

Underground Injection Control – Class VI Permit Application for

High West CCS Project Spoonbill No. 001 to 005

St. Charles and Jefferson Parishes, Louisiana

SECTION 7 – POST-INJECTION SITE CARE AND SITE CLOSURE PLAN

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7.1. Introduction

This Post-Injection Site Care (PISC) and Site Closure plan describes the activities that High West Sequestration LLC (High West) will perform to meet the requirements of Statewide Order (SWO) 29-N-6 **§3633**. High West will monitor groundwater quality and track the position of the CO₂ plume and pressure front for the PISC timeframe. High West may not cease post-injection monitoring for 50 years or until a demonstration of non-endangerment of underground sources of drinking water (USDW) has been approved by the Louisiana Department of Energy and Natural Resources (LDENR) Commissioner of Conservation (Commissioner) pursuant to SWO 29-N-6 **§3633.2.c**. Following approval for site closure, High West will plug all monitoring wells, restore the site to its original condition, and submit a site closure report and associated documentation.

7.2. Pre- and Post-Injection Pressure Differential

The following information is submitted to support SWO **§3633.A.1.b**.

Based on modeling the pressure front as part of the area of review (AOR) delineation, pressure at the injection well is expected to decrease to approximately pre-injection levels 20 years after the cessation of injection.

The maximum predicted pressure differential over the life of the project is approximately 1,341 psi, expected to occur at Spoonbill No. 003 during injection. The predicted critical pressure front dissipates completely approximately 10 years after the injection has ceased. The largest critical pressure front is expected to occur in Zone 1 (Spoonbill No. 001) at the end of injection.

Table 7-1 – Maximum Pressure Differential by Year

Year	Spoonbill No. 001 (psi)	Spoonbill No. 002 (psi)	Spoonbill No. 003 (psi)	Spoonbill No. 004 (psi)	Spoonbill No. 005 (psi)
1	1,315	607	1,341	909	953
2	1,324	642	1,341	912	953
3	1,323	660	1,341	927	953
4	1,318	671	1,341	939	953
5	1,312	678	1,341	948	953
6	1,304	683	1,341	954	948
7	1,296	687	1,341	958	938
8	1,286	689	1,341	961	930
9	1,279	691	1,341	962	924
10	1,271	692	1,341	962	919
11	1,263	693	1,341	962	914
12	1,256	693	1,341	961	908

Year	Spoonbill No. 001 (psi)	Spoonbill No. 002 (psi)	Spoonbill No. 003 (psi)	Spoonbill No. 004 (psi)	Spoonbill No. 005 (psi)
13	1,250	693	1,341	960	903
14	1,244	692	1,341	958	898
15	1,239	691	1,341	957	893
16	1,234	690	1,341	955	887
17	1,230	689	1,341	953	883
18	1,225	688	1,341	951	878
19	1,222	687	1,341	949	873
20 (End of Injection)	1,217	685	1,341	947	868
25	95	83	68	89	67
30	33	41	27	44	46
35	14	28	20	33	42
40	8	23	19	29	40
45	5	20	18	27	39
50	4	18	18	26	38
55	3	17	17	25	37
60	2	16	17	25	37
70	1	15	17	24	36

Figures 7-1 through 7-5 present graphical representations of the data in Table 7-1, showing the pressure differential over the life of both injection wells. The dark green line represents the increase from in situ pressure, and the lighter color line represents the maximum pressure gradient. The red dotted line shows the pressure constraint (0.628 psi/ft) imposed on each well, indicating the model does not surpass this maximum pressure.

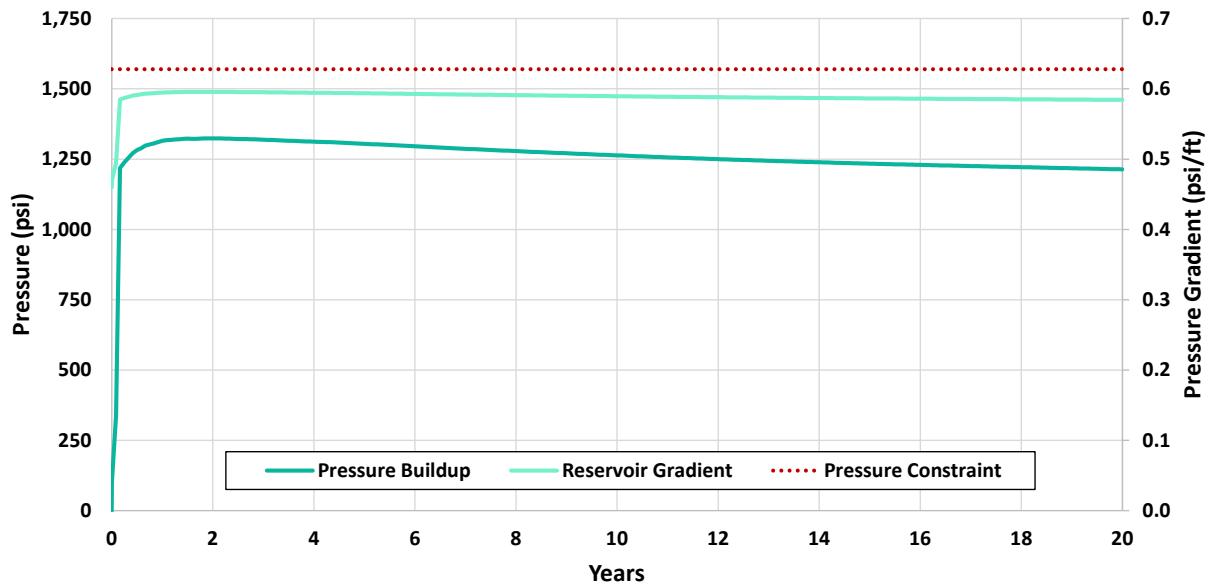


Figure 7-1 – Maximum Pressure Differential for Spoonbill No. 001

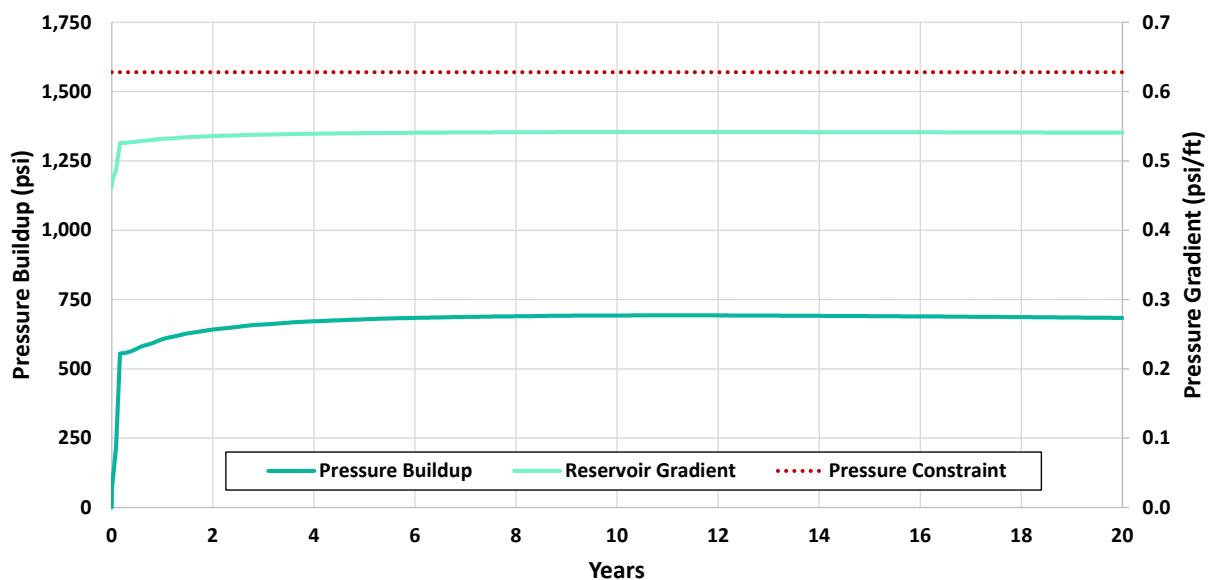


Figure 7-2 – Maximum Pressure Differential for Spoonbill No. 002

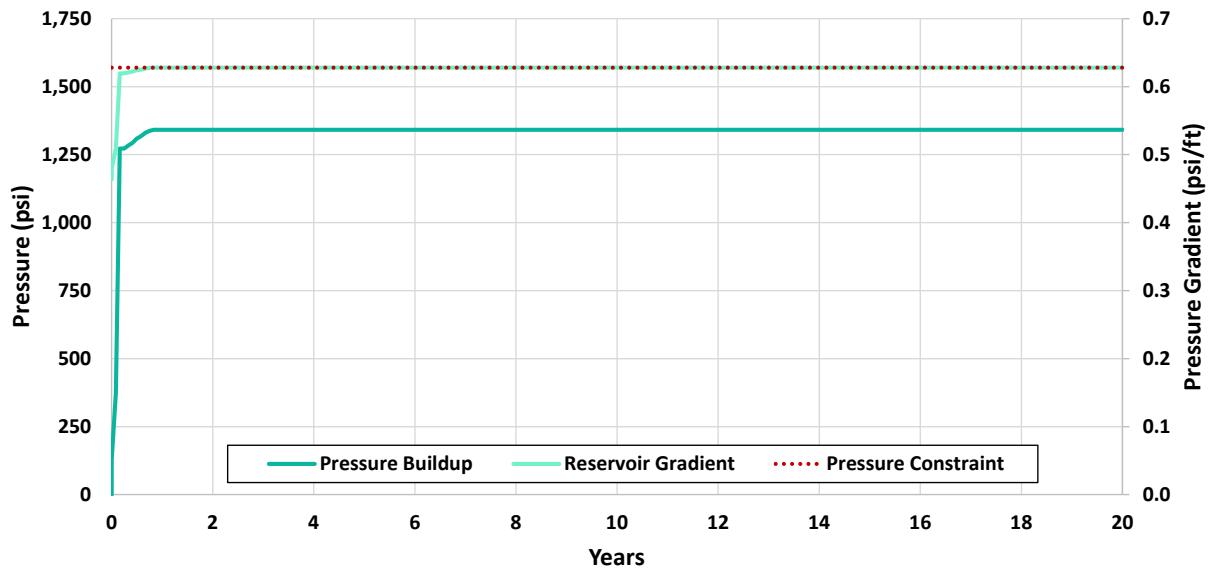


Figure 7-3 – Maximum Pressure Differential for Spoonbill No. 003

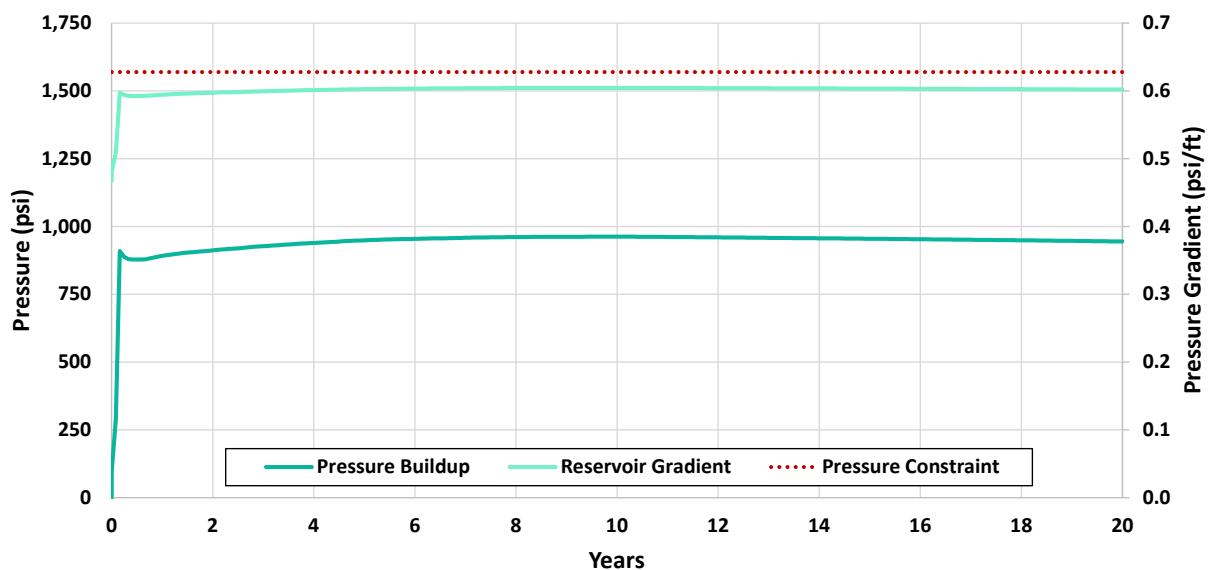


Figure 7-4 – Maximum Pressure Differential for Spoonbill No. 004

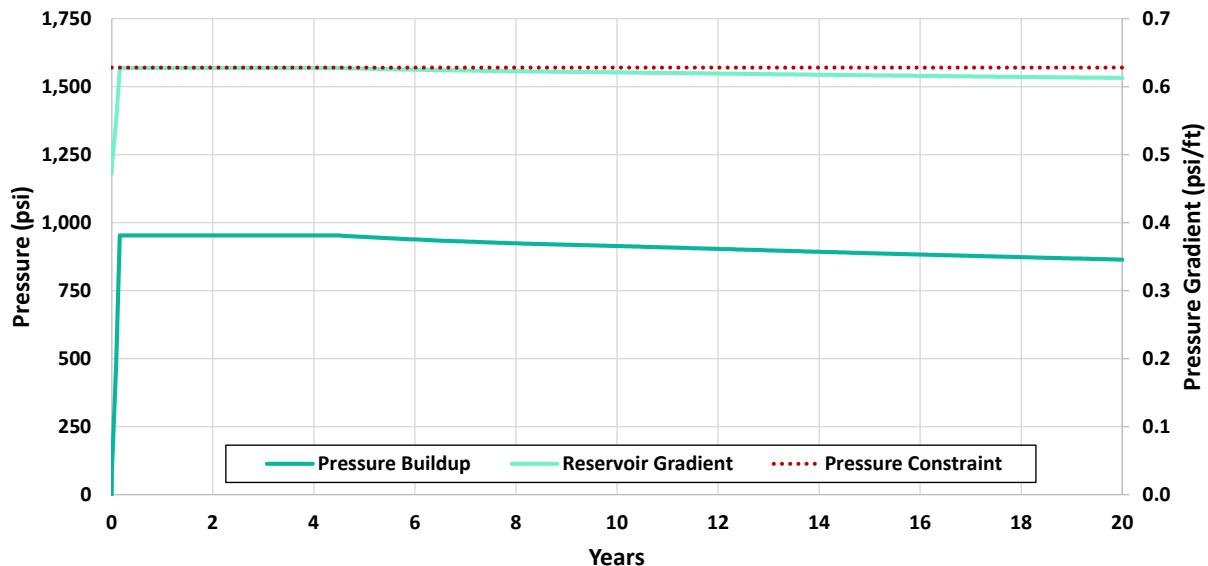


Figure 7-5 – Maximum Pressure Differential for Spoonbill No. 005

7.3. CO₂ Plume Position and Pressure Front at the End of Closure

To meet the requirements of SWO 29-N-6 **§3633.A.1.b.ii**, Figure 7-6 shows the predicted position of the CO₂ plume and associated pressure front at site closure. Cross-sectional views of the stabilized plume at the end of injection and at the time of site closure.

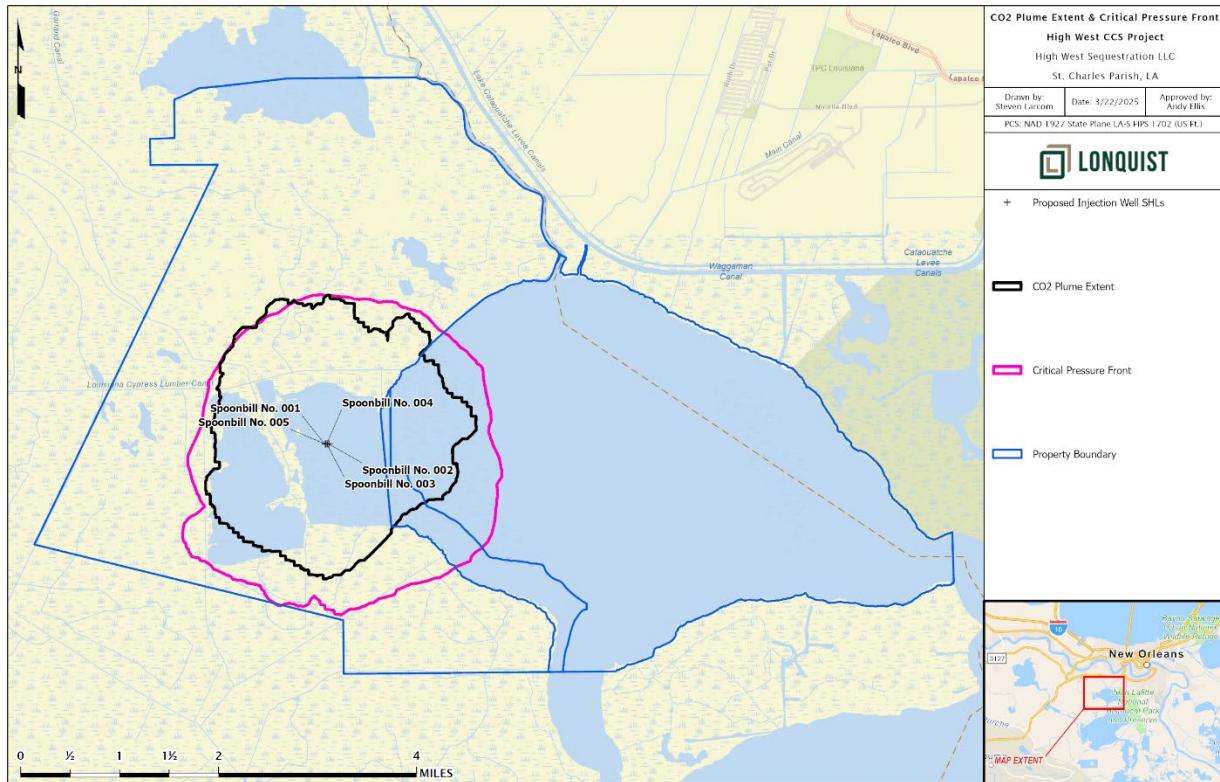


Figure 7-6 – Stabilized CO₂ Plume and Critical Pressure Front at Site Closure

7.4. Post-Injection Monitoring Plan

Upon cessation of injection, High West will submit an amended PISC and Site Closure Plan—or demonstrate to the Commissioner through monitoring data and modeling results that no amendment to the plan is needed. As required by SWO 29-N-6 **§3633.A.2**, High West will continue to monitor the site to ensure that the project does not an endangerment to USDWs until the plume has been proven to stabilize and the Commissioner approves the project for closure.

7.4.1. Post-Injection Monitoring Activities

Post-injection monitoring will be used to track the movement of the plume and pressure front under SWO 29-N-6 **§3633.A.2**. The Testing and Monitoring Plan (*Section 5*) will be extended and used to confirm that the injection project continues to conform to the permit conditions—and that any unexpected USDW endangerment is identified and mitigated. These testing and monitoring activities, as described in *Section 5 – Testing and Monitoring Plan*, will be performed and reported at the frequency shown in Table 7-2.

Table 7-2 Post-Injection Monitoring and Reporting Frequency

Testing/Monitoring Activity	Frequency	Reporting Schedule
Groundwater Monitoring Well Geochemical Analysis	Every 5 years	Within 30 days after data collection and analysis
Seismic Event Monitoring	Continuously	Annually
Pressure and Temperature Monitoring (Injection and In-Zone Monitoring Wells)	Continuously	Annually
Indirect Plume and Pressure Front Monitoring (Vertical Seismic Profile [VSP])	Every 5 years until plume is stabilized	Within 30 days after data collection and analysis
Direct Plume Calculations Based on Pressure and Temperature Data	Annually	Annually

All testing and monitoring activities listed in will be performed and analyzed as discussed in *Section 5*, including QA/AC measures.

7.5. Demonstration of Non-Endangerment of USDW

Before the approval of the site closure authorization, High West will provide documentation that the USDW will not risk further endangerment from the CO₂ plume, as required by SWO 29-N-6 **§3633.A.3**. High West will submit a report to the Commissioner demonstrating the non-endangerment of the USDW including site-specific conditions, updated plume model, predicted pressure decline within the injection zone and any updates to the underlying geological assumptions used in the original model.

7.6. Site Closure Plan

To meet the requirements of SWO 29-N-6 **§3633.A.5** and **§3633.A.6**, the following site closure activities will be performed. The activities include removal of surface equipment, plugging of all wells, site restoration and submittal of final site closure reports.

7.6.1. Pre-Closure

Notice of intent to close the site will be submitted to the Commissioner at least 120 days prior to closure operations. If any changes have been made to the original PISC Plan, a revised plan will be submitted. Relevant notifications and applications, such as plugging requests, will be submitted for approval by the appropriate agency before commencing such activities.

7.6.2. Plugging Activities

The injection and monitoring wells will be plugged as discussed in *Section 6 – Plugging Plan*. The Plug and Abandonment procedures are designed to prevent the migration of CO₂ or formation fluids in the injection interval from migrating to the USDW. Prior to plugging the wells, the mechanical integrity of these wells will be determined by an annulus pressure test, casing inspection log, temperature log as well, and pressure fall-off test as described in *Section 5*. Plugging schematics and procedures are provided in *Appendix H*.

7.6.3. Site Restoration

Once the injection well and monitoring well are plugged and capped below grade, all surface equipment will be decommissioned and removed from the site.

7.6.4. Documentation of Site Closure

Within 90 days of site closure, a final report must be submitted to the Commissioner, per requirements of SWO 29-N-6 **§3633.6**, and will include:

- Documentation of appropriate injection and monitoring well plugging, including a copy of the survey plats
- Documentation of well-plugging report to LDENR
- Records of the nature, composition, and volume of the CO₂ stream over the injection period.

A record of notation in the facility property deed will be added to provide, in perpetuity, any potential purchaser of the property the following information:

- The fact the land was used to sequester carbon dioxide
- The name of the State agency (LDENR) with which the survey plat was filed and the EPA and or State Agency to which it was submitted
- The total volume of fluid injected, the injection zones into which it was injected, and the period over which injection occurred

High West will retain all records collected during the post-injection site care period for 10 years following site closure. At the end of the retention period, High West will deliver all records to the Commissioner and will thereafter be retained at a location designated by the Commissioner.