[redacted]

UIC CLASS VI GEOLOGIC STORAGE OF CO_2 PERMIT APPLICATION

Loving CCS Hub

[redacted]
Loving County, Texas

Section 10: Emergency and Remedial Response Plan (ERRP)

[40 CFR §146.94(a) - (d)(3)]

Prepared for:

EPA Region 6

Underground Injection Control Section

1201 Elm Street, Suite 500 | Dallas, Texas 75270

Prepared and submitted by:

Milestone Carbon Delaware CCS Hub, LLC

840 Gessner Rd, Suite 600

Houston, Texas 77024

Prepared by

Numeric Solutions, LLC

1536 Eastman Ave, Suite D

Ventura, California 93003

1 August 2024

Table of Contents

List of Tables

List of Figures

10.0 EMERGENCY AND REMEDIAL RESPONSE PLAN (ERRP) [40 CFR 146.82(a)(19), 146.94(a)]

This Emergency and Remedial Response Plan (ERRP) for the Well is provided to meet the requirements of 40 CFR 146.94(a). The comprehensive plan describes potential adverse events that could occur in the development, operation and post-closure phases of the project and the actions to be taken in the unlikely event of such an emergency at the [redacted] or within the identified AoR. The ERRP describes the potential affected resources, lists entities and individuals to be notified, and provides actions to be taken expeditiously to mitigate any emergency and protect human health and safety of the environment, including USDWs.

This plan describes actions that Milestone will take in the event of an emergency that would allow fluids to move from the injection interval into the USDW or that could endanger any USDW within the AoR during construction, operation, or post-injection site care. Such events may include unplanned CO_2 release or detection of unexpected subsurface movement of CO_2 or fluids in or from the injection zone.

If Milestone obtains evidence that the injected CO_2 stream and/or associated pressure front may cause an endangerment to a USDW, Milestone will perform the following actions: **[40 CFR 146.94(b)]**

1) Initiate shutdown plan for the injection well.
2) Take all steps reasonably necessary to identify and characterize any release.
3) Notify the permitting agency (UIC Program Director) of the emergency event within 24 hours.
4) Implement applicable portions of the approved ERRP.

Where the phrase “initiate shutdown plan” is used, the following protocol will be employed:

> Milestone will immediately cease injection. However, given the high injection pressures, supercritical fluid within the wellbore, and high injection rates, Milestone will, in consultation with the UIC Program Director, determine appropriate pre-planned shut-down procedures that allow for safe shutdown of the well and associated mid-stream infrastructure that does not endanger human health, equipment, or the environment.

10.1 Local Resources and Infrastructure in AoR

10.1.1 Description of Project Area

[redacted]

[redacted]

[redacted]

[redacted]

[redacted], [redacted]

[redacted]

[redacted]

[redacted]

10.2 Emergency Event Descriptions

Several scenarios could activate an emergency response. This ERRP considers any adverse incident with the potential of causing any of the following as an "emergency event" or simply "event": 1) Injuries to human health; 2) USDW contamination; 3) environmental damage; or, 4) property damage.

The scope of response, response actions, and order of activities will be proportionate to the severity and impacts of the event and implemented as outlined in this ERRP. Emergency event risk categories are shown in **Table 10-1**. Tables **10-2** through **10-8** cover various events.

The protocols may be modified and refined based on the specific circumstances and conditions of the event as well as any discussion with governmental authorities having jurisdiction.

Table 10-1: Degrees of Risk for Emergency Events

Emergency Condition	Definition
Major Emergency Event	Poses immediate substantial risk to human health, resources, or infrastructure. Emergency actions involving local authorities (evacuation or isolation of areas) should be initiated. ***Example***: well blowout while injecting
Serious Emergency Event	Poses potential serious (or significant) near term risk to human health, resources, or infrastructure if conditions worsen or no response actions taken. ***Example:*** malfunction of monitoring equipment for pressure or temperature that may indicate a problem with the injection well and possible endangerment of public health and the environment
Minor Emergency Event	Poses no immediate risk to human health, resources, or infrastructure. ***Example***: higher pressure reading observed in monitoring wells with no potential to move fluid.

Discovery of an emergency event triggers the corresponding response plan proposed herein. Response plan actions and activities will depend upon the circumstances and severity of the event. Milestone will address an event immediately and, when required, will communicate the event to the UIC Program Director within 24 hours of discovery.

The protocols described in this document are conceptual and may be adjusted based on actual circumstances and conditions of the event and any previous communication with governmental authorities having jurisdiction.

If an event triggers cessation of injection and remedial actions, before resuming injection, Milestone will demonstrate that subsequent injection will not endanger USDWs. Injection operations will only resume upon receipt of written authorization of the UIC Program Director. See permit **Section 10.8**.

10.2.1 Event Description: Well Integrity Failure

Integrity loss of the injection well and/or a monitoring well may endanger USDWs. Integrity loss may have occurred if the following events occur:

- Automatic shutdown devices are activated:
  - ✓ Wellhead pressure exceeds the specified shutdown pressure specified in the permit.
  - ✓ Annulus pressure indicates a loss of external or internal well containment.
  - ✓ Pursuant to 40 CFR 146.91(c)(3), Milestone must notify UIC Program Director within 24 hours of any triggering of a shut-off system (i.e., down-hole or at the surface).
- Mechanical integrity test results identify a loss of mechanical integrity.

If CO_2 escapes to the surface:

- If there is a report or indication of a leak from visual observation, gas monitors, pressure drop, etc., the area will be evacuated and isolated.
- A two-man control and countermeasure team will be dispatched with emergency breathing air equipment and gas monitors to investigate the area and locate the leak.
- Local wind speed, direction, and H_2S monitors will be used to determine the potentially affected areas.
- Emergency shutdown systems will be utilized as necessary to isolate the leak. Pressure from the system will be relieved, not vented, due to the dangerous composition of the gas.

Table 10-2: Event Description & Response Scenario 1 | Well Integrity Failure

Emergency ID	**Response**
Risk Level:	**Medium**
Timing / Phase of Event: *(Construction, pre-injection, during injection, and/or post-injection).*	Any Phase
Prevention and Detection:	• Proper wellbore design, including proper cement and metallurgy of the casing and tubing will be implemented in the construction phase • Pressure, rate, and mechanical integrity monitoring, pressure fall-off tests, annulus pressure tests, etc., will all be performed per the Testing and Monitoring Plan. (permit **Section 6**)
Potential Response Actions:	• Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) • Determine the severity of the event, based on the information available, within 24 hours of discovery • For a Major or Serious emergency: ✓ Initiate shutdown plan. Steps could include: ▪ [redacted] ▪ Monitor well and annulus pressures. ▪ Bleed off pressure if necessary ▪ Determine the cause and severity of failure to determine if any release of the CO_2 stream or formation fluids may have been released into any unauthorized zone. ▪ [redacted] ▪ [redacted] ▪ Demonstrate Mechanical Integrity per the methods discussed in Testing and Monitoring Plan.

Emergency ID	Response
	✓ If contamination is detected, identify and implement appropriate remedial actions (in consultation with the UIC Program Director) • For Minor emergency: ✓ Conduct assessment to determine whether there has been a loss of mechanical integrity ✓ If there has been a loss of mechanical integrity, initiate shutdown plan
Response Personnel:	Drilling / workover crews or operations personnel and Milestone HSE personnel
Equipment:	BOP. Cement. Pressure, rate, and mechanical integrity monitoring instrumentation

10.2.2 Event Description: Injection Well Monitoring Equipment Failure

The failure of monitoring equipment for wellhead pressure, temperature, and/or annulus pressure may indicate a problem with the injection well that could endanger USDWs.

Table 10-3: Event Description & Response Scenario 2 | Injection Well Monitoring Equipment Failure

Emergency ID	Response
Risk Level:	**Low**
Timing/Phase of Event: *(Construction, pre-injection, during injection, and/or post-injection).*	During injection and post-injection
Prevention and Detection:	• [redacted]
Potential Response Actions:	• Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) • Determine the severity of the event, based on the information available, within 24 hours of discovery • For a Minor emergency: ✓ [redacted]
Response Personnel:	Facility operations personnel and safety personnel
Equipment:	• [redacted]

[1] Continuously regarding injection well equipment defined more precisely in Permit **Section 6**, typically this means data measured every 5 seconds and recorded every 5 minutes

10.2.3 Event Description: Spill

This event could occur during the drilling of the wellbore due to an accidental release of drilling fluids, hydrocarbons, chemicals, brine etc. during drilling and completion or workover operations.

Table 10-4: Event Description & Response Scenario 3 | Spill

Emergency ID	Response
Risk Level:	**Low**
Timing/Phase of Event: *(Construction, pre-injection, during injection, and/or post-injection).*	Drilling or Workover of Injection or Monitoring Wells
Prevention and Detection:	• Maintain appropriate mud weights as expected for the area based on offset well data Monitor rate of drilling fluid returns versus rates pumped, penetration rates, pump pressures, etc. • Properly maintain blowout preventers to prevent accidental release of drilling fluids or hydrocarbons • Spill prevention equipment on drilling or workover rig
Potential Response Actions:	• Notify the [redacted], per 40 CFR 146.91(c) • Determine the severity of the event, based on the information available, within 24 hours of discovery • For Minor emergency: ✓ Stop drilling; close the blowout preventer; insert rams into the well; read and record stabilized shut-in pressures. ✓ Kill the well by pumping fluid down the wellbore that is heavier than the current fluid until the well stops flowing. ✓ Contain spill using available equipment such as absorbents, booms, etc. ✓ Notify appropriate regulatory authority and supervisory personnel ✓ Immediately take samples around the point of entry ✓ Initiate Spill Prevention, Control and Countermeasures Plan for facility
Response Personnel:	Onsite drilling personnel, drilling supervisors and Milestone regulatory manager
Equipment:	Drilling rig, mud logging equipment, blowout preventers with annular rams, drilling fluid materials to increase mud weight adequately. Spill kit

10.2.4 Event Description: CO_2 or Subsurface Fluid Migration

This event could occur if the plume or other subsurface fluids reach faults or fractures that allow migration into another zone, including the USDW, or to the surface. Failure of the confining zone could also cause CO_2 or subsurface fluids to migrate.

Table 10-5: Event Description & Response Scenario 4 | CO2 or Subsurface Fluid Migration

Emergency ID	Response
Risk Level:	**Medium**
Timing/Phase of Event: *(Construction, pre-injection, during injection, and/or post-injection).*	During injection and post-injection
Prevention and Detection:	The CO_2 plume will be monitored as described in the Testing and Monitoring Section (permit **Section 6**)
Potential Response Actions:	• Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) • Determine the severity of the event, based on the information available, within 24 hours of discovery • For all emergencies (Major, Serious, or Minor): [redacted]
Response Personnel:	Operations personnel and Milestone regulatory manager
Equipment:	Depends on the cause of leak, hydraulic barrier, pump, water testing kit

10.2.5 Event Description: Natural Disaster

A natural disaster could impact the normal operation of the injection well. For example, a tornado, wildfire or lightning strike may impact surface facilities.

Table 10-6: Event Description & Response Scenario 5 | Natural Disaster

Emergency ID	Response
Risk Level:	**Low**
Timing/Phase of Event: *(Construction, pre-injection, during injection, and/or post-injection).*	Any phase.
Prevention and Detection:	• Proper wellbore design, including proper cement and metallurgy of the casing and tubing will be implemented in the construction phase • Pressure and rate monitoring, pressure fall-off tests, annulus pressure tests, etc., will all be performed per the Testing and Monitoring Plan • Weather event monitoring and communication will be implemented
Potential Response Actions:	• Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) • Determine the severity of the event, based on the information available, within 24 hours of discovery • For a Major or Serious emergency: ✓ Initiate shutdown plan. Steps could include: [redacted]
Response Personnel:	Operations personnel, local Fire and or Sheriff's Department or Other Emergency Contacts and Milestone regulatory manager
Equipment:	Depends on the type of Natural Disaster

10.2.6 Event Description: Induced Seismic Event

Induced seismic events typically refer to minor seismic events that are caused by human activity which alter the stresses and fluid pressures in the Earth's crust. Induced seismicity could potentially result from the injection of fluids into subsurface formations that change the stress state of pre-existing faults, which causes fault plane movement and energy release.

[redacted]

[redacted]

[redacted]

Table 10-7: Event Description & Response Scenario 6 | Induced Seismic Event

Emergency ID	Response
Risk Level:	**Low**
Timing/Phase of Event: *(Construction, pre-injection, during injection, and/or post-injection).*	During Construction, During injection, Post Injection
Prevention and Detection:	Near Surface Seismometer Water well: Cemented Geophones Injection well: DAS microseismic monitoring Monitoring well: DAS microseismic monitoring
Potential Response Actions:	[redacted]
Response Personnel:	[redacted]
Equipment:	[redacted]

Table 10-8: [redacted]

[redacted]

[redacted]

10.2.6.1 Did you Feel It Analysis

The “Did You Feel It” (DYFI) internet-based macroseismic intensity map in **Figure 10-4** [redacted]

[redacted]

10.3 Response Personnel and Equipment

Equipment needed in the event of an emergency and remedial response will vary, depending on the triggering emergency event. Response actions (e.g., cessation of injection, well shut-in, etc.) will generally not require specialized equipment to implement. Where specialized equipment (such as a drilling rig or logging equipment) is required, Milestone will be responsible for its procurement.

[redacted]

10.4 Emergency Communication Plan

[redacted]

Milestone will also communicate with other entities who may need to be informed about or take action in response to the event, including local water systems, CO_2 source(s) and pipeline operators, landowners, Oil and Gas Operators and Regional Response Teams (as part of the National Response Team).

[redacted]

An emergency contact list (**Table 10-9**) will be maintained during the life of the project and posted at all Milestone Carbon facilities. In the unlikely occurrence of an emergency event, the director of operations or a field superintendent will immediately start the contact list and ensure that responsible, essential Milestone and local emergency personnel are contacted. The operator's designated personnel will handle all event communications with the public. A list of contractors (**Table 10-10**) will be maintained during the life of the project.

The appropriate amount of information, timing, and communications method(s) will be based upon the circumstances and severity of the event, which may include, but are not limited to:

1) Event description and location.
2) Event investigation process and response status (e.g., actions taken).
3) Whether there is any known impact to the drinking water, surface atmospheric release of CO_2 or other environmental impacts
4) Any known injury to person or property or probable risk to person or property.

For protracted responses (e.g., passive monitoring or ongoing cleanups), the project will provide periodic updates on the progress of the response action(s). Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP. Site personnel to be notified (not listed in order of notification):

Table 10-9: Contact Information for Key Local, State and Other Authorities

Agency	Phone Number
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Table 10-10: [redacted]

Agency	Phone Number
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

10.5 Plan Review [40 CFR 146.94(d)]

[redacted] Any amendments to the plan will be approved by the UIC Program Director and will be incorporated into the permit. This plan will also be reviewed and re-submitted to the UIC Program Director given the following:

- Within one (1) year of an AoR re-evaluation
- Following any significant changes to the facility, such as addition of injection or monitoring wells, on a schedule determined by UIC Program Director
- Change in key personnel
- Or when required by the UIC Program Director.

If the review indicates that no amendments to the ERRP are necessary, Milestone will provide the UIC Program Director with the documentation supporting the "no amendment necessary" determination. If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the UIC Program Director within sixty (60) days following an event that initiates the ERRP review procedure.

10.6 Staff Training and Exercise Procedures

Personnel responsible for implementing this ERRP will be trained in their duties and responsibilities during annual onsite and/or table-top training exercises. All Milestone personnel, visitors, and contractors must attend an overview orientation before obtaining permission to enter any of the facilities. A refresher course on this training will be required annually.

Before starting CO_2 injection operations, Milestone will provide a copy of the ERRP to local first responders and discuss potential response scenarios.

Milestone will proactively work with local first responders to determine appropriate procedures in the event of an emergency event including removing the public from the affected area or controlling access to the site. These procedures will include the use of specialty equipment. The Milestone incident commander will work with first responders on the scene to direct what responses are required on location, e.g. fire suppression, evacuation of injured personnel, access to the location.

10.7 Site Security and Access Control

[redacted]

10.8 Resume Operations [40 CFR 146.94(c)]

[redacted]