E.2. EMERGENCY AND REMEDIAL RESPONSE PLAN

40 CFR 146.94(a)

Facility Information

Facility name: Rapides One CCS Site

[redacted]

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1. Overview

This Emergency and Remedial Response Plan (ERRP) describes actions that CapturePoint Solutions, LLC shall take to address movement of the injection fluid or formation fluid in a manner that may endanger an underground source of drinking water (USDW) during the construction, operation, or post-injection site care periods.

Background

The Rapides CCS project in Rapides Parish, Louisiana will inject CO_2 from gathered source emitters into six injection wells. The projected composition of the captured gas is greater than 90.0% (by volume) CO_2 with trace quantities of nitrogen and oxygen. Two wells will be used to monitor injection, one completed above the uppermost confining layer and in proximity to the injection wells and one completed within three targeted injection zones. Continuous monitoring will occur at each monitoring well. Shallow groundwater wells within the AoR will be sampled on a regular basis to monitor shallow USDWs.

Identification of Potential Emergency Events

This ERRP focusses on emergency events that have the potential to move injection fluid or formatin fluid in a manner that may endanger safety, USDWs or the environment during operation or post-injection site care periods.

If CapturePoint Solutions, LLC obtains evidence that the injected CO_2 stream and/or associated pressure front may cause an endangerment to safety, a USDW or the environment, CapturePoint Solutions, LLC must perform the following actions.

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

Wherever the phrase “initiate shutdown plan” is used, the following protocol will be employed: CapturePoint Solutions, LLC will immediately cease injection. However, in some circumstances, CapturePoint Solutions, LLC will, in consultation with the UIC Program Director, determine whether gradual cessation of injection (using the parameters set forth in the Summary of Requirements of the Class VI permit) is appropriate.

1.1 Local Resources and Infrastructure

Resources in the vicinity of the Rapides CCS Site that may be affected as a result of an emergency event at the project site include: underground sources of drinking water (USDWs); potable water wells; surface drainages and other surface water (Table 1).

Table 1 USDWs and Surface Water

USDWs	Surface Drainages	Lakes and Reservoirs	Wetlands
[redacted]			

However, all natural resources that have been identified with the site of interest and concern have all been evaluated to occur at least [redacted] feet above the Rapides CCS Injection Site proposed operations.

Infrastructure within the vicinity of the proposed injection site that that may be affected as a result of an emergency include:

1. The wellhead(s)
2. CapturePoint Solutions, LLC facilities.

Resources and infrastructure addressed in this plan are shown in Figure 1.

Figure 1. Map of Site Resources and Infrastructure

[redacted]

1.2 Potential Risk Scenarios

Response actions will depend on the severity of the event(s) triggering an emergency response. "Emergency events" are categorized as shown in Table 2.

Table 2 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.
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.
Minor emergency	Event poses no immediate risk to human health, resources, or infrastructure.

2. Emergency Identification and Response Actions

Steps to identify and characterize the event will be dependent on the specific issue identified, and the severity of the event. The potential risk scenarios are based upon construction, operation and closure activities associated with the lifetime of the project. Table 3 identifies the risks associated with the various stages of the project. Impact severity is based upon the definitions contained in Table 2 (Degrees of Risk), and likelihood levels are based upon real world experience with well operations and maintenance.

Table 3 Potential Project Emergency Events, Impact, Risk and Detection

Potential Emergency Events	Location	Phase	Impact Severity	Risk Likelihood	Detection
E.1. Movement of brine during drilling	Wellbore	C	Serious	Low	Loss of circulation while drilling
E.2. Well Control Event	Well	C	Serious	Low	Unexpected changes in well fluid levels occur while drilling
E.3. Failure of CO_2 flow lines from capture to wellhead	Surface facilities	I	Minor	Moderate	Monitoring detects CO_2 leak

Potential Emergency Events	Location	Phase	Impact Severity	Risk Likelihood	Detection
E.4. Monitoring equipment failure	Wellhead	I	Low	Moderate	Failure of monitoring equipment for wellhead pressure, temperature and or annulus pressure is detected
E.5. Injection Well Integrity Failure	E.4.a Tubing and or packer failure	I	Moderate	Low	Monitoring detects changes in pressure and temperature
	E.4.b Casing failure	I	Serious	Low	Changes in annulus fluid level is detected
E.6. Monitoring Well Integrity Failure	E.5.a Casing failure	I, PI	Serious	Low	Changes in annulus fluid level is detected
E.7. Potential brine or CO_2 leakage to USDW	AoR	I, PI	Serious	Unlikely	Elevated concentrations of indicator parameters in soil, groundwater or surface water samples are detected
E.8. Storage reservoir unable to contain the formation fluid or stored CO_2	AoR	I, PI	Serious	Unlikely	Elevated concentrations of indicator parameters in soil, groundwater or surface water samples are detected
E.9. Induced seismicity	AoR	I	Moderate	Low	Seismic readings are detected that exceed predefined limits
E.10. Other natural disaster	AoR	I, PI	Low	Low	

Note: C = Construction Period, I = Injection Phase and PI = Post Injection Period

E.1. Movement of Brine During Drilling

Prevention: To prevent the occurrence of cross flow (fluid losses into a USDW) surface casing will be set at approximately [redacted] feet. Surface casing will be set to the top of the Jackson-Vicksburg shale roughly [redacted] feet below the lowest USDW. The surface casing will be cemented to surface and checked for mechanical integrity and a CBL tool will be run to check cement bonding (see Table 6.6 in the Testing and Monitoring Plan and Table 3 in the Pre-Operational Narrative).

Response: In the event that cross flow is detected the following procedures will be implemented:

1. Stop drilling
2. Check well fluid level to detect lost circulation or influx
3. If fluid loss is detected treat wellbore with lost circulation material and evaluate mud weight drilling parameters
    a. If an influx of fluid is detected, control the well
    b. In the case that the shoe is leaking, squeeze to regain integrity
4. If a leak is detected in the surface casing, squeeze or install a casing patch

Next phase of drilling operations will only commence once the surface casing and cement job shows integrity.

E.2. Well Control Event

Description: During the construction phase if there is a well control event while drilling it could potentially allow the movement of formation fluid from one zone to another or cause potential harm to health or life of personnel onsite. The severity of an event can range from minor to major. However, any well control event will be classified at a minimum of "Serious" and evaluated as a potential risk to human health and life.

Prevention: During drilling the flow and pressure of the drilling fluid will be closely monitored as well as the fluid tank levels and circulation rates. Mud weight control will also be utilized in order to prevent the movement of fluid across zones and reduce the potential of a blow-out. Monitoring during drilling will require the following:

1. Flow sensor
2. Pressure sensor
3. Tank level indicator
4. Tripping displacement practices (as per industry drilling operational procedures)
5. Mud weight control

Controls in place to remediate such an event include the following:

1. Blowout prevention equipment (BOP)
2. Kill fluid
3. Well control training (as per the drilling company practices and protocols)

4. BOP testing protocol (per manufacture specifications)

Response: In the case of an event occurring while drilling, drilling operations will cease immediately, the blow-out preventer will be closed, the drilling area will be secured and the drilling parameters will be evaluated to determine the root cause of the event. Additional information is available in Table 7.

In addition to the above steps, if a major event occurs, the site will be evacuated and emergency response personnel (identified in Table 6) will be contacted. The emergency communication plan will also be enacted. The cause of the event will only be evaluated after the site has been secured and poses no immediate threat to human health and life.

E.3. Failure of CO_2 Flow Lines from Capture to Wellhead

Description: The CO_2 release and its location will be detected by the DAS/DTS fiber optic cable, which will trigger an alarm and result in the automatic shutdown of the flow line.

If warranted, an evacuation plan will be initiated in tandem with an appropriate workspace and/or ambient air-monitoring program at the plant boundary to monitor the presence of CO_2 and its natural dispersion following the shutdown of the flow line.

Response: The point of failure will be inspected to determine the root cause of the flow line failure.

The damaged flow line will be repaired, and if warranted, put in place the measures necessary to eliminate such events in the future (Table 7).

E.4. Monitoring Equipment Failure

Description: CapturePoint Solutions, LLC will install and use continuous recording devices to monitor injection pressure, rate and volume; the pressure on the annulas between the tubing and the long string casing; the annulas fluid volume added; and the temperature of the CO_2 stream as required at 40 CFR 146.88(e)(1), 146.89(b) and 146.90(b). The failure of monitoring equipment for wellhead pressure, temperature, and annulus pressure may indicate a problem with the injection well that could endanger USDWs. Monitoring frequency and equipment is addressed in section A.3 Table 1 of the QASP.

Detection: Automatic alarm and automatic shutoff systems will be designed and installed to sound in the event that pressures, flow rates or other parameters designated by the UIC Program Director exceed a range or gradient specified in the injection permit per 40 CFR 146.88(e)(2). If an alarm or shutdown is triggered, CapturePoint Solutions, LLC will immediately investigate and identify the cause of the alarm or shutoff.

Response:

1. Immediately notify the Site superintendent or designee
2. Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).

3. Determine the severity of the event, based on the information available, within 24 hours of notification.

For an emergency that requires a shutdown see tables 4 and 7. Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

E.5. Injection Well Integrity Failure

Description: Integrity loss may have occurred if the following events occur:

1. Automatic shutdown devices are activated:
    a. Wellhead pressure exceeds the specified shutdown pressure specified in the permit.
    b. Annulus pressure indicates a loss of external or internal well containment.
    c. Pursuant to 40 CFR 146.91(c)(3), CapturePoint Solutions, LLC must notify the UIC Program Director within 24 hours of any triggering of a shut-off system (i.e., down-hole or at the service).
2. Mechanical integrity test results identify a loss of mechanical integrity. Mechanical integrity tests are detailed in section A.3 Table 1 items T.6 through T.9 in the QASP)

Injection well failure can happen either due to tubing or packer failure (E.5.a) , casing failure (E.5.b) or a tubing hanger leak. The event could occur because of corrosion damage in used tubulars, fatigure and higher load profiles and others which could cause communication of the formation fluids with the annulur casing tubing as well as sustained casing pressure.

E.5.a. Tubing and Packer:

A tubing and or packer leak will be monitored through the use of the following:

1. Pressure and temperature sensors at the wellhead (see Table 1 items T.3, T.4 and T.5 in the QSAP)
2. Annular pressure test
3. CO_2 leak sensor at the wellhead

Controls in place to mitigate the possibility of a tubing or packer leak include:

1. Coated tubing
2. Inhibited packer fluid in annulur space
3. Corrosion monitoring plan
4. New Tubing (Table 7)

E.5.b. Casing:

A casing failure will be monitored by means of:

1. The pressure and temperature sensors at the wellhead
2. Electromagnetic casing inspection log
3. Annular pressure test
4. CO_2 leak sensor at the wellhead

Controls in place to mitigate a casing issue include the following:

1. CO_2 resistant cement and metallurgic across injection zone
2. Injection through tubing and packer
3. Inhibited packer fluid in the annulur space
4. Cement to surface
5. Corrosion and Monitoring Plan
6. New casing and tubing installed (Table 7)

Integrity loss of the injection well and/or monitoring well may endanger USDWs. CapturePoint Solutions will monitor for this event using pressure and temperature monitoring equipment at the wellhead (the details for these tests are covered in Table 1 items T.3, T.4 and T.5 in the QASP).

Response actions in the event of tubing, packer or casing failure:

CapturePoint Solutions, LLC has multiple controls in-place to prevent and reduce potential leakage as a result of injection well failure. The likelihood of loosing mechanical integrity of the injection wells is low. However, a response action has been developed in the event should this occur and is as follows:

- 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 notification.
- For an emergency that requires a shutdown see Tables 4 and 8 in this ERRP.
- Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure. Identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program director).
- If subsurface impacts are detected, implement appropriate remedial actions (in consultation with the UIC program Director)
- If warranted based on the site investigations, implement appropriate remedial actions (in consultation with the UIC Program Director)

E.6. Monitoring Well Integrity Failure

Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure.

E.6.a. Tubing and Packer:

Monitoring and controls in place to mitigate the possibility of a tubing or packer leak for a monitoring well see E.5.a.

E.6.b. Casing:

Monitoring and controls in place to mitigate the possibility of a casing failure see E.5.b.

E.7. Potential Brine or CO_2 Leakage to USDW

Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence of fluid (brine) or CO_2 leakage into a USDW. Vertical migration of CO_2 could potentially move through the injection well, other injection wells, monitoring wells, damage to the confining zone or artificial penetrations acting as conduits with the AoR (legacy wells). Monitoring equipment to dectect potential leakage is addressed in section 6.1 Table 6.1 items T.8, T.9 and T.10 in the Testing and Monitoring Plan.

E.7.a. Vertical Migration via Injection Wells

This can occur as the result of a leak in the casing as the result of stresses, corrosion and break down of the cement. Changes in injection pressure and temperature can cause stresses related to expansion and contraction of the tubulars during injection. As CO_2 is introduced to formatin fluids carbonic acid can be generated in turn will negatively affect materials such as cement and casing materials used in the construction of the well.

Sensors at the wellhead for pressure and temperature monitoring (see Table 6.6 in the Testing and Monitoring Plan), groundwater monitoring, soil and gas probes and neutron activated logs can be used to detect parameters out side of baseline conditions.

The wells have been designed in accordance with 40 CFR 146.86(b). Controls set in place to prevent vertical migration of CO_2 include the following:

1. CO_2 resistant cement across the injection zone
2. All casing strings are cemented to surface
3. Surface casing set below the lowest USDW

Monitoring and surveillance equipment at the wellhead will trigger shut down alarms if the presence of CO_2 is detected. These alarms may also be activated by personnel working at the site in the case of an event. Shut down procedures are listed in section E.7.e.

E.7.b. Vertical Migration via Monitoring Wells

Vertical migration of brine and stored CO_2 can occur as the result of fluid migrating up along conduits adjacent to the wellbore cement and casing. Additionally fluid can enter through leaks in the casing and tubing of the well.

Monitoring and surveillance to detect leaks utilize above confining zone, groundwater monitoring, and soil gas probes.

To mitigate and remediate the leak, a mechanical integriy well test can be used to assess and determine the root cause of the failure. Repairs or replacement of the tubing, packer or casing may be required. Additional information for this is detailed in Table 7 under Potential brine or CO_2 leakage to a USDW.

For controls and monitoring see E.7.a.

E.7.c. Vertical Migration via legacy and P&A Wells

This can occur as the result of how a well was completed, failure of cement and plugs and inadequate plugging procedures and allow fluid to migrate up along conduits adjacent to the wellbore cement and casing.

Detection of any potential leak requires the use of routine inspections and the use of soil gas probes and CO_2 sensors at and around legacy and P&A'd well locations.

E.7.d. Vertical Migration due to Failure of the Confining Layer

This can result from an exceedance in pressure beyond the fracture gradient of the confining layer or due to previously undected faults and or fractures.

This event can occur if, during injection, the pressurization of the injection zone exceeds the sealing capacity of the cap rock/seal above or if there are features such as faults or fractures that are reactivated. CO_2 and brine could find a leak path to a shallower formation, including USDW. Injection operations at the facility will be at set rates, so that the pressures will not exceed the fracture gradient of the confining zone. This event is considered unlikely to occur.

Ground water monitoring (See Section 5 in Testing and Monitoring Plan) and the use of soil gas probes will be employed to monitor and detect if there is a CO_2 leak above the confining zone and into USDWs.

<u>Response in cases of Events E.7a through E7.d:</u>

1. Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
2. Determine the severity of the event, based on the information available, within 24 hours of notification.
3. Initiate Shutdown plan and cease injection to the well(s)
4. Identify the point of potential leakage
5. Check monitoring well integrity as source of potential leakage
6. Evaluate offset wells as potential leakage points
7. If the presence of indicator parameters are confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan to:
    a. Install additional groundwater monitoring points near the affected groundwater well(s) to delineate the extent of impact and
    b. Remediate unacceptable impacts to the affected USDW
8. Within 24 hours of a release into the USDW, CapturePoint Solutions, LLC will notify the local health authority, place a notice in a newspaper of general circulation and notify adjacent landowners
9. Arrange for an alternate potable water supply, if the USDW was being utilized and has been caused to exceed drinking water standards
10. Proceed with efforts to remediate USDW to mitigate any unsafe conditions (e.g. install system to intercept/extract brine or CO_2 or "pump and treat" to aerate CO_2-laden water).

11. Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by CapturePoint Solutions, LLC and the UIC Program Director) until unacceptable adverse USDW impacts has been fully addressed.

E.8 Lateral Migration of CO_2 outside of AoR

Description: Lateral migration of CO_2 can result from the presence of natural fracture networks, high permeability or theif zones, viscous fingering of injected CO_2 and gravitational forces.

Detection: Controls in place to prevent lateral migration of stored CO_2 outside of the AoR involve continuous data acquisition and pressure evaluation at the in-zone monitoring well (see Table 6.1 items T.11, T.12 and T.13 in the Testing and Monitoring Plan). Validation of the detailed geologic model with stratigraphic wells as calibration. Acquisition of a gravity survey and integrate into the model in order to update parameters, observed data and simulation outputs. Perform extensive characterization of the rocks and formation. Review and calibrate the AoR at least every five years. Monitor the plume until stabilization (minimum of 10 years).

Response

- Immediately notify the Plant Manager or designee
- 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 notification.

In the case that lateral migration of fluid is detected the following protocol will be followed:

1. Monitoring staff will trigger the alarm for the system.
2. Review monitoring data and trends, and compare with the simulation.
3. Discuss with regulatory agency the findings, and request to keep injection process while AoR is reviewed, if the data show that CO_2 will stay in the secured pore space.
4. Perform logging in monitoring wells.
5. Conduct geophysical survey as required to evaluate AoR.
6. Recalibrate model, and simulate new AoR.
7. Assess if additional corrective actions are needed and if it's required to secure additional pore space.
8. Assess if any remediation is needed, and discuss action plan with regulatory agency.
9. Present AoR review to regulatory agency for approval and adjust monitoring plan

For all emergencies (Major, Serious, or Minor) Initiate shutdown plan (Table 4).
Collect a confirmation sample(s) of groundwater from the monitoring well, soil gas profile station, and analyze them for indicator parameters (see section 6.5 of the Testing and Monitoring Plan).

If the presence of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan to:

Install additional monitoring points near the impacted area to delineate the extent of impact:

1. If a USDW is impacted above drinking water standards, arrange for an alternate potable water supply for all users of that USDW.

2. If a surface release of CO_2 to the atmosphere is confirmed, initiate an evacuation plan, if warranted, in tandem with an appropriate workspace and/or ambient air-monitoring program at the plant boundary to monitor the presence of CO_2 and its natural dispersion following the termination of CO_2 injection.

3. If a release of CO_2 to surface waters is confirmed, implement appropriate surface watermonitoring program to determine if water quality standards are being exceeded more information regarding water quality is in section 6.5 Above Confining Zone Monitoring in the Testing and Monitoring Plan.

Proceed with efforts, if necessary, to a) remediate the USDW to achieve compliance with drinking water standards (e.g., install system to intercept/extract brine or CO_2 or "pump and treat" the impacted drinking water to mitigate CO_2/brine impacts) and/or b) manage surface waters using natural attenuation (i.e., natural processes, e.g., biological degradation, active in the environment that can reduce contaminant)

E.9. Storage Reservoir unable to Contain the Formation Fluid or Stored CO_2

Description: Failure of the storage reservoir to contain formation fluid or stored CO_2 can result from several different causes including; failure of the confining layer, the presence of faults and or fracture networks and possibly seismic events significant enough to cause faulting and fracturing of the overlying confining unit. Other conduits that would potentially permit the vertical and or lateral migration of CO_2 out of the storage reservoir are well penetrations as discussed in sections E.7a through E.7c.

Response:
- Immediately notify Site Superintendent or designee
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- Evaluate abandonment of project

E.10. Induced Seismicity

Description: Based on the project operating conditions, the very low risk of natural seismicity and the absence of faults within the AoR, it is highly unlikely that injection operations would ever induce a seismic event within a 7 mile radius from the wellhead. Therefore this portion of the response plan is developed for any seismic event with an epicenter within an 7 mile radius of the injection well(s).

Detection:

To monitor the area for seismicity information from the USGS Earthquake Hazards Program will be periodically reviewed. In the event of a detected seismic event within a 7 mile radius of the injection site, data from the USGS Earthquake Hazards Program will be immediately accessed, reviewed and the recorded depth and epicenter location will be compared to this project's operating parameters.

Based on the periodic analysis of the monitoring data, observed level of seismic activity, and local reporting of felt events, the site will be assigned an operating state. The operating state is determined using threshold criteria which correspond to the site's potential risk and level of seismic activity. The operating state for this project's location is green (Table 5). The operating state provides operating personnel information about the potential risk of further seismic activity and guides them through a series of response actions.

The seismic monitoring system structure is presented in table 5. The table corresponds each level of operating state with the threshold conditions and operational response actions.

E.11. Other Natural Disaster

Description: Well problems (integrity loss, leakage, or malfunction) may arise as a result of a natural disaster affecting the normal operation of the injection well. An earthquake may disturb surface and/or subsurface facilities; and weather-related disasters (e.g., tornado, hurricaine, earthquake or lightning strike) may affect surface facilities. Please note that the Rapides Parish injection site is located in one of the lowest seismic risk areas for the United States with no faults identified with the area of interest. Detailed information on the seismicity of Louisiana and the local area is contained with the "Project Narrative Report – Section 2.5- Seismicity" contained with Module A - Summary of Requirements.

However, natural disasters such as flooding, lightning strikes, tornadoes, forest fires, etc, are not able to be predicted.

Response: If a natural disaster occurs that affects normal operation of the injection well, or access to the injection well or facility, the following procedures will be followed:

- 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 notification. For an emergency that requires a shutdown see table 4:
- Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure.
- If warranted, perform additional monitoring of groundwater, surface water, and/or workspace/ambient air to delineate extent of any impacts.

If impacts or endangerment are detected, identify and implement appropriate response actions (in consultation with the UIC Program Director).

Table 4 Operational Shutdown Procedures

Severity	Well Integrity Failure	Monitoring Equipment Failure	Potential Brine or CO_2 Leakage to USDW	Natural Disaster
All Emergency Events	Shut-In Well (Close Flow Valve) Vent CO_2 from Surface Facilities			
Major Impact Events	Limit access to wellhead to authorized persnonnel only Communicate with CapturePoint Solutions and local authoritis to initiate evacuation plans, as necessary Monitor well pressure, temperature and annulus pressure to verify integrity loss and determinethe cause and extent of failure, identify and implement appropriate remedial actions to repair the well (in consultation with the UIC Program Director)	Limit access to wellhead to authorized persnonnel only Communicate with CapturePoint Solutions and local authorities to initiate evacuation plans, as necessary Monitor well pressure, temperature and annulus pressure (manually if necessary) to determine and the cause and extent of failure Identify and, if necessary, implement appropriate remedial actions(in consultation	Collect confirmation sample(s) of groundwater and analyze for indicator parameters (potential indicators are listed in Tables 6.5, 6.6, 6.7 and 6.8 in the Testing and Monitoring Plan. If the precense of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case specific plan to: 1. Install additional groundwater monitoring points near the impacted groundwater well(s) to delineate the extent of impact 2. Remediate unacceptable impacts to the USDW	Limit access to wellhead to authorized persnonnel only Communicate with CapturePoint Solutions and local authoritis to initiate evacuation plans, as necessary Monitor well pressure, temperature and annulus pressure to verify well status and determine the cause and extent of any failure Determine if any leaks to groundwater or surface water occured If contamination or endangerment is detected, identify and implement

Severity	Well Integrity Failure	Monitoring Equipment Failure	Potential Brine or CO_2 Leakage to USDW	Natural Disaster
	If contamination is detected, identify and implement appropriate remedial actions (in consultation with the UIC Program Director)	with the UIC Program Director) Identify impacts	3. Arrange for an alternate source of potable water supply, if the USDW was being utilized and has been caused to exceed drinking water standards 4. Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by CapturePoint Solutions and the UIC Program Director) until the adverse USDW impact has been fully addressed	appropriate remedial actions (in consultation with the UIC Program Director)

Severity	Well Integrity Failure	Monitoring Equipment Failure	Potential Brine or CO_2 Leakage to USDW	Natural Disaster
Minor Impact Events	Reset automatic shutdown devices Monitor well pressure, temperature and annulus pressure to verify integrity loss and determinethe cause and extent of failure, identify and implement appropriate remedial actions to repair the well (in consultation with the UIC Program Director)	Reset automatic shutdown devices Monitor pressure, temperature and annulus pressure (manually if necessary) to determine the cause and extent of failure Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director)		Limit access to wellhead to authorized personnel only Monitor well pressure, temperature and annulus pressure to verify integrity loss and determine the cause and extent of any failure Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director)

Table 5 Seismic monitoring system, for seismic events > M1.0 with an epicenter within an 7 mile radius of the injection well.

Operating State	Threshold Condition[1,2]	Response Action[3]
Green	Seismic events less than or equal to M1.5	1. Continue normal operation within permitted levels.
Yellow	Five (5) or more seismic events within a 30 day period having a magnitude greater than M1.5 but less than or equal to M2.0	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well.
Orange	Seismic event greater than M1.5 and local observation or felt report Seismic event greater than M2.0 and no felt report	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director, of the operating status of the well. 3. Review seismic and operational data. 4. Report findings to the UIC Program Director and issue corrective actions.
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan. 2. Vent surplus CO_2 from surface facilities 3. Limit access to the wellhead to authorized personnel only 4. Within 24 hours of the incident, notify the UIC Program Director, of the operating status of the well. 5. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 6. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 7. Determine if leaks to ground water or surface water occurred. 8. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Initiate shut down plan (See table 4) 9. Review seismic and operational data. 10. Report findings to the UIC Program Director and issue corrective actions.

[1] Specified magnitudes refer to magnitudes determined by USGS seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network.

[2] "Felt report" and "local observation and report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.

[3] Reporting findings to the UIC Program Director and issuing corrective action will occur within 25 business days (five weeks) of change in operating state.

Operating State	Threshold Condition[1,2]	Response Action[3]
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage[4] Seismic event >M3.5	1. Initiate shutdown plan. (See table 4) 2. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well. 3. Limit access to the wellhead to authorized personnel only 4. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 5. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 6. Determine if leaks to ground water or surface water occurred. 7. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director) 8. Review seismic and operational data. 9. Report findings to the UIC Program Director and issue corrective actions.

[4] Onset of damage is defined as cosmetic damage to structures, such as bricks dislodged from chimneys and parapet walls, broken windows, and fallen objects from walls, shelves, and cabinets.

3. Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP. The nearest populated area is the town of [redacted] and is located approximately [redacted] miles east [redacted] of the injection site.

Site personnel to be notified (not listed in order of notification):

1. Site Superintendent
2. Plant Manager
3. Health & Safety Manager

A site-specific emergency contact list will be developed and maintained during the life of the project. CapturePoint Solutions, LLC will provide the current site-specific emergency contact list (Table 6) to the UIC Program Director.

Table 6 Contact Information for Key Local, State, and other Authorities.

[redacted]

As appropriate, CapturePoint Solutions, LLC will communicate with the public regarding events that require an emergency response.

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

3.1 Emergency Communications Plan

CapturePoint Solutions, LLC will communicate to the public about any event that requires an emergency response to ensure that the public understands what happened and whether or not there are any environmental or safety implications. The amount of information, timing, and communications method(s) will be appropriate to the event, its severity, whether any impacts to

drinking water or other environmental resources occurred, any impacts to the surrounding community, and their awareness of the event.

CapturePoint Solutions, LLC will describe what happened, any impacts to the environment or other local resources, how the event was investigated, what responses were taken, and the status of the response. For responses that occur over the long-term (e.g., ongoing cleanups), CapturePoint Solutions, LLC will provide periodic updates on the progress of the response action(s).

CapturePoint Solutions, LLC will also communicate with entities who may need to be informed about or take action in response to the event, including local water systems, CO2 source(s) and pipeline operators, land owners, and Regional Response Teams (as part of the National Response Team).

An emergency contact list will be maintained for the lifetime of the project (construction, operation and closure). The contact list will be comprised of all facility management and essential personnel that will be activated in the case of an event. One person will be designated by the facility to handle all points of communication with the public.

3.2 Plan Review

This ERRP shall be reviewed:

- At least once every five (5) years following its approval by the permitting agency;
- Within one (1) year of an area of review (AOR) reevaluation;
- Within a reasonable time frame agreed to by all parties following any significant changes to the injection process or the injection facility, or an emergency event; or
- As required by the permitting agency.

If the review indicates that no amendments to the ERRP are necessary, CapturePoint Solutions, LLC will provide the permitting agency 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 permitting agency within a reasonable time frame to be agreed upon by all affected parties and authorized regulatory bodies following an event that initiates the ERRP review procedure.

3.3 Staff Training and Exercise Procedures

CapturePoint Solutions, LLC will integrate the ERRP into the plant specific standard operating procedures and training program. Periodic training will be provided, not less than annually, to well operators, plant safety and environmental personnel, the plant manager, plant superintendent, and corporate communications. The training plan will document that the personnel listed above have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.

Table 7 Summary Table for Risks, Monitoring and Response Actions

Risk	Description	Monitoring	Controls	Response Actions	Responsible Personnel
Movement of brine between zones while drilling	The occurance of crossflow or loss into a USDW while drilling	• Tank level sensor • Pressure sensor • Flow Sensors • Mud weight	Surface casing set below USDW Casing integrity test	Stop drilling Check well fluid levels to determine loss or influx If loss is detected control the well	Rig personnel Site Superintendent
Well control event while drilling	The potential for pressure buildup downhole resulting in loss of fluid level control in the well		BOP equipement Kill fluid Well control training BOP testing protocol	Stop drilling Close BOP Clear drilling floor and secure area Execute well control procedures Evaluate drilling parameters to identify cause	Rig personnel Site superintendent Plant Manager
Failure of flow lines from capture to wellhead	Leak occuring in pipeing as a result of physical damage or corrosion	Routine inspections by project personnel DAS/DTS fiber optic cable along flow line Pressure gauges • Temperature sensors • Flow meters • Automatic alarms		Shut off flow and isoloate leak Make repairs Assess loss of volumes Evaluate and implement procedures to prevent future occurances	Site personnel Site superintendent

Risk	Description	Monitoring	Controls	Response Actions	Responsible Personnel
		• (See Section E.3.)			
Monitoring equipement failure	Mechanical or electrical failure of guages or sensors at the wellhead or along the flow lines	• Automatic alarms • Routine inspection and calibration			
Mechincal Integrity failure of well	Failure of the tubing, packer or casing that allows fluid across zones and into a USDW	• Automatic alarms • Pressure guages • Temperature sensors • Flow meters			Site personnel Site superintendent Plant Manager Remediation contractors
Potential Brine or CO_2 leakage to USDW	Potential migration of brine or stored CO_2 along conduits such as well penetrations or through faults or fractures in the confining layer	• Above confining zone monitoring • Groundwater monitoring • Soil gas probes • (see section 6.1 table 6.1 item T.8, T.9 and T.10 in the Testing and monitoring plan)			
Storage Reservoir Unable to Contain the Formatin Fluid or Stored CO_2	Failure of the confining layer as the result of faulting or fracturing or the presence of previously unknown faults and fractures in the confining layer				Site personnel Site superintendent Plant Manager Remediation contractors

Risk	Description	Monitoring	Controls	Response Actions	Responsible Personnel
Lateral Migration of brine and or CO_2 outside of the AoR			• Detailed geologic model with stratigraphic wells as control • Geophysical survey • AoR review and calibration every 5 years • Monitoring until plume stabilization occurs	See section E.7.e	
Induced Seismicity	As a result of injection pressure exceeding the fracture gradient of the system causing ground movement compensation	• Pressure guages • Temperature sensors • Flow meters • (see table 4)	• Injection rate and volume control limits • Pressure and temperature limits	Stop injection Vent CO_2 from surface facilities	Site personnel Site superintendent Plant Manager Remediation contractors
Other Natural Disaster	Natural seismicity, weather events, or physical impact and damage to flow lines or wellhead	N/A	Stop injection	Stop injection Vent CO_2 from surface facilities	