POST-INJECTION SITE CARE AND SITE CLOSURE PLAN
40 CFR 146.93

Project Name: Tri-State CCS Buckeye 2

Facility Information

Facility Contact: Tri-State CCS, LLC
14302 FNB Parkway
Omaha, NE 68154
402-691-9500

Well Location: Jefferson and Harrison Counties, Ohio

Well Name	Latitude (WGS 84)	Longitude (WGS 84)	County
TB2-1	40.52542700	-80.69641700	Jefferson
TB2-2	40.49732800	-80.83907000	Jefferson
TB2-3	40.49763300	-80.71967780	Jefferson
TB2-4	40.45937700	-80.89751600	Jefferson
TB2-5	40.41380300	-80.84988900	Jefferson
TB2-6	40.29706900	-80.83528000	Jefferson
TB2-7	40.29258500	-80.80013900	Jefferson
TB2-8	40.27538400	-80.73308700	Jefferson
TB2-9	40.24805800	-80.71799700	Jefferson
TB2-10	40.22659200	-80.80370600	Jefferson
TB2-11	40.40687700	-80.92462500	Harrison
TB2-12	40.39183000	-80.98459000	Harrison
TB2-13	40.37394700	-80.91794600	Harrison
TB2-14	40.35175500	-81.05526700	Harrison
TB2-15	40.32634200	-80.94335800	Harrison
TB2-16	40.32545800	-80.96751800	Harrison
TB2-17	40.27392800	-80.88990500	Harrison
TB2-18	40.25624300	-80.92103300	Harrison
TB2-19	40.21935400	-80.94936500	Harrison
TB2-20	40.19950300	-80.94510400	Harrison

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List of Acronyms

Al	Aluminum
AOB-#	Above-Zone Observation Well
AoR	Area of Review
APHA	American Public Health Association
ASTM	American Society for Testing and Materials
Ba	Barium
Br	Bromine
Ca	Calcium
CCS	Carbon Capture and Storage
Cd	Cadmium
Cl	Chlorine
CO_2	Carbon Dioxide
Cr	Chromium
CSP	Crosswell Seismic Profile
Cu	Copper
DAS	Distributed Acoustic Sensing
DIC	Dissolved Inorganic Carbon
DTS	Distributed Temperature Sensing
Fe	Iron
Grp	Group
ICP	Inductively Coupled Plasma
IOB-#	In-Zone Observation Well
K	Potassium
KIC	Knox Injection Complex
M	Medina Group
MD	Measured Depth
Mg	Magnesium
MIC	Medina Injection Complex
Mn	Manganese
MS	Mass Spectrometry
Na	Sodium
NO_3	Nitrate
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OES	Optical Emission Spectrometry
P	Pressure
Pb	Lead
pH	Potential of Hydrogen
PISC	Post-Injection Site Care

PNC	Pulsed Neutron Capture
RR	Rose Run Sandstone
psi	Pounds per Square Inch
QASP	Quality Assurance and Surveillance Plan
Sb	Antimony
Se	Selenium
Si	Silicon
SO_4	Sulfate
Ti	Titanium
TB2-#	Tri-State CCS Buckeye 2 Injection Well
TBD	To be determined
UIC	Underground Injection Control
UOB-#	Lowermost USDW Observation Well
USDW	Underground Source of Drinking Water
U.S. EPA	U.S. Environmental Protection Agency
VSP	Vertical Seismic Profile

1. Introduction

This Post-Injection Site Care and Site Closure Plan describes the activities that Tri-State CCS, LLC will perform to meet the requirements of 40 CFR 146.93 at Tri-State CCS Buckeye 2 in Jefferson and Harrison counties, Ohio (the "project'). Injection is planned in 20 wells for 30 years into the Rose Run Sandstone injection interval in the Knox Injection Complex (KIC) followed by 30 years of injection into the Medina Group injection interval in the Medina Injection Complex (MIC). Tri-State CCS, LLC will monitor groundwater quality and track the position of the CO_2 plume and pressure front for 80 years post-injection in the KIC and 50 years post-injection in the MIC. Tri-State CCS, LLC may not cease post-injection monitoring until a demonstration of non-endangerment of USDWs has been approved by the UIC Program Director pursuant to 40 CFR 146.93(b)(3). Following approval for site closure, Tri-State CCS, LLC will plug all monitoring wells, restore the site to its original condition, and submit a site closure report and associated documentation.

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

Based on modeling of the pressure fronts in both the KIC and MIC for the Area of Review (AoR) delineation, pressure in the injection wells decreases rapidly at the end of injection through the first 5 years post-injection, then the rate steadily decreases over the remaining post-injection periods in the KIC and MIC (Figure 1 and Figure 2). Modeling indicates that pressure at the injection wells will not decrease to pre-injection levels during the post-injection periods for the KIC or MIC but steadily decreases to below the critical pressure threshold (362 psi for the Rose Run Sandstone or 226 psi for the Medina Group) from the outer perimeter of wells to the inner. The critical pressure threshold front will be modeled consistently through the PISC period to confirm it has predictable behavior within the bounds of the AoR. Figure 3 and Figure 4 show the pressure differential with time at the top of the injection zones at the proposed monitoring well locations. The CO_2 plume area and extent of the critical pressure threshold front (using a 362-psi cut-off) in the Rose Run Sandstone with time is presented in Figure 5, with the CO_2 plume area being calculated by determining the area of the vertically integrated CO_2 mass per unit area for a single plume, representing the area of each plume. Figure 6 shows the CO_2 plume area and extent of the critical pressure threshold front (using a 226-psi cut-off) in the Medina Group. Additional information on the projected post-injection pressure declines and differentials and CO_2 plume shape and extent is presented in Section 2.0 of the Area of Review and Corrective Action Plan.

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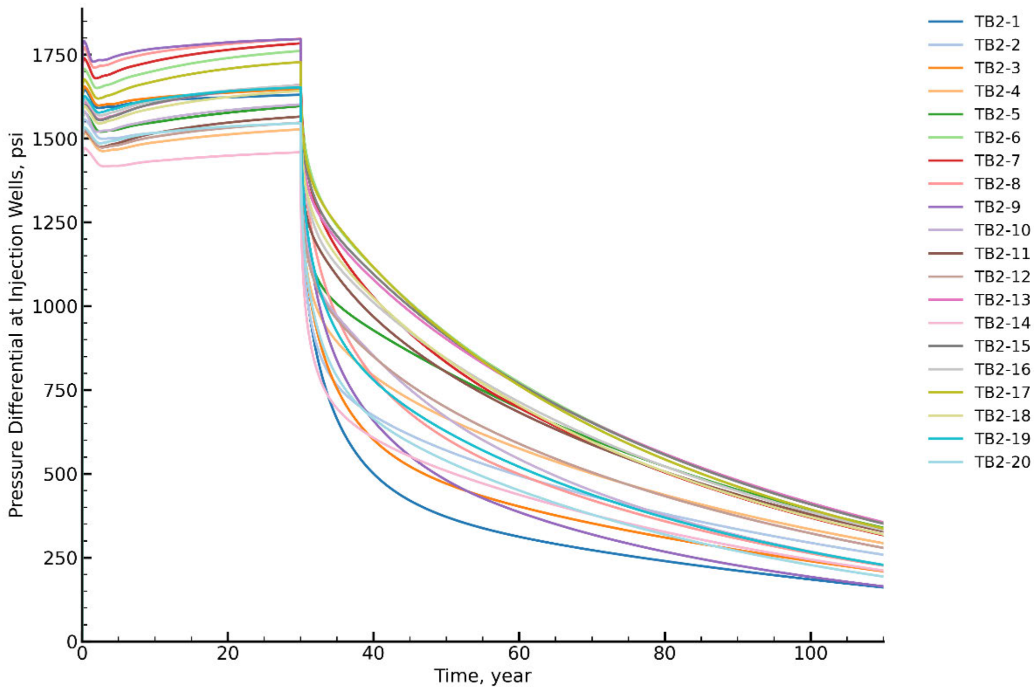

Figure 1: Simulated pressure differential at injection wells perforated in the Rose Run Sandstone, assuming 30 years of injection into the Rose Run Sandstone followed by 80 years post-injection in the Rose Run Sandstone.

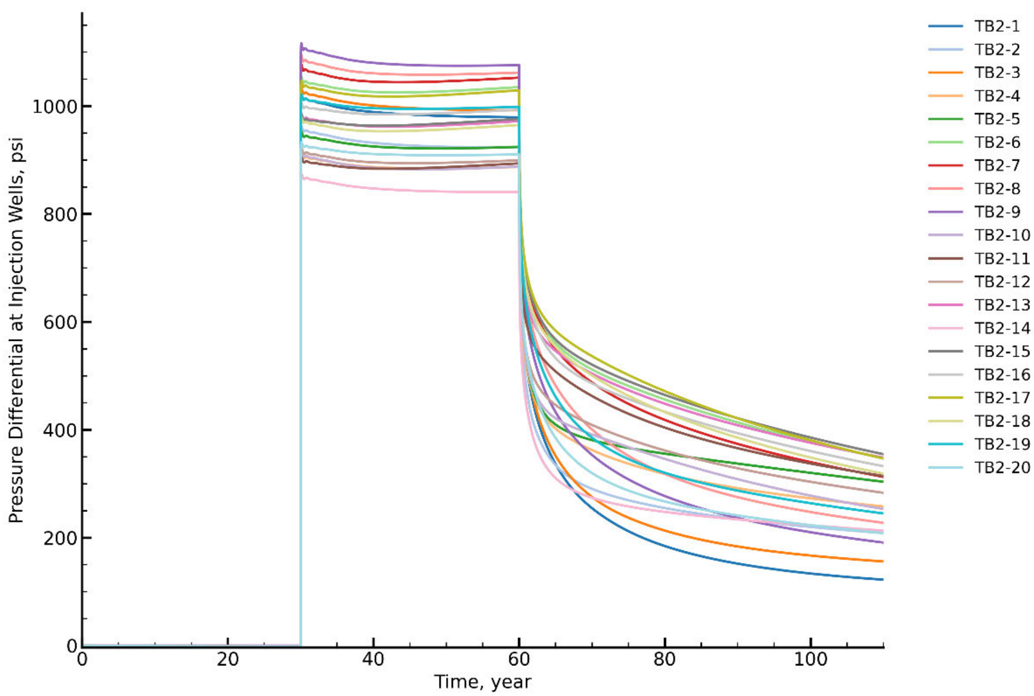

Figure 2: Simulated pressure differential at injection wells perforated in the Medina Group, assuming no injection in the Medina Group for the first 30 years followed by 30 years of injection into the Medina Group and 50 years post-injection in the Medina Group.

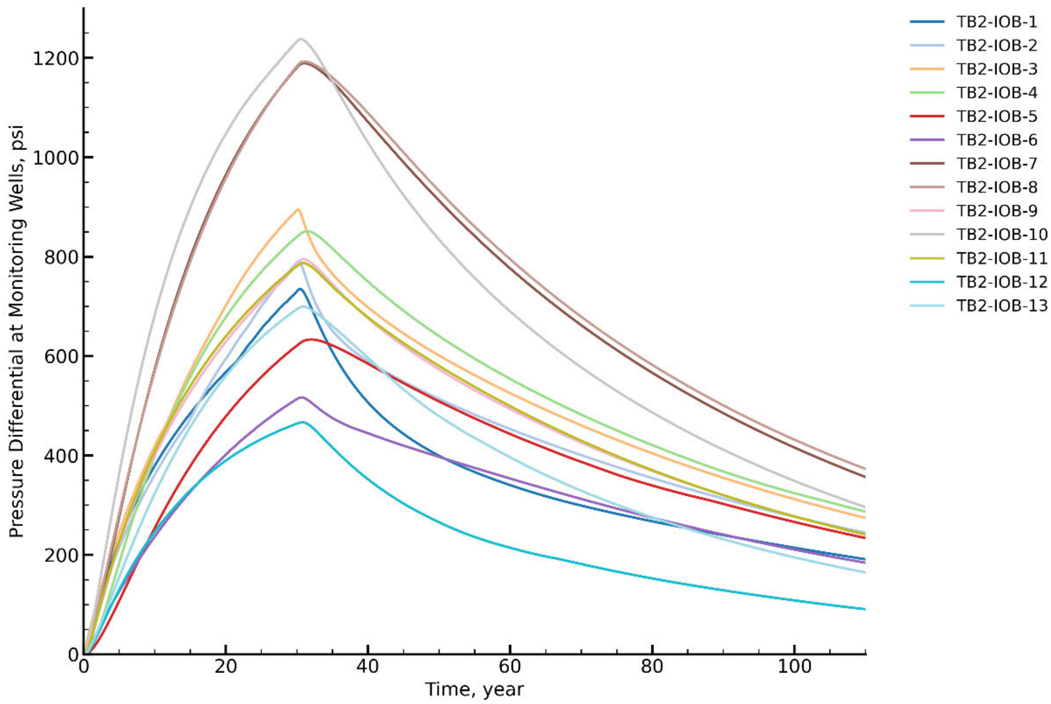

Figure 3: Simulated pressure differential at monitoring wells perforated in the Rose Run Sandstone, assuming 30 years of injection into the Rose Run Sandstone followed by 80 years post-injection in the Rose Run Sandstone.

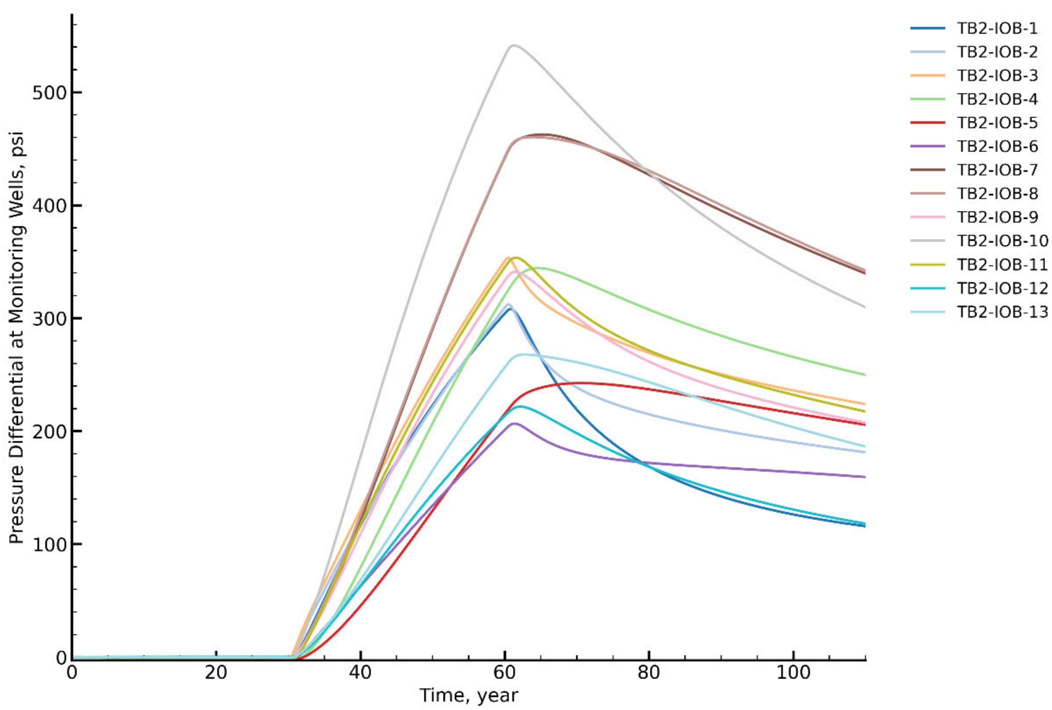

Figure 4: Simulated pressure differential at monitoring wells perforated in the Medina Group, assuming no injection in the Medina Group for the first 30 years followed by 30 years of injection into the Medina Group and 50 years post-injection in the Medina Group.

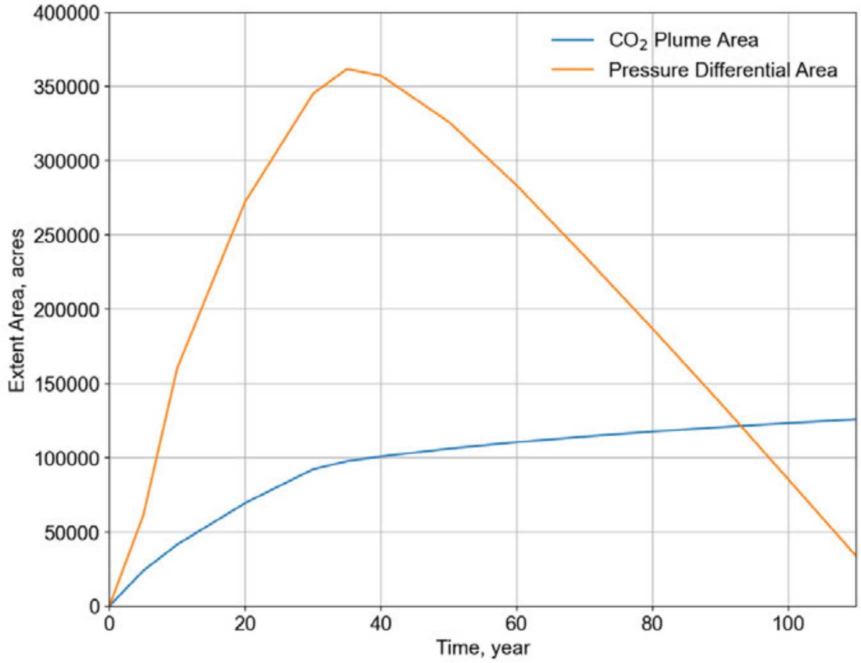

Figure 5: Extent of the critical pressure threshold front (at 362 psi cut-off) and CO_2 plume area in the Rose Run Sandstone with time summed over all twenty injection wells, assuming 30 years of injection followed by 80 years post-injection in the Rose Run Sandstone. Each distinct CO_2 plume area is determined as defined by the vertically integrated mass of gas CO_2 per area (VIMPA).

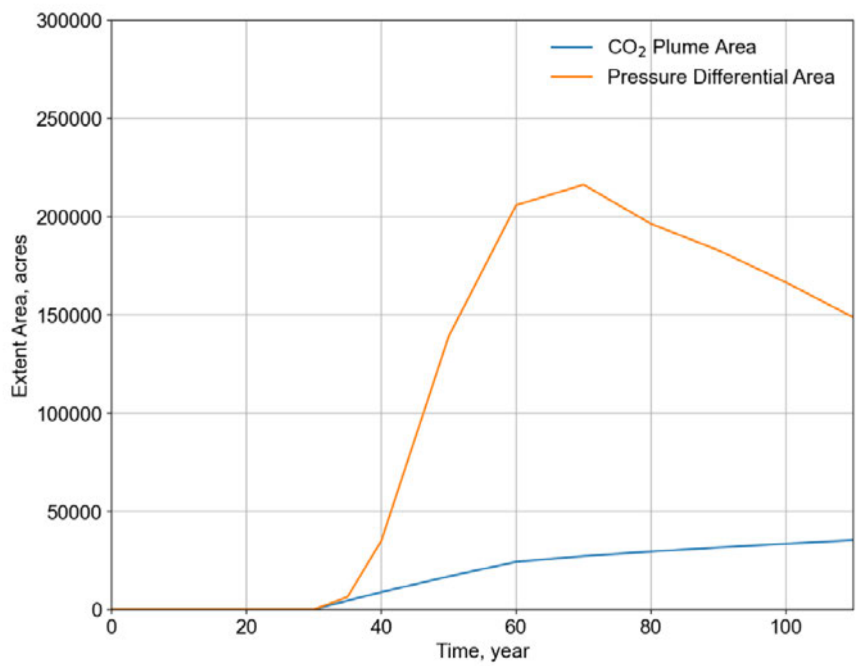

Figure 6: Extent of the critical pressure threshold front (at 226 psi cut-off) and CO_2 plume area in the Medina Group with time summed over all twenty injection wells, assuming no injection in the Medina Group for the first 30 years followed by 30 years of injection and 50 years post-injection in the Medina Group. Each distinct CO_2 plume area is determined as defined by the vertically integrated mass of gas CO_2 per area (VIMPA).

3. Predicted Position of the CO_2 Plume and Associated Pressure Front at Site Closure [40 CFR 146.93(a)(2)(ii)]

Figure 7 shows the predicted extent of the CO_2 plume and critical pressure threshold front in the KIC at site closure (after 30 years of injection and 80 years post-injection). The maximum extent of the CO_2 plume in the KIC occurs at site closure. The maximum extent of the critical pressure threshold front in the KIC in some areas occurs at the end of the injection; however, in other areas, it occurs 10 years after the end of injection. After that, the extent of the critical pressure threshold front in the Rose Run Sandstone continuously shrinks. At site closure, modeling indicates the pressure differential has decreased below the critical pressure threshold at 19 of the 20 injection wells.

Figure 8 shows the predicted extent of the CO_2 plume and critical pressure threshold front in the MIC at site closure (after 30 years of no injection followed by 30 years of injection and 50 years post-injection). The maximum extent of the CO_2 plume in the MIC occurs at site closure. The maximum extent of the critical pressure threshold front occurs at different times in different areas, however, it decreases in all areas after 30 years post-injection in the MIC. After that, the extent of the critical pressure threshold front in the Medina Group continuously shrinks. At site closure, modeling indicates the pressure differential decreases below the critical pressure threshold at 7 of the injection wells on the outer perimeter of the project.

The critical pressure threshold front in both the KIC and MIC will be monitored through the PISC period to confirm it has predictable behavior within the bounds of the AoR and to ensure nonendangerment of USDWs. For more information on the temporal evolution of the CO_2 plume and critical pressure threshold front and AoR delineation, see the modeling results submitted pursuant to 40 CFR 146.84 and presented in Section 3.0 of the Area of Review and Corrective Action Plan.

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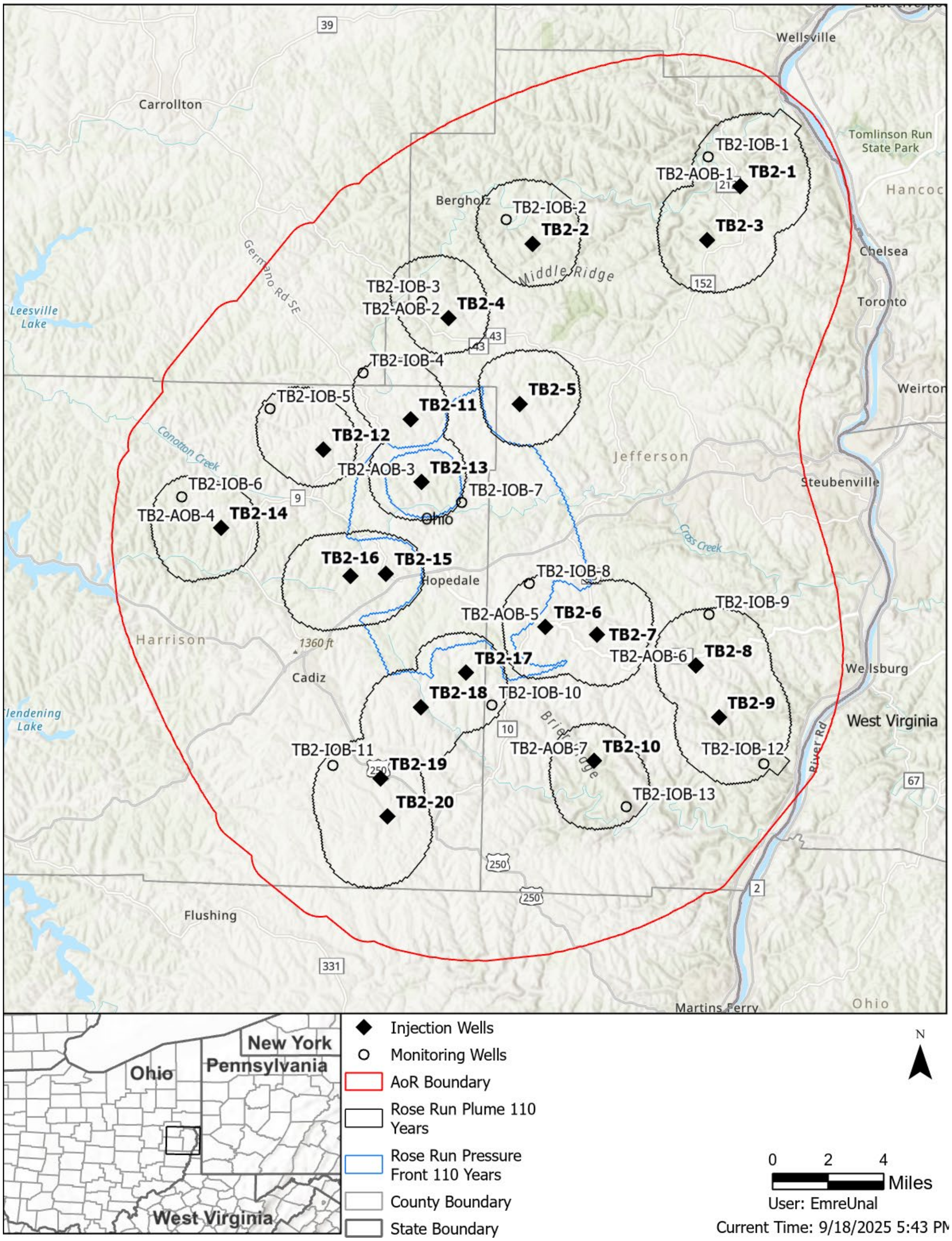

Figure 7: Map of the AoR and predicted extent of the CO_2 plume and critical pressure threshold front at site closure in the KIC, after 30 years of injection followed by 80 years post-injection.

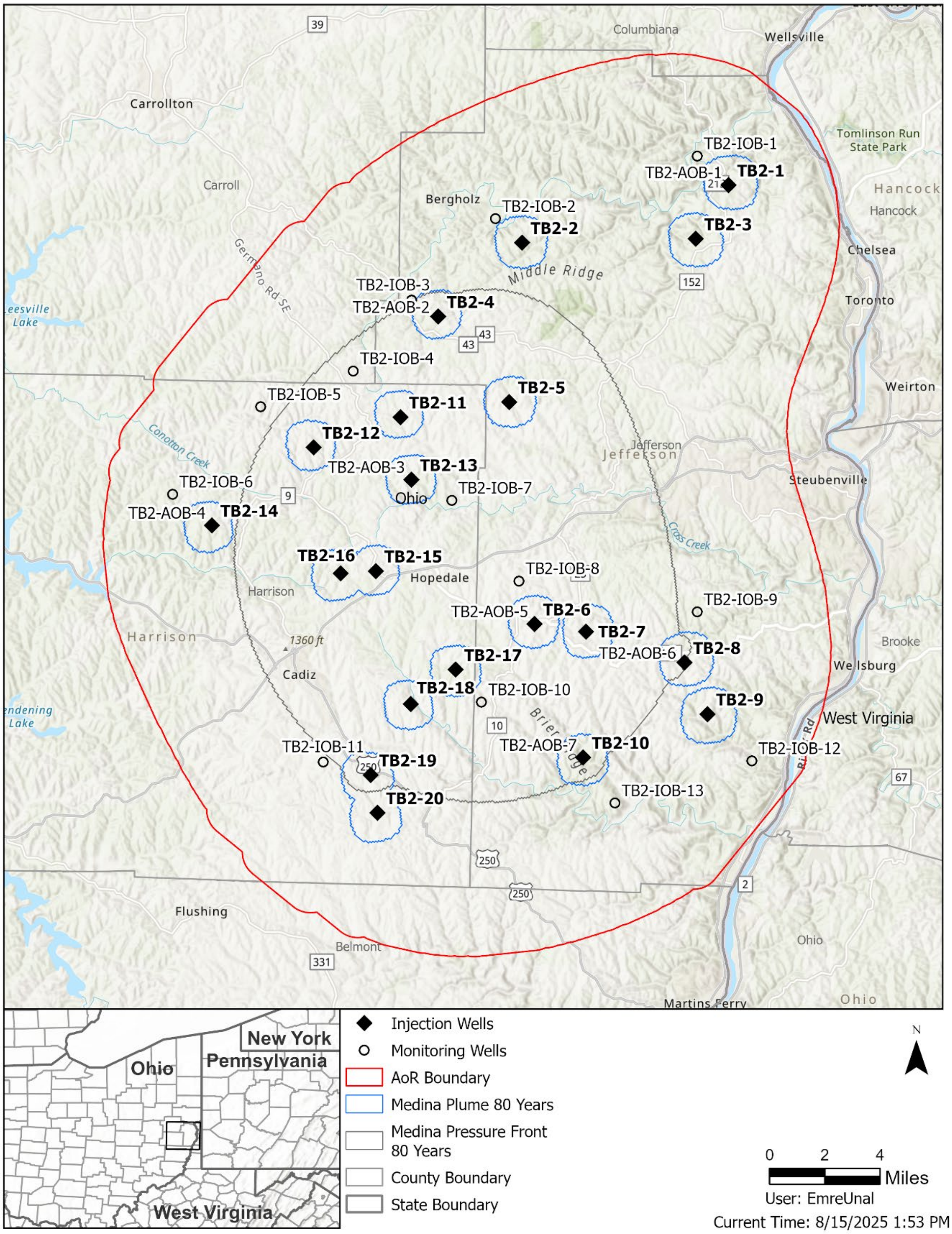

Figure 8: Map of the AOR and predicted extent of the CO_2 plume and critical pressure threshold front at site closure in the MIC, after 30 years of no injection followed by 30 years of injection and 50 years post-injection.

4. Post-Injection Monitoring Plan [40 CFR 146.93(b)(1)]

Performing groundwater monitoring, lowermost underground source of drinking water (USDW) monitoring, and injection formation pressure and temperature monitoring as described in the following sections during PISC timeframe of 80 years post-injection in the KIC and 50 years post-injection in the MIC will meet the requirements of 40 CFR 146.93(b)(1). PISC monitoring following injection into the KIC will occur in the first permeable unit above the Wells Creek Formation confining zone. PISC monitoring following injection into the MIC will occur in the first permeable unit above the Rochester Shale Formation confining zone. The first permeable unit will be defined as the first unit above the confining zone of the injection complex with porosity ≥3% and permeability ≥ 1 md, unless an alternate permeable unit is identified during drilling and evaluation of the injection well. The results of all post-injection phase testing and monitoring will be submitted annually, within 60 days following the anniversary date of the date on which injection ceases or with the prior approval of the UIC Program Director, as described under subsection 4.3 below. Pursuant to 40 CFR 146.93(b)(2), however, Tri-State CCS, LLC could propose a shorter PISC timeframe after injection ceases if merited based on review of the plume relaxation. Such a proposal would be made based on a demonstration to the UIC Program Director that a shorter period would be protective of USDWs.

Following the cessation of injection into the MIC, all injection wells may be converted to monitoring wells that will contribute monitoring data for five years at the discretion of Tri-State CCS, LLC, as they did during the injection phase of the project. If the injection wells are not converted into monitoring wells, they will be plugged and abandoned. See the Injection Well Plugging Plan for each injection well for more details. No monitoring technologies will be added during the PISC phase of the project. The post-injection phase will include monitoring for gas leaks in the wellheads and valves, external mechanical integrity testing, groundwater sampling, direct pressure and temperature measurements, and indirect and direct plume tracking. Every five years during the PISC phase of the project, the monitoring data will be incorporated into computational models, and the monitoring plan will be reviewed and updated, if needed, based on modeling results. Details on the specific technologies utilized and frequency for monitoring strategies pursuant to 40 CFR 146.93(a)(iii) are provided in Table 1 below. Please refer to the Testing and Monitoring Plan for more detailed information on the testing and monitoring technologies. The monitoring strategy utilizes a fixed frequency schedule to collect data. A Quality Assurance and Surveillance Plan (QASP) for all testing and monitoring activities is provided in the appendix to the Testing and Monitoring Plan.

Tri-State CCS, LLC plans to secure options for rights to surface access in the AoR for the life of the project. In-well monitoring technologies will be implemented until the start of each well's plugging and abandonment procedure. All PISC monitoring technologies will be implemented for a minimum of 50 years or according to the Director-approved alternate PISC timeframe if proposed.

Table 1: PISC monitoring strategy & frequency.

Monitoring Category	Monitoring Method		Post-Injection Frequency
Monitoring Plan Update	Reviewed every 5 years. Updated as required		As required
Mechanical Integrity Testing	*Internal*	Pressure Monitoring	Continuous *(monitors)*
Groundwater Quality and Geochemistry Monitoring (Above-Zone)	Fluid Sampling		Annually
Direct Pressure Monitoring	Electronic Pressure gauges		Continuous
Indirect Plume Monitoring Techniques	*Fiber/Wireline*	DTS	Continuous
		PNC	Every 5 Years

4.1. Monitoring Above the Confining Zone

Table 2 presents the monitoring methods, locations, and frequencies for monitoring above the confining zones during the PISC timeframe. Table 3 identifies the parameters to be monitored and the analytical methods Tri-State CCS, LLC will employ. Table 4 indicates the frequency of continuous monitoring during the PISC period.

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Table 2: Monitoring of groundwater quality and geochemical changes above the confining zones during the PISC timeframe.

Target Formation	Monitoring Activity	Monitoring Location(s)	Spatial Coverage	Frequency
Sharon Sandstone (Lowermost USDW)	Fluid Sampling	Lowermost USDW observation wells	11 Well Locations	Annually
	Downhole P Gauge		Vertical (ft. MD): TB2-UOB-1: ~1,037 TB2-UOB-2: ~784 TB2-UOB-5: ~820 TB2-UOB-9: ~966 TB2-UOB-10: ~755 TB2-UOB-12: ~768 TB2-UOB-13: ~803 TB2-UOB-14: ~726 TB2-UOB-17: ~931 TB2-UOB-19: ~921 TB2-UOB-20: ~812	Continuous
TBD[1] (First permeable unit over confining zones of each injection complex)	Fluid Sampling	Above-zone observation wells	7 Well Locations	Annually
	Downhole P Gauge		Vertical (ft. MD): TB2-AOB-1: TBD[1] TB2-AOB-2: TBD[1] TB2-AOB-3: TBD[1] TB2-AOB-4: TBD[1] TB2-AOB-5: TBD[1] TB2-AOB-6: TBD[1] TB2-AOB-7: TBD[1]	Continuous

[1] The first permeable unit for the two injection complexes will be defined as the first unit above the confining zones of the injection complex with porosity ≥ 3% and permeability ≥ 1 md. These cutoffs are subject to change based on subsurface data collected during pre-operational testing for each injection well and from CarbonSAFE stratigraphic test wells, as available.

Table 3: Summary of analytical and field parameters for groundwater samples.

Parameters	Analytical Methods
SHARON SANDSTONE	
Cations: Al, Ba, Mn, As, Cd, Cr, Cu, Pb, Sb, Se, and Ti	ICP-MS, U.S. EPA Method 6020B (2014a) or U.S. EPA Method 200.8 (1994a)
Cations: Ca, Fe, K, Mg, Na, and Si	ICP-OES, U.S. EPA Method 6010D (2014b) or U.S. EPA Method 200.7 (1994b)
Anions: Br, Cl, F, NO_3, and SO_4	Ion Chromatography, U.S. EPA Method 300.0 (1993)
Isotopes: δ^{13} C of DIC	Isotope ratio mass spectrometry
Dissolved CO_2 Total Dissolved Solids Water Density Alkalinity pH (field) Specific conductance (field)	Coulometric titration, ASTM D513-16 (2016) Gravimetry, APHA 2540C Oscillating body method APHA 2320B (1997) U.S. EPA 150.1 (1982) APHA 2510 (1992)

Parameters	**Analytical Methods**
Temperature (field)	Thermocouple
FIRST PERMEABLE UNITS ABOVE CONFINING ZONES	
Cations: Al, Ba, Mn, As, Cd, Cr, Cu, Pb, Sb, Se, and Tl	ICP-MS, U.S. EPA Method 6020B (2014a) or U.S. EPA Method 200.8 (1994a)
Cations: Ca, Fe, K, Mg, Na, and Si	ICP-OES, U.S. EPA Method 6010D (2014b) or U.S. EPA Method 200.7 (1994b)
Anions: Br, Cl, F, NO_3, and SO_4	Ion Chromatography, U.S. EPA Method 300.0 (1993)
Isotopes: δ^{13} C of DIC	Isotope ratio mass spectrometry
Dissolved CO_2 Total Dissolved Solids Water Density Alkalinity pH (field) Specific conductance (field) Temperature (field)	Coulometric titration, ASTM D513-16 (ASTM, 2016) Gravimetry, APHA 2540C Oscillating body method APHA 2320B (1997) U.S. EPA 150.1 (1982) APHA 2510 (1992) Thermocouple

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Table 4: Sampling and recording frequencies for continuous monitoring during PISC timeframe.

Parameter	Device(s)	Location	Min. Sampling Frequency	Min. Recording Frequency
Pressure	Pressure Gauge	Injection Wells; In-Zone Observation Wells; Above-Zone Observation Wells; Lowermost USDW Observation Wells	5 sec.	5 mins.
Temperature	DTS	Injection Wells In-Zone Observation Wells	10 min. / 12 hours	10 min. /12 hours

Notes:

- 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.
- 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.

4.2. Carbon Dioxide Plume and Pressure Front Tracking [40 CFR 146.95(a)(2)(iii)]

Tri-State CCS, LLC will employ direct and indirect methods to track the extent of the CO_2 plume and the presence or absence of elevated pressure during the PISC timeframe. Table 5 presents the indirect methods that Tri-State CCS, LLC will use to monitor the CO_2 plume, including the activities, locations, and frequencies Tri-State CCS, LLC will employ.

Table 6 presents the direct methods that Tri-State CCS, LLC will use to monitor the pressure front, including the activities, locations, and frequencies that will be employed.

Sample handling and custody will be performed as described in subsection 2.3 of the QASP; and quality control will be ensured using the methods described in subsection 2.5 of the QASP.

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Table 5: Post-injection phase plume monitoring.

Target Formation	Monitoring Activity	Monitoring Location(s)	Spatial Coverage	Frequency
INDIRECT PLUME MONITORING				
Rose Run Sandstone in the KIC and Medina Group in the MIC (Injection Intervals)	DTS	Injection wells; In-zone observation wells	Continuous to full well depth	Continuous
	PNC	Injection wells	To full well depth	Every 5 Years
	PNC	In-zone observation wells; Above zone observation wells; Lowermost USDW observation wells	To full well depth	PNC logging will only occur in wells with detected CO_2 breakthrough and suspected containment loss.
	Repeat 3D DAS VSP/CSP	TBD[1]	TBD	TBD

[1] While DAS is planned to be included in some of the wells, the exact wells and the exact frequency will depend on the evolution of the plume and independent observations from other monitoring methods over time.

Table 6: Post-injection phase pressure-front monitoring.

Target Formation	Monitoring Activity	Monitoring Location(s)	Spatial Coverage	Frequency
DIRECT PRESSURE-FRONT MONITORING				
Rose Run Sandstone in the KIC and Medina Group in the MIC injection zones	P Gauges	Injection wells; In-zone observation wells	Above the Packer – Ported to Upper Medina Group and Rose Run Sandstone depending on the injection zone in each well	Continuous
First Permeable Unit above Confining Zones		Above zone observation wells	Above Packer - Ported to first permeable units above Confining Zones	Continuous
Sharon Sandstone (lowermost USDW)		Lowermost USDW observation wells:	Above Packer – Ported To Sharon Sandstone (Aquifer)	Continuous

4.3. Schedule for Submitting Post-Injection Monitoring Results [40 CFR 146.93(a)(2)(iv)]

All PISC monitoring data and monitoring results collected using the methods described above will be submitted to the UIC Program Director annually, within 60 days following the anniversary date on which injection in the MIC ceases or alternatively with the prior approval of the UIC Program Director. During the 30-year period of injection into the MIC, PISC monitoring results for the KIC will be submitted semi-annually as part of the monitoring for the MIC, other than the groundwater sampling which will be submitted annually. The reports will contain information and data generated during the reporting period, i.e., well-based monitoring data, sample analysis, and the results from updated site models.

5. Non-Endangerment Demonstration Criteria

Prior to approval of the end of the post-injection phase, Tri-State CCS, LLC will submit a demonstration of non-endangerment of USDWs to the UIC Program Director, per 40 CFR 146.93(b)(2) and (3).

Tri-State CCS, LLC will issue a report to the UIC Program Director that makes 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 UIC Program 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 Post-Injection Site Care 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 the Testing and Monitoring Plan and this Post-Injection Site Care and Site Closure Plan, 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 UIC Program 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 results of computational modeling used for AoR delineation will be compared to monitoring data collected during injection and the PISC period. The data will include the results of time-lapse temperature and pressure monitoring, and groundwater quality analysis used to update the computational model and to monitor the site. Data generated during the PISC period will be used to help show that the computational model accurately represents the storage site and can be used as a proxy to determine the plumes' properties and sizes. Tri-State CCS, LLC will demonstrate this degree of accuracy by comparing the monitoring data obtained during the PISC period against the model's predicted properties (i.e., plume locations, rates of movement, pressure decay). Statistical methods will be employed to correlate the data and confirm the model's ability to accurately represent the storage site. The validation of the computational model with the large volume of available data will be a significant element to support the non-endangerment demonstration. The validation of the complete model over the areas, and at the points, where direct data is collected will help to ensure confidence in the model for those areas where surface infrastructure preclude geophysical data collection and where direct observation wells cannot be placed.

5.3.1. Evaluation of Reservoir Pressure

Tri-State CCS, LLC will support the demonstration of non-endangerment to USDWs by showing that, during the PISC period, the pressure in the injection zones has decreased towards pre-injection static reservoir pressure values. The increased pressure during injection is the main driving force for fluid movement that may endanger a USDW. Therefore, the decay in pressure differentials will provide justification that the injectate does not pose a risk to any USDWs.

During the PISC period, Tri-State CCS, LLC will monitor downhole pressure gauges and collect formation pressure data that will be used to evaluate pressure decline and resulting non-endangerment to USDWs. The measured pressure at a specific depth interval will be compared against the pressure predicted by the numerical simulation. Agreement between the predicted values will help validate the accuracy of the model and demonstration of non-endangerment.

5.3.2. Evaluation of CO_2 Plume

The plume areas are expected to increase in aerial extent over time, while decreasing notably in CO_2 saturation density. During the PISC period, the CO_2 saturation density in each injection zone will be monitored to understand the evolution of the plume fronts. Tri-State CCS, LLC will use direct pressure monitoring to track the pressure front evolution in both injection zones throughout the project's life. DTS technology will be run on the outside of the long string casing along the entirety of all injection and in-zone observation wellbores. PNC logging will be used in the injection wells, any in-zone observation wells, or any above-zone / lowermost USDW observation wells with detected containment loss. A good correlation between data sets and modeled plume thicknesses will help provide strong evidence in validating the model's ability to represent the storage system.

Both the DTS and PNC data will be used to verify the computational model's ability to predict the CO_2 behavior in the PISC phase of the project and support a demonstration of non-endangerment of USDWs at the end of the project.

5.3.3. Evaluation of Emergencies or Other Events

During injection and the PISC phase of the project, measurement of water quality parameters from monitoring wells will be used to demonstrate that the storage formation fluids have not migrated above the confining formations and, thus, do not pose a risk to USDWs. To demonstrate non-endangerment, the project will compare the results of the fluid sampling from the lowermost USDW from the injection and PISC phases to the pre-injection baseline samples. This comparison will demonstrate whether significant changes in fluid properties of the overlying formations have occurred and whether mobilized storage formation fluids have moved through the confining layer. All wells associated with the project will be plugged and abandoned appropriately, per the Plugging Plan for each injection well and this Post-Injection Site Care and Site Closure Plan. Legacy wells will be remediated in accordance with the Area of Review and Corrective Action Plan. Tri-State CCS, LLC will retain surface access to the AoR through pore space agreements for the life of the project.

6. Site Closure Plan

Tri-State CCS, LLC will conduct site closure activities to meet the requirements of 40 CFR 146.93(e). The procedure for site closure is described below, but the actual site closure plan may employ different methods and procedures. A final Site Closure Plan will be submitted to the UIC Program Director for approval with the notification of the intent to close the site.

6.1. Site Closure Procedure

Tri-State CCS, LLC will notify the UIC Program Director at minimum 120 days prior to site closure. Upon receiving authorization for site closure, all monitoring wells shall be plugged and abandoned (P&A) as outlined in subsection 6.3 below. The following steps are to be used as a general guide during site closure:

- Notify the UIC Program Director and all relevant local, state, and federal government agencies of intent to close the project site.
- Decommission equipment.
- P&A all monitoring and related project wells.
- Return well locations to pre-injection conditions including site reclamation, as necessary.
- Complete and submit the Site Close Report to the UIC Program Director within 90 days.

6.2. Equipment Decommissioning

The decommissioning of equipment will be completed in two steps: after the cessation of injection in the MIC where equipment required to inject CO_2 is no longer necessary and at the end of the PISC period.

Step 1: After cessation of injection in the MIC, surface equipment necessary to safely sequester CO_2 such as pumps, flowlines, flowmeter, annular pressure monitoring equipment, and piping and control equipment will no longer be necessary and shall be dismantled and removed from the project.

Step 2: After the PISC period, surface equipment related to the monitoring activities demonstrated in this plan and as part of the PISC period outlined in the Testing and Monitoring Plan will be decommissioned. This includes the plugging and abandonment of all project wells, removal of surface facilities, and reclamation of the land to pre-injection conditions. The plugging and abandonment procedures are outlined below and are designed to ensure containment of the injected CO_2 and for protection of USDWs.

6.3. Site Closure Plugging Program

Once the UIC Program Director has authorized site closure, all observation wells will be plugged and abandoned following state regulations described in subsection 6.3.1 below. Plugging will be in a manner similar to that described in the Injection Well Plugging Plan to prevent migration of CO_2 in formation fluids to the USDWs. Each well will be plugged and abandoned using best practices to ensure no fluid movement between the injection zone and the USDWs. The internal and external integrity of the wells will be confirmed by conducting either a temperature log, noise log, or oxygen activation log before the wells are plugged. Additionally, a pressure fall-off test will be performed above the perforated intervals, where present, to confirm well integrity. The logging results will be reviewed and approved by the appropriate regulatory agencies before plugging the wells.

6.3.1. State Requirements

All wells will follow the state regulations with respect to plugging and abandonment and well site closure pursuant to Ohio Administrative Code (OAC) Chapter 1509:9-11 including but not limited to:

- Permit to Plug (ODNR Form 1P): Prior to initiating plugging activities, Tri-State CCS, LLC will submit an application for a Permit to Plug to the Ohio Department of Natural Resources (ODNR) for each observation well along with a Plugging Plan, Ohio Registered Surveyor's Plat, well completion record, and fee. Plugging activities shall not begin until ODNR issues the permit and the ODNR inspector is notified at least 24 hours prior to commencement. [OAC 1409:9-11-02 and 04]
- The plugging plan will be designed to isolate oil, natural gas, hydrogen sulfide, brine, water, or other fluids to the reservoir rock in which it occurs or originates, isolate mineable coal seams, and prevent movement of fluids into or between USDWs. [OAC 1409:9-11-03]
- Within 30 days of plugging completion, a plugging report shall be submitted to the ODNR that includes a cementing ticket and an affidavit attesting that all information included in the report and the attached tickets are true and accurate. [OAC 1409:9-11-12]

6.3.2. Site Restoration

At the direction of the UIC Program Director, Tri-State CCS, LLC will restore the site to a condition agreed to with the UIC Program Director, as close to pre-injection conditions as possible. This includes removing surface equipment, road access, and any other facilities that remain on location. The preliminary vegetation type and density of the area will be utilized to ensure that pre-injection conditions are established.

6.3.3. Site Closure Report

Within 90 days of site closure, Tri-State CCS, LLC shall submit a Site Closure Report to the UIC Program Director. This report will be retained at a location designated by the UIC Program Director for 10 years. The report will contain at minimum the following information:

- Documentation of appropriate injection and monitoring well plugging;
- Location of sealed injection wells on a plat of survey that has been submitted to Jefferson or Harrison County, depending on the well's location;
- 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 CO_2; and
- Post-injection monitoring records.

Tri-State CCS, LLC will record a notation to the property's deed on which each injection well was located that will indicate the following:

- That the property was used for CO_2 sequestration;
- The name of the local agency to which a plat of survey with injection well location was submitted;
- The volume of fluid injected;
- The formations into which the fluid was injected; and
- The period over which the injection occurred.

The Site Closure Report will be submitted to the UIC Program Director and maintained by Tri-State CCS, LLC for a period of 10 years following site closure. Additionally, Tri-State CCS, LLC 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 UIC Program Director.

7. References

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American Public Health Association (APHA), SM 2540 C. "Standard Methods for the Examination of Water and Wastewater", APHA-AWWA-WPCF, 20th Edition (SDWA) and 21st Edition (CWA).

ASTM Standard D513-11, (2016). "Standard Test Methods for Total and Dissolved Carbon Dioxide in Water," ASTM International, West Conshohocken, PA. DOI: 10.1520/D0513-11E01, www.astm.org.

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U.S. EPA, (1993). "Method 300.0: "Methods for the Determination of Inorganic Substances in Environmental Samples." Revision 2.1. Washington, DC.

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