Response to Comments
U.S. Environmental Protection Agency
Underground Injection Control - Class VI Underground Injection
Permit Nos. R6-TX-135-C6-0001, R6-TX-135-C6-0002, and R6-TX-135-C6-0003
Oxy Low Carbon Ventures, LLC, Brown Pelican Class VI UIC Injection Project – Ector County, TX

I. Introduction

The United States Environmental Protection Agency, Region 6, issues this response to comments in accordance with 40 C.F.R. § 124.17(a). This provision requires that at the time any final EPA permit decision is issued, the Agency shall: (1) specify which provisions, if any, of the draft permit have been changed in the final permit decision, and the reasons for the change; and (2) briefly describe and respond to all significant comments on the draft permit raised during the public comment period, or during any hearing.

II. Background

On September 3, 2024, the EPA released for public comment three (3) draft Underground Injection Control (UIC) Class VI permits (Permit Nos. R6-TX-135-C6-0001, R6-TX-135-C6-0002, and R6-TX-135-C6-0003) for the purpose of injecting carbon dioxide for permanent storage to Oxy Low Carbon Ventures, LLC (OLCV). The public comment period began on September 3, 2024, when the EPA published the draft permits on Regulations.gov and ended on November 6, 2024, including a thirty (30)-day extension that the EPA issued on October 7, 2024.

The EPA held a public hearing on October 3, 2024, in Odessa, Texas. During the public hearing, which included day and evening sessions to accommodate working schedules, participants were able to provide oral comments regarding the draft permits. The EPA had interpreters available to assist individuals with limited English proficiency. The comments provided during the hearing were recorded and transcribed by a court reporter.

Following the close of the comment period, the EPA received an email from Ring Energy, Inc., withdrawing their comment submitted on November 6, 2024, which was originally designated with the docket number EPA-R06-OW-2024-0410-0042. Ring Energy later clarified that they also wished to withdraw oral testimony given during the public hearing on October 3, 2024.

The comments submitted during the public comment period apply to all three (3) draft permits (R6-TX-135-C6-0001, R6-TX-135-C6-0002, and R6-TX-135-C6-0003). The EPA's response to these comments and description of changes as outlined below apply to all three permits.

Throughout the following responses, the EPA references the administrative record, which includes the permit application. In many instances, relevant portions of the permit application were redacted because the applicant claimed information as confidential business information, or "CBI." The EPA reviewed and evaluated the full, unredacted permit application, including portions unavailable to the public.

III. Description of Changes to the Draft Permits

In accordance with 40 C.F.R. § 124.17(a)(1), the EPA hereby specifies which provisions of the draft permits have been changed in the final Permit decision and the reasons for the changes. The changes to the draft permits are explained in Items 1-4 below, and the changes apply to each permit—R6-TX-135-C6-0001, R6-TX-135-C6-0002, and R6-TX-135-C6-0003.

1. Amending permit section M.4, with the addition marked in bold here, to read: "Corrosion Monitoring: The Permittee must perform quarterly corrosion monitoring of the construction materials **in all pipeline, injectors, monitor and water withdrawal wells** for loss of mass, thickness, cracking, pitting, and other signs of corrosion using the procedures described in the Testing and Monitoring Plan and in accordance with 40 CFR 146.90(c). This ensures that the well components meet the minimum standards for material strength and performance set forth in 40 CFR 146.86(b)." In permit Attachment 6, Testing and Monitoring, Table 7, Oxy lists out the locations and materials they would monitor using corrosion coupons from all their wells. The EPA is adding this language for clarity.

2. The EPA revised language in the permit preface describing the EPA's authorization "to construct." As addressed in response #4c, below, the applicant commenced construction of the three proposed Class VI wells during the public comment period after the wells were permitted under state authority as stratigraphic test wells. For the sake of clarity and to avoid confusion, the phrase "to construct" has been struck from the preface language describing the scope of the EPA's permitting action:

   "...Oxy Low Carbon Ventures, LLC hereinafter referred to as the "Permittee," is authorized ~~to construct and~~, upon issuance of authorization to commence injection, to operate the following Class VI well...." (page 3)

   The following sentence has also been revised for the same reasons:

   "*This permit is for the ~~construction and~~ operation of one Class VI injection well.*" (page 4).

   Regardless of the timing of well construction, the injection wells must conform to all well design, material, and construction requirements set forth in the final permit (e.g., Section I and Appendix 4). Those requirements remain unchanged from the draft permit. As explained in response 4c, the permittee must submit as-built construction information and pre-operational testing data for EPA review and approval before the EPA will authorize injection.

3. In response to comments regarding conversion of the wells from Class VI to another well class or type of non-UIC well, the EPA removed permit condition B.5 from the final permit. The Criteria and Standards for UIC Class VI rules at 40 CFR 146 Subpart H do not specifically address conversion of Class VI wells; however, 40 CFR 144.51(n), a condition applicable to all permits, provides, "The permittee shall notify

the Director at such times as the permit requires before conversion or abandonment of the well...."

In addition, other permit provisions address any potential conversion. Permit Condition section A provides, "Notwithstanding any other provisions of this Permit, the Permittee authorized by this Permit must not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of injection, annulus, or formation fluids into underground sources of drinking water (USDWs) or any unauthorized geologic zones." Section F.1, O.3, and O.5 place additional restrictions on well conversion.

A number of technical and risk-related factors present unique challenges in converting wells from Class VI, including: large injectate volumes, high pressures, injectate composition, and plume interactions, among other things.

4. The EPA is deleting the following paragraph from page 4 of the permit:

~~*Executive Order 12898, 59 Fed. Reg. 7629 (Feb. 11, 1994), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to identify and address as appropriate, to the greatest extent practical and permitted by law, disproportionate and adverse environmental and human health impacts on people of color and low-income populations. Executive Order 14096, 88 Fed. Reg. 25251 (Apr. 21, 2023), Revitalizing Our Nation's Commitment to Environmental Justice for All, supplemented this direction. EPA considered these executive orders and EPA's Environmental Justice Guidance for UIC Class VI Permitting and Primacy (August 17, 2023) as part of the review for this Permit.*~~

The EPA is deleting this paragraph in accordance with Executive Orders "Initial Rescissions of Harmful Executive Orders and Actions" (January 20, 2025) and "Ending Illegal Discrimination and Restoring Merit-Based Opportunity" (January 21, 2025), which rescind the above referenced orders.

IV. 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 a UIC permit application to be approved. These regulations define the scope of the EPA's regulatory authority and the permit application review process, including standards for geologic siting, well engineering, operation, injection system monitoring, well plugging and abandonment, post-injection 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.

The EPA received many comments not regarding these proposed actions—the issuance of Class VI UIC permits—or that addressed matters otherwise outside the scope of the UIC Program's

purpose and mandate, which is to protect underground sources of drinking water (USDWs). The EPA is not obligated to respond to such "out-of-scope" comments which do not relate to the UIC permitting process, or to any UIC 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, the EPA was expansive in determining the comments for which a response is provided.

As indicated above, the 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 of the UIC program with respect to this permitting action:

1. Concerns about the carbon dioxide pipeline transport, citing examples of leakage and well blowouts;
2. General opposition to geologic sequestration and the UIC Program;
3. Opposition to issuing carbon credits or publicly-funded incentives;
4. General concerns about climate change, geologic sequestration as a climate mitigation tool, or other climate mitigation tools;
5. Comments about Class II projects or wells;
6. Comments about the effects of the project on existing oil and gas operations;
7. Concerns that approving the permits will set precedent for future Class VI projects;
8. Concerns about other Class VI projects; and
9. Comments generally voicing support or opposition to the Project without identifying UIC-related reasons.

V. In Scope Comments

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

1. Site Geology

Comment 1a: A commenter expressed concern that the permeable nature of the subsurface rock formations or porosity changes due to interactions between the injected CO_2 and water can allow buoyant CO_2 to leak.

EPA Response to Comment 1a: The EPA acknowledges concerns about the potential for CO_2 to leak. The EPA evaluated the siting (location) of the proposed injection wells and the surrounding geology in accordance with 40 C.F.R. Part 146, Subpart H and the siting criteria of 40 C.F.R. 146.83(a)(1) and (2), which require:

- Injection zone(s) that are of sufficient areal extent, thickness, porosity, and permeability to receive the total anticipated volume of the carbon dioxide stream; and
- Geologic confining zone(s) that are free of transmissive faults or fractures and are 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 EPA considered the regulatory requirements for the geology and siting of Class VI UIC wells and whether the proposed injection well sites as described in the permit applications meet those requirements. Upon review of the permit applications, the EPA found that all regulatory requirements have been met and the proposed injection site is suited for carbon dioxide sequestration and protective of USDWs.

The injection zone for the OLCV project is the Lower San Andres Formation, which lies about 4,400 feet below ground. The Lower San Andres is a high-porosity, high-permeability dolomite. The three sub-zones that comprise the proposed injection zone have average porosities between 9.4% and 11.2% and average permeabilities of 1.2 millidarcies (mD) to 18.8 mD. This is based on correlations of 359 well logs. This data was used to create a site-specific model that predicted long-term injection behavior. The output of this model demonstrated the suitability of these porosities and permeability ranges.

The primary confining zone for the project is the combined Upper San Andres and Grayburg Formations, occurring at a depth of approximately 3,900 to 4,500 ft. Based on neutron logs and core data included in the full application, the Grayburg Formation, with an average thickness of 237 feet, has an average porosity of 4.1% and an average permeability of less than 0.1 mD. This low permeability will prevent the injected CO_2 or any native formation fluids from migrating upward and endangering USDWs. The Grayburg Formation is underlain by the Upper San Andres Formation, which is 355 feet thick on average. In addition, the confining zones are overlain by over 2,500 feet of laterally continuous evaporites, shale, and tight silts, providing

additional vertical separation of over 3,100 feet between the lowermost USDW and the top of the confining zone.

The Upper Glorieta Formation is proposed as a lower confining zone. It is present below the injection zone and has a porosity of less than 1% and a permeability of less than 0.1 mD. This formation is 341 feet thick on average, based on well log data. Like the primary upper confining zone, this extensive layer of low permeability rock will prevent fluid migration.

The lithological, petrophysical, geomechanical, and geochemical properties of the upper and lower confining zones, along with an absence of faults or fractures (see the EPA's responses to "Seismicity" comments below), indicate that these formations will provide a stable and suitable trap to prevent the carbon dioxide from moving upward, thereby protecting USDWs from endangerment, as required under 40 C.F.R. 146.83.

OLCV has drilled its injection, monitoring, and water withdrawal wells under the authority of the state of Texas (see the EPA response to Comment 4c below) and has conducted the pre-operational testing and logging required by 40 CFR 146.87 and Section J.1 of the permits. Prior to the EPA authorizing injection, OLCV must submit the results of this required pre-operational testing and logging to the EPA for review, and results must confirm that the Grayburg Formation has sufficient mineralogy, lithology, and geomechanical properties to confine the total volume of injected CO_2. Also, as described under "Monitoring and Reporting" below, OLCV must routinely perform extensive testing throughout the injection and post-injection phases to confirm that the CO_2 plume and pressure front are moving as anticipated and that there is no escape of the CO_2 above the confining layer.

The EPA also recognizes that interactions between the CO_2 and formation fluids can cause porosity changes. For this reason, applicants must provide information on the compatibility of the fluids with the CO_2 injectate. During required pre-operational testing, OLCV gathered fluid samples from the Lower San Andres injection zone and performed geochemical studies to identify any potential geochemical reactions that could affect injection operations. The fluid analyses and results of geochemical studies must also be submitted to the EPA for review prior to authorizing injection.

If this pre-operational testing does not confirm the geologic information in the permit application or the modeling assumptions on which it is based, the UIC Program Director will not authorize injection.

Additionally, per Part K.10.h of the permits, if the UIC Program Director determines the site is no longer suitable for injection based on new information about the site geology during the well's operational phase, injection must cease immediately.

2. Seismicity

Comment 2a: Commenters expressed concern about the potential for induced seismicity, alluding to past injection-induced events in the Permian Basin. One commenter asserted that there is a shallow fault in the area.

EPA Response to Comment 2a: The EPA's technical review of the permit applications included an assessment of faults and fractures, existing (historic) seismicity in the area, and the probability of induced seismicity (earthquakes) due to injection activities as required by 40 C.F.R. 146.82(a)(3)(v).

Recorded earthquakes serve as a general indicator of seismic activity and the potential existence of a stressed fault. A record of past earthquakes provides evidence of the presence of stressed faults in the area, a criterion the EPA considers when evaluating the potential for seismic activity and induced seismicity for every Class VI permit.

The EPA reviewed information on earthquakes in the area surrounding the project. The OLCV injection site is situated in an area of low historical seismic activity based on seismic data cataloged by the U.S. Geological Survey and the TexNet Seismic Observatory (see Sections 2.2.4 and 2.2.5 of the permit application AoR Narrative (v3), and also AoR Narrative Appendix D). The area of review (AoR) is not located within any of the Texas Railroad Commission's designated seismic response areas.

The EPA also reviewed information to determine if any faults are present in the project area. There are no faults within the injection or confining zones; this is based on 2-dimensional and 3-dimensional Texas Bureau of Economic Geology (BEG) seismic data from across West Texas and 2D seismic lines licensed by OLCV (AoR Narrative (v3) Section 2.2.4; AoR Narrative Appendix D). This data shows that all faults around the project are within rock layers that are deeper (Early Permian-aged and before) than the injection zone and the lower confining zone, and that the Mid- to Late-Permian-aged upper and lower confining zones and injection zone are un-faulted. The EPA disagrees with the commenter that there is a shallow fault in the project area; none of the surveys described in the application identified one and the commenter provided no evidence of this fault or its location.

While the potential for induced seismic activity near the injection wells is low, several aspects of the project will mitigate the potential effects of any induced seismic activity:

- The injection wells will be constructed to withstand significant stresses, with multiple strings of casing that are cemented in place (per Part I of the permits). The permittee must continuously monitor the wells during injection operations to identify any potential mechanical integrity concerns. In addition, the wells are designed to automatically cease operation in the event the integrity of the well is compromised, including by a seismic event.
- The Testing and Monitoring Plan and Part M.11.a of the permits require OLCV to monitor seismicity around the project. OLCV will deploy a seismometer network to determine the locations, magnitudes, and focal mechanisms of any natural or injection-induced seismic events in case they occur. This information will be used to monitor for induced seismicity and allow adjustment of well operations as needed. Furthermore, per Part L of the permits, the Permittee must mechanically test the injection wells to demonstrate external mechanical integrity before operations begin and annually throughout injection operations.

- Any detected seismic activity in a 5.6-mile radius per the permitting requirements for the State of Texas would trigger the Emergency and Remedial Response Plan (Attachment 9) and could result in cessation of injection operations depending on the magnitude, location, and frequency of seismic events.
- A seismic event greater than ML 3.5, or seismic monitoring data indicating reactivation of a fault or structures due to pressurization of the reservoir, will trigger a new evaluation of the AoR to account for, anticipate, and mitigate the consequences of CO2 injection.

3. Area of Review (AoR) and Corrective Action

Comment 3a: Commenters expressed concerns about the quality of abandoned wells in the AoR, citing concerns for corrosion of cement upon exposure to CO_2 or CO_2-water mixtures. Commenters requested that each well in the AoR that was plugged with Portland cement be excavated and re-plugged. They also expressed concern that limited information is available on wells in the AoR and their condition/plugging that demonstrate the wells were properly plugged. Commenters requested evidence that OLCV will properly plug the wells to prevent channeling and microannuli in the cement.

EPA Response to Comment 3a: The EPA acknowledges that abandoned wells can pose a significant threat for movement of CO_2 or other fluids that can contaminate USDWs. For this reason, the Class VI Rule requires applicants to perform a thorough search to identify wells in a project's AoR and perform corrective action on any deficient wells. During the permit application review, the EPA reviewed proposed corrective action information submitted in the application (including wellbore diagrams and information on the wells' condition).

As discussed in permit Attachment 2 Section 5.0 and in the Class VI application (AoR Narrative v3, Section 5.0; AoR Appendix B, Sections 2.0-3.0), OLCV conducted extensive well records searches of publicly available databases and in-person records, where applicable, maintained by the Texas Railroad Commission, the Texas Commission on Environmental Quality, the Texas Department of Licensing and Regulation, the Texas Water Development Board, and the Texas Bureau of Economic Geology. OLCV then compared these results with records obtained from private third-party well records databases to which it maintains licenses.

Additionally, OLCV conducted an airborne magnetic survey in May 2023 to identify and/or confirm the location of existing abandoned wells within the AoR. Anomalies observed during the magnetic survey as well as any discrepancies in database information were cross-referenced with aerial photos, drone photographic surveys, and physical site observations when needed to confirm the presence or absence of abandoned wells. These media were included in the publicly redacted AoR Appendix B, which the EPA reviewed in full. The results of the magnetic survey corroborated that the artificial penetrations (APs) in the AoR were all located near the locations recorded in public sources. There were no additional APs identified by the magnetic survey that were not recorded in a database search.

The EPA reviewed the entirety of the well records search and site survey information provided and concluded that OLCV had conducted an exhaustive search for abandoned wells within the AoR.

Based on OLCV's abandoned well searches, four wells were identified within the AoR – three previously plugged dry and abandoned wells associated with oil and gas activity, and one USDW brine production well (see Permit Attachment 2, Section 5.0). Records provided for the brine production well indicated it was not deep enough to penetrate the proposed injection or confining zones; however, OLCV plugged the well in September 2023 regardless. The three plugged oil and gas wells all penetrate the proposed injection and confining zones. Upon evaluation, OLCV determined that all three wells require re-entry and re-plugging. Per Part G.2 of the permits, OLCV must properly plug and abandon all three wells and provide evidence of proper plugging for each before the EPA will authorize injection.

The EPA reviewed OLCV's proposed plans for plugging and abandoning the wells submitted in AoR Narrative (v3) Section 5.2.4 of the permit application and determined them to be acceptable. The EPA acknowledges commenters' concerns that certain types of cement, including neat Portland cement (i.e., with no additives), may not be resistant to CO_2 or CO_2-water mixtures. As proposed in the permit application, the permittee must plug the wells using CO_2-resistant cement.

Following plugging of the three wells, OLCV must submit final reports documenting the process and materials used for corrective action on each well (per Part G.3.b of the permits). Based on email communications with the EPA, OLCV indicated that, as of February 27, 2025, all three wells have been re-entered and re-plugged as detailed in the permit application's corrective action plans. OLCV will submit final corrective action plugging reports to the EPA for review along with data from required injection well pre-operational testing once all data is available. OLCV will not be authorized to commence injection until the EPA has reviewed and approved this information. If the EPA finds any issues with how the wells were plugged in the review, the EPA will not authorize injection until the concerns are addressed by OLCV.

The EPA acknowledges that only limited information was available about wells in the AoR that was not CBI. The Agency treated OLCV's claims of confidentiality consistent with the requirements of 40 CFR § 144.5 and 40 CFR Part 2, and the information that was ultimately claimed as confidential is not part of the public docket. However, as indicated in Section II above, EPA specialists reviewed the detailed plans for plugging the wells, including the procedures and testing OLCV will perform, and determined them to be effective and consistent with best practices for CO_2 injection projects and that they will provide sufficient isolation and prevent movement of CO_2 or formation fluids that could endanger USDWs.

Comment 3b: Commenters asserted that the AoR delineation modeling could be wrong, and there are other abandoned wells that could be affected by injection operations. These commenters recommended adding a buffer around the AoR or requiring OLCV to plug all wells within five miles of the AoR. Commenters also requested that the AoR be evaluated more frequently (annually) to address discrepancies in the modeled AoR.

EPA Response to Comment 3b: As defined at 40 C.F.R. 146.84(a) the AoR is the region surrounding the geologic sequestration project where USDWs may be endangered by the injection activity. The AoR is delineated using computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide stream and is based on site characterization, monitoring, and operational data.

In accordance with 40 C.F.R. 146.84(c)(1), OLCV delineated the AoR using a computational model that predicts the movement of the carbon dioxide plume and critical pressure front based on available information about planned injection operations and the characteristics of the subsurface rock formations. OLCV's simulation model encompasses the whole project site, delineating the AoR as well as a larger Area of Interest and the surface land where the project is located with a one-mile buffer around it. The combined AoR for the three injection wells is an area of approximately 5.4 square miles and considers inputs from the larger modeled area.

OLCV also investigated APs that were nearby but not within the AoR (within 2 miles). They applied the same methodologies as when they searched for wells within the AoR, searching databases and matching information to their magnetic survey results and aerial photographs. Database records showed nine additional wells in the area. Their magnetic survey corroborated the location of seven, but they found no magnetic nor visual evidence of two. There were no additional APs identified by the magnetic survey that were not recorded in a database search.

The AoR is based on modeling that reflects site-specific data to predict the extent of the CO_2 plume and pressure front, which are the areas within which any deficient wells could be affected by the proposed operation. Given the complexity of AoR delineation for Class VI projects, which is more detailed than what is required for other injection well classes, the EPA disagrees that a buffer around the AoR is necessary to ensure USDW non-endangerment or that evaluating wells outside of the delineated AoR is needed. The EPA clarifies that the scope of the UIC permits is limited to wells within the identified AoR of the three Class VI injection wells.

Additionally, pursuant to Part G.4 of the permits, OLCV must reevaluate the AoR every five years at a minimum over the life of the project by incorporating operational and monitoring data into the delineation model in order to verify that the plume and pressure front are behaving as predicted. Part of the AoR reevaluation process includes a new survey of wells identifying the names and locations of all wells within the AoR (existing or modified), which is a vehicle to identify and address concerns about additional abandoned wells being affected by the project. Injection operations cannot continue if the UIC Program Director does not approve the revised AoR and, if necessary, Corrective Action Plan.

The EPA disagrees that annual AoR reevaluations are necessary. The EPA believes based on the modeling approach described that the applicant has sufficiently predicted the extent of the plume and pressure front, and that reevaluations every five years are consistent with the Class VI Rule requirements and appropriate.

The EPA clarifies that the applicant must submit testing and monitoring and operational data every six months, which will be reviewed by the region. Should any unforeseen situations arise

(e.g., any monitoring that indicates that the CO_2 plume and pressure front are behaving differently than predicted or an emergency event occurs), this may trigger an out-of-cycle AoR reevaluation based on consultation with the UIC Program Director as described in the AoR and Corrective Action Plan (permit Attachment 2). OLCV would be required to update the AoR modeling and, if the resultant AoR were larger than initially predicted, they would be required to identify whether any additional wells may necessitate corrective action and perform any needed corrective action.

4. Well Construction

Comment 4a: Many commenters expressed concerns about the potential for CO_2 or CO_2-water mixtures and their reaction products (i.e., carbonic acid) to corrode well materials. They cited examples of well corrosion of Class VI wells (e.g., at the Archer Daniels Midland project in Illinois) and in Class II wells. Commenters requested the use of non-Portland cement and super 25 chrome for the OLCV injection wells.

EPA Response to Comment 4a: The compatibility between well materials and CO_2 and the products of CO_2-water mixtures is a critical element of maintaining the integrity of injection wells and preventing fluid movement that can endanger USDWs. For this reason, Class VI injection and monitoring wells must be designed and built to withstand the environment to which they will be exposed over the lifespan of the project.

For all portions of the three injection wells that may be in contact with CO_2 and/or formation fluids, the permits require the use of corrosion resistant, CO_2-compatible materials (see Permit Section I and Attachment 4). Such materials will contain the carbon dioxide in the injection zone and prevent upward fluid migration as required by 40 CFR 146.86. This, in combination with frequent testing of injection well integrity, will make a release of CO_2 highly unlikely.

The EPA acknowledges that there have been concerns with corrosion at other Class VI injection operations, though this has been limited to wells that were constructed with chromium-13. For this reason, the EPA discourages the use of chromium-13 in the portions of the wells that may be exposed to CO_2 and/or water, particularly in the absence of significant project- and site-specific data and studies (e.g., modeling or laboratory studies) that demonstrate the compatibility of well materials with the CO_2 stream and formation fluids.

Factors impacting the corrosivity of an environment containing CO_2 are complex and may include, but are not limited to, pressure, temperature, and impurities (Cl^-, O_2, SO_2, NO_x, H_2S, etc.) that are frequently present in sequestration injectate and/or formation fluids. Selection of appropriate well construction materials is, therefore, project- and site-specific and depends, among other things, on the composition of formation fluids and the CO_2 stream.

Due to the acidic conditions generated by the mixing of CO_2 and water, alloys that may come into contact with water should be able to withstand pH values below 2.5. Some materials commonly used in less corrosive environments, such as neat Portland cement (i.e., with no additives) and chromium-13, may not be appropriate for the corrosive conditions that occur

where both water and CO_2 are present, either from aqueous formation fluids mixing with CO_2 or from water present in the CO_2 stream itself. For these reasons, the EPA requires that applicants must either choose appropriate CO_2-resistant materials (e.g., chromium-25 casing, CO_2-resistant cements/additives) or provide significant evidence to demonstrate why such materials, including lower chromium alloys (e.g., chromium-13), are sufficient based on project- and site-specific conditions.

Attachment 4 of the permits specifies the casing materials for each of the injection wells. These materials, which have been selected to mitigate and inhibit corrosion, include K-55 steel (for the surface casing), J-55 steel (for the intermediate casing), L80 and SN25CRW-125 steel (for the long string casings), L80 TK-805 coated tubing, and nickel-plated HNBR packers. The suitability of the materials is based on published performance data from materials suppliers. The EPA reviewed OLCV's proposed well construction plans and supporting materials and did not identify any concerns associated with the use of these materials in CO_2 or CO_2-water environments. This includes OLCV's proposed use of SN25CRW-125 (a chromium-25 alloy) only in portions of the injection wells that will be exposed to the CO_2 stream and/or formation fluids.

OLCV's Testing and Monitoring Plan (Attachment 6) describes the construction of the monitoring wells that penetrate the confining zone and will be exposed to CO_2 – they will be constructed with K-55, J-55, and L80 steel casings.

To cement the injection wells, OLCV proposed using a proprietary CO_2-resistant blend of Portland cement that contains additives to improve the chemical and mechanical resistance of the cement to the effects of exposure to carbonic acid. The EPA's Underground Injection Control (UIC) Program Class VI Well Construction Guidance published in May 2012, includes details and references as to how additives can increase corrosion resistance of cement in the presence of CO2. OLCV submitted the specifications for the proposed CO_2-resistant cement as part of permit application Appendix B of the Well Construction Narrative (submitted as confidential/proprietary business information). These specifications included a listing of all additives and their relative percent concentrations for the cement used in all areas that may potentially be exposed to the CO_2 stream and/or formation fluids. The EPA reviewed these specifications and supporting materials and determined that the proposed blend satisfies the regulatory requirements at 40 CFR 146.86(b) and will provide adequate protection against potential corrosion.

Oxy proposed constructing monitoring wells with Class C cement, and the EPA will confirm prior to authorization for injection.

Before the EPA will authorize injection, the permittee must perform pre-operational mechanical integrity testing. The EPA will review all final well construction reports and the MIT results from each well to confirm that the wells were properly constructed before authorizing injection.

In summary, the permit sets forth conditions that ensure that the injection wells are constructed of corrosion resistant, CO_2-compatible materials in all areas of the well potentially

exposed to the CO_2 stream and/or formation fluids, and these materials contain the CO_2 in the injection zone and prevent upward fluid migration. Additionally, required annual testing of injection well integrity, quarterly corrosion coupon monitoring, and other testing and monitoring (as described in Item 5 below), will allow for early detection of potential issues in the unlikely event of corrosion or other well issues that may result in the release of CO_2 from the injection zone.

Comment 4b: Commenters also expressed concerns about allowing OLCV to convert the Class VI wells to other types. They assert that Class VI wells need to remain as Class VI wells in perpetuity to maintain stringent operational and monitoring requirements that ensure the safe, permanent sequestration of CO_2.

EPA Response to Comment 4b: As explained in Section III, above, the EPA deleted permit condition B.5 from the final permit.

Comment 4c: A commenter expressed concerns that the permittee has already drilled the wells, and that the EPA is not considering commenter's concerns.

EPA Response to Comment 4c: As described in Table 16 of Attachment 2 of the permits, the Shoe Bar 1 (SLR1) and Shoe Bar 1AZ (ACZ1) wells were drilled in 2023 and were authorized under state permits as stratigraphic test wells. These wells were drilled to allow OLCV to collect site-specific geologic data to confirm suitability of the site and refine the AoR delineation modeling. These wells will be converted to above-confining zone monitoring wells. The USDW monitoring well (USDW1) and the four water supply wells (WW1, WW2, WW3, and WW4) were all drilled and completed in 2024, and SLR2, which is one of two proposed in-zone monitoring wells, was drilled late 2024 to early 2025 and is anticipated to be completed in late March or early April 2025. All monitoring and water withdrawal wells were authorized under state permits.

All three injection wells (BRP CCS1, BRP CCS2, and BRP CCS3) were drilled as experimental wells similar to the original stratigraphic test wells (Shoe Bar 1/SLR1 and Shoe Bar 1AZ/ACZ1). Drilling was from October to December 2024, with BRP CCS3 completed in January 2025, BRP CCS1 completed in February 2025, and BRP CCS2 estimated to be completed in March 2025. All wells have been drilled under the authority of the Texas RRC, and the authorizing state permits are included in the administrative record.

As noted above, a commenter expressed concerns that because the permittee had already drilled the wells, the EPA would not consider commenters' concerns and that the EPA's public participation opportunities were "a moot point." The EPA disagrees that the agency would not consider commenters' concerns and that public participation was a "moot point." The EPA considered all comments before making its final permit decision (and is responding to all significant comments here). This includes all comments received regarding well construction, including regarding construction materials and corrosion concerns as discussed above. If comments, or any other information in the administrative record, indicated that changes to the construction-related conditions of the draft permits were appropriate, the EPA still could, and

would, have made changes accordingly. The EPA carefully reviewed the construction plans and designs (permit Attachment 4) and determined that they meet all regulatory requirements under 40 CFR 146.86. Oxy's construction of the permits under state authority does not necessitate any changes to the permit's construction requirements. Based on the EPA's evaluation of the submitted materials in light of all relevant requirements, the EPA determines the injection wells are technically sound.

Additionally, as with any other Class VI project, the EPA will review as-built construction information for all wells prior to authorizing injection to confirm wells 1) were constructed to the specifications required by the Permit (Section I. and Attachment 4), 2) will prevent CO_2 movement out of the injection zone, and 3) will ensure non-endangerment of USDWs. See 40 CFR 146.82(c)(5), (7), and (8). Injection into any well will not be authorized until the permittee has performed required pre-operational testing and demonstrated that the information collected supports and confirms suitability of the site. If this cannot be demonstrated, the permittee would be required to plug the wells.

As noted in 40 CFR 146.81(c) and the Underground Injection Control (UIC) Program Class VI Well Construction Guidance published in May 2012, owners or operators seeking to permit existing wells as Class VI wells must demonstrate to the Director that the wells were engineered and constructed to meet the requirements at 40 CFR 146.86(a) and ensure protection of USDWs, in lieu of requirements at 40 CFR 146.86(b) and 40 CFR 146.87(a). Unlike for conversions from pre-existing Class I, II, or V well to a Class VI well, OLCV specifically designed and constructed these injection wells to Class VI standards. As such, these wells do not raise the same potential concerns that may exist with converted wells not originally constructed to Class VI standards, some of which could be much older. The EPA reviewed the proposed OLCV injection wells' construction against all the regulatory requirements for construction, including 40 CFR 146.86(b) and 40 CFR 146.87(a).

5. Monitoring and Reporting

Comment 5a: A commenter requests additional monitoring wells to provide landowners warning of CO_2 leakage to drinking water aquifers, including additional monitoring wells to the southwest and southeast of monitoring well SLR2.

EPA Response to Comment 5a: The EPA agrees with commenters about the importance of a robust monitoring program. The permits (Section M) and the Testing and Monitoring Plan (Attachment 6 to the permits) describe the rigorous testing and monitoring that OLCV is required to perform pursuant to 40 C.F.R. 146.90. The permits and plan contain monitoring requirements for all aspects of the Class VI UIC injection project, including injection and monitoring well mechanical integrity testing, direct and indirect CO_2 plume and pressure front tracking, seismic monitoring, soil gas monitoring, corrosion monitoring, and water quality monitoring above the confining zone. This testing and monitoring is required to ensure that the injection system is operating within the limits in the permits and to demonstrate that USDWs are not being endangered.

It is important to avoid an excessive number of wells that penetrate the confining zone and are unplugged, as these have the potential to create additional pathways for fluid movement. Additionally, the monitoring wells are only one component of an integrated plume and pressure front monitoring plan that also includes annual pulse neutron logging; 2D vertical seismic profiling (VSP); and quarterly Differential Interferometric Synthetic-Aperture Radar (DInSAR) surveys to verify that the CO_2 plume and pressure front are moving as predicted or to provide early indication if they are not. Temperature and pressure gauges, Distributed Temperature Sensing (DTS) fiber, and injection line flowmeters directly and continuously record the operational parameters of the injection wells via the in-zone and above-confining zone monitoring wells. Anomalies in injection rate, volume, pressure, and temperature would be detected in real-time and appropriate action taken as outlined in the permit's Attachment 9. Additionally, permit section K.8.b requires the continuous operation of an automatic alarm and shut-down system in the injection well.

Based on a comprehensive review of the proposed testing and monitoring strategy and the totality of proposed monitoring methods and locations, the EPA determined that the number and location of monitoring wells in the permits is sufficient to verify that the CO_2 plume and pressure front are behaving as predicted or provide early warning that they are not or that USDWs are endangered.

Figure 7 of permit Attachment 6 shows the locations of all monitoring wells, including wells for monitoring the first permeable zone above the upper confining zone (SLR1 (Shoe Bar 1) on the eastern margin of the AoR and ACZ1 (Shoe Bar 1AZ) centrally located near CCS1 and CCS2); the lowermost USDW (USDW1 centrally located near CCS1 and CCS2); and the injection zone (SLR2 on the southern edge of the AoR and SLR3 on the northern edge). Positioning of SLR2 and SLR3 at the extreme southern and northern edges of the extent of the plume, respectively, is ideal for collecting monitoring data. To supplement data obtained from the dedicated monitoring wells, OLCV will also collect monitoring data from the injection zone via the four water withdrawal wells (WW1, WW2, WW3, and WW4), which are strategically positioned near or just beyond the boundaries of the AoR to the north, south, east, and west. The combination of monitoring in the central part of the AoR (ACZ1, USDW1) and on the periphery (WW1, WW2, WW3, WW4, SLR1, SLR2, and SLR3) will allow OLCV to collect ample data across the AoR to validate modeled predictions and ensure the project is operating as planned.

In addition to data obtained from monitoring wells, OLCV will also collect data from a network of soil gas monitors and seismometers installed across the project area. Corrosion coupons representing all metals used in the project, including for injection, monitoring, and water withdrawal wells, will be monitored quarterly, and follow up casing inspection logs may be required should corrosion coupon data indicate unexpected loss of strength or performance of construction materials. Annual mechanical integrity testing will monitor the integrity of the injection and monitoring wells, and additional measures (casing inspection log, cement bond log, etc.) may be required should these tests fail or reveal potential issues. All of this information, along with real-time and periodic direct and indirect plume and pressure front monitoring data, groundwater analyses, and operating data, will provide a comprehensive

picture of the project and ensure regulatory requirements are met and the project is operating safely.

If monitoring were to indicate that the CO_2 plume or pressure front were expanding beyond the delineated AoR, OLCV would be required to update the modeling and amend the project plans (including the Testing and Monitoring Plan and possibly including additional monitoring wells). Following this, the EPA would modify the permits and reissue them for public comment. The UIC Program Director can also require updates to the Testing and Monitoring plan outside of the regular five-year review cycle per 40 CFR 146.90(j), and the EPA may request that additional monitoring wells be added both within the original AoR as well as beyond the boundaries of both the AoR and leased area, if necessary.

Section N of the permits details OLCV's reporting and recordkeeping requirements to the EPA. Situations potentially endangering human health or the environment have stringent and quick reporting requirements. Any noncompliance with a permit condition, triggering of the shut-off systems, loss of mechanical integrity, action taken to implement the Emergency and Remedial Response plan, and other potentially endangering events must be reported to the UIC Program Director within 24 hours. Moreover, Section K.10 lists the circumstances under which injection must cease immediately. Even if there is a 24-hour reporting requirement for the event, injection would have to be stopped as soon as possible.

In the event of potential endangerment of a USDW, the permittee must implement the activities described in the Emergency and Remedial Response Plan (Attachment 9) in coordination with the UIC Program Director. These include a full investigation of the cause of any anomalous monitoring results and appropriate actions, including ceasing injection, groundwater cleanup and providing alternate water supplies if needed.

Comment 5b: Commenters expressed concern that well corrosion might not be detected by planned monitoring.

EPA Response to Comment 5b: Pursuant to Part M of the permits and the attached Testing and Monitoring Plans, OLCV must monitor the injection wells and the portions of the deep monitoring wells that will be exposed to CO_2 and water for signs of corrosion and demonstrate internal and external well integrity.

Per Part M.4 of the permits, OLCV will perform corrosion monitoring of the injection, monitoring, and water withdrawal wells. OLCV will expose coupons (i.e., pieces of steel made of the same materials used in the wells' construction) to the carbon dioxide stream. These coupons will represent all metals present within the wells, including the surface and production casing, tubing, and packer, which may be exposed to the CO_2 stream. On a quarterly basis, OLCV will examine the coupons by photographing and weighing them to identify any loss of mass, thickness, cracking, pitting, or other signs of corrosion. If any such changes were occurring, OLCV would be required to repair the injection wells.

Part M.3 of the permits requires that, during injection operations, OLCV must continuously observe and record injection pressure, flow rate and volume, and the pressure on the annulus

to detect the development of any leaks in the casing, tubing, or packer (to demonstrate internal mechanical integrity).

OLCV will use temperature and pressure gauges, Distributed Temperature Sensing fiber, and injection line flowmeters to directly and continuously record the operational parameters of the injection wells via the monitoring wells. Anomalies in injection rate, volume, pressure, and temperature would be detected in real-time and appropriate action taken as outlined in permit Attachment 9. Additionally, permit section K.8.b requires the continuous operation of an automatic alarm and shut-down system in the injection well.

In addition, OLCV must (per Part M.6 of the permits) initially demonstrate external mechanical integrity (i.e., no movement of fluid along the well behind the casing) and annually using a tracer survey (oxygen activation log), temperature log, or noise log. This mechanical testing will provide early indication of any degradation of well materials due to contact with CO_2 in the presence of water.

Comment 5c: A commenter asked the EPA to clarify frequencies for pre-operational testing, stating that the Testing and Monitoring Plan does not include specific information on the frequency of some pre-injection testing.

EPA Response to Comment 5c: Per Part J of the permits, OLCV will perform pre-operational testing during the construction of the injection wells, per 40 C.F.R. 146.87. This testing, to be performed during and following well construction, is required to verify the geology of the site and to ensure compliance with the well construction requirements per 40 C.F.R. 146.86. All pre-operational testing must be completed and submitted to the EPA for review before an applicant may receive authorization to begin injecting. Failure to satisfy all pre-operational testing requirements may delay, or even prohibit, issuance of an authorization to inject. Note that much of the pre-operational logging, testing, and coring required by 40 CFR 146.87 and Part J of the permits are only performed once prior to the start of injection authorization. Ongoing testing and monitoring during and after injection operations is covered in Part M and Attachment 6 of the permits.

Comment 5d: A commenter asserts that mechanical integrity testing should be performed by an independent third party, that the EPA should witness all MITs, and landowners should be allowed to witness the testing. Other commenters expressed concerns about trusting operators to self-report (e.g., about CO_2 purity/composition) and to monitor throughout the 50-year post-injection time frame. Commenters also requested that the EPA make monitoring results public on the EPA's website.

EPA Response to Comment 5d: Self-monitoring and self-reporting are fundamental elements of the UIC permit program and other Federal regulatory programs, such as those under the Clean Water Act, Resource Conservation and Recovery Act, and Clean Air Act. Documents reporting the results of testing and monitoring activities must be certified under penalty of law as complete, true, and accurate by OLCV. 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 of the monitoring report under 40 C.F.R. 144.32(d) and permit Part N.8.

According to Part J.5 of the permits, the EPA must be notified at least 30 days prior to when a mechanical integrity test is proposed so that a field inspector may be present to witness and document the results of the test. In addition to EPA notifications and witnessing by field inspectors, the TX RRC also requires notifications and commonly sends its own inspectors to witness mechanical integrity and other tests. The EPA disagrees that landowners should be invited to witness MITs; these tests typically require heavy equipment and could pose safety concerns for untrained individuals present at the testing site.

The EPA's periodic environmental compliance inspections supplement regular self-monitoring data, and permit violations are subject to EPA enforcement action. EPA inspectors and enforcement staff conduct periodic field inspections of wells, investigate non-compliance, and evaluate permit violations. If warranted, EPA inspectors or designated representatives may also conduct independent sampling to confirm the accuracy of data collected by the permittee. Under federal law, there are civil and criminal penalties for violations. Based on these factors, the EPA finds that the collection of samples, monitoring, testing, and reporting as required in the permits is appropriate.

After testing and monitoring data is collected and reported, the EPA will review all the submitted data to ensure the data was collected correctly and that reported results are within the allowable ranges in the permits. Any incorrect testing would require follow up/repeat tests that meet the Testing and Monitoring Plan and quality assurance protocols. Any monitoring data that indicates divergence from permit limits or from the predicted behavior of the CO_2 plume or pressure front may trigger a reevaluation of the AoR and updates to applicable plans as necessary. Significant breaches of permit conditions may also be considered permit violations, potentially subjecting an applicant to remedial actions, civil and/or criminal penalties, and revocation of permits.

The EPA agrees that monitoring data should be available to the public. All monitoring reports will be available on the EPA's UIC Class VI Data Repository website at https://udr.epa.gov/ords/uicdr/r/uicdr_ext/uicdr-pub/map.

6. Operations

Comment 6a: A commenter questioned the use of the brine to be removed from the injection zone, and whether it would be used for enhanced oil recovery (EOR).

EPA Response to Comment 6a: The EPA clarifies that, as discussed in Section 1.1 of permit Attachment 6, the purpose of the brine production wells is to withdraw brine from the Lower San Andres Formation to control pressure increases in the injection zone and reduce the risk of fracturing the injection formation. OLCV has no plans to use the Class VI wells to reinject the brines within the project area, which would be counter to the purpose of the project. Brine will be transported via pipeline for use in other Oxy or third-party operations or transported to the

locations of planned Class I disposal wells outside the project area. Injection for EOR or Class I disposal is outside of the scope of this Class VI permitting action, and any such injection would be pursuant to Class I or Class II injection well requirements under the authority of the state of Texas.

7. Emergency and Remedial Response

Comment 7a: Commenters asserted that the Emergency and Remedial Response Plan does not provide or describe adequate response actions to protect USDWs, such as the specific remediation activities that would be performed or the duration that alternative water supplies would be provided. They assert that the only remedial action indicated is consultation with or notification of the EPA and/or local authorities. They also expressed concern that the plan should reflect the additional risk associated with the first horizontal Class VI wells and potential damage to the wells due to seismic activity or corrosion.

EPA Response to Comment 7a: Under 40 CFR 146.94(a), the emergency and remedial response plan must describe, "actions the owner or operator must take to address movement of the injection or formation fluids that may cause an endangerment to a USDW during construction, operation, and post-injection site care periods." 40 CFR 146.94(b) articulates four actions an owner or operator must take if he or she obtains evidence that the injected carbon dioxide stream and associated pressure front may cause an endangerment to a USDW: (1) Immediately cease injection; (2) Take all steps reasonably necessary to identify and characterize any release (3) Notify the Director within 24 hours; and (4) Implement the emergency and remedial response plan approved by the Director. Section P of the permits incorporates these requirements.

The EPA acknowledges concerns about CO_2 leakage and the safety of the local community. The purposes of the Emergency and Remedial Response Plan in Attachment 9 of the permits include identifying potential scenarios based on understanding of the site geology, operations, and the local community, and establishing procedures to follow in the unlikely event of a leak, so as to ensure an expedient response. The plan addresses a variety of scenarios, including loss of mechanical integrity, potential brine or CO_2 leakage to a USDW, a natural disaster, or an induced seismic event. For each of the scenarios, the plan identifies specific response actions that are suitable to and dependent upon the nature and severity of the event. In addition to identifying potential response actions, the plan also identifies responsible personnel, detection methods, and avoidance measures.

The EPA disagrees that the Plan does not contain adequate or appropriate responses to USDW contamination. The response actions to events that may involve vertical migration of brine or CO_2 to USDWs in Section 5.3 of the plan include: ceasing injection, evaluating if there is movement of CO_2 or brines to USDW, preparing remediation action plans, and assessing mechanical integrity/proposing repair actions. As it developed the Class VI Rule and the required content of Emergency and Remedial Response Plans, the EPA recognized that each

emergency or unanticipated event will be unique, and the appropriate response will be specific to the nature of the event and any adverse effects that are detected.

The EPA acknowledges that the initial step of the response actions identified in the plan is discussion with the permitting authority; however, this is to ensure that any action is developed in consultation with the EPA. The EPA would require that OLCV perform the agreed-upon actions and would not allow them to resume injection until it can be demonstrated that there is no endangerment to USDWs. The required consultation with the Director, as described in the Emergency and Remedial Response Plan and required at 40 CFR 146.88(f), ensures that the permittee's response to any major or minor unanticipated event will reflect the UIC Program's protective measures and comply with the Class VI requirements.

The EPA disagrees that the response actions in the Emergency and Remedial Response Plan do not address the horizontal construction of the Class VI injection wells. The identified response actions, such as repairing casing or tubing or plugging the well, would be specific to the well's construction. While commenters identify numerous risk factors that can compromise the integrity of the injection wells, such as seismic events or corrosion, the response activities (i.e., evaluating mechanical integrity and repairing or plugging the wells) are essentially the same, regardless of the cause of damage.

Additionally, as noted above, if the permittee obtains evidence of endangerment to a USDW, they must (1) Immediately cease injection; (2) Take all steps reasonably necessary to identify and characterize any release (3) Notify the Director within 24 hours; and (4) Implement the emergency and remedial response plan approved by the Director. Also, the plan includes commitments to notify local authorities and the public in the event of an emergency.

Comment 7b: Commenters requested that the Emergency and Remedial Response Plan include notifying local emergency services, county and municipal officials, potential future groundwater conservation districts, and adjacent landowners about emergency events. They requested that the plan provide additional information about what is communicated (e.g., the nature of each incident; what equipment failed; dates of failure; the extent of damage; and current or ongoing potential risks to the landowner, surrounding neighbors, and all groundwater sources). Commenters expressed concerns that local first responders and medical systems are not prepared to respond to a major CO_2 leakage. They also requested funding for emergency response personnel, training, equipment, and community coordination should be built into the permit requirements.

EPA Response to Comment 7b: The EPA acknowledges that some of the entities that the commenters recommend would be interested in the status of the response. The parties listed on Table 4 of the Emergency and Remedial Response Plan are those people and entities that would be part of an initial response and need to know of an emergency event immediately. The EPA adds that first responders (including the local police and fire departments) and Ector County officials, including the sheriff and emergency management offices, would be notified.

Pursuant to the communications plan in Section 7 of the Emergency and Remedial Response Plan, the content of the communications must be appropriate to the event and its severity. As such, communications may include the topics that commenters suggest if they were applicable and significant to the community's understanding of the event, particularly in the unlikely case of a long-term response. As the plan describes, OLCV will describe what happened, any impacts to the environment or local resources, how the event was investigated, what response actions were taken, and the status of the response. Communications would target the entities that commenters mentioned, such as municipal officials, groundwater conservation districts, and landowners.

The EPA clarifies that all emergency responses would be undertaken by OLCV and not local first responders. The responses are technically complex and specific to CO_2 injection and storage; for this reason, the Class VI emergency and remedial response requirements are in place so that operators, not local communities, are responsible for addressing any emergency events via a comprehensive Emergency and Remedial Response Plan and financial responsibility requirements to cover the cost of any such responses.

Regarding the comment on funding for local emergency response, it is unclear whether the comment requests this requirement be added to the Class VI permitting rules or to the permits. To the extent the comment addresses programmatic rule revision, the comment is outside the scope of this permitting decision. As for inclusion in these permits, there is no regulatory requirement that permits must include funding commitments for local emergency responders in order to meet the criteria at 40 C.F.R. 146.94.

8. Financial Responsibility

Comment 8a: Commenters assert that the permits provide inadequate financial coverage to address emergency events, such as CO_2 leaks and water well contamination. They express concern that OLCV's financial responsibility demonstration involves less financial coverage than other Class VI projects. Commenters request that the amount set aside for remedial action covers potential contamination at any point during the injection and post-injection phases. Commenters also requested that the financial coverage address liability to residents and businesses or that OLCV be required to purchase affected property at market value. Commenters also alleged that the permittee will abandon the wells on its property and leave landowners to address environmental damage.

EPA Response to Comment 8a: The financial responsibility requirements placed on owners and operators of Class VI wells are designed to ensure that resources are available to responsibly plug the injection wells, conduct corrective action if needed, implement emergency responses, and properly restore and close the site. The aim is to ensure protection of USDWs in all eventualities. If an owner or operator is unable to meet their financial obligations under their permits (e.g., as a result of bankruptcy or other financial difficulty), the financial instruments will provide the funding for the EPA to implement necessary actions to ensure protection of USDWs.

The financial responsibility requirements are outlined in Section H of the permits. The costs have been estimated (permit Attachment 3) and approved by the EPA for the following aspects of the project:

- 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).

To evaluate OLCV's financial responsibility demonstration, the EPA compared the cost estimates they provided in their Class VI permit application to those generated by the EPA's internal Cost Estimation Tool for Class VI Financial Responsibility Demonstrations (the Cost Tool), which generates an acceptable range of costs for Class VI financial responsibility activities based on information submitted with a permit application. These inputs include site-specific information, such as the size of the AoR, the presence/absence of USDWs in the AoR, the amount of CO_2 to be injected, the duration of the post-injection site care period, the depths and diameters of the injection and monitoring wells, and the characteristics of any deficient wells in the AoR requiring corrective action.

To ensure that the cost estimates were appropriate to the covered activities, the EPA spoke to OLCV staff to confirm the cost estimate details and gain background on the sources and site-specific nature of the line items in the cost estimates (notes of EPA-OLCV March 25, 2025, call). Specifically, OLCV confirmed the following regarding their cost estimates:

- Cost estimates for plugging the injection and monitoring wells and performing corrective action are sourced from a vendor with whom OLCV currently works. The estimates are based on recent plugging jobs and reflect the types of cements that are needed for contact with CO_2.
- Post-injection monitoring cost estimates reflect a variety of current activities and instruments installed at the project site and operated by third-party vendors (e.g., for the seismicity monitoring array and soil gas monitoring probes). Geophysical monitoring for plume and pressure front tracking and above confining zone/in-zone monitoring cost estimates are from vendors with whom OLCV works and are familiar with the project site. Costs for performing MITs and well workovers are based on vendor estimates for the types of jobs that are expected to be performed during the post-injection monitoring period and are similar to costs OLCV currently incurs.
- The emergency and remedial response cost estimates reflect mechanical integrity failure response costs that are based on state-specific information and are on par with costs incurred at OLCV's operations. Additionally, OLCV performed water well searches to demonstrate that no water wells for human or agricultural use are present within the AoR.

All the cost items were reviewed by a licensed Professional Engineer (as required by state law), who certified that the estimates represent third-party costs to do the work as described in the

project plans (Statement by a Licensed Professional Engineer in Accordance with 16 TAC §§5.203 and 5.205).

The EPA determined, based on this site-specific evaluation, that OLCV has set aside sufficient resources to address the covered activities as described in the relevant, approved project plans, and that the financial assurance demonstration is adequate. The EPA recognizes that other Class VI projects have higher financial responsibility amounts; however, financial responsibility needs are specific to the project and the covered activities over the life of the project, including the injection and post-injection phases. The amount of financial responsibility needed for a project is specific to the activities and characteristics of that project, including the presence of a USDW and the predicted extent of the CO_2 plume and pressure front.

The resources available for well plugging and site closure will ensure that all of the wells at the site, including the injection and monitoring wells, will be plugged regardless of the permittee's financial status at the end of the project.

The EPA clarifies that the financial amount set aside for emergency and remedial response would address contamination at any point during the injection or post-injection phases. OLCV is required to meet the financial responsibility obligations for the duration of the project (40 C.F.R. 146.85(b)(1)). The EPA would not authorize release of funds from the instruments until OLCV demonstrates that the project no longer poses a risk of endangerment to USDWs and the EPA has authorized site closure pursuant to 40 C.F.R. 146.93(b) and Part O.6.d of the permits. The Emergency and Remedial Response cost estimates include the costs associated with the remediation of contaminated USDWs. This includes stopping injection, the creation of a hydraulic barrier, the installation of sealants to stop CO_2 leakage, and the treatment of contaminated USDWs. The applicant's emergency and remedial response plan cost estimates account for a myriad of potential events such as loss of well control; loss of mechanical integrity; the vertical migration of CO_2 via faults, fractures, or APs; the lateral migration of CO2; monitoring equipment failure; natural disasters; seismicity; and any surface events.

To ensure that sufficient resources are available over the duration of the project, OLCV must, per Part H.1 of the permits, update the available funds to account for annual inflation or to address changes to any of the project plans. These enforceable financial responsibility provisions ensure that sufficient resources are available to perform these USDW-protective activities without using public funds.

Comment 8b: Commenters also requested that the EPA require OLCV to obtain liability insurance from a third-party insurer and not rely on corporate resources.

EPA Response to Comment 8b: OLCV will use a letter of credit to demonstrate financial responsibility for all activities requiring financial assurance, which is an acceptable instrument, per 40 C.F.R. 146.85(a)(1)(iii). OLCV will also establish a standby trust fund in accordance with the EPA's Class VI Financial Responsibility Guidance to receive any funding necessary to address the cost of covered activities. Prior to authorizing construction of the injection wells, EPA

financial experts will review the instruments to verify that they meet the Class VI requirements and have appropriate conditions of coverage.

The EPA disagrees that the instruments OLCV plans are inappropriate. While insurance, as commenters suggest, is also a qualified Class VI financial instrument, the EPA has determined, based on financial research as it developed the Class VI Rule, that a letter of credit and standby trust are acceptable instruments that meet the requirements.

The EPA acknowledges commenters' concerns about corporate structures that could allow operators to isolate liabilities and potentially transfer risk to the public. The EPA clarifies that the purpose of the Class VI financial responsibility requirements is to prevent this eventuality. Because OLCV has secured financial responsibility via an outside institution, any bankruptcy of the operator would still allow the financial commitments to be met.

The EPA also clarifies the scope of the Class VI financial responsibility requirements is limited to addressing endangerment to USDWs. Therefore, any coverage of liability or damage to landowners or their property is outside the scope of this UIC permitting decision.

9. Community Engagement and Public Notice

Comment 9a: Commenters requested greater transparency and engagement with the local community about the project. A commenter expressed concern that communities of color have not been involved in past decision-making.

EPA Response to Comment 9a: The EPA has met the public notice and comment requirements for these permits per 40 CFR 124.10. Further public engagement activities undertaken by the EPA included: holding two in-person public information meetings; holding an in-person public hearing with afternoon and evening sessions; extending the public comment period beyond the minimum 30 days to 64 days; and making project information available in both English and Spanish. Based on an analysis of U.S. Census data, there are no residents in the AoR, so care was taken to reach out to nearby landowners and communities in the EPA's and OLCV's notification lists. The EPA's in-person efforts were focused in the biggest nearby population center, Odessa, which is more than 10 miles from the project site.

OLCV has identified and engaged with community stakeholders in Ector County throughout their project development process. They reached out directly to adjacent property owners, created an ongoing Community Engagement Plan, and met with community stakeholders in one-on-one, small group, and large public meetings. They further detailed community engagement efforts in the Community Engagement module in their full application, which included: building local partnerships to support education, healthcare, traffic management and safety, and workforce development opportunities; hosting tours of the project site; donating to and meeting with first responders in Ector County; and maintaining a public website with project and contact information (Ector1PointFive.com).

Comment 9b: Commenters assert that redactions in the permit application limit transparency and preclude a full review.

EPA Response to Comment 9b: The EPA acknowledges commenters' concerns about redacted text, which limits the public's ability to review every page of the permit application. OLCV validly claimed the information as confidential business information, the Agency treated the confidential claims consistent with the requirements of 40 CFR § 144.5 and 40 CFR Part 2, and the information that was ultimately claimed as confidential is not part of the public docket. EPA technical specialists reviewed a full non-redacted version of the application and determined that it meets the Class VI requirements.

Comment 9c: Commenters asked the EPA to extend the public comment period to provide time to review the extensive amount of technical information in the permit applications. Commenters asserted that the EPA is "fast-tracking" issuance of the permits.

EPA Response to Comment 9c: Regulations require the EPA to hold a 30-day public comment period. The EPA is also required to hold a public hearing on a draft permit when significant public interest exists based on written requests. The EPA's initial notice included a 34-day comment period, from September 3, 2024, to October 7, 2024. In response to numerous requests, the EPA extended the comment period until November 6, 2024, providing a total of 64 days. Rather than waiting to receive requests for a public hearing, the EPA provided early notice on September 3, 2024, of the October 3, 2024, public hearing. The public hearing included day and evening sessions to accommodate working schedules.

The EPA disagrees that it is fast tracking this Class VI permitting decision. EPA technical experts conducted a thorough review of OLCV's permit application and every attachment. During the extensive review process, the EPA submitted multiple requests for additional information (RAIs) to the applicant and did not consider the application to be approvable until all RAI comments were addressed to the Agency's satisfaction. The EPA also initiated a public comment period during which it held a public hearing. The EPA reviewed each comment and revised the permits to address those comments. The data and information provided by OLCV as part of the permit application (and subsequent responses for additional or clarifying information) and reviewed by the EPA is publicly available as part of the permit administrative record, along with other information the EPA considered in its decision-making.

10. Safety Concerns

Comment 10a: Commenters also raised general concerns about the safety of the project, including the potential for CO_2 to leak from the injection zone and affect groundwater or air quality. They express concern that CO_2, carbonic acid, or other contaminants could leak and make groundwater unusable for human consumption or agriculture or violate air quality standards. They also assert that CO_2 sequestration is an unproven technology.

EPA Response to Comment 10a: 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. Since the passage of the Safe Drinking Water Act (SDWA) in 1974, the UIC program has overseen hundreds of thousands of permits across the country. Deep injection

wells have a history of safe operation because of the robust protections available under the SDWA and implementing regulations.

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 are proven. For example, as it developed the Class VI Rule, the EPA performed background research and held technical workshops to bring together experts on appropriate well construction in CO_2 environments. The requirements in the Rule (which are implemented in UIC permits) reflect this scientific research.

The Class VI requirements and OLCV's permits contain numerous provisions to ensure the safety of the project and the protection of USDWs. These include the following:

- Suitable geology that meets the requirements of 40 C.F.R. 146.83 to protect USDWs from endangerment with: (1) an injection zone that can receive the total volume of CO_2 that OLCV will inject without fracturing; and (2) a competent confining zone, with no transmissive faults or fractures to prevent the CO_2 from moving upward.
- Well construction provisions (Part I of the permits) to prevent the movement of fluids into or between USDWs, including materials that are compatible with the fluids in which they will come into contact and mechanical strength to withstand operational stresses or stresses associated with seismicity.
- Operating conditions (Part K of the permits) to ensure that injection pressure will not initiate fractures in the injection or confining zones. The injection wells are equipped with an automatic surface shut-off system that would shut off the well if any permitted operating parameters—such as injection pressure—diverge from permit limitations.
- Extensive injection and post-injection phase testing and monitoring (per Parts M and O.6 of the permits) to verify that the CO_2 plume and pressure front are moving as predicted or to provide early indication if they are not. This includes CO_2 injectate monitoring, groundwater sampling, pressure fall-off testing, CO_2 plume and pressure front tracking, well testing (mechanical integrity testing, corrosion monitoring, and continuous monitoring), and seismic monitoring.
- Emergency and Remedial Response procedures (Part P of the permits) to address adverse events and facilitate expedient responses and prevent or mitigate harm to USDWs and the environment.
- Financial resources (Part H of the permits) to perform all needed corrective action on wells in the AoR, plug the injection wells, perform all required post-injection site care and close the site, and conduct any needed emergency and remedial response measures without using public/taxpayer money.

11. Concerns about the Permittee

Comment 11a: Commenters asserted that the permittee has a poor record of compliance with its Class II permits/EOR wells, including abandoning wells, and expressed concern about allowing it to operate a Class VI injection project. Commenters also expressed concern that wells associated with its Class VI project would remain unplugged and create an ongoing potential for USDW endangerment.

EPA Response to Comment 11a: The EPA clarifies that this permitting action is under the scope of Subpart H of 40 C.F.R Part 146, which includes specific requirements for geologic siting, well construction, operation, testing and monitoring of the injection wells and the project, well plugging and abandonment, post-injection site care, financial assurance, and site restoration for CO_2 injection wells. The terms and conditions of the permits require OLCV to meet these requirements during the injection and post-injection phases of the project.

The EPA acknowledges commenters' concerns about past activities by the applicant; however, the EPA clarifies that the activities on this project will be pursuant to a Class VI permit that reflects the requirements of Subpart H of 40 C.F.R Part 146, and the EPA will expect that the permittee will perform activities as described in the permits. Under federal law, there are civil and criminal penalties for violations.

The EPA clarifies that the injection and monitoring wells associated with the project will not remain unplugged. Pursuant to Part O of the permit, OLCV must plug all three injection wells as described in the well plugging plan (Attachment 7 to the permits), and any changes to these approved procedures must be approved by the EPA prior to OLCV proceeding with plugging the wells. Further, as part of the site closure process, the permittee must plug all monitoring wells in accordance with Part O and Attachment 8 of the permits. OLCV must maintain financial resources for performing these plugging activities until the EPA has reviewed the plugging reports and verified that the wells were properly plugged. If OLCV did not (or was not able to) perform these activities, the EPA would perform them using funds available in the letter of credit and standby trust fund that OLCV has provided per Part H of the permits.

12. Concerns about TX RRC

Comment 12a: Commenters expressed concerns about the TX RRC's ability to oversee the Class VI project. They asserted that lax oversight of Class II wells has led to increased non-compliance, induced seismicity, failed MITs, and lack of community engagement. Several commenters requested that the EPA withdraw RRC's Class II primacy and not grant RRC Class VI primacy.

EPA Response to Comment 12a: The EPA has received the petition to withdraw Class II primacy and is considering that document under a separate process. The EPA will issue a determination under the appropriate portion of the rules. As such, this petition and concerns about RRC's ability to oversee Class VI permits is outside the scope of this Class VI permitting action.

The EPA acknowledges that Texas has applied for Class VI primacy, however that application will have its own separate public notice and comment period. The purpose of this permitting decision is limited to the injection wells that OLCV proposes to construct and operate under EPA-issued Class VI permits. The EPA clarifies that the activities on this project will be pursuant to a permit that is issued and overseen by EPA Region 6.

VI. Determination

After considering all public comments, the EPA has determined that none of the comments submitted have raised issues that alter the EPA's basis for determining that it is appropriate to issue three permits to Oxy Low Carbon Ventures, LLC, to operate Class VI injection wells in Ector County, Texas. Therefore, the EPA is issuing final permits with the modifications indicated in this response to comments.

VII. 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 the EPA's Environmental Appeals Board (EAB) to review any condition of the final permit decision. Any person who failed to file comments or failed to participate in a public hearing on the draft permits may petition for administrative review only to the extent of the changes from the draft to the final permit decisions.

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 the 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 Guide to the U.S. Environmental Protection Agency's Environmental Appeals Board (March 2023) available at: https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/8f612ee7fc725edd852570760071cb8e/26e637699cb1cc1685257b50004044f6/$FILE/Guide%20to%20the%20EAB%20March%202023.pdf.

If you wish to request an administrative review, the EAB encourages you to utilize the EAB's electronic filing system accessible on the website: http://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.