



ATTACHMENT E

Injection Well Plugging Plan

Gulf Coast Sequestration, LLC (G1037)

Project Minerva, Cameron Parish

Minerva South CCS Well Nos. 001 & 002

EPA Project Id: R06-LA-0002

LDCE Appl Nos: 45031 & 45032

Original: November 2024

Revision 1: January 2026

Revision 2: May 2026



45031 & 45032

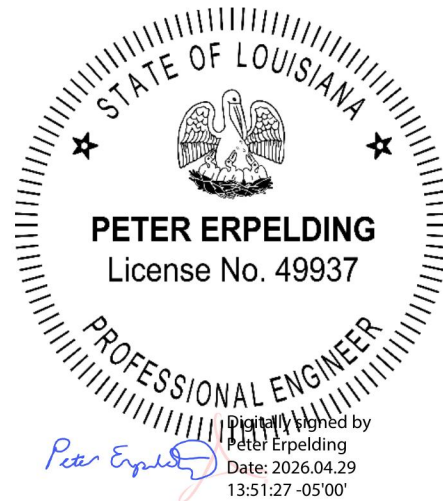
ENGINEERING CERTIFICATION

Per LAC 43:VII §3603.H.2, the engineering aspects of the Injection Well Plugging Plan have been prepared by or under the supervision of a licensed Professional Engineer (PE) authorized to practice by and in good standing with the Louisiana Board Professional Engineering and Land Surveying.

Peter Erpelding

LA License No. 49937

I, Peter Erpelding, certify that I have personally examined and am familiar with the information submitted in this document and the attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.



INJECTION WELL PLUGGING PLAN SECTIONS (Including applicable Tables, Figures, and Appendices)

Section 3 Plugging Information

Section 4 Description of Plugging and Abandonment Procedures

Appendix E-I-1 Proposed P&A Procedure for Minerva South CCS No. 001

Appendix E-I-2 Proposed P&A Procedure for Minerva South CCS No. 002



TABLE OF CONTENTS

FACILITY INFORMATION	1
1 INTRODUCTION.....	1
2 PLANNED TESTS OR MEASURES.....	1
2.1 Bottom-Hole Reservoir Pressure (BHP).....	1
2.2 Mechanical Integrity Testing (MIT)	1
2.2.1 Internal.....	1
2.2.2 External	1
3 PLUGGING INFORMATION	2
3.1 Volume calculation methods.....	2
4 DESCRIPTION OF PLUGGING AND ABANDONMENT PROCEDUES	3
4.1 Notice of Intent to Plug.....	3
4.2 Plugging Procedures.....	3
4.2.1 Proposed P&A Procedure for MS CCS 1 and MS CCS 2	3
4.2.2 Cementing Protocols.....	3
4.2.3 Plugging Protocols.....	4
4.2.4 Contingencies.....	4
4.3 Abandonment Procedures.....	4
5 WELL CLOSURE REPORTS.....	4

LIST OF TABLES, FIGURES, AND APPENDICES

TABLES

Table E.2.2-1	Planned and Alternate External Mechanical Integrity Tests
Table E.3-1	Plugging Details for MS CCS 1 and MS CCS 2
Table E.4.2-1	Potential Issues during P&A and Contingent Actions

FIGURES

Figure E.4-1	Proposed Pre-Closure Well Schematic - Minerva South CCS Well No. 001
Figure E.4-2	Proposed Pre-Closure Well Schematic - Minerva South CCS Well No. 002
Figure E.4-3	Proposed Post-Closure Well Schematic - Minerva South CCS Well No. 001
Figure E.4-4	Proposed Post-Closure Well Schematic - Minerva South CCS Well No. 002



APPENDICES

- Appendix E-I-1 Proposed P&A Procedure for Minerva South CCS No. 001
- Appendix E-I-2 Proposed P&A Procedure for Minerva South CCS No. 002
- Appendix E-II PermaSet™ Cement System



FACILITY INFORMATION

Facility Name:	Minerva Facility
Injection Wells:	Minerva South CCS Well No. 001 (MS CCS 1) Minerva South CCS Well No. 002 (MS CCS 2)
Facility Contact:	David Cook, CEO 5599 San Felipe Street, Suite 1450, Houston, Texas 77056 (713) 419-6808; dcook@gcscarbon.com
Well Locations:	Sec 3, T12S, R13W, Cameron Parish, Louisiana MS CCS 1 (North American Datum (NAD) 1927) Surface: 30° 02' 34.10"N, 93° 40' 20.63"W Bottom-Hole: 30° 02' 34.10"N, 93° 40' 20.63"W MS CCS 2 (NAD 1927) Surface: 30° 02' 33.84"N, 93° 40' 20.48"W Bottom-Hole: 30° 02' 13.74"N, 93° 40' 42.07"W

1 INTRODUCTION

Gulf Coast Sequestration (GCS) will conduct injection well plugging and abandonment according to the following sections.

2 PLANNED TESTS OR MEASURES

2.1 BOTTOM-HOLE RESERVOIR PRESSURE (BHP)

GCS will record bottom hole pressure using a downhole pressure gauge and calculate kill fluid density.

2.2 MECHANICAL INTEGRITY TESTING (MIT)

2.2.1 Internal

At the end of injection activities, an (internal) pressure test can be performed with the tubing in-place, still connected to the packer. The pressure inside the 9 5/8" long string casing can be increased to a value above the standard pressure applied during injection.

The tubing/casing annular pressure will be maintained with a pressure that exceeds the operating injection pressure. These test pressures can be read on the 0-5,000 psi gauges installed on the wing outlets valves for the tubing and tubing-casing annulus.

2.2.2 External

In accordance with LAC 43:XVII §3631.A.3.b and LAC 43:XVII §3627.A.3, final tests will be performed to ensure external mechanical integrity. Primary tests are described in Table E.2.2-1. If there are any temperature anomalies that may indicate a failure of well integrity (i.e. movement of fluid behind the casing), GCS will submit a Form UIC-17 Work Permit



within 30 days of identification and propose to run the alternate test in Table E.2.2-1.

3 PLUGGING INFORMATION

GCS will use the materials and methods noted in Table E.3-1 to plug MS CCS 1 and MS CCS 2. The volume and depth of the plug or plugs will depend on the well's final geology and downhole conditions as assessed during construction. The cement(s) formulated for plugging will be compatible with the carbon dioxide stream. The cement formulation and required certification documents will be submitted with the well-plugging plan to the agency. GCS will report the wet density and will retain duplicate samples of the cement used for each plug.

3.1 VOLUME CALCULATION METHODS

The well will be flushed with a brine fluid of a specific weight designed to kill and control the well from any flow or pressure up. The brine fluid will be injected at least three times the volume of the tubing without exceeding the fracture pressure. The specific weight of brine fluid used for final displacement will be selected based on the final total depth mud weight or kill weight fluid (whichever is higher), and final observation of pore pressure values. The objective is to keep well on balance. A final external Mechanical Integrity Test (MIT) will be performed to ensure that the well is mechanically plugged.

Before installing bridge plugs and starting the cement plugging operations, the tubing and packer will be pulled out of the well. All the casing in this well will be cemented to the surface and will not be retrieved at abandonment.

Well cementing software will be used to model the sealing and verify the plug designs. Lab test will be conducted before plugging operations. Slurry samples will be kept at the well site as proof of cement / plug quality. All casings will cut off at least 3 feet below the surface, below the plow line. Then, a blanking plate will be welded with the necessary permit information to the top of the cutoff casing.

Volumes will be calculated for specific abandonment of wellbore environments based on desired plug diameter and length required. Volume calculations are the same for plug and abandonment during construction and post-injection.

Choose the following:

- Length of the cement plug desired
- Desired setting depth of base of plug
- Amount of spacer necessary to be pumped ahead of the slurry

Determine the following:

- Number of sacks of cement required (yield)
- Volume of spacer to be pumped behind the slurry to balance the plug
- Plug length before the pipe is withdrawn



- Length of mud freefall in drill pipe
- Displacement volume required to spot the plug (depending on the Tubing / Drill pipe specs)

Field cementing and wellsite supervisor will both review calculations prior to spotting any plug.

4 DESCRIPTION OF PLUGGING AND ABANDONMENT PROCEDURES

4.1 NOTICE OF INTENT TO PLUG

In compliance with LAC 43:XVII §3631.A.4, GCS will submit the Form UIC-17, or successor form, to the C&E Secretary and receive written approval from the C&E Secretary before beginning actual well plugging operations. The form will contain information on the procedures to be used in the field to plug and abandon (P&A) the well.

4.2 PLUGGING PROCEDURES

Pre-Closure and Post-Closure Well Schematics for MS CCS1 and MS CCS2 are shown in Figures E.4-1, E.4-2, E.4-3 and E.4-4.

GCS will use the materials and methods noted in Table E.3-1 to plug the injection well. It is assumed there will be three primary completion intervals for CO₂ injection. The plugging plan will be performed via a bottom-up sequence.

4.2.1 Proposed P&A Procedure for MS CCS 1 and MS CCS 2

Appendices E-I-1 and E-I-2 detail the proposed P&A Procedure for MS CCS 1 and MS CCS 2, process to plug each completion interval and potential contingencies.

4.2.2 Cementing Protocols

Plug-and-abandonment (P&A) cementing operations should occur when fluids in the wellbore are at balance with the exposed formation (in this case, via perforations in the long string). Water is the major component of the working fluid and is the liquid component of the cement. Water is effectively incompressible. A barrel of water introduced into a closed system will cause one barrel of water to be displaced out of the system.

The cement in fluid form will be precisely placed by accurately measuring the volumes of spacer, cement, and work fluid so that the cement height outside the work string will match the height inside the work string as a balanced plug. As soon as the cement is in place, the workstring will be slowly pulled from the static fluid cement mixture, leaving a cement column of a known height. The cement curing process will be modelled to ensure sufficient wait on cement (WOC) time has occurred so that cement will have reached 500 psi compressive strength. Verification of cement curing and stability will be assessed via either physical tagging of the plug or pressure test.

The interval depths, length, and method to place every cement plug is described in Table



E.3-1. For Plugs #1-#3 (within the Injection Zone), PermaSet™ Cement System (or equivalent) will be used because it is compatible with CO₂ and H₂S. For more details about the PermaSet™ Cement System, refer to Appending E-II.

For Plugs #4 and #5 (above the Confining Zone), Class H cement with additives will be utilized. The following additives will be included to the Class H cement slurry: Tricalcium Silicate (C₃S), Dicalcium silicate (C₂S), Tricalcium Aluminate (C₃A), Tetra calcium aluminoferrite (C₄AF). Subject to final vendor selection; chemical composition and non-corrosive additives will all be reviewed.

4.2.3 Plugging Protocols

Table E.3-1 details the plugging details for MS CCS 1 and MS CCS 2. For each plug, the relevant completion interval, retainer depth, volume, placement method and cement type are described.

Each cement plug will be allowed to cure for a minimum of 8 hours and until cement reaches at least 500 psi compressive strength, confirmed by lab testing based on in-situ conditions. Prior to pumping the next cement plug or placing abandonment buffer fluid, each plug will be tagged and seal tested to verify its location and competency. This process will confirm each plug is successfully placed and ensure the future protection of the USDW.

4.2.4 Contingencies

Detailed contingencies are listed for possible scenarios that may occur while implementing various steps listed in Appendices E-I-1 and E-I-2 (Proposed P&A Procedures).

Table E.4.2-1 also lists potential issues and contingent actions.

4.3 ABANDONMENT PROCEDURES

Once plugging placement is completed and pressure tested, the work string will be laid down. All equipment will be rigged down and moved out. Casing will be cut 15' below the ground. Cellar will be cleaned so a plate with relevant well information can be welded on.

5 WELL CLOSURE REPORTS

In compliance with LAC 43:XVII §3631.A.5, GCS will submit a Well Closure Report to the C&E Secretary within 30 days after well plug and abandonment. The report will detail the procedures of the closure operation and specify any differences between the original plan and actual closure. The report will also include relevant state regulatory reporting forms and information related to the closure activity, such as final schematics, tests and monitoring data.