to injection activities is highly unlikely because the carbon dioxide plume and pressure front will be fully contained within the deeper injection zone rock formations, as will any fluids or gasses displaced by the injection.

EPA reviewed the model. EPA agrees with its inputs, outputs, variables, and assumptions. EPA believes that the model accurately characterizes the projected behavior of the carbon dioxide plume and pressure front. The permits require the collection of operation and monitoring data from the site to validate the model over time and Section G requires that the AoR be re-evaluated every 5 years.

Comment #5: Numerous comments were received regarding the risks and toxicity of carbon dioxide, concerns that carbon dioxide is a hazardous waste, concerns that carbon dioxide is explosive and flammable, and the health and safety of the residents of the area.

Response #5:

Carbon dioxide is a colorless and odorless gas under standard temperature and pressure (i.e., temperature and pressure found at the earth's surface), is heavier than air, and is noncombustible and not flammable. In gaseous form, it is water soluble and can form carbonic acid (mild acid). In low concentrations it is not toxic, but since it is heavier than air it has the ability to displace oxygen and cause asphyxia. 40 C.F.R. § 241.4(h) conditionally excludes carbon dioxide streams as a hazardous waste. Carbon dioxide generators and injection well owners must legally certify that the stream has not been mixed with, or otherwise co-injected with a hazardous waste. Additionally, well owners must certify that the injection is being conducted in accordance with 40 C.F.R. Parts 144 and 146. The permits allow only a carbon dioxide stream to be injected as stated on Page 1 and the stream must be greater than 99.5% carbon dioxide as stated in Attachment A of the permits.

Under the conditions of the proposed injection, carbon dioxide can occur as a gas, liquid, or a supercritical fluid (conditions that cause it to behave as both a gas and a liquid). EPA's thorough review of the application materials, and work to develop appropriate permit conditions including well construction, monitoring equipment, alarms, and automatic shut off systems, are designed to prevent release of carbon dioxide to the atmosphere at the injection well heads. Wells will be constructed of corrosion resistant, compatible materials that completely seal the carbon dioxide flow from geologic formations below the ground surface. This, in combination with frequent testing of injection well integrity, means that an atmospheric release originating below the

ground surface would be highly unlikely. The Emergency and Remedial Response Plan (ERRP) covers equipment failure as a response scenario in Attachment F, page 6 of the permits. Therefore, EPA finds that the proposed carbon dioxide injection is safe and will be protective of human health and the environment.

Comment #6: Several comments were received regarding environmental justice and disproportionate impact to elderly and poor residents.

Response #6: EPA incorporates environmental justice (EJ) in its permitting process. Executive Order 12898 (59 *Federal Register* 7629, February 16, 1994) directs federal agencies, to the greatest extent practicable and permitted by law, to identify and address, as appropriate, disproportionate and adverse human health or environmental impacts on people of color and low-income populations. Executive Order 14096 (88 FR 25251, April 21, 2023) recently supplemented this direction and included, among other things, consideration of "effects (including risks) and hazards related to climate change and cumulative impacts of environmental and other burdens on communities with environmental justice concerns.

EPA evaluated the WCS permit application using a tool known as EJScreen (https://www.epa.gov/ejscreen/what-ejscreen). EJScreen indicated that 27% of the population near the proposed wells may be considered low income and between 20 and 23% of the population is older than 64.

EPA completed a number of steps to enhance the opportunity for public engagement on the draft permits. EPA mailed and emailed fact sheets regarding the draft permits to landowners, elected officials, Indiana regulatory officials, and local and statewide environmental and community organizations. The fact sheet and permits were published on EPA Region 5 website and the documents were reviewed and formatted for compliance with Section 508 of the Rehabilitation Act of 1974, as amended in 1998. This act requires documents to be accessible to people with disabilities. Instead of publishing notification of the public comment period and hearing in the legal notices section, EPA took out a large newspaper ad in the Terre Haute *Tribune Star* on July 7, 2023 to increase viewership and for ease of reading. Regulations require EPA to hold a public hearing on a draft permit when significant public interest exists based on written requests. Rather than wait to receive requests, EPA initiated the August 10 public hearing, and elected to pair it with a public meeting, because of the local demographic information identified above. EPA also issued a press release and extended the public comment period beyond the 30-day minimum required by regulations. The public meeting and hearing were well attended and EPA received more than 1,000 communications during the public comment period, suggesting broad awareness of the opportunity to comment.

Injection will place the carbon dioxide approximately 5,000 feet below the ground surface, with about 2,600 feet of confining rock layers between the base of the lowermost USDW and the depth of injection. Geologic siting, well construction, and permit conditions are designed to ensure that no population or subpopulation will be exposed to the sequestered carbon dioxide.

Comment #7: Many commenters questioned the ERRP being adequate to cover all contingencies including power outages and training of local responders.

Response #7: The ERRP is required by 40 C.F.R. §§ 146.82(a)(19) and 146.94 and is covered in Section Q and Attachment F of the permits. The ERRP outlines the actions and responses that are required in an emergency or if an endangerment of a USDW may occur. The ERRP is not required to cover the training and capability of local responders.

The plan developed by WCS outlines actions that will be taken if there is evidence that the injected carbon dioxide stream and/or associated pressure front may cause an endangerment to an USDW during the construction, operation, or post-injection site care periods.

Contingencies were developed using risk scenarios that range from minor to major occurrences. Actions can include:

- Automatic and manual injection well shutdown;
- Identify and characterize any USDW and public health endangerment;
- Notify EPA Region 5 and the EPA National Response Center; and
- Implement the relevant actions of the ERRP commensurate with the event.

The ERRP outlines responses to the following risk scenarios:

- Injection or monitoring (verification) well(s) integrity failure;
- Injection well monitoring equipment failure (e.g., valve or gauge, etc.);
- A natural disaster (e.g., earthquake, tornado, lightning strike);
- Fluid (e.g., brine) leakage to a USDW; and
- Carbon dioxide leakage to USDW or land surface (including surface water).

As part of the preparation of the ERRP and associated costs, worst-case scenarios were modeled. The ERRP supplements facility health and safety plans required by other local, state, or federal regulatory requirements. EPA finds the ERRP to be adequate to address the contingencies and scenarios required by regulation. Additionally, the permits require that the ERRP be updated every 5 years or more frequently at EPA's discretion.

In the event of an electrical power outage, the permits provide for backup monitoring methods to be employed until such time as power is restored. The permits require that a minimum annulus pressure of 100 pounds per square foot gauge (psig) be maintained at all times, including during power outage events. EPA has evaluated the ERRP and has determined that it meets the regulatory requirements.

Comment #8: Numerous comments were received questioning the method of estimating project costs, inadequacy of the amount of financial assurance, or payment of costs associated with a contamination event after the injection ends.

Response #8: Financial assurance (FA) requirements placed on owners and operators of Class VI

UIC wells are designed to ensure that resources are available to responsibly abandon the injection wells, conduct corrective action if needed, implement emergency responses, and for site restoration and closure. The aim is to ensure protection of USDWs in all eventualities. If the owner/operator is unable to meet their financial obligations under their permits, the FA instruments will provide the funding for EPA to implement necessary actions to ensure protection of USDWs.

The FA requirements are outlined in Section H of the permits. The costs have been estimated, and approved by EPA, for the following aspects of the proposed injection:

- Corrective action (that meets 40 C.F.R. § 146.84);
- Injection well plugging (that meets 40 C.F.R. § 146.92);
- Post injection site care and site closure (that meets 40 C.F.R. § 146.93); and
- Emergency and remedial response (that meets 40 C.F.R. § 146.94).

The total amount of FA that will be provided for these categories is $24,600,000. An additional amount of $10,600,000 is provided for operation and maintenance of wells during the operational and PISC periods. The total FA that will be provided is $35,200,000.

FA has been adequately demonstrated to EPA. WCS has provided both bonds and a trust fund as the approved financial instruments to fund the costs outlined above. In all cases, EPA is named as the beneficiary of the FA accounts and if the owner/operator is not able meet their financial responsibilities, the funds are released to EPA for direct oversight, site closure, and site restoration. Under the applicable regulations, FA is not required to cover any costs associated with potential third-party environmental tort litigation. EPA retains the authority to require Wabash to mitigate any environmental issues after the PISC period ends.

The permits require that the FA cost estimates be updated annually and the monetization of the funding mechanisms as needed to ensure that there is sufficient funding to complete the required tasks.

EPA reviewed the cost estimates (including the Monte Carlo simulation used for emergency and remedial response risk scenarios), the financial instruments to be used, the funding of those instruments over time, and the agreements naming EPA as beneficiary for regulatory compliance. Based on this review, EPA has determined that the FA proposed by WCS meets all regulatory obligations.

Comment #9: Numerous comments were received regarding the adequacy of the testing and monitoring that will be conducted, who will collect samples, how the results will be reported to EPA, and how the results would be interpreted.

Response #9: The permits outline the rigorous testing that is required to properly monitor all aspects of the WCS Class VI UIC injection projects. Testing and monitoring is used to ensure that the injection system is operating within the limits established in the permits. Testing and monitoring are required for the following aspects of the injection:

ACTIVITY	MINIMUM RECORDING FREQUENCY	MINIMUM REPORTING FREQUENCY
CO_2 stream characterization	Continuous	Semi-annually
Flow rate, injection mass, annulus pressure, annulus fluid level, and temperature	Continuous	Semi-annually
Injection Pressure at the wellhead	Continuous	Semi-annually
Injection Pressure at the Injection Zone	Continuous	Semi-annually
Injection Zone Fluid Monitoring	Annually	Annually
Corrosion monitoring	Quarterly	Semi-annually
External MIT	Annually	Annually
Fall-off Test	Every 5 years	Every 5 years
Above Confining Zone Plume Monitoring – Pennsylvanian System	Quarterly for first 2 years of operation; semi-annually thereafter	Annually
Above Confining Zone Plume Monitoring – Silurian System: Lowest USDW	Annually	Annually
Above Confining Zone Plume Monitoring Silurian System: Lowest USDW – Pulse Neutron Logging	Annually	Annually
Area of Review/Corrective Action Plan Assessment and Financial Responsibility Update	NA	Annually

Under the permits, mechanisms are incorporated into the injection system that will automatically shutdown the injection wells should any parameters fall outside the ranges in the permits.

The permits require reporting of testing and monitoring results to EPA on a semi-annual or annual basis. Additionally, the permits require: (1) 24-hour oral and five-day written reports of any noncompliance which may endanger health or the environment, and (2) identification of any other noncompliance in the semi-annual and annual reports referenced earlier in this paragraph.

Under the permits, system monitoring is automatically read and recorded by devices installed in the injection system. Other aspects of the testing and monitoring program require the human collection of discrete, representative samples (ground water sampling for instance). In these cases, WCS or their designated representative will collect the samples. Self-monitoring under permit conditions has been well-established for decades and is a very common practice under most federal and state environmental protection statutes.

EPA's periodic environmental compliance inspections supplement regular self-monitoring data, and permit violations are subject to EPA enforcement action. Inspectors and enforcement staff from the EPA conduct periodic field inspections of wells, investigate non-compliance, and evaluate permit violations. Under federal law, there are civil and criminal penalties for violations.

Based on these factors, EPA finds that the collection of samples, monitoring, testing, and reporting as required in the permits is appropriate.

Comment #10: Numerous comments were received regarding the adequacy of the post injection period, the site closure process, and what happens after site closure is approved by EPA.

Response #10: The Post Injection Site Care (PISC) period is established to monitor the carbon dioxide plume and pressure front for a period of time after injection activities have ceased, the injection wells have been sealed, and the injection site restored. 40 C.F.R. § 146.93(b)(1) states that the PISC period should be for a duration of at least 50 years as a default. 40 C.F.R. § 146.93(c) allows for applicants to propose a PISC period of less than 50 years provided it is supported by data or modeling and demonstrates non-endangerment of USDWs.

The results of the computational modeling demonstrate that the WCS carbon dioxide plume and pressure front will become stable vertically and horizontally 10 years post injection. Therefore, EPA has established an alternate PISC period of 10 years post injection. The permits require collection of shallow ground water samples, lowermost USDW samples, and injection zone pressure readings (collected continuously) during the PISC period. The PISC period may be extended by EPA as provided in permit section P(6)(d).

A total of 10 (Pennsylvanian System) ground water monitoring wells will be sampled throughout the PISC period to detect any intrusion of fluids that could have been caused by injection activities. In the unlikely event that impacts to the ground water are detected, corrective actions must be implemented.

Based on these factors, EPA has determined that the alternate PISC period and the post injection monitoring plan are appropriate and will be protective of USDWs.

Comment #11: Several comments were received regarding the chemistry of the injectate, the purity of the carbon dioxide, and the impurities that will be present.

Response #11: 40 C.F.R. Part 146, Subpart H, defines a carbon dioxide 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. This subpart does not apply to any carbon dioxide stream that meets the definition of a hazardous waste under 40 CFR Part 261. The permits prohibit the injection of hazardous waste. The permits specify that the injection fluid (injectate) stream must be at a minimum 99.5% carbon dioxide as measured continuously by a mass spectrometer or similar instrumentation. The carbon dioxide capture process will limit the percent impurity of the injectate stream. The injection system will have alarms and warnings set if the carbon dioxide purity drops below 99.5%.

Based on these factors, EPA has determined that the carbon dioxide purity specified in the permits is appropriate.

Comment #12: Numerous comments were received expressing concerns that groundwater will become contaminated and that the confining zone will be breached.

Response #12: The EPA UIC program is tasked by Congress in the Safe Drinking Water Act (SDWA) to ensure that any proposed injection put before it is protective of USDWs.

EPA is conservative in its approach to evaluating permit applications in the context of USDW protection, and the very definition of a USDW is conservative in that it includes groundwater that merely has the potential to be used as drinking water. The value that defines a USDW is groundwater that contains less than 10,000 mg/l (parts per million) total dissolved solids. Typical tap water has total dissolved solids of less than 500 mg/l. By using a conservative definition of USDW, EPA expands the volume and extent of groundwater will be protected.

EPA studied and evaluated the permit application over a two-year period and required the applicant to modify or supplement many portions. After reviewing the updated information, EPA has determined that the confining zone present in the AoR is free of known faults or factures and that the proposed injection activities will not endanger USDWs. The following table depicts the rock formations that exist between the injection zone and the lowermost USDW:

Formation Name	Formation Thickness (ft)	Depth MD (ft)	Average Porosity (%)	Estimated Average Permeability (mD)	Shale Thickness (ft)
Maquoketa Group	314	2,386	3	0.0001	314
Trenton Limestone	163	2,700	1.3	0.00000273	3.5
Platteville Group	379	2,863	1.2	0.00000475	16
Dutchtown Limestone	84	3,242	2.8	0.000084	70.5
St. Peter Sandstone	28	3,326	4	0.0039	3.5
Shakopee Dolomite (upper)	346	3,354	2.8	0.022360406	101
Shakopee Dolomite (lower)	270	3,700	9.1	0.098032	71
Total Thickness	**1992**	**-**	**-**	**-**	**592.5**

Comment #13: Numerous comments were received expressing concerns regarding the mechanical integrity of the injection wells, including construction, compatibility, corrosion, potential failure, repair, and testing.

Response #13: The permits require that: 1) the injection well must have and maintain mechanical integrity, 2) mechanical integrity demonstrations must have the opportunity to be witnessed by EPA or its authorized representatives, 3) internal mechanical integrity is demonstrated by the continuous monitoring of injection and annulus pressure, 4) external mechanical integrity testing to detect movement of fluid along the bore hole must be performed annually, 5) after potential loss of mechanical integrity, well injection must immediately cease and WCS must report the incident to EPA, and 6) after any such loss, the operator must repair the well and demonstrate mechanical integrity and report such results to EPA for review before EPA considers authorizing recommencement of well injection.

The permits also require the following:

- Wells must be constructed using materials that are compatible with the injectate to minimize corrosion;
- Wells must be constructed with: 1) a conductor casing, 2) a steel surface casing to seal upper groundwater units from the rest of the well, 3) a steel intermediate casing, and 4) a chrome alloy for the lower portion of the long string casing that houses the injection tubing;
- The annular space between the injection tubing and the long-string casing must be filled with corrosion resisting fluids;
- Injection must only take place through the tubing, with a chrome alloy packer set in the long string casing within or below the nearest cemented and impermeable confining system no more than 100 feet above the injection zone; and
- Injection must be conducted in chrome alloy tubing only.

Constructed in this manner, the wells are completely sealed from all geologic rock layers from the ground surface to the bottom of the confining zone. The only point where the injectate interacts with the rock is in the injection zone, through a perforated interval. Permit section I(1) states: "*Once the construction of the well is completed, and prior to authorization to inject, the permittee must submit the final, as-built construction specifications and diagrams within 30 days for review and approval by the Director. Any deviations from the proposed design and as-built construction of the well must be noted. If the changes in well design are significant, the Director may require this permit to be modified.*" This allows EPA to ensure that the wells are constructed as proposed and will function to protect USDW.

In addition to the mechanical integrity testing (MIT) requirements and the stringent well construction standards, the owner/operator must conduct corrosion testing. This testing must

be conducted quarterly and reported to the EPA on a semi-annual basis. If signs of corrosion are detected, well repair and corrective actions can be required. The permits also require that all wells be abandoned with compatible materials, permanently sealing the holes to prevent them from becoming conduits for fluid movement.

EPA has determined that the corrosion resistant well construction, testing, and monitoring requirements meet regulatory requirements, and the life of the injection wells would otherwise last beyond the proposed 10-year operating period. Therefore, EPA finds that the mechanical integrity of the injection wells is able to be maintained over the proposed duration of injection activities.

Comment #14: Comments were received expressing concern that well stimulation would cause caverns to develop and cause well failure and breach of the confining units.

Response #14: Stimulation of injection wells is a common practice to maintain or increase the injectivity into the injection zone rocks. Stimulation is a precise method to remove or flush drilling fluids from the perforated section of the long string casing and to increase connectivity between the injection wells and the pore space in the injection zone. Stimulation may involve but is not limited to flowing fluids into or out of the well, increasing or connecting pore spaces in the injection formation, or other activities that are intended to allow the injectate to move more readily into the injection formation. It should be noted that any stimulation that may occur will not cause well failure, the development of caverns, or breach the confining units.

Under the permits, all stimulation programs must be approved by EPA prior to initiation. This includes the fluid to be used, the duration of the stimulation activities, the proposed pressure the fluid will be introduced into the injection zone, and a demonstration that the stimulation will not interfere with injection fluid containment. EPA finds these requirements ensure that stimulation activities will not compromise the integrity of the injection wells or the injection and confining formations.

Comment #15: Many comments were received expressing concern regarding potential contamination of surface water used for drinking.

Response #15: The injection interval for the wells is anticipated to be between approximately 4,400 and 5,040 feet bgs and EPA has determined that the injected carbon dioxide will remain within the injection zone. Therefore, contamination of surface water will not occur from the carbon dioxide injected at depth. The ERRP outlines a response for a surface release of injection fluid and the procedures that would be immediately employed. In this unlikely event, actions to be taken include immediate cessation in injection, immediate notification to EPA Region 5 and the National Response Center, spill containment, and spill remediation. If a spill reaches a surface water body, it will be contained and mitigated per the ERRP. EPA finds that surface water bodies, as with USDWs, will not be endangered as a result of the proposed injection activities.

Comment #16: Numerous comments were received expressing concern that the pressure of injection will fracture the rocks in the injection zone, and questioned the data that was used to determine the proper injection pressure.

Response #16: The permits do not allow hydraulic fracturing (also known as fracking) to occur. Limits are established for maximum injection pressure (MIP) to prevent rock fracture. The injection pressure for the wells will be monitored continuously and is included in the alarm system set points for operation as follows:

- Surface: MIP is 1296 psi, warning triggered at 1100 psi, and alarm triggered at 1270 psi;
- Injection interval: MIP is 2537 psi, warning triggered at 2350 psi, and alarm triggered at 2490 psi; and
- System will shutdown if either MIP is exceeded.

The permits require that the MIP be limited to no more than 90% of the fracture pressure of the injection zone rock and the MIP was calculated based upon a fracture gradient of 0.71 psi/foot. The fracture gradient was calculated from 7 step rate tests conducted in the WCS test well. The MIP in the permits is 1296 psig at ground surface and 2537 psig at the depth of injection.

After the well is constructed, the MIP will be recalculated based upon either compressive strength tests from core samples obtained during well drilling or step rate tests conducted at the time of construction, and the actual depth to the top of the injection zone. Once construction is completed, the MIP will be revised and incorporated into the final permits. EPA is confident that the permitted MIP will prevent rock fracture from occurring. Any stimulation event proposed by the operator requires EPA approval and it must be demonstrated that such activities will not compromise the integrity of the injection or confining zones.

Comment #17: Numerous comments were received regarding the protection of habitats, wildlife, and forests.

Response #17: EPA consulted a list of threatened, proposed endangered, and endangered species in Vermillion and Vigo Counties, Indiana using the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation website. In accordance with 40 C.F.R. § 144.4(c) EPA reviewed the threatened, proposed endangered, and endangered species lists for the area around the well sites to determine whether actions authorized by the EPA may affect such species, or adversely affect designated critical habitats.

This information showed that there are currently two species in Vermillion and Vigo Counties that are federally listed as threatened or endangered. These species include:

- Indiana Bat (*Myotis sodalis*), endangered; and
- Northern Long-eared Bat (*Myotis septentrionalis*), threatened.

EPA consulted USFWS fact sheets on each of the above species. Each fact sheet provides information including a species' habitat in different seasons and information regarding preventing or minimizing potential impacts to that species.

The proposed injection well locations are in open farmland, adjacent to county roads, are free of trees, and are not located within critical habitats. During construction of the injection wells the

land that will be disturbed is estimated to be approximately 3 acres (one acre for each proposed well site and an additional acre for access roads). After construction, each well will have a minimal land surface footprint.

Comment #18: Numerous comments were received regarding EPA public notice, public outreach, criteria for responding to comments, scheduling of the public meeting and hearing, the location of the public meeting and hearing, and the length of time allotted for comment during the public hearing.

Response #18: The regulations at 40 C.F.R. § 124.10 "Public Notice of Permit Actions and Public Comment Period" require EPA to public notice a draft permit action and provide at least 30 days for comment. Similarly, 40 C.F.R. § 124.12 requires EPA to notify the public that a hearing has been scheduled at least 30 days before the hearing date. The notice and initial public comment period for the draft permits was 35 days which is in compliance with the regulations at 40 C.F.R. §§ 124.10(b)(2) and 124.12(a)(4). In response to requests, EPA extended the public comment period to August 21, 2023 (with public notice published of the extension), for a total comment period of 45 days.

EPA mailed and emailed fact sheets regarding the draft permits to landowners, elected officials, Indiana regulatory officials, and local and statewide environmental and community organizations. More than 1,000 parties were notified. The fact sheet and permits were published on the EPA Region 5 website and the documents were reviewed and formatted for compliance with Section 508 of the Rehabilitation Act of 1974, as amended in 1998. This act requires documents to be accessible to people with disabilities. Instead of publishing notification of the public comment period and hearing in the legal notices section, EPA took out a large newspaper ad in the Terre Haute *Tribune Star* on July 7, 2023 to increase viewership and for ease of reading. Regulations require EPA to hold a public hearing on a draft permit when significant public interest exists based on written requests. Rather than wait to receive requests, EPA initiated the August 10 public hearing, and elected to pair it with a public meeting. EPA also issued a press release notifying the public of its draft permit action. The public meeting and hearing were well attended and EPA received more than 1,000 communications during the public comment period, suggesting broad awareness of the opportunity to comment.

Since the two proposed injection wells are relatively close to each other, EPA chose a venue that provided the maximum available seating capacity in proximity to both well locations. During the public meeting, EPA gave a brief presentation summarizing the draft permits and conducted a question-and-answer period, which lasted approximately 1.5 hours, with the attendees. The meeting's question-and-answer period was followed by a public hearing where participants were able to provide comments regarding the draft permits and lasted for approximately 1.5 hours. The comments provided during the hearing were recorded and transcribed by a court reporter and they are addressed in this response to comments. Hearing attendees were asked to sign up if they wished to make comment. Speaking time was allocated equally among the commenters. At the beginning of the hearing, EPA informed the attendees that, "If you are concerned that you will not have enough time to make a full statement, you can provide more information in writing

to EPA either tonight or before the public comment period ends and comments may be as long as you like." EPA also collected written comments via email during the entirety of the public comment period. Please see responses to related comments #6 and #19 for information on steps EPA completed to promote transparency and public engagement.

EPA met and exceeded the notice and public comment requirements for the draft permits.

Comment #19: Numerous comments were received expressing concerns regarding how EPA reviews permit applications, issues permits, and the transparency of the process.

Response #19: EPA regulations at 40 C.F.R. Parts 144 and 146 (Subpart H for Class VI wells) set the requirements and standards that a UIC permit applicant must meet to be issued a draft permit. These regulations address the geology, siting, well construction and engineering, well operation, testing and monitoring, definition of the AoR, post injection monitoring, and site closure. EPA reviews permit applications within the context of these regulations and 40 C.F.R. Part 124. EPA requires each proposed Class VI well applicant to perform a comprehensive review which includes siting, well construction, operational, and financial requirements to ensure the protection of all USDWs.

Additionally, all applications and reports must, in accordance with 40 C.F.R. § 144.32(d), include the following certification text: "*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*"

EPA reviews each UIC permit application by evaluating its completeness and technical content against the standards set in federal regulations prior to preparing a draft permit for public comment. National guidance further informs reviews. EPA bases final approval on whether a proposed well meets the technical and safety requirements under these regulations.

For Class VI permits, the following are the general steps in the review process:

- Completeness review;
- Technical review;
- Decision to issue or not to issue a draft permit;
- Public comment period, public meeting, and public hearing; and
- Decision to issue or not to issue a final permit.

The permit application was submitted in May 2021 and EPA conducted an almost two-year, comprehensive technical review prior to issuing the draft permits. EPA issued a request for

additional information to WCS and they responded to the satisfaction of EPA. EPA finds that the permitting requirements for issuing these permits were fully met.

Comment #20: A commenter expressed concern that their copy of a draft permit had significant amounts of redactions.

Response #20: EPA posted the draft permits to its website and there were no redactions made.

Comment #21: Comments that the test well used to collect data for the permit application was not located at proposed well sites and regarding impartiality of the study of local geology and hydrogeology submitted to EPA as part of the permit application.

Response #21: 40 C.F.R. § 146.87(b) allows for the use of data collected from cores obtained from nearby wells, provided that the data is representative of the injection well locations. EPA considers the data collected from the WCS test well to be representative of the proposed well locations due to the uniformity and lateral continuity of the rock layers in this part of the Illinois Basin. Additionally, Section J(1)(b) states that the pre-injection testing must include, "*Whole cores or sidewall cores of the injection zone and confining system and formation fluid samples from the injection zone that meet the requirements of 40 C.F.R. § 146.87(b)*" from each well location. Therefore, site specific data will be obtained from each well location.

Additionally, all data and representations made in the permit application regarding the geological and hydrogeological studies conducted by WCS includes the certification language outlined in 40 C.F.R. § 144.32(d). Please also refer to Response #19.

Comment #22: Concerns were expressed regarding the rights of landowners, pore space rights, land ownership, and State of Indiana laws.

Response #22: Section A of the permits states: "*Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations. Nothing in this permit shall be construed to relieve the permittee of any duties under applicable regulations*."

Comment #23: Concerns were expressed that carbon sequestration is an unproven technology and that the risk posed by the project is too high.

Response #23: Deep well injection has been used as a method of waste disposal in the United States since about 1930, starting with the disposal of brine in the petroleum industry. With the passage of Safe Drinking Water Act in 1974, the UIC program has issued hundreds of thousands of permits. Deep injection wells have a history of safe operation. The technologies for the injection of fluids, well construction, injection system operation monitoring, injection well mechanical integrity testing, and well closure have existed for decades. Although the injection of carbon dioxide is relatively new, the technologies employed are well established, and the science and engineering is proven. EPA considered many factors (siting, geology, well construction, and testing and monitoring) in its review of the permit application and has determined that the proposed injection is safe and that USDWs will not be endangered.

Comment #24: Concerns were raised that EPA will not have resources to provide enough inspectors.

Response #24: Assuring compliance with our nation's environmental laws in one of EPA's primary commitments. EPA inspectors and enforcement staff conduct periodic field inspections of UIC wells, investigate non-compliance, evaluate permit violations, and escalate enforcement as appropriate, for all six classes of UIC wells. Please note that EPA's fiscal year budget is determined by funding received from Congress.

Comment #25: Concerns were raised in the comments regarding impacts to farmland from the construction and operation of the injection wells.

Response #25: As stated in Response #17, the post-construction footprint for each injection well will be limited (similar injection wells have footprints in the range of approximately 1,100 square feet). During construction, the surface disturbance is anticipated to be about 1.5 acres for each well, including access. During operation, farmland will not be disturbed by the injection. The permits require that once the injection period ends, the wells will be abandoned with cement, all surface structures will be removed, and the injection sites will be restored.

Comment #26: Comments were received that a third party should be used to evaluate monitoring data.

Response #26: Most monitoring data from injection well operation is collected automatically by monitors and sensors built into the injection system. Please refer to Response #9. EPA also has the authority to inspect, monitor, and collect samples "*for the purposes of assuring permit compliance*" as stated in Section F(9) of the permits.

Additionally, if a well owner or operator knowingly submits inaccurate, incomplete, or false data such action is punishable under law, as stated in the required certification under 40 C.F.R. § 144.32(d).

Comment #27: Comments were received that the public should provide approval of the final permits.

Response #27: In the Safe Drinking Water Act, Congress authorized EPA to issue or deny federal permits for fluid injection. The Act and regulations in 40 C.F.R. Parts 124, 144, and 146 provide the criteria and standards EPA applies in making a decision on a permit application. The regulations include a process through which local voices are heard. The public hearing held on August 10, 2023, and public release of this Response to Comments are parts of that process. In the permits, EPA makes plain that the act of issuing a federal permit does not infringe on local or state law or regulations.

Comments From the Applicant: The applicant submitted several comments regarding the draft permits in a letter to EPA dated August 11, 2023. EPA provides responses to these comments below. As a general point: many of the applicant's comments compare text in the draft permits and the text of the regulations (40 C.F.R. Parts 144 and 146). It is EPA's stance that permits are stand-alone enforceable documents that need not only directly quote from the applicable regulations. Permits

are not intended to just re-state the applicable regulatory requirements, but to apply them to the matter being permitted. EPA has determined that the terms of the permits are compliant with the requirements outlined in 40 C.F.R. Parts 144 and 146. In crafting permit terms, EPA has omnibus authority in 40 C.F.R. §§ 144.52(a)(9): "*The Director shall impose on a case-by-case basis such additional conditions as are necessary to prevent the migration of fluids into underground sources of drinking water," and in 144.52(b)(1): "In addition to conditions required in all permits the Director shall establish conditions in permits as required on a case-by-case basis, to provide for and assure compliance with all applicable requirements of the SDWA and parts 144, 145, 146 and 124," and in 144.52(b)(3): "New or reissued permits, and to the extent allowed under § 144.39 modified or revoked and reissued permits, shall incorporate each of the applicable requirements referenced in § 144.52."*

Applicant comments and EPA responses use the alphanumeric outline references contained in the Applicant's August 11th letter.

Applicant comment II.a: "The fluid to be injected should not be limited to the injection fluid identified on page one of the Draft Permits".

Response: The applicant cites draft permit sections K(3) and O(5) as wells as 40 C.F.R. § 144.52 in support of this comment. The applicant advocates for the ability to inject fluids other than those stated on Page 1 of the draft permits, stating the "this fluid restriction doesn't exist in the applicable regulations and that 40 C.F.R. § 144.52 "contemplates multiple fluid streams". While section 144.52 may contemplate multiple fluid streams, that section establishes standards and requirements for all classes of injection wells, and therefore by necessity, must use text to accommodate wells that can inject multiple injection fluid streams. Furthermore, the draft permits are for Class VI injection wells. 40 C.F.R. Part 146, Subpart H, is the controlling regulation pertaining to this issue. Section 144.6(f) defines Class VI wells as "*Wells that are not experimental in nature that are used for geologic sequestration of carbon dioxide beneath the lowermost formation containing a USDW*" and defines carbon dioxide 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. This subpart does not apply to any carbon dioxide stream that meets the definition of a hazardous waste under 40 CFR part 261"*. Therefore, by the fact that these are Class VI wells, the regulations limit the injection fluid to carbon dioxide (gas, liquid, supercritical fluid) and no other fluids are allowed to be injected into these wells unless previous authorization form EPA is obtained. EPA's goal is to protect human health and the environment, including USDWs. In attainment of this goal EPA is obligated to limit and regulate the fluids injected into disposal wells to those that the system was intended and designed to inject.

The Applicant further contends, as an example, that it may become necessary to inject nitrogen during initial start-up, for maintenance, and to purge the pipeline and that there could be

"immaterial variability in the carbon dioxide that nonetheless diverges from the definition of injection fluid on the first page of the Draft Permits." Under the definition of carbon dioxide stream cited above, nitrogen injection would not necessarily be prohibited. Furthermore, EPA finds that the permits, in Section K(3), allow for this type of maintenance and that the notification requirement is simple and reasonable and does not present an undue burden on the applicant. Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment II.b: "EPA's approval of as-built drawings required by the Draft Permits' Section I(1) is unnecessary."

Response: The applicant contends that the permit is requiring separate approval of injection as-built drawings, that this is not required in the regulations, and that this requirement may cause "unnecessary" delays to WCS injection operations.

Injection well schematics, drawings and construction procedures must be included in Class VI permit applications for consideration by EPA under 40 C.F.R. §§ 146.82(a)(11) and (12). The regulation at 40 C.F.R. § 146.82(c) outlines the information to be considered prior to granting approval for the operation of a Class VI well. 40 C.F.R. § 146.82(c)(5) requires submittal of the final injection well construction procedures in order to evaluate whether or not the injection wells meet the construction requirements of 40 C.F.R. § 146.86. Furthermore, 40 C.F.R. § 146.82(c)(10) allows EPA to require any other information deemed necessary prior to injection authorization. The information required to be provided to EPA under the draft permits is necessary to demonstrate that the well construction is protective of USDWs and to inform EPA's decision whether to authorize injection into the wells. It is implicit in the regulations, and explicit in the permits, that EPA approval of as-built drawings is necessary to ensure protection of USDWs. Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment II.c: "Injection pressure provisions of the Draft Permits should include an exception for stimulation activities".

Response: Sections K(1) and K(2) and Attachment J of each permit contemplate and allow EPA approval for the cited activity. Thus, EPA has not modified the draft permits based on this comment.

Applicant comment II.d: "Backflow and blowout procedures are not required by federal regulation for Class VI injection wells".

Response: Per authority granted under 40 C.F.R. § 144.52, EPA is not obligated to limit the text in Class VI permits to the precise text in 40 C.F.R. Part 146 Subpart H. EPA is obligated to protect human health and the environment and to ensure non-endangerment to USDWs under SDWA. The annulus pressure requirements of Section K(7) of the permits are reasonable and protective. EPA requirements of annular pressure maintenance, blowout preventer installation, and the

listed procedures are not burdensome, are reasonable, and will be protective of human health and the environment if future unforeseen events include any condition in the injection wells or in the reaction between the injectate and the injection zone formations resulting in pressure increases that would otherwise cause a blowout to occur.

The applicant also states that the two procedures listed in sections K(7)(a) and (b) of the draft permits are requirements applicable to hazardous waste wells and are not applicable to Class VI wells. Section K(7) of the permits establishes that blowout prevention is an important condition of Class VI permits for protection of human health and the environment and ensuring non-endangerment of USDWs. 40 C.F.R. § 146.88(e)(2), for instance, mentions the installation and use (at the discretion of the EPA) of down-hole automatic shut-off and check valves which are similar in concept to the blow-out protection listed in section K(7). Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment III.a: "The Director's approval should not be needed prior to injections beginning".

Response: The Applicant's comment does not include a regulatory citation or a citation to the draft permits. EPA presumes that the intended regulation is 40 C.F.R. §§ 144.51(m)(1) and (2), since its text matches the text of the comment. EPA finds no conflict between the text of the draft permits and the quoted regulation. 40 C.F.R. § 144.51(m)(2)(i) states, "…*the Director has inspected or* ***otherwise reviewed*** *the new injection well and finds it is in* ***compliance with the conditions of the permit.***" Additionally, 40 C.F.R. § 146.82(c) lists the information that EPA must consider prior to granting approval for the operation of Class VI wells. Furthermore, the UIC Program Director has the authority to require this notification and approval per 40 C.F.R. § 144.52.

EPA has determined that the permit conditions outlined in Section R are necessary for regulatory compliance and protection of USDWs, and that confirmation of these aspects by EPA prior to operation of the wells is reasonable and appropriate. Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment III.b: "The Director's approval of the alarm system should not be needed prior to injections beginning".

Response: The applicant comments that draft permit Sections K(6)(a)(ii) and R(7) should be deleted because those conditions are covered elsewhere in the draft permits, though the applicant did not identify the permit sections of the purported duplications. The requirement for demonstration of the functionality outlined in permit Section K(6)(ii) is necessary to ensure for EPA that all required system components are functional prior to issuing authorization to commence injection activities, and to establish the annual testing requirement. EPA considers all the conditions listed in permit Section R to serve as a clear list of conditions necessary in order for EPA to authorize commencement of injection, and for ease of reference to the requirements by the permittee. Furthermore, EPA has the authority to require this notification and approval

per 40 C.F.R. § 144.52. Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment III.c: "The Director's discretion to determine mechanical integrity should follow the mechanical integrity provisions of the federal regulations".

Response: Please see EPA response to applicant comment II.d. EPA has determined that the conditions outlined in the draft permits do follow the provisions of the federal regulations. The applicant states: "*…this permit condition* (establishment that a well has mechanical integrity) *would, in effect, purport to provide the Director with sole discretion over whether WCS may operate. This reservation of discretion would exceed the Director's authority under regulations and, to that extent, be unenforceable and introduce unnecessary uncertainty to WCS's operations"*. The conditions outlined in the draft permits and in applicable regulations clearly establish that the permittee must conduct monitoring and testing related to the injection activities and submit reports summarizing these activities to EPA for review. It is within the authority of EPA to conduct reviews and make determinations of whether the permit conditions and regulatory requirements are being met, including the establishment and maintenance of mechanical integrity. The conditions for the determination of mechanical integrity are established by the regulation at 40 C.F.R. § 146.89(a), and 40 C.F.R. § 146.89(f) states: "*In conducting and evaluating the tests enumerated in this section or others to be allowed by the Director, the owner or operator and the Director shall apply methods and standards generally accepted in the industry. When the owner or operator reports the results of mechanical integrity tests to the Director, he shall include a description of the test(s) and the method(s) used. In making his/her evaluation, the Director shall review monitoring and other test data submitted since the previous evaluation*". This clearly establishes that for approval, the owner/operator must apply test methods allowed by the EPA. EPA has the duty to review the data submitted in the reports applying industry standards as understood by the Agency.

The regulation at 40 C.F.R. § 144.51(q)(1) requires that the owner/operator establish and maintain mechanical integrity. 40 C.F.R. § 144.51(q)(2) states: "*When the **Director determines** that a Class I, II, III or VI well lacks mechanical integrity pursuant to § 146.8 or § 146.89 of this for Class VI of this chapter, he/she shall give written notice of his/her determination to the owner or operator*" (emphasis added). This indicates that EPA is authorized to make this determination, and the scope of the regulations provide that the Director will apply reasonable discretion in making the determination.

Further, 40 C.F.R. § 144.52 establishes permit conditions in addition to those established in 40 C.F.R. § 144.51. 40 C.F.R. § 144.52(a)(8) states: "*A permit for any Class I, II, III or VI well or injection project which lacks mechanical integrity shall include, and for any Class V well may include, a condition prohibiting injection operations until the permittee shows **to the satisfaction of the Director** under § 146.8 or § 146.89 for Class VI, that the well has mechanical integrity*" (emphasis added). This clearly indicates that the determination of whether a well demonstrates

mechanical integrity is at the discretion of EPA.

Lastly, 40 C.F.R. § 146.89(g) states: "*The Director may require additional or alternative tests if the results presented by the owner or operator under paragraphs (a) through (d) of this section* ***are not satisfactory to the Director to demonstrate that there is no movement of fluid into or between USDWs resulting from the injection activity****"* (emphasis added). It is clear that the EPA is authorized to make the final decision of whether or not a well has mechanical integrity. EPA finds that it is within the authority of EPA to make the determination if a well lacks mechanical integrity.

Addressing the aspect of the comment about the "sole discretion over whether WCS may operate," EPA approval is only one of a number of conditions and approvals that an owner/operator must obtain before well operation. And it is true, as discussed above, that EPA is required to find that the protective requirements of SDWA and the regulations have been satisfied before issuing authorizations.

Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment III.d: "Situations requiring the cessation of injections should follow the federal regulations".

Response: The Applicant comments that draft permit sections K(8)(c) and (d) broaden EPA authority beyond the requirements of 40 C.F.R. § 144.52(a)(8) with regard to cessation of injection due to an automatic alarm being triggered or when there is a significant unexpected change in annulus or injection pressure. As stated in EPA response to Applicant comment II.d, above, EPA is not limited in establishing permit conditions to those that are mere re-statements of the regulations. This permit condition establishes that if an alarm is triggered or monitoring observations indicate that conditions warrant action (i.e., endangerment to USDW) then injection should be halted until the cause is determined. EPA finds this requirement reasonable, and to follow directly from regulatory provisions such as 40 C.F.R. § 146.94(b) and in the authority outlined in 40 C.F.R. § 144.52. Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment III.e: "Section L(2)(e) should be revised to incorporate the mechanical integrity testing standards in the federal regulations".

Response: The text in draft permit section L(2)(e) clearly states, "*After any well repair or workover that* ***may compromise*** *the internal mechanical integrity of the well…".* This permit condition is predicated on the requirement in 40 C.F.R. § 146.88(d) that the owner/operator maintain mechanical integrity of the injection well at all times. EPA contemplates that there could be circumstances where well repairs and workovers will compromise the mechanical integrity of the well. In such circumstances, the regulations dictate that the mechanical integrity of the well post-repair must be re-established to EPA's satisfaction. EPA finds this permit

condition does incorporate the mechanical integrity standards in the regulations. Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

The Applicant also reiterated its comment that EPA does not have sole discretion in determining whether a well has mechanical integrity. Please see EPA response to comment III.c above.

Applicant comment III.f: "Requiring the cessation of injections if the Director determines the time to repair continuous monitoring equipment is excessive".

Response: Proper installation and use of continuous monitoring devices are required by 40 C.F.R. § 146.88(e)(1). While the use of other "backup" methods of monitoring (i.e., flow calculations) is allowed on an interim basis, the regulations clearly stipulate that continuous monitoring devices must be used. The text of permit Section I(5) describes the authority of EPA to order injection to cease when the required continuous monitoring device is inoperable, while recognizing that instrument failures occasionally occur and allowing reasonable time for repair or replacement of the defective equipment.

The required continuous monitoring is a component of demonstrating a well's mechanical integrity. 40 C.F.R. § 146.89(b) states: *"To evaluate the **absence of significant leaks** under paragraph (a)(1) of this section, owners or operators must, following an initial annulus pressure test, continuously monitor injection pressure, rate, injected volumes; pressure on the annulus between tubing and long-string casing; and annulus fluid volume as specified in § 146.88(e)"*. The text "absence of significant leaks" would encompass the mechanical integrity of a well. The regulatory text clearly states that the use of continuous monitoring devices is an indicator of well integrity and ensuring operations occur within the permitted conditions is vital to the protection of USDWs. Therefore, no modifications to the draft permits related to this comment have been made by EPA in the final permits.

Applicant comment III.g: "The Director's approval should not be required prior to plugging wells".

Response: The Applicant contends that applicable regulations do not require prior approval for well plugging. As stated in EPA response to applicant comment II.d, EPA is not obligated to limit the requirements in Class VI permits to the precise text in 40 C.F.R. Part 146, Subpart H, as outlined in omnibus authority in 40 C.F.R. § 144.52. The text of draft permit Section P(4)(a) requiring EPA approval of well plugging includes all scenarios under which a well would be abandoned and plugged, and not only for the ending of injection operations. Unforeseen circumstances could arise that would cause an injection well to be plugged (injectivity issues, irreparable damage, etc.). EPA therefore retains the authority to require approval of any activity or circumstance regarding the drilling, construction, operation, and abandonment of injection wells. This authority is essential for adherence to EPA's mission because improperly abandoned wells may serve as a conduit of fluid movement and thereby potentially endanger USDWs. Therefore, no modifications to the draft permits related to this comment have been made by

EPA in the final permits.

Applicant comment IV.a: "The Attachments to the Draft Permits Should only reference "WCS" as the Permittee".

Response: The draft permits will be modified to reference WCS as the permittee in the final permits.

Applicant comment IV.b: "WCS's zip code should be corrected on all Attachment documents".

Response: The draft permits will be modified to show zip code 47885 in the final permits.

Applicant comment IV.c: "Attachment G to the IN-165-6A-0001 Draft Permit is incorrect and should be replaced with Exhibit A to this response".

Response: Applicant submitted a proposed revision (called Exhibit A in the comment documents) of Attachment G (Pre-Injection Testing Plan) that is specific to draft permit IN-165-6A-0001 (WVCCS1). EPA has reviewed Exhibit A and compared it to the original Attachment G of the draft permits. The Applicant proposes to use some of the geologic data from WVCCS1 in place of intermediate core samples and vertical seismic profiles for IN-167-6A-0001 (WVCCS2). The versions of Attachment G in both draft permits are otherwise substantively the same. Because this revision is acceptable, the text of Exhibit A will be incorporated into Attachment G for permit IN-165-6A-0001.

It should be noted that Section J(1)(b) of the permits requires that samples (either sidewall or whole core) are obtained from the confining system and the injection zone for both wells.

Applicant comment IV.d: "Certain references to equipment and monitoring methods should be revised to note that alternative equipment and methods can be used at the discretion of the Director".

Response: This comment by the Applicant is applicable to Attachments C and H. The equipment and methods outlined in these Attachments were taken directly from WCS's permit application. EPA understands that there could be circumstances that specifically identified pieces of equipment and methods (mass spectrometer, Coriolis flow meter and 3D surface seismic survey as identified by the Applicant) could be modified and yield similar results that would not violate conditions of the permits. If the owner/operator determines that an alternative piece of equipment or method is preferred for the long-term, and EPA concurs, then the EPA may approve its use or propose a modification to the permit.

V. Determination

After considering all public comments, EPA has determined that none of the comments submitted have raised issues which alter EPA's basis for determining that it is appropriate to issue two permits to Wabash Carbon Services, LLC to construct and operate injection wells CCS-1 and CCS-2 in Vermillion and Vigo Counties, Indiana. Therefore, EPA is issuing final permits to Wabash Carbon Services, LLC, with the modifications indicated in this response to comments

document.

VI. Appeal

In accordance with 40 C.F.R. §124.19, any person who filed comments on the draft permits or participated in the public hearing may petition EPA's Environmental Appeals Board (EAB) to review any condition of the final permit decision. Such a petition shall include a statement of the reasons supporting review of the decision, including a demonstration that the issue(s) being raised for review were raised during the public comment period (including the public hearing) to the extent required by these regulations. The petition should, when appropriate, show that the permit condition(s) being appealed are based upon either, (1) a finding of fact or conclusion of law which is clearly erroneous, or (2) an exercise of discretion or an important policy consideration which the Environmental Appeals Board should, in its discretion, review. A petition for review of any condition of a UIC permit decision must be filed with the EAB within 30 days after EPA serves notice of the issuance of the final permit decision. 40 C.F.R. § 124.19(a)(3). Additional information regarding petitions for review may be found in the Environmental Appeals Board Practice Manual (August 2013) and A Citizen's Guide to EPA's Environmental Appeals Board, both of which are available at:
https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/

If you wish to request an administrative review, the EAB encourages you to utilize the EAB's electronic filing system accessible on the website: www.epa.gov/eab (Click on "Electronic Filing" Link in the left margin). If you must submit a document in hard copy form through the mail or by hand delivery, please specify the name of the permittee or facility and the permit number or correspondence you sent through the mail and the date it was sent.

All documents that are sent through the U.S. Postal Service, except by USPS Express Mail, must be addressed to the EAB's mailing address, which is: Clerk of the Board, U.S. Environmental Protection Agency, Environmental Appeals Board, 1200 Pennsylvania Avenue, NW, Mail Code 1103M, Washington, DC 20460-0001. Documents that are hand-carried in person, delivered via courier, mailed by Express Mail, or delivered by a non-USPS carrier such as UPS or Federal Express must be delivered to: Clerk of the Board, U.S. Environmental Protection Agency, Environmental Appeals Board, 1201 Constitution Avenue, NW, WJC East Building, Room 3332, Washington, D.C. 20004.

Please contact Marc Fisher of my staff at (312) 886-4240, or via email at fisher.marc@epa.gov if you have any questions about the Wabash Carbon Services Class VI injection well permits.

1/19/2024

X 

Tera L. Fong
Director, Water Division
Signed by: TERA FONG