

Class VI Injection Well Application

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**Attachment 08: Post-injection Site Care and Site Closure Plan
40 CFR §146.93(a)**

Maple Project
Putnam County, Ohio

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Project Information

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List of Acronyms and Abbreviations

ACZ	above confining zone
AoR	Area of Review
BHP	bottomhole pressure
BOPs	blowout preventors
CO ₂	carbon dioxide
DIC	dissolved inorganic carbon
Director	EPA UIC Program Director
EPA	Environmental Protection Agency
LD	lay down
MITs	mechanical integrity tests
MPL ACZ1	Maple Above Confining Zone Monitoring Well 1
MPL INJ1	Maple Injection Well 1
MPL OBS1	Maple Deep Observation Well 1
MPL USDW1	Maple USDW Monitoring Well 1
ND	nipple down
NU	nipple up
P&A	plug and abandon (plugged and abandoned)
PBI	proprietary business information
pH	acidity or alkalinity measurement
PISC	Post-injection Site Care and Site Closure
PNL	pulsed neutron logging
ppg	pounds per gallon
psi	pound-force per square inch
POOH	pull out of hole
Q1	first quarter
Q4	fourth quarter
QASP	Quality Assurance and Surveillance Plan
RIH	run in hole
RU	Rig up
UIC	Underground Injection Control
US	United States
USDW	underground source of drinking water

This Post-injection Site Care and Site Closure (PISC) Plan describes the activities that Vault GSL CCS LP will perform at the project site to meet requirements of 40 CFR §146.93. Vault GSL CCS LP is not proposing an alternative PISC timeframe. The position of the subsurface carbon dioxide (CO₂) plume, pressure front, and aqueous geochemistry of the shallow groundwater will be monitored for portions of the 50-year PISC period. Vault GSL CCS LP may not cease post-injection monitoring until a demonstration of non-endangerment of underground sources of drinking water (USDWs) has been approved by the Underground Injection Control (UIC) Program Director (Director) pursuant to 40 CFR §146.93(b)(3). Following approval to abandon the project wells, Vault GSL CCS LP will plug all monitoring wells, restore the site to its original condition, and submit the proper plugging and abandonment documentation. Following approval for site closure, Vault GSL CCS LP will conclude all monitoring activities and submit a site closure report and associated documentation.

1. Pre- and Post-injection Pressure Differential [40 CFR §146.93(a)(2)(i)]

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2. Predicted Position of the CO₂ Plume and Associated Pressure Front at Site Closure [40 CFR §146.93(a)(2)(ii)]



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3. Post-injection Monitoring Plan [40 CFR §146.93(b)(1)]

The PISC monitoring plan for the Maple Project site includes shallow groundwater, above confining zone (ACZ), injection zone, and geophysical monitoring to meet the post-injection monitoring requirements of 40 CFR §146.93(b)(1). The results of PISC monitoring will be submitted annually, within 30 days of the conclusion of the activities or receipt of processed data, whichever is later, as described in Section 3.3 *Schedule for Submitting Post-injection Monitoring Results*.

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Annual external mechanical integrity tests (MITs) will be acquired in MPL INJ1 and MPL OBS1 using either a temperature logging tool or a combined temperature and pulsed neutron logging (PNL) tool until the wells are abandoned in Year 10 of the PISC (Table 1).

Deep fluid samples will be taken from MPL ACZ1 for geochemical analysis as a contingent action to verify CO₂ containment should other monitoring parameters indicate potential CO₂ leakage may have occurred above the confining zone.

Shallow groundwater samples for geochemical analysis will be obtained from the shallow groundwater utilization wells and the Maple USDW Monitoring Well 1 (MPL USDW1) annually for the first 10 years of the PISC. After 10 years, annual fluid samples will continue to be acquired from MPL USDW1, and the rest of the shallow groundwater utilization wells will be sampled every five years for the duration of the PISC. Surface access to the shallow groundwater utilization wells for testing will be negotiated as part of the landowner leases for the project.

Continuous microseismic monitoring will be performed during the first two years of PISC using a surface-based microseismic monitoring array of five stations placed at a range of azimuths to optimize accuracy of the event locations and magnitudes as discussed in the Testing and Monitoring Plan (Attachment 06: Testing and Monitoring, 2025). Passive seismic monitoring will be phased out as pressure and the frequency of detectable events decreases. These criteria will be evaluated during the first two years of the PISC phase. Induced seismicity is expected to decrease in frequency and intensity once injection phase of the project is complete, and the project enters the PISC period. During operations, induced microseismic activity is related directly to the elevation of pore pressure which can reduce the effective normal stress on pre-existing fractures to allow them to potentially slip or move. Once injection has stopped, pressure in the injection zone will dissipate and decrease relatively quickly within the initial months and years of the PISC as shown in Figure 2, Figure 3, and Figure 4. With the dissipation of pressure there will be a corresponding decrease in pore pressure which will enhance the stability of fractures by increasing the effective normal stress and, thereby, frictional resistance, which makes the fractures less likely to slip. Within the first several months of the PISC period, there will be an expected decrease in the frequency and intensity of any induced microseismic activity.

The Emergency and Remedial Response Plan (Attachment 09: Emergency and Remedial Response Plan, 2025) describes response reactions to induced seismic events and the appropriate operating state. The Green operating state is for normal operations in which seismic events are less than or equal to M1.5. Once induced microseismic activity attributable to the project remains at or below M1.5 for six continuous months, and there is an observed decrease in event frequency, the project will propose the discontinuation of microseismic monitoring after two years in consultation with the Director.

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- Verification of CO₂ containment in the injection zone,
- Demonstration of increasing post-injection CO₂ plume stability,
- Input for calibration and verification of computational modeling.

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Table 2 presents the sampling and recording frequencies for continuous pressure monitoring during the PISC phase of the project.

Table 2: Sampling and recording frequencies for continuous monitoring in MPL ACZ1

Period During the PISC	Parameter	Device(s)	Location	Minimum Sampling ¹ Frequency	Minimum Recording ² Frequency
Years 1-3	Wellhead Pressure	Digital Surface Pressure Gauge	MPL ACZ1	Every 60 Minutes	Every 24 hours
	Downhole Pressure	Digital Downhole Pressure Gauges	MPL ACZ1	Every 60 Minutes	Every 24 hours
	Wellhead Pressure	Digital Surface Pressure Gauge	MPL INJ1	Every 10 seconds	Every 10 seconds
	Downhole Pressure	Digital Downhole Pressure Gauges	MPL INJ1	Every 10 seconds	Every 10 seconds
	Wellhead Pressure	Digital Surface Pressure Gauge	MPL OBS1	Every 10 seconds	Every 10 seconds
	Downhole Pressure	Digital Downhole Pressure Gauges	MPL OBS1	Every 10 seconds	Every 10 seconds
Years 4-10	Wellhead Pressure	Digital Surface Pressure Gauge	MPL ACZ1	Every 60 Minutes	Every 24 hours
	Downhole Pressure	Digital Downhole Pressure Gauges	MPL ACZ1	Every 60 Minutes	Every 24 hours
	Wellhead Pressure	Analog Surface Pressure Gauge	MPL INJ1	Continuous analog readout	Every 24 hours
	Wellhead Pressure	Analog Surface Pressure Gauge	MPL OBS1	Continuous analog readout	Every 24 hours
Years 11-50	Wellhead Pressure	Analog Surface Pressure Gauge	MPL ACZ1	Continuous analog readout	Every 24 hours

¹ Sampling frequency refers to how often the monitoring device obtains data from the well for a particular parameter. For example, a recording device might sample a pressure transducer monitoring injection pressure once every two seconds and save this value in memory.

² Recording frequency refers to how often the sampled information gets recorded to digital format (such as a computer hard drive). For example, the data from the injection pressure transducer might be recorded to a hard drive once every minute.

3.1 Monitoring Above the Confining Zone

The monitoring plan for the PISC is designed to be adaptive and respond to evolving project risks over time. No changes will be made to the PISC without informing the Director (40 CFR §146.93 (a)(3)).

Table 3 presents the proposed groundwater monitoring methods, locations, and frequencies. The ACZ monitoring zone will be in the Kerbel Formation at a depth of approximately 2,501 feet which will be refined through the Pre-operational Testing Program (Attachment 05: Pre-operational Testing Program, 2025). If fluid samples are required from the ACZ monitoring zone, they will be collected using a bailer system that maintains the formation pressure for analysis of dissolved inorganic carbon (DIC), and acidity or alkalinity measurement (pH). Samples for all other analytes will be collected with a bailer. Prior to sample collection, stagnant water will be removed from the well and ensure representative water is collected from the formation. The fluid removed from the well will be monitored for field parameters, such as pH, specific conductance, and temperature, using a calibrated water quality meter. Once these parameters stabilize, it will be an indication that representative formation fluid is in the well at the time the sample is collected.

Further detail on specifications, sample collection methods, analytical techniques, detection limits, and means of storing and transporting fluid samples is provided in Attachment 10: Quality Assurance and Surveillance Plan, (2025).

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Table 4 identifies the initial groundwater parameters to be monitored and the analytical methods that will be used for the samples in the baseline analysis of the data.

Table 4: Summary of analytical and field parameters for ground water samples

Parameters	Analytical Methods ¹
Cations: Ca, Fe, K, Mg, Na, Si	EPA 6010D
Cations: Al, Sb, As, Ba, Cd, Cr, Cu, Pb, Mn, Hg, Se, Tl	EPA 6020A EPA 7470A
Anions: Br, Cl, F, NO ₃ , and SO ₄	EPA 300.0
Alkalinity	Standard Method (SM) 2320B
Total Dissolved Solids	SM 2540C
Total Organic Carbon	Method 9060A
DIC	Method 9060A
Total and Dissolved CO ₂	SM 4500
pH	Isotope Ratio Mass Spectrometry ²
Conductivity/Resistivity	Field with multi-probe system
Temperature	Field with multi-probe system
¹ An equivalent method may be employed with the prior approval of the Director.	
² Gas evolution technique by Atekwana and Krishnamurthy, 1998 with modifications made by (Hackley et al., 2007)	

Sampling and analytical measurements will be performed in accordance with project quality assurance requirements. A qualified laboratory will be selected for the fluid sampling and analysis. Samples will be tracked using appropriately formatted chain-of-custody forms as per Attachment 10: Quality Assurance and Surveillance Plan, (2025).

The results of the geochemical analysis will be delivered in the form of lab reports. If anomalous changes in the aqueous geochemistry are observed in the lowermost USDW or shallow groundwater monitoring zones, new samples will be obtained from the affected zone to verify the changes. The frequency with which fluid samples are obtained for analysis from that zone will also be increased.

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3.2 CO₂ Plume and Pressure Front Tracking [40 CFR §146.93(a)(2)(iii)]

The project will employ direct and indirect methods to track the extent of the CO₂ plume and the presence or absence of elevated pressure throughout the PISC phase. Table 5 presents the direct and indirect methods that will be used to monitor the CO₂ plume including the activities, locations, and frequency of sampling.

The quality assurance procedures for seismic monitoring methods will be performed as described in Attachment 10: Quality Assurance and Surveillance Plan, (2025).

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PNL will be received as LAS files and its interpreted products can be imported into the static model. PNL will be used to monitor the distribution and saturation of CO₂ adjacent to the wellbore in MPL INJ1 and MPL OBS1. The PNL will be run through the ACZ monitoring zone to verify that there are no accumulations of CO₂ adjacent to the wellbore above the primary confining zone in MPL INJ1 and MPL OBS1. Note that the intervals the PNL will be run in MPL INJ1 are the same as those listed in Attachment 06: Testing and Monitoring, (2025). Technical details on PNL tools can be found in Attachment 10: Quality Assurance and Surveillance Plan, (2025).

Seismic data is delivered in a variety of formats including acquisition and processing reports and SEG-Y data files. In the context of time-lapse analysis, an assessment will be provided of the differences between the baseline and time-lapse surveys as well as data files that can be

incorporated into the static model. The injection of CO₂ and expansion of the plume is expected to change the acoustic impedance of intervals within the injection zone and increase the time it takes seismic waves to travel through the CO₂ plume over time. Both the acoustic impedance and travel time changes will be used to track CO₂ plume during the PISC phase of the project. In addition, time-lapse analysis metrics such as normalized root mean square, and predictability can be used to track the plume. The time-lapse seismic data will also be monitored for changes that may suggest that CO₂ has migrated past the primary confining zone and into the ACZ monitoring zone.

No direct fluid sampling is planned for the injection zone for the PISC phase of the project.

Table 6 presents the direct and indirect methods that will be used to monitor the pressure front.



The downhole pressure sensors will be programmed to measure and record pressure and temperature data in 10-second intervals. The downhole pressure will be monitored in MPL INJ1 and MPL OBS1 until the BHP change drops below the critical delta pressure, which is anticipated to be approximately three years after injection ceases. After this time, annual static gradient surveys will be collected from MPL INJ1 and MPL OBS1 via wireline until the wells are abandoned in Year 10 of the PISC.

Should a BHP gauge fail during the period in which continuous data is being collected from it (Table 2), positive pressure readings at the wellhead will be used to verify continued pressure fall off, as appropriate, until the gauges can be replaced. EPA will be notified of any gauge failure once identified and be provided with a timeline and procedure to replace the gauges at notification of failure. Should positive pressure at the wellhead not be present, an alternative periodic method will be used to determine the hydrostatic fluid level (i.e., shoot fluid levels or

equivalent method) and calculate BHP until the gauge is replaced. The downhole gauges will be replaced as soon as safely possible as part of a well workover event. A workover will be performed on each of the project wells to install new bottomhole gauges prior to the end of injection operations (Attachment 01: Narrative, 2025).

The final monitoring interval within the Mt. Simon Sandstone in MPL OBS1 will be determined after the well has been drilled and the well logs have been analyzed (Attachment 05: Pre-operational Testing Program, 2025).

The results of the aqueous geochemistry, PNL, and time-lapse seismic data will all be integrated to develop a comprehensive understanding of the CO₂ plume behavior during the PISC phase. PNL and time-lapse seismic data can be incorporated into the static model for comparison to the computational modeling predictions at different points in time. The data can be used to constrain the computational modeling results and produce better CO₂ plume predictions over the course of the project.

The PNL data will be used to calibrate the computational modeling and provide information on the vertical and horizontal CO₂ plume behavior as well as supply more detailed and direct measurement of CO₂ saturations than indirect seismic methods. The time-lapse seismic data will be used to update the models after the data has been analyzed. If the CO₂ plume monitoring data diverges significantly from the modeled plume predictions, it may result in a re-assessment of the AoR as per Attachment 02: AoR and Corrective Action Plan, (2025).

Based on the current computational modeling results, the CO₂ plume is expected to stabilize during the PISC phase of the project (Figure 5 and Figure 6), shortly after injection stops. Time-lapse seismic surveys acquired during the first or fourth quarter in Year 8 and Year 48 of the PISC phase of the project will demonstrate the stabilization of the CO₂ plume and be used to verify the computational modeling results.

3.3 Schedule for Submitting Post-injection Monitoring Results [40 CFR §146.93(a)(2)(iv)]

PISC monitoring data and results obtained using the methods described above will be submitted to the United States (US) Environmental Protection Agency (EPA) in annual reports. These reports will contain information and data generated during the reporting period (i.e., well-based monitoring data, sample analysis, and results from updated site models).

4. Alternative PISC Timeframe [40 CFR §146.93(c)]

Vault GSL CCS LP will not be requesting an alternative PISC timeframe.

5. Non-endangerment Demonstration Criteria

Prior to approval of the end of the post-injection phase, Vault GSL CCS LP will submit a demonstration of non-endangerment of USDWs to the Director, per 40 CFR §146.93(b)(2) and (3).

Vault GSL CCS LP will issue a report to the Director. This report will make a demonstration of USDW non-endangerment based on the evaluation of the site monitoring data used in conjunction with the project's computational model. The report will detail how the non-endangerment demonstration evaluation uses site-specific conditions to confirm and demonstrate non-endangerment. The report will include all relevant monitoring data and interpretations upon which the non-endangerment demonstration is based, model documentation and all supporting data, and any other information necessary for the Director to review the analysis. The report will include the following sections.

5.1 Introduction and Overview

A summary of relevant background information will be provided, including the operational history of the injection project, the date of the non-endangerment demonstration relative to the post-injection period outlined in this PISC and Site Closure Plan, and a general overview of how monitoring and modeling results will be used together to support a demonstration of USDW non-endangerment.

5.2 Summary of Existing Monitoring Data

A summary of all previous monitoring data collected at the site, pursuant to Attachment 06: Testing and Monitoring, (2025) and this document, including data collected during the injection and post-injection phases of the project, will be submitted to help demonstrate non-endangerment. Data submittals will be in a format acceptable to the Director [40 CFR §146.91(e)] and will include a narrative explanation of monitoring activities, including the dates of all monitoring events, changes to the monitoring program over time, and an explanation of all monitoring infrastructure that has existed at the site. Data will be compared with baseline data collected during site characterization [40 CFR §146.82(a)(6) and 146.87(d)(3)].

5.3 Summary of Computational Modeling History

The computational modeling demonstrates non-endangerment of USDWs in several ways:

- Computational modeling indicates that the CO₂ plume expansion slows considerably and stabilizes shortly after injection operations cease (Figure 5 and Figure 6)
- Injection zone pressures decline rapidly once injection operations cease and will fall below the critical delta pressure of 151 psi within approximately three years (Figure 2, Figure 3, and Figure 4),
- Residual gas and gas solubility trapping of the CO₂ will increase with time and contribute to trapping the CO₂ more effectively than structural trapping alone (Attachment 02: AoR and Corrective Action Plan, 2025),
- Geomechanical modeling shows that integrity of the primary confining zone will not be impacted by planned injection rates and would be maintained at much higher annual injection rates (Attachment 01: Narrative, 2025).

Table 7 summarizes the monitoring data that will be used to verify and calibrate the computational modeling and support the demonstration of non-endangerment of USDWs.

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The monitoring data will be used to calibrate predicted properties from the computational model such as vertical and horizontal CO₂ plume location, rate of movements, and pressure decline. These data will verify that the computational model predictions do not result in a material change to CO₂ plume and pressure front behavior and can be used as a proxy for future behavior. The differences in monitoring and modeling results will be compared using maps and graphs of the CO₂ and pressure front development over time. If there is major disagreement between monitoring and modeling results at the time of the demonstration, the models will be updated to reflect the monitoring results, as described in Attachment 02: AoR and Corrective Action Plan, (2025).

5.4 Evaluation of Injection Zone Pressure

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If CO₂ injection operations result in induced seismicity, it is expected that the rate of the events generated will decrease as injection zone pressure decreases. The rates of induced seismicity will provide further qualitative information about the decrease in pressure throughout the injection zone during the PISC phase.

Increased pressure in the injection zone is one of the main drivers for fluid migration through the primary confining zone through conduits such as well penetrations. As the injection zone pressure decreases during the PISC phase, the risk of fluid migration out of the injection zone and the potential risk to USDWs will also decrease.

5.5 Evaluation of CO₂ Plume

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5.6 Evaluation of Emergencies or Other Events

Table 8 provides a summary of the monitoring data that will be used to demonstrate that injection zone fluids have not migrated above the primary confining zone. Data acquired through the injection and PISC phases of the project will be compared to the baseline data gathered for the project to ensure that there are no indications that injection zone fluids have migrated into the ACZ monitoring interval. If the PISC monitoring data shows no significant changes from the baseline data, it will demonstrate the integrity of the primary confining zone and that injection zone fluids are not an endangerment to USDWs.

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The closest artificial penetration to the project wells in the injection and confining zones is the Barlage Louis well (UWI 34137200310000) which penetrates the Precambrian and is located approximately seven miles southwest of the injection well (Attachment 02: AoR and Corrective Action Plan, 2025). The well was plugged and abandoned in 1944. Claimed as PBI

The well integrity of MPL INJ1 will be thoroughly assessed during the Pre-operational Testing Program using cement bond logs as well as ultrasonic cement evaluation tools that will be run specifically over the injection zone, primary confining zone, and ACZ monitoring interval (Attachment 05: Pre-operational Testing Program, 2025).

During the injection phase, the well integrity of MPL INJ1 will be continuously monitored using wellhead pressure gauges, and annular pressure and annulus fluid volume levels to evaluate operational performance (Attachment 06: Testing and Monitoring, 2025). Wellhead and downhole pressures will continue be monitored in MPL INJ1 and MPL OBS1 during the PISC phase until the wells are abandoned. The project will continue to run static temperature logs every year, and PNL logs every second year starting in Year 1 to ensure that MPL INJ1 and MPL OBS1 are not providing a conduit for injection zone fluids to migrate above the primary confining zone until they are abandoned.

The Emergency and Remedial Response Plan includes further discussion of how emergencies or other events will be addressed by the project (Attachment 09: Emergency and Remedial Response Plan, 2025).

6. Site Closure Plan

Vault GSL CCS LP will conduct site closure activities to meet the requirements of 40 CFR §146.93(e) as described below. Vault GSL CCS LP will submit a final Site Closure Plan and notify the permitting agency at least 120 days prior to its intent to close the site. Once the permitting agency has approved closure of the site, Vault GSL CCS LP will plug MPL ACZ1 and MPL USDW1 and submit a site closure report to the US EPA. This report will be submitted within 60 days of the completion of all site closure activities and will be retained by Vault GSL CCS LP for a minimum period of no less than 10 years following site closure (40 CFR §146.92(d) and 40 CFR §146.93(h)).

The activities, as described below, represent the planned activities based on information provided to the US EPA. The actual site closure plan may employ different methods and procedures. A final Site Closure Plan will be submitted to the Director for approval with the notification of the intent to close the site.

6.1 Plugging Monitoring Wells

As discussed in the Testing and Monitoring Plan of the application, the project will have dedicated monitoring wells (Attachment 06: Testing and Monitoring, 2025): deep observation well MPL OBS1 will be plugged during Year 10 of the PISC phase MPL ACZ,1 and MPL USDW1 will be plugged as part of the site closure process. Vault GSL CCS LP does not plan to plug the pre-existing privately owned groundwater wells used for shallow groundwater sampling in the AoR.

This subsection serves to provide the methods and procedures that will be utilized to plug each of the wells. In addition to discussion of the proposed methodology and procedures, the schematics displaying the anticipated layout of the well following completion of operations to P&A have been provided. The cost estimates developed for these activities are provided in Attachment 03: Financial Assurance Plan, (2025).

6.1.1 MPL OBS1 P&A

In compliance with 40 CFR §146.92, the following will be done:

1. The regulatory agency will be notified at least 60 days before any field activity begins with an updated plugging plan.
2. CO₂ pipelines will be marked and noted with the rig supervisor and facility manager.
3. Hold safety meetings with all available rig crew, contractors, and facility personnel.
4. Move in the workover rig and rig up (RU) on MPL OBS1.
5. Check wellhead pressure and kill well with appropriately weighted fluid before accessing well.
 - a. It is anticipated that approximately 9.5 pounds per gallon (ppg) will be appropriate. This weight is subject to change based on the result of the bottomhole pressure survey. It is noted that regardless of the pressure survey, 9.5 ppg will be the minimum fluid weight.

6. Ensure that rig pump or another suitable pump is rigged up to the well. Pressure test all lines to minimum 2,500 psi. Perform annulus pressure test.
7. Fill tubing and two cased hole volumes (defined as the volume from the bottom of the packer to the bottom of the well) with kill fluid if needed. Monitor tubing pressure to ensure the well is dead.
 - a. Note that this will serve as the flush to fulfill CFR 40 §146.92(a).
8. Once the well is dead, nipple down (ND) the well head.
9. Nipple up (NU) and test blowout preventors (BOPs).
10. Latch onto and remove tubing hanger from wellhead.
11. Lay down (LD) tubing hanger.
12. Latch onto injection string.
13. Unlatch from packer
 - a. Note that, at this time, the well is likely to u-tube. Ensure rig pump is connected to the top side and a tank to the back side, close the BOPs, and slowly circulate out the annulus fluid while maintaining a full column of fluid (as feasible) using the kill fluid as outlined in Step 5.
14. Once the annulus fluid volume has been replaced, pull out of hole (POOH) with tubing and LD same.
 - a. Fill hole as necessary.
15. Pick up work string with packer pulling tool and run in hole (RIH).
16. Latch onto packer and remove same.
17. POOH with work string and packer. LD same.
18. RIH with open end work string.
19. Tag bottom. Note tag depth.
20. RIH with and set cement retainer within 40 feet of the top of the long string casing float collar (approximately 2,800 feet).
21. Sting into cement retainer and pump Plug #1 as follows.
 - a. Pump cement until one of the following conditions are met:
 - i. 50% excess over the calculated whole volume, or,
 - ii. 90% of the fracture pressure
 - b. When finished pumping, hold pressure for 10 minutes to ensure cement retainer sealing elements hold.
 - c. Sting out of cement retainer and dump minimum 10 barrels (approximately 250 feet) of cement above the retainer. Total plug volume should be as detailed in Table 9.
 - d. Slowly pull out of hole as necessary while pumping plug.
 - e. Pressure test to 1,000 psi to ensure retainer and cement hold.
22. Target top of cement should be approximately 2,526 feet. Trip work string out to approximately 100 feet above anticipated cement top. Wait at that depth for approximately two hours.
 - a. Wait time is dependent on hardening time for cement.

- b. Wet samples of cement should be taken.
23. RIH and tag top of cement. Note top of cement. Ensure cement top has not moved.
24. Pump Plug #2.
 - a. Pump 20 feet off bottom (approximately 2,506 feet).
 - b. Target height of plug should be 500 feet. Plug volume should be as detailed in Table 9. Plug to be pumped as balance plug.
 - c. Target top of Plug #2 should be 2,049 feet. This depth is approximately 500 feet above the top of the Conasauga and Rome Formation.
25. RIH with work string and tag top of cement. Note top of cement.
 - a. Pump additional cement if necessary.
26. Flush wellbore with fresh water.
27. Pump Plug #3.
 - a. Pump 20 feet off bottom (approximately 2,029 feet).
 - b. Target height of plug should be 500 feet. Plug volume should be as detailed in Table 9. Plug to be pumped as balance plug.
 - c. Slowly pull out of hole as necessary while pumping plug.
28. Target top of cement should be approximately 1,549 feet. Trip out work string to 100 feet above projected top with cement. Wait two hours.
 - a. Wait time is dependent on hardening time for cement.
 - b. Wet samples of cement should be taken.
29. RIH and tag top of cement. Note top of cement.
30. Pump remaining 500-foot plugs by repeating steps 26 through 29.
31. ND BOPs.
32. Ensure cement is to surface. Fill from surface if necessary.
33. Rig down rig. All casing should be cut to a minimum of three feet below ground level and have a plate with well information welded on top.
34. Fill and level the ground as necessary.

Note that the procedure presented above assumes that no contingencies are necessary. Cement volumes, pumping pressures, and weights are subject to change based on geologic and field conditions. This plan will be updated following the drilling and completion of MPL OBS1.

Vault GSL CCS LP will use the materials and methods noted in Table 9 to plug MPL OBS1. The volume and depth of the plug or plugs will depend on the final geology and downhole conditions of the well as assessed during construction. The cement(s) formulated for plugging will be compatible with the carbon dioxide (CO₂) stream as outlined in Attachment 01: Narrative, (2025) per 40 CFR §146.86(b)(1)(v). The cement formulation and required certification documents will be submitted to the EPA with the well plugging report. The owner or operator will report the wet density and will retain duplicate samples of the cement used for each plug.

The general plugging methodology is as follows:

- Approximately 500-foot plugs to be used throughout the well,
- CO₂-resistant cement will be used from total depth to approximately 500 feet above the Conasauga and Rome Formation,
- Class A cement to be used from 500 feet above the Conasauga and Rome Formation to surface.

Claimed as PBI

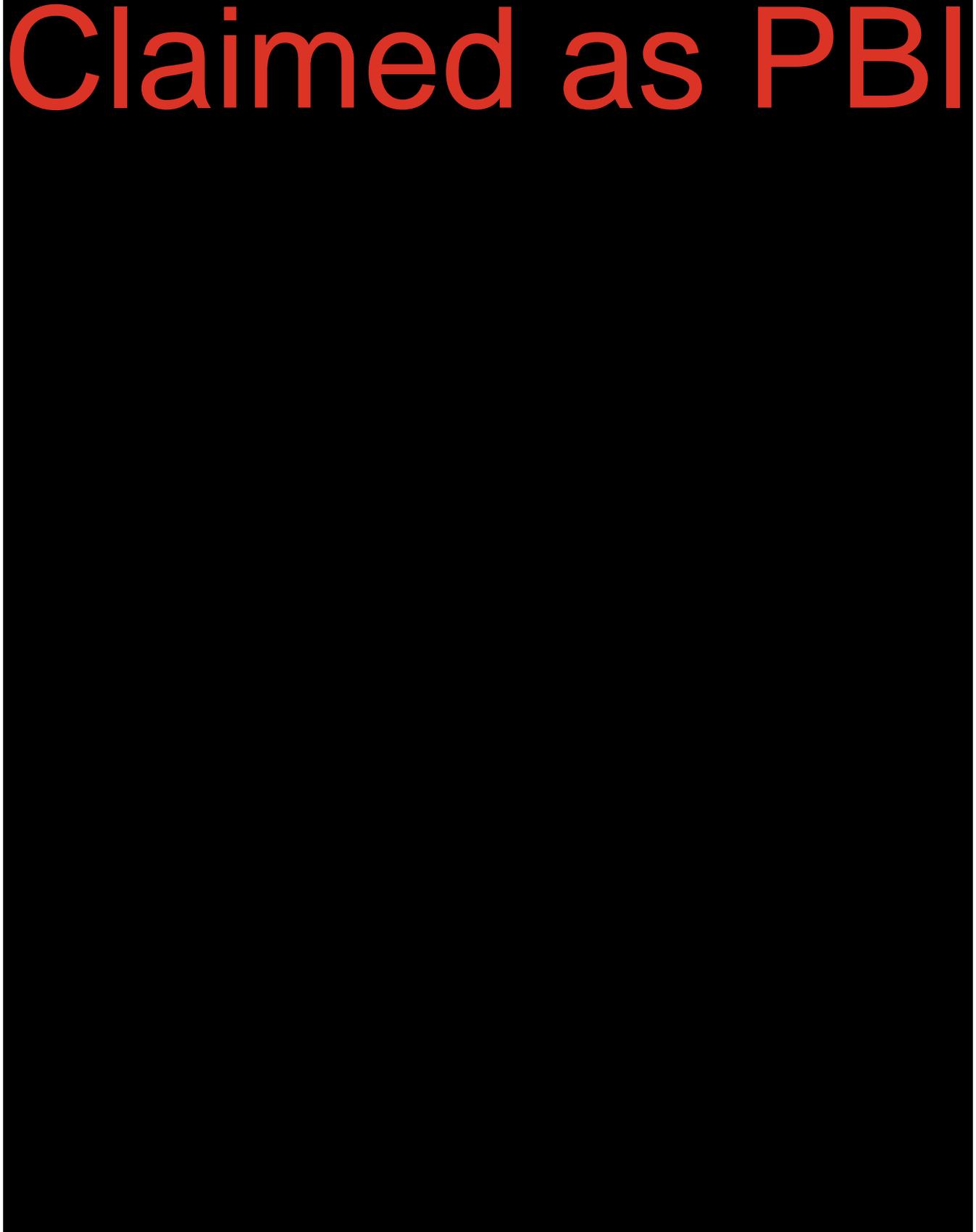
Any contingency plans that are necessary will be provided for as part of the formal procedure submitted 60 days before any field activities.

A report detailing the procedures and processes followed to plug this well will be submitted to the agency once field activities are complete. This report will be submitted within 60 days of the

completion of plugging. Per 40 CFR §146.92(d), Vault GSL CCS LP will retain this report for a period no less than 10 years following site closure.

Figure 7 displays the theoretical plugging schematic for MPL OBS1.

Claimed as PBI



6.1.2 MPL ACZ1 P&A

In compliance with 40 CFR §146.92, the following will be done:

1. The regulatory agency will be notified at least 60 days before any field activity begins with an updated plugging plan.
2. CO₂ pipelines will be marked and noted with the rig supervisor and facility manager.
3. Hold safety meetings with all available rig crew, contractors, and facility personnel.
4. Move in the workover rig and RU on MPL ACZ1.
5. Check wellhead pressure and kill well with appropriately weighted fluid before accessing well.
 - a. It is anticipated that approximately 9.5 ppg will be appropriate. This weight is subject to change based on the result of the bottomhole pressure survey. It is noted that regardless of the pressure survey, 9.5 ppg will be the minimum fluid weight.
6. Ensure that rig pump or another suitable pump is rigged up to the well. Pressure test all lines to minimum [REDACTED] psi. Perform annulus pressure test.
7. Fill tubing and two cased hole volumes (defined as the volume from the bottom of the packer to the bottom of the well) with kill fluid if needed. Monitor tubing pressure to ensure the well is dead.
 - a. Note that this will serve as the flush to fulfill 40 CFR §146.92(a).
8. Once the well is dead, ND the well head.
9. NU and test BOPs.
10. Latch onto and remove tubing hanger from wellhead.
 - a. The tubing should remain in the slips with the annular BOP engaged to ensure the tubing does not fall after the tubing hanger is removed.
11. LD tubing hanger.
12. POOH with tubing and LD same
 - a. Fill hole as necessary.
13. PU open end work string and RIH.
14. Tag bottom. Note tag depth.
15. Pump Plug #1.
 - a. Pump 20 feet off bottom (approximately [REDACTED] feet).
 - b. Target height of plug should be 500 feet. Plug volume should be as detailed in Table 10. Plug to be pumped as a balance plug.
 - c. Slowly pull out of hole as necessary while pumping plug.

16. Target top of cement should be approximately Claimed as PB feet. Trip work string out to approximately 100 feet above anticipated cement top. Wait at that depth for approximately two hours.
 - a. Wait time is dependent on hardening time for cement.
 - b. Wet samples of cement should be taken.
17. RIH and tag top of cement. Note top of cement. Ensure cement top has not moved.
18. Pump remaining 500-foot plugs by repeating steps 14 through 16.
19. ND BOPs.
20. Ensure cement is to surface. Fill from surface if necessary.
21. Rig down rig. All casing should be cut to a minimum of three feet below ground level and have a plate with well information welded on top.
22. Fill and level the ground as necessary.

Note that the procedure presented above assumes that no contingencies are necessary. Cement volumes, pumping pressures, and weights are subject to change based on geologic and field conditions. This plan will be updated following the drilling and completion of MPL ACZ1.

Vault GSL CCS LP will use the materials and methods noted in Table 10 to plug MPL ACZ1. The volume and depth of the plug or plugs will depend on the final geology and downhole conditions of the well as assessed during construction. The cement(s) formulated for plugging are outlined in Attachment 01: Narrative, (2025) per 40 CFR §146.86(b)(1)(v). The cement formulation and required certification documents will be submitted to the EPA with the well plugging report. The owner or operator will report the wet density and will retain duplicate samples of the cement used for each plug.

The general plugging methodology is as follows:

- Approximately 500-foot plugs to be used throughout the well,
- Class A cement to be used to surface

Claimed as PBI

Any contingency plans that are necessary will be provided for as part of the formal procedure submitted 60 days before any field activities.

A report detailing the procedures and processes followed to plug this well will be submitted to the agency once field activities are complete. This report will be submitted within 60 days of the completion of plugging. Per 40 CFR §146.92(d), Vault GSL CCS LP will retain this report for a period no less than 10 years following site closure.

Figure 8 displays the theoretical plugging schematic for MPL ACZ1.

Claimed as PBI

6.1.3 MPL USDW1 P&A

MPL USDW1 will be plugged by pulling the well pump (if present) and filling the well with bentonite as is consistent with practices for the abandonment of local groundwater wells. A potential plugging schematic has been provided as Figure 9. Note that the target depth and construction details of the well have not been finalized. This schematic will be finalized following the installation of the well.

A report detailing the procedures and processes followed to plug this well will be submitted to the agency once field activities are complete. This report will be submitted within 60 days of the completion of plugging. Per 40 CFR §146.92(d), Vault GSL CCS LP will retain this report for a period no less than 10 years following site closure.

Claimed as PBI

6.2 Site Closure Report

In accordance with 40 CFR §146.93(f), a site closure report will be prepared and submitted within 90 days following site closure, documenting the information required by 40 CFR §146.93(f), as applicable, including but not limited to the following:

- Plugging of the monitoring wells as well as MPL INJ1 if it has not previously been plugged,
- Location of sealed MPL INJ1 on a plat of survey that has been submitted to the local zoning authority,
- Notifications to state and local authorities as required at 40 CFR §146.93(f)(2),
- Records regarding the nature, composition, and volume of the injected CO₂, and
- Post-injection monitoring records.

In accordance with 40 CFR §146.93(g), Vault GSL CCS LP will record in the real property records of the county where the project is located, notice of the property tracts integrated for the storage facility and proper notice of the MPL INJ1 well that will include the following:

- That the property was used for CO₂ sequestration,
- The name of the local, state, federal, etc. agencies to which a plat of survey with MPL INJ1 location was submitted,
- The volume of fluid injected,
- The formation into which the fluid was injected, and
- The period over which the injection occurred.

In accordance with 40 CFR §146.93(h), the site closure report will be submitted to the permitting agency (EPA) and maintained by the owner or operator for a period of 10 years following site closure. Additionally, the owner or operator will maintain the records collected during the post-injection period for a period of 10 years after which these records will be delivered to the Director.

6.3 Quality Assurance and Surveillance Plan

The Quality Assurance and Surveillance Plan is presented in the QASP (Attachment 10: Quality Assurance and Surveillance Plan, 2025).

7. References

Atekwana, E. A., and R. V. Krishnamurthy, 1998, Seasonal variations of dissolved inorganic carbon and $\delta^{13}\text{C}$ of surface waters: application of a modified gas evolution technique: *Journal of Hydrology*, v. 205, no. 3, p. 265–278, doi:10.1016/S0022-1694(98)00080-8.

Attachment 01: Narrative, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 02: AoR and Corrective Action Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 03: Financial Assurance Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 05: Pre-operational Testing Program, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 06: Testing and Monitoring, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 09: Emergency and Remedial Response Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 10: Quality Assurance and Surveillance Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

Hackley, K., S. Panno, H.-H. Hwang, and W. Kelly, 2007, Groundwater Quality of Springs and Wells of the Sinkhole plain in Southwestern Illinois: Determination of Dominant Sources of Nitrate: *ISGS Circular*, v. 570.