EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)

Pelican Sequestration Project

1.0 Facility Information

Facility name: Pelican Sequestration Project
Pelican CCS 1 Well

Facility contact: [redacted], Project Manager
5 Greenway Plaza Houston, TX 77046
[redacted]

Well location: Holden, Livingston Parish, Louisiana
[redacted] (NAD 1927, BLM Zone 15N)

This Emergency and Remedial Response Plan (ERRP) describes actions the Pelican Sequestration Hub, 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.

If the Pelican Sequestration Hub, LLC obtains evidence that the injected CO_2 stream and/or associated pressure front may cause an endangerment to a USDW, the Pelican Sequestration Hub, LLC must perform the following actions:

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 as required by 40 CFR 146.94(b)(3).
4. Implement applicable portions of the approved ERRP.

Where the phrase "initiate shutdown plan" is used, the Pelican Sequestration Hub, LLC will cease injection.

2.0 Local Resources and Infrastructure

Resources in the vicinity of the Pelican Sequestration Project that may be affected as a result of an emergency event at the project site include USDWs, surface rivers and riverine, and nontidal, emergent wetlands. The USDWs that may be encountered while drilling are the Chicot aquifer system, Evangeline aquifer, and the Jasper aquifer system. The base of the USDW in the Pelican CCS 1 AoR is in the Jasper aquifer system. In the project area, the depts vary from about [redacted] subsea in the north to [redacted] subsea in the south.

The physical geography of the AoR has the open water of the Tickfaw River to the east and south, the riverine of Bear Creek to the east and south, and the riverine of East Hog Branch to the

west. Figure ERR-1 shows the surface water features within the project AoR. The surface water features include freshwater forested shrub wetlands and riverine.

The Area of Review and Corrective Action Plan document provides further details on the USDWs within the project area.

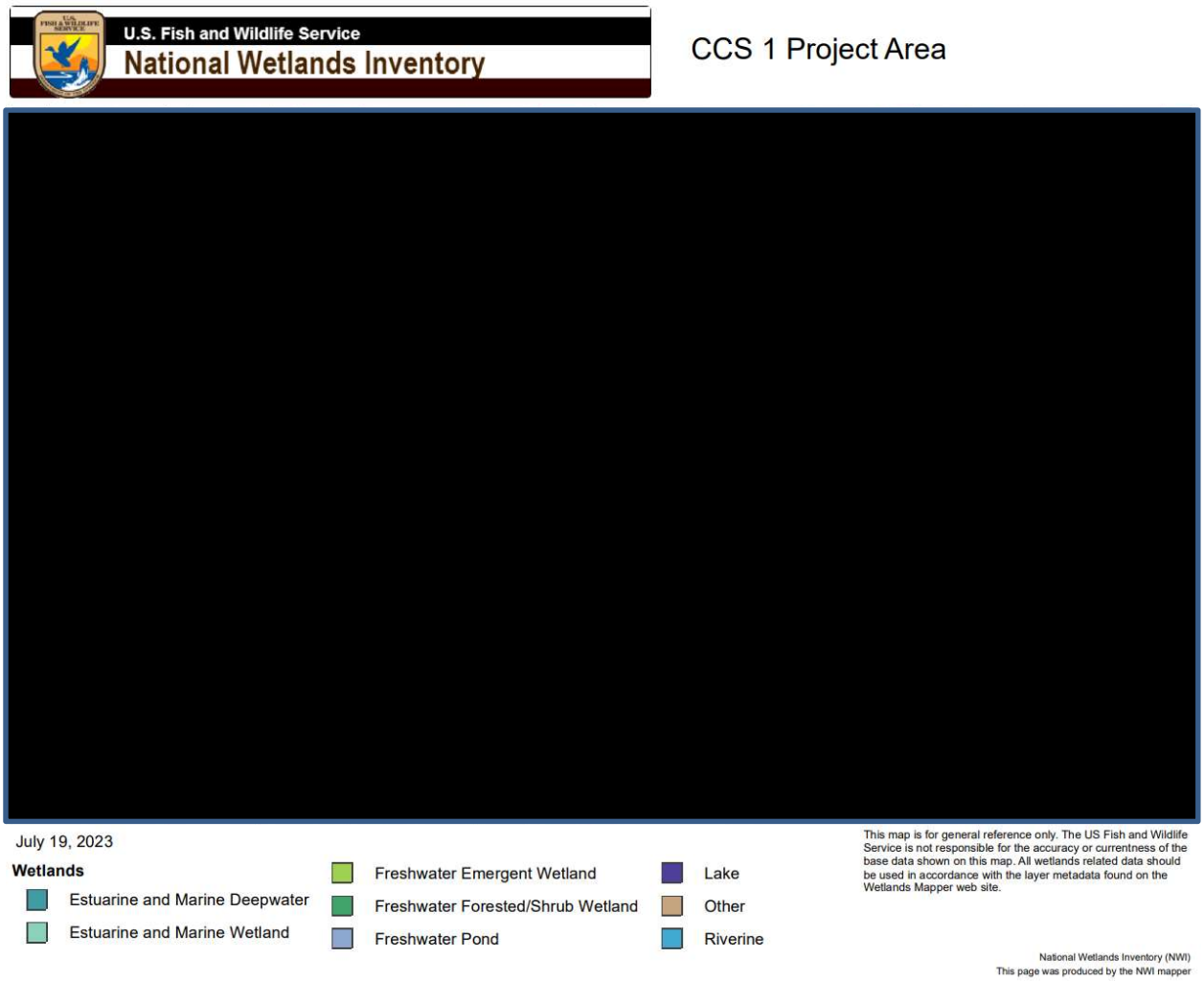

Figure ERR-1—Map of surface water features near the Pelican CCS 1 (adapted from National Wetlands Inventory https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/)

Infrastructure that that may be affected as a result of an emergency at the project site include local timber operations on the surface of the AoR.

Two small concentrations [redacted] residences each are located outside of the AoR. The area is marked by yellow circles in Figure ERR-2.

Figure ERR-2—Map of residences near the Pelican CCS 1 (from Google Earth Pro)

3.0 Potential Risk Scenarios

The events related to the Pelican Sequestrations Project that could potentially result in an emergency response are included in Table ERR-1. This table lists the types of potential adverse incidents that will trigger response actions to protect USDWs, if the incidents occur during the construction, injection, or post-injection site care periods. The activities that the Pelican Sequestration Hub, LLC will undertake in response to these incidents will result in the implementation of emergency or remedial actions. The worst-case consequences of various scenarios have been developed to ensure that response plans are in place for all eventualities.

Table ERR-1–Potential Adverse Incidents

Construction / Pre-Injection Period
• Over-pressured gas flow (blowout) • Movement of brine between formations during drilling
Injection Period
• Loss of mechanical well integrity in injection or monitoring wells (e.g., tubing leak or vehicle strike) • Rapid and/or unexpected movement of CO_2 outside the defined AoR • Migration of CO_2 from the injection zone through faults and fractures • Migration of CO_2 from the injection zone through documented or undocumented artificial penetrations (existing wells) within the defined AoR • Migration of CO_2 from the injection zone through failure of the confining zone (loss of containment) • Well monitoring equipment failure or malfunction (e.g., shutoff valve or pressure gauge) • Movement of brine or CO_2 from the injection zone to an overlying USDW or the land surface • Natural disaster (e.g., earthquake, tornado, hurricane, lightning strike) • Induced seismic event
Post-Injection Site Care Period
• Loss of mechanical well integrity in monitoring wells (e.g., tubing leak) • Rapid and/or unexpected movement of CO_2 outside the defined AoR • Migration of CO_2 from the injection zone through faults and fractures • Migration of CO_2 from the injection zone through documented or undocumented artificial penetrations (existing wells) within the defined AoR • Migration of CO_2 from the injection zone through failure of the confining zone (loss of containment) • Monitoring equipment failure or malfunction • Movement of brine or CO_2 from the injection zone to an overlying USDW or the land surface • Natural disaster (e.g., earthquake, tornado, hurricane, lightning strike) • Induced seismic event

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

Table ERR-2–Degrees of risk for emergency events

Emergency Condition	Definition
Major emergency	Known release or indication of a potential incident that poses an immediate (acute) risk to human health, resources, or infrastructure. Response actions involving local authorities (evacuation, isolation of areas, or restrictions on water usage) should be initiated. Example: well blowout during injection
Serious emergency	Incidents/releases posing potential (chronic) risk to human health, resources, or infrastructure, if conditions worsen or no mitigative or remedial response actions are taken. Examples: well seal failures, detection of increased pressure or indicators of CO_2 in zones above caprock.
Minor emergency	Incident poses a challenge to the confinement barrier, but it does not result in the immediate release of CO_2 or brine posing a risk to human health, resources, or infrastructure. Example: pressure in monitoring wells higher than anticipated.

4.0 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 listed in Table ERR-1 are detailed below.

4.1 Well Control Event

Loss of containment could occur during drilling and completions operations if the hydrostatic column controlling the well decreases below the formation pressure, allowing fluids to enter the well.

Severity: Serious

Timing of event: Construction / Pre-Injection

Avoidance measures: Blow out prevention (BOP) equipment, kill fluid, well control training, kick drill, and lubricators for wireline operations

Detection methods: flow sensor, pressure sensor, tank level indicator, tripping displacement practices, and mud weight control

Potential response actions:

- Drilling
    - Stop operation
    - Close BOP
    - Clear floor and secure area
    - Execute well control procedure
    - Evaluate drilling parameters and identify root cause
    - Continue operations

- Completion
    - Stop operation
    - Close BOP
    - Clear floor and secure area
    - Execute well control procedure
    - Continue operations

Response personnel: Rig crew, rig manager, field superintendent, and project manager

4.2 Well Integrity Failure

Integrity loss of the injection well and/or monitoring well may endanger USDWs. Integrity loss may occur during the following scenarios:

- Movement of brine between formations during drilling
- Loss of mechanical integrity due to a tubing or packer leak in the injection well or monitoring well
- Loss of mechanical integrity due to a casing leak in the injection well or monitoring well

4.2.1 Movement of brine during drilling

Movement of brine drilling during could occur if there is a cross flow with losses to the USDW during drilling activities.

Severity: Minor

Timing of event: Construction/Pre-Injection

Avoidance measures: USDW covered with surface casing, casing test after cementing surface casing to check integrity, FIT test to verify shoe integrity, mud used in surface casing based on fresh water and clays, and cement bonding log

Detection methods: tank level sensor, mud lab test, pressure sensors, flow tensors, and tripping sheets

Potential response actions:

- Stop drilling
- Check well level to detect lost circulation or influx
- In case of loss, treat well with lost circulation material and evaluate mud weight and drilling parameters
- In case of influx, control well without compromising shoe integrity
- In case the shoe is identified as leaking, squeeze to regain integrity
- In case the surface casing is identified as leaking, squeeze or casing patch are options

Response personnel: Rig crew, rig manager, field superintendent

4.2.2 Loss of mechanical integrity; tubing or packing leak in injection well

Loss of mechanical integrity due to a tubing or packing leak in the injection well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause communication of the formation fluids with the annulus between the casing and tubing and sustained casing pressure. There is no loss of containment in this scenario.

Severity: Minor

Timing of event: Injection

Avoidance measures: Coated tubing, inhibited packer fluid in annulus, corrosion monitoring plan, dry CO_2 injected, nickel-plated packers, FF trim on tubing hanger and tree, and CR or Inconel carrier for the sensors

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, annular pressure test, and CO_2 leak sensor on the wellhead

Potential response actions:

- Follow protocol to stop operation, vent, or deviate CO_2
- Troubleshoot the well
- If tubing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair tubing

Response personnel: Operations engineer, field superintendent, project manager, and rig crew

4.2.3 Loss of mechanical integrity; tubing or packing leak in monitoring well

Loss of mechanical integrity due to a tubing or packing leak in the monitoring well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause communication of the formation fluids with the annulus between the casing and tubing and sustained casing pressure. There is no loss of containment in this scenario.

Monitoring wells are designed to be outside the projected plume for the majority of the project operation, reducing the risk of contact with CO_2.

Severity: Minor

Timing of event: Injection

Avoidance measures: Inhibited packer fluid in annulus, corrosion monitoring plan, nickel-plated packers, and CR or Inconel carrier for the sensors

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, annular pressure test, and CO_2 leak sensor on the wellhead

Potential response actions:

- Troubleshoot the well
- If tubing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair tubing or abandon the well

Response personnel: Operations engineer, field superintendent, project manager, and rig crew

4.2.4 Loss of mechanical integrity; casing leak in injection well

Loss of mechanical integrity due to a casing leak in the injection well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause a migration of CO_2 and brines through the casing, the cement sheet, and into different formation in the injection target or USDW.

Severity: Minor

Timing of event: Injection

Avoidance measures: CO_2-resistant cement and metallurgy across injection zone, injection through tubing and packer, nickel-plated packers, CR or Inconel carrier sensors, inhibited packer fluid in the annulus, cement to surface, corrosion monitoring plan, and CBL/USIT after installation

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, CO_2 leak sensor on the wellhead, real-time DTS fiber alongside of casing, flow rate monitoring, soil gas probes, neutron-activated logs, and USDW water monitoring

Potential response actions:

- Follow protocol to stop operation, vent, or deviate CO_2
- Troubleshoot the well
- Evaluated if there is movement of CO_2 or brines to USDW
- If USDW is affected, discuss remediation with regulating authority
- If casing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair casing

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.2.5 Loss of mechanical integrity; casing leak in monitoring well

Loss of mechanical integrity due to a casing leak in the monitoring well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause a migration of CO_2 and brines through the casing, the cement sheet, and into different formation in the injection target or USDW.

Severity: Minor

Timing of event: Injection

Avoidance measures: CO_2-resistant cement across injection zone, nickel-plated packers, CR or Inconel carrier sensors, inhibited packer fluid in the annulus, cement to surface, corrosion monitoring plan, and CBL/USIT after installation

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, CO_2 leak sensor on the wellhead, soil gas probes, neutron-activated logs, and USDW water monitoring

Potential response actions:

- Troubleshoot the well
- Evaluated if there is movement of CO_2 or brines to USDW
- If USDW is affected, discuss remediation with regulating authority
- If a casing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair casing

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.3 Well Monitoring Equipment Failure

The failure of monitoring equipment for a well may indicate a problem with the well that could endanger USDWs. Failure of the devices could allow for an undetected overpressure of the system and/or damage to equipment, tubulars, or surface facilities.

4.3.1 Injection Well Monitoring Equipment Failure

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

Severity: Minor

Timing of event: Injection / Post-Injection

Avoidance measures: Preventative maintenance program and periodic inspections

Detection methods: Real-time monitoring systems, redundancy, and field inspections

Potential response actions:

- If the failure is a single surface monitoring device (e.g., surface pressure transmitter) that has a redundant device (i.e., second pressure transmitter) still in operation, operations response is required to repair the device. No change to operations will be immediately planned.

- If there is an injury or property damage, contact field superintendent and activate emergency evacuation to secure location
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- Assess mechanical integrity of the system and propose repair actions, if necessary
- Assess environmental impact and discuss remedial action with regulating authority
- If assessment allows, discuss plan with the regulating authority to safety resume injection
- Repair or replace instrumentation; calibrate equipment
- Review monitoring records and if needed, perform a fall-off test to evaluate reservoir

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, emergency teams, geologist, reservoir engineer, and monitoring staff

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.

Severity: Serious

Timing of event: Injection

Avoidance measures: Preventative maintenance program and periodic inspections

Detection methods: Real-time monitoring systems, redundancy, and field inspections

Potential response actions:

- If there is an injury or property damage, contact field superintendent and activate emergency evacuation to secure location
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- Assess mechanical integrity of the system and propose repair actions, if necessary
- Assess environmental impact and discuss remedial action with regulating authority
- If assessment allows, discuss plan with the regulating authority to safety resume injection
- Repair or replace instrumentation; calibrate equipment
- Review monitoring records and if needed, perform a fall-off test to evaluate reservoir

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, emergency teams, geologist, reservoir engineer, and monitoring staff

4.3.2 Monitoring Well Monitoring Equipment Failure

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

Severity: Minor

Timing of event: Injection

Avoidance measures: Preventative maintenance program and periodic inspections

Detection methods: Real-time monitoring systems, redundancy, and field inspections

Potential response actions:

- If the failure is a single surface monitoring device (e.g., surface pressure transmitter) that has a redundant device (i.e., second pressure transmitter) still in operation, operations response is required to repair the device. No change to operations will be immediately planned.
- If there is an injury or property damage, contact the field superintendent and activate emergency evacuation to secure location
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- Assess mechanical integrity of the system and propose repair actions, if necessary
- Assess environmental impact and discuss remedial action with regulating authority
- If assessment allows, discuss plan with the regulating authority to safety resume injection
- Repair or replace instrumentation; calibrate equipment
- Review monitoring records and if needed, perform a fall-off test to evaluate reservoir

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, emergency teams, geologist, reservoir engineer, and monitoring staff

4.4 Potential Brine or CO_2 Leakage to USDW

Potential brine or CO_2 leakage to the USDW from the injection well and/or monitoring well may endanger USDWs. Integrity loss may occur during the following scenarios:

- Vertical migration of CO_2 or brine between formations through the injection well or monitoring well
- Vertical migration of CO_2 or brine between formations through legacy or plugged and abandoned (P&Ad) wells

- Vertical migration of CO_2 or brine between formations due to failure of the confining rock, faults, or fractures
- Lateral migration or CO_2 outside the defined AoR

4.4.1 Vertical migration of brine or CO_2 to USDW; injection well

Vertical migration of brine or CO_2 during injection could occur if there are induced stresses or a chemical reaction on the tubulars or cement of the injection well exposed to the CO_2 pressure or plume.

Severity: Minor

Timing of event: Injection

Avoidance measures: CO_2-resistent cement and metallurgy across injection zone, injection through tubing and packer, cement to surface, CBL/USIT after installation, and USDW covered as section barrier with surface casing and surface cement sheet

Detection methods: CO_2 leak sensors on the wellhead, real-time DTS fiber alongside the casing, soil gas probes, USDW water monitoring, neutron-activated logs to be run for external MI, pressure gauges at surface, and flow rate monitoring

Potential response actions:

- Follow protocol to stop operation, vent, or deviate CO_2
- Troubleshoot the well
- Evaluate if there is movement of CO_2 or brines to USDW
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Discuss plan to repair the well with the regulating authority

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.4.2 Vertical migration of brine or CO_2 to USDW; monitoring well

Vertical migration of brine or CO_2 during injection or post-injection could occur if there are induced stresses or a chemical reaction on the tubulars or cement of the monitoring well exposed to the CO_2 pressure or plume.

Severity: Minor

Timing of event: Injection and Post-Injection

Avoidance measures: CO_2-resistent cement across injection zone, cement to surface, CBL/USIT after installation, and USDW covered as section barrier with surface casing and surface cement sheet

Detection methods: CO_2 leak sensors on the wellhead, soil gas probes, USDW water monitoring, neutron-activated logs to be run for external MI, and pressure gauges at surface

Potential response actions:

- Troubleshoot the well
- Evaluate if there is movement of CO_2 or brines to USDW
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Discuss plan to repair or abandon the well with the regulating authority

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.4.3 Vertical migration of brine or CO_2 to USDW; legacy and P&A wells

Vertical migration of brine or CO_2 during injection or post-injection could occur if there is poor cement bonding, cement degradation, or cracking in the legacy or P&A wells exposed to the CO_2 pressure or plume.

Severity: Serious

Timing of event: Injection and Post-Injection

Avoidance measures: Legacy wells to be properly abandoned for brine movement and CO_2 plume according to the corrective action plan; injectors will be abandoned as soon as CO_2 injection in the project ends unless they are left as monitoring wells

Detection methods: Soil gas probes, CO_2 leak sensors, and seismic surveying during AoR review periods

Potential response actions:

- Evaluate if there is movement of CO_2 or brines to USDW due to a leak in a legacy or P&A well
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Discuss plan to repair the well with the regulating authority

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.4.4 Vertical migration of brine or CO_2 to USDW; failure of confining rock, faults, or fractures

Vertical migration of brine or CO_2 during injection could occur if the pressure of the injection zone exceeds the sealing capacity of the caprock or seal above or if fault or fracture features are reactivated. Brine or CO_2 could leak to a shallower formation, including a USDW.

Severity: Minor

Timing of event: Injection

Avoidance measures: Seismic survey in the area shows no faults crossing the storage formation or the seal, injection is limited to 90% of the fracture gradient, and extensive characterization of the rocks show good sealing capacity

Detection methods: USDW water sampling, 4D seismic, neutron-activated logs in monitoring wells, soil gas monitoring, and surface pressure monitoring

Potential response actions:

- Follow protocol to stop injection
- Assess root cause by reviewing monitoring data
- If required, conduct geophysical survey to delineate potential leak path
- Evaluate if there is movement of CO_2 or brines to USDW due to a failure of confining rock, faults, or fractures
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Actions to restore injection depend on nature of the leak path and the extension

Response personnel: Monitoring staff, geologist, reservoir engineer, project manager, and remediation contractors

4.4.5 Lateral migration of CO_2 to outside the defined AoR

Lateral migration of CO_2 outside the defined AoR could occur during injection or post-injection if the plume moves faster or in an unexpected pattern and expands beyond the secure pore space and AoR for the project.

Severity: Serious

Timing of event: Injection and Post-Injection

Avoidance measures: Detailed geologic model with stratigraphic well as a calibration, seismic survey integrated in the model, extensive characterization of the rocks and formation, AoR review and calibration at least every 5 years, and monitoring of the plume until stabilization

Detection methods: 4D seismic, neutron-activated logs in monitoring wells, and real-time pressure and temperature gauges in monitoring wells

Potential response actions:

- Injection
    - Review monitoring data and trends compared with simulation
    - Discuss findings with regulating authority; request to maintain injection during AoR evaluation if data shows that CO_2 will stay in secured pore space
    - Perform logging in monitoring wells

    - Conduct geophysical survey as required to evaluate AoR
    - Recalibrate model and simulate new AoR
    - Assess if additional corrective actions and pore space are needed
    - Assess if remediation is needed; prepare action plan and review with regulating authority
    - Present AoR review to regulating authority for approval; adjust monitoring plan
- Post-Injection
    - Review monitoring data and trends compared with simulation
    - Discuss findings with regulating authority
    - Conduct geophysical survey as required to evaluate AoR
    - Recalibrate model and simulate new AoR
    - Assess if additional corrective actions and pore space are needed
    - Conduct geophysical survey as required to evaluate AoR
    - Recalibrate model and simulate new AoR

Response personnel: Monitoring staff, geologist, reservoir engineer, and project manager

4.5 Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise as a result of a natural disaster affecting the normal operation of the injection well. A major seismic event may disturb surface and/or subsurface facilities and weather-related disasters (e.g., tornado, lightning strike, or hurricane) may affect surface facilities.

If a natural disaster occurs that affects normal operation of the injection well, perform the following:

Severity: Dependent on severity of event; potentially Major

Timing of event: Injection and Post-Injection

Avoidance measures: N/A

Detection methods: geophones array on surface to monitor induced seismicity will detect naturally occurring major seismic event and operations staff monitoring weather

Potential response actions:

- Major Seismic Event
    - For event above ML 2.0 within 5.6 miles of injection well
        - Review monitoring parameters to validate normal operation
        - If parameters indicate a potential mechanical integrity failure, follow procedure for event above ML 4.0

        - Compare storage behavior with the model
        - If needed, propose adjustments to operating conditions
    - For event above ML 4.0 within 5.6 miles of injection well
        - If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
        - Follow protocol to stop injection
        - Assess mechanical integrity of the system; propose repair actions based on findings
        - Assess environmental impact; discuss remedial action with regulating authority, if necessary
        - Review regional information and monitoring records to determine origin of the event
        - If even is induced, reevaluate model, define new injection parameters, and discuss with regulating authority
        - If assessment allows for resuming injection safely, increase surveillance to validate effectiveness of actions

- Weather Disaster
    - If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
    - Follow protocol to stop injection
        - In the event of a pending, known weather event, gradual cessation of injection may be appropriate to allow for depressuration and idle of pipelines as a measure to mitigate surface risk
    - Assess mechanical integrity of the system; propose repair actions based on findings
    - If assessment allows for resuming injection safely, increase surveillance to validate effectiveness of actions

Response personnel: Operations engineer, field superintendent, project manager, geologist, reservoir engineer, monitoring staff, remediation contractors, and emergency teams

4.6 Induced Seismic Event

Based on the project operating conditions, it is highly unlikely that injection operations would ever induce a seismic event outside a 5.6-mile radius from the wellhead. Therefore, this portion of the response plan is developed for any seismic event with an epicenter within a 5.6-mile radius of the injection well.

A geophone array on surface will be used to monitor the area for seismicity.

Severity: Serious

Timing of event: Injection

Avoidance measures: Seismic survey of the storage complex shows no faults that could be reactivated, detailed geomechanical model created to evaluate the storage complex, and region is seismically stable

Detection methods: Geophone array on surface

Potential response Actions:

- For event above ML 2.0 within 5.6 miles of injection well
    - Review monitoring parameters to validate normal operation
    - If parameters indicate a potential mechanical integrity failure, follow procedure for event above ML 4.0
    - Compare storage behavior with the model
    - If needed, propose adjustments to operating conditions
- For event above ML 4.0 within 5.6 miles of injection well
    - If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
    - Follow protocol to stop injection
    - Assess mechanical integrity of the system; propose repair actions based on findings
    - Assess environmental impact; discuss remedial action with regulating authority, if necessary
    - Review regional information and monitoring records to determine origin of the event
    - If even is induced, reevaluate model, define new injection parameters, and discuss with regulating authority
    - If assessment allows for resuming injection safely, increase surveillance to validate effectiveness of actions

Response personnel: Operations engineer, field superintendent, project manager, geologist, reservoir engineer, monitoring staff, remediation contractors, and emergency teams

4.7 Surface Impacts

Surface impact may cause loss of containment during the follow scenarios

- External impact to the injection wellhead
- External impact to the monitoring wellhead
- External impact to the surface piping or buried pipelines

4.7.1 Loss of containment; external impact to injection wellhead

External impact to the injection wellhead due to heavy trucks or equipment could cause loss of containment of brine or CO_2 if the wellhead is disconnected from the wellpipe or the surface pipeline.

Severity: Serious

Timing of event: Injection

Avoidance measures: Fenced location and bollards installed and signage

Detection methods: Real-time pressure and temperature at the wellhead and surface facilities, field inspections, and OGI cameras

Potential response actions:

- Automated shutdown will initiate; follow protocol to shutdown CO_2 delivery if the automated shutdown devices are not functional
- If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
- Clear the location and secure the perimeter
- Contact well control special team to execute blowout emergency plan that may include capping the well, drilling a relief well to kill injector, repair well, and/or abandon well; discuss plan with regulating authority
- Evaluate environmental impact to soil, water, vegetation; present remediation plan to regulating authority
- Execute remediation and install monitoring system as needed

Response personnel: Operations engineer, field superintendent, project manager, rig crew, remediation contractors, and well control specialist

4.7.2 Loss of containment; external impact to monitoring wellhead

External impact to the monitoring wellhead due to heavy trucks or equipment could cause loss of containment of brine or CO_2 if the wellhead is disconnected from the wellpipe or the surface pipeline.

Severity: Minor

Timing of event: Injection and Post-Injection

Avoidance measures: Fenced location and bollards installed, signage, and reduced pressure in the monitoring well compared with the injection well

Detection methods: Real-time pressure and temperature at the wellhead and surface facilities and field inspections

Potential response actions:

- If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
- Clear the location and secure the perimeter
- Contact well control special team to execute blowout emergency plan that may include capping the well, drilling a relief well to kill injector, repair well, and/or abandon well; discuss plan with regulating authority
- Evaluate environmental impact to soil, water, vegetation; present remediation plan to regulating authority
- Execute remediation and install monitoring system as needed

Response personnel: Operations engineer, field superintendent, project manager, rig crew, remediation contractors, and well control specialist

4.7.3 Loss of containment; external impact to surface piping or buried pipeline

External impact to the surface piping or buried pipeline due to heavy trucks or equipment could cause loss of containment of brine or CO_2 if the pipe is ruptured.

Severity: Serious

Timing of event: Injection

Avoidance measures: Fenced location and bollards installed to protect surface piping, field pipeline is buried, pipeline Right-of-Way identified with signage, and One Call 811 Program

Detection methods: Real-time pressure, temperature, and flow measurement and field inspections

Potential response actions:

- Automated shutdown will initiate; follow protocol to shutdown CO_2 delivery if the automated shutdown devices are not functional
- If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
- Clear the location and secure the perimeter
- Evaluate environmental impact to soil, water, vegetation; present remediation plan to regulating authority
- Execute remediation and install monitoring system as needed

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, and well control specialist

5.0 Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement the ERRP.

Monitoring, control, and routine maintenance of the injection operations will be the responsibility of the Injection Operations Staff. Site personnel are expected to include, at minimum, the positions listed below in Table ERR-3.

If an adverse event is discovered, the Operations Manager and Emergency Coordinator on duty will be notified immediately. The Emergency Coordinator will be responsible for notifying offsite emergency agencies and resources. The Operations Manager will contact outside emergency response organizations if the Emergency Coordinator is not available. The EPA Region 6 UIC Program Director will be notified within 24 hours, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).

Table ERR-3–Operations Staff Descriptions

Position	Function	Qualifications
Emergency Coordinator	Responsible for notification of offsite support agencies in accordance with written procedures. Responsible for coordination and overseeing contact with the media.	Trained in the Communications Plan and Emergency Notification Procedures requirements as contained in the ERRP.
Operations Manager	Serves as the Emergency Response Manager responsible for the overall management of the Incident Response Team. Manages facility operations and personnel during an emergency and is responsible for implementation of appropriate emergency procedures and their follow-up activities.	Trained in the requirements of the ERRP and facility operations.
Project Manager	Serves as the Emergency Response Coordinator responsible for the overall communication between Incident Response Team members. Directs facility operations during an emergency and is responsible for communication between on-site personnel and professional services. Implements emergency procedures and ensures documentation of follow-up activities.	Trained in the requirements of the ERRP and facility operations.
Senior Reservoir Engineer	Responsible for injection operation and monitoring. Lead incident response manager regarding injection and storage zone operation at the facility.	Undergraduate degree in engineering, related to chemical or reservoir, with at least 5 years of experience in reservoir dynamics and relevant monitoring interpretation.
Geologist/ Geophysicist	Professional serving to assist in operation, maintenance, and monitoring of the injection process. Conducts routine data management and interpretation. Assists in implementing response actions regarding injection zone integrity.	Undergraduate degree in geophysics or geology with specialization in hydrology/fluid mechanics.
Operations Engineer	Oversees mechanical and fluid management operation of the injection wells, annulus pressure control system, and wellhead piping systems. Maintains and repairs injection-related equipment, including valves, instruments, and piping. Assists in mechanical and electronic control of the injection process.	Undergraduate degree in engineering, related to mechanical, chemical, or process control. Minimum of 2 years of experience in operation and service of equipment and instruments for pressurized well systems and wellhead controls.

A site-specific emergency contact list will be developed and maintained during the life of the project. The Pelican Sequestration Hub, LLC will provide the current site-specific emergency contact list to the UIC Program Director.

A list of contacts for state agencies having jurisdiction within the AoR and key local emergency agencies is presented below in Table ERR-4.

There are no federally recognized Native American Tribes located within the AoR. If a federally recognized Native American Tribe were to exist in the AoR at the time of a site emergency, then that tribe(s) will be notified of the site emergency at that time.

Table ERR-4–Contact information for key local, state, and other authorities

Agency	Location	Phone
Livingston Parish Fire District	Albany, LA	911 or 225-209-5353
Livingston Police Department	Livinston, LA	911 or 225-686-7153
North Oaks Medical Center	Hammond, LA	985-345-2700
State Police	Baton Rouge, LA	511 or 1-800-469-4828
Livingston Parish Sheriff	Livingston, LA	911 or 225-686-2241
Louisiana Office of Emergency Preparedness	Baton Rouge, LA	225-925-7500
Livingston Parish Office of Homeland Security and Emergency Preparedness (LOHSEP)	Livingston, LA	225-686-3066
US EPA Region 6	Dallas, TX	214-665-2294
Louisiana Stage Geological Survey	Baton Rouge, LA	225-578-5320
Louisiana Department of Natural Resources	Baron Rouge, LA	225-342-5569
US Geological Survey Water Resources for Louisiana	Baron Rouge, LA	225-298-5481

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, the Pelican Sequestration Hub, LLC shall be responsible for its procurement.

6.0 Emergency Communications Plan

The Pelican Sequestration Hub, LLC will communicate to the public about any event that requires an emergency response to ensure that the public understands what happened and whether there are any current or potential 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.

The Pelican Sequestration Hub, LLC will describe what happened, current or potential 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), the Pelican Sequestration Hub, LLC will provide periodic updates on the progress of the response action(s).

The Pelican Sequestration Hub, LLC will communicate with entities who need to be informed about or take action in response to the event, including local water systems, CO_2 source(s), pipeline operators, landowners, and Regional Response Teams (as part of the National Response Team).

If a seismic event occurs, the Pelican Sequestration Hub, LLC will provide information about whether the event was naturally occurring or induced by the injection, whether any damage to the well or other structures in the area occurred, the investigative process, and what responses, if any, were taken by the Pelican Sequestration Hub, LLC or others.

7.0 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 prescribed period (to be determined by the permitting agency) following any significant changes to the injection process or 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, the Pelican Sequestration Hub, 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 six months following an event that initiates the ERRP review procedure.

8.0 Staff Training and Exercise Procedures

All operations employees will receive training related to health and safety, operational procedures, and emergency response according to the roles and responsibilities of their work assignments. Initial training will be conducted by, or under the supervision of, the operations manager or a designated representative. Trainers will be thoroughly familiar with the Operations Plan and ERRP.

Facility personnel will participate in annual training that teaches them to perform their duties in ways that prevent CO_2 discharge. The training will include familiarization with operating procedures and equipment configurations appropriate to the job assignment as well as emergency response procedures, equipment, and instrumentation. New personnel will be instructed before beginning their work.

Refresher training will be conducted at least annually for all operations personnel. Monthly briefings will be provided to operations personnel according to their respective responsibilities and will highlight recent operating incidents, actual experience in operating equipment, and recent storage reservoir monitoring information.

Only personnel who have been properly trained will participate in drilling, construction, operations, and equipment repair at the storage site. A record including the person's name, date of training, and instructor's signature will be maintained.

EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)

Pelican Sequestration Project

1.0 Facility Information

Facility name: Pelican Sequestration Project
Pelican CCS 2 Well

Facility contact: [redacted], Project Manager
5 Greenway Plaza Houston, TX 77046
[redacted]

Well location: Holden, Livingston Parish, Louisiana
[redacted] (NAD 1927, BLM Zone 15N)

This Emergency and Remedial Response Plan (ERRP) describes actions the Pelican Sequestration Hub, 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.

If the Pelican Sequestration Hub, LLC obtains evidence that the injected CO_2 stream and/or associated pressure front may cause an endangerment to a USDW, the Pelican Sequestration Hub, LLC must perform the following actions:

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 as required by 40 CFR 146.94(b)(3).
4. Implement applicable portions of the approved ERRP.

Where the phrase "initiate shutdown plan" is used, the Pelican Sequestration Hub, LLC will cease injection.

2.0 Local Resources and Infrastructure

Resources in the vicinity of the Pelican Sequestration Project that may be affected as a result of an emergency event at the project site include USDWs, surface rivers and riverine, and nontidal, emergent wetlands. The USDWs that may be encountered while drilling are the Chicot aquifer system, Evangeline aquifer, and the Jasper aquifer system. The base of the USDW in the Pelican CCS 1 AoR is in the Jasper aquifer system. In the project area, the depts vary from about [redacted] subsea in the north to [redacted] subsea in the south.

The physical geography of the AoR has the open water of the Tickfaw River to the east and south, the riverine of Bear Creek to the east and south, and the riverine of East Hog Branch to the

west. Figure ERR-1 shows the surface water features within the project AoR. The surface water features include freshwater forested shrub wetlands and riverine.

The Area of Review and Corrective Action Plan document provides further details on the USDWs within the project area.

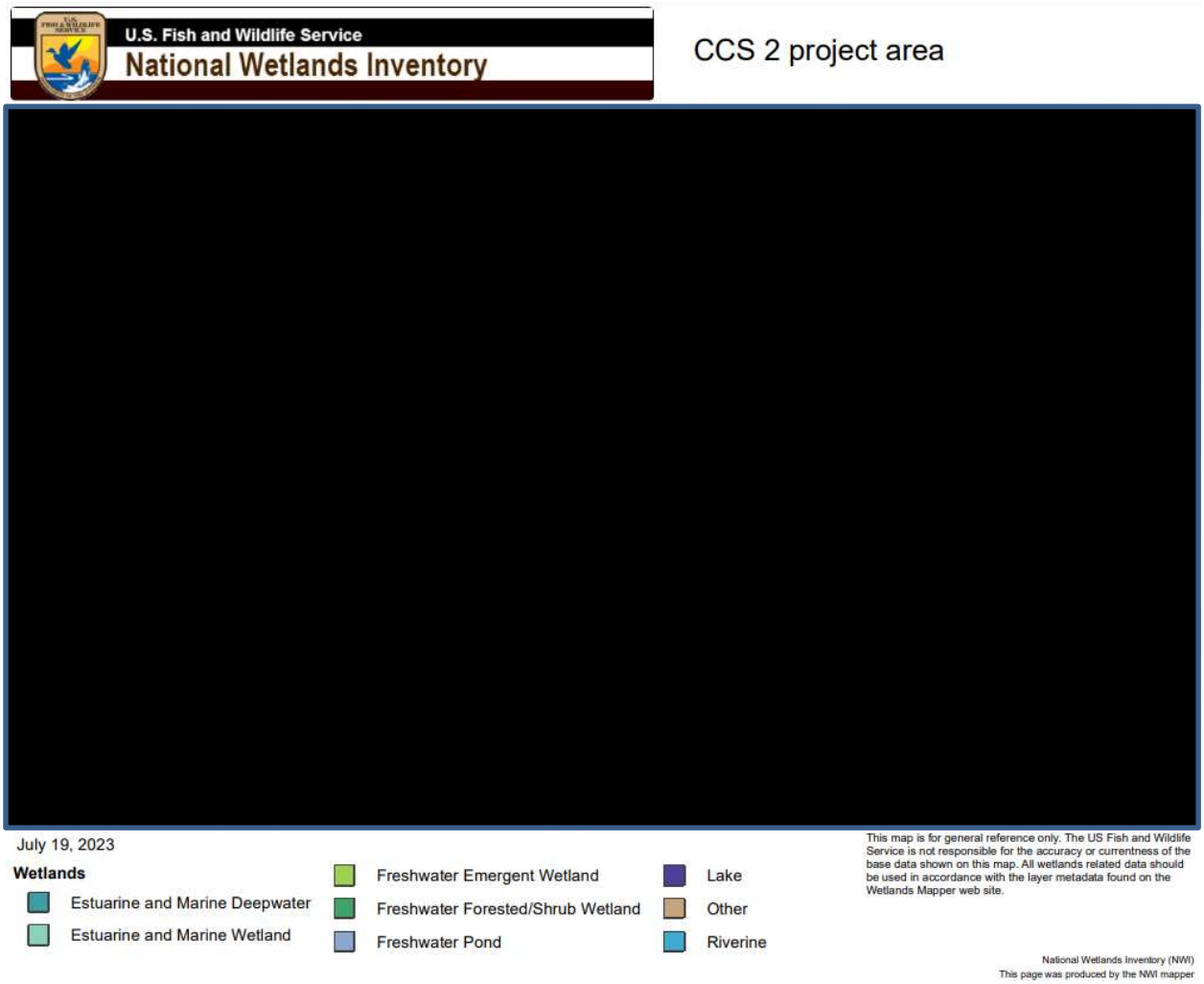

Figure ERR-1—Map of surface water features near the Pelican CCS 2 (adapted from National Wetlands Inventory https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/)

Infrastructure that that may be affected as a result of an emergency at the project site include local timber operations on the surface of the AoR.

Two small concentrations [redacted] residences each are located outside of the AoR. The area is marked by yellow circles in Figure ERR-2.

Figure ERR-2—Map of residences near the Pelican CCS 2 (from Google Earth Pro)

3.0 Potential Risk Scenarios

The events related to the Pelican Sequestrations Project that could potentially result in an emergency response are included in Table ERR-1. This table lists the types of potential adverse incidents that will trigger response actions to protect USDWs, if the incidents occur during the construction, injection, or post-injection site care periods. The activities that the Pelican Sequestration Hub, LLC will undertake in response to these incidents will result in the implementation of emergency or remedial actions. The worst-case consequences of various scenarios have been developed to ensure that response plans are in place for all eventualities.

Table ERR-1–Potential Adverse Incidents

Construction / Pre-Injection Period
• Over-pressured gas flow (blowout) • Movement of brine between formations during drilling
Injection Period
• Loss of mechanical well integrity in injection or monitoring wells (e.g., tubing leak or vehicle strike) • Rapid and/or unexpected movement of CO_2 outside the defined AoR • Migration of CO_2 from the injection zone through faults and fractures • Migration of CO_2 from the injection zone through documented or undocumented artificial penetrations (existing wells) within the defined AoR • Migration of CO_2 from the injection zone through failure of the confining zone (loss of containment) • Well monitoring equipment failure or malfunction (e.g., shutoff valve or pressure gauge) • Movement of brine or CO_2 from the injection zone to an overlying USDW or the land surface • Natural disaster (e.g., earthquake, tornado, hurricane, lightning strike) • Induced seismic event
Post-Injection Site Care Period
• Loss of mechanical well integrity in monitoring wells (e.g., tubing leak) • Rapid and/or unexpected movement of CO_2 outside the defined AoR • Migration of CO_2 from the injection zone through faults and fractures • Migration of CO_2 from the injection zone through documented or undocumented artificial penetrations (existing wells) within the defined AoR • Migration of CO_2 from the injection zone through failure of the confining zone (loss of containment) • Monitoring equipment failure or malfunction • Movement of brine or CO_2 from the injection zone to an overlying USDW or the land surface • Natural disaster (e.g., earthquake, tornado, hurricane, lightning strike) • Induced seismic event

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

Table ERR-2–Degrees of risk for emergency events

Emergency Condition	Definition
Major emergency	Known release or indication of a potential incident that poses an immediate (acute) risk to human health, resources, or infrastructure. Response actions involving local authorities (evacuation, isolation of areas, or restrictions on water usage) should be initiated. Example: well blowout during injection
Serious emergency	Incidents/releases posing potential (chronic) risk to human health, resources, or infrastructure, if conditions worsen or no mitigative or remedial response actions are taken. Examples: well seal failures, detection of increased pressure or indicators of CO_2 in zones above caprock.
Minor emergency	Incident poses a challenge to the confinement barrier, but it does not result in the immediate release of CO_2 or brine posing a risk to human health, resources, or infrastructure. Example: pressure in monitoring wells higher than anticipated.

4.0 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 listed in Table ERR-1 are detailed below.

4.1 Well Control Event

Loss of containment could occur during drilling and completions operations if the hydrostatic column controlling the well decreases below the formation pressure, allowing fluids to enter the well.

Severity: Serious

Timing of event: Construction / Pre-Injection

Avoidance measures: Blow out prevention (BOP) equipment, kill fluid, well control training, kick drill, and lubricators for wireline operations

Detection methods: flow sensor, pressure sensor, tank level indicator, tripping displacement practices, and mud weight control

Potential response actions:

- Drilling
    - Stop operation
    - Close BOP
    - Clear floor and secure area
    - Execute well control procedure
    - Evaluate drilling parameters and identify root cause
    - Continue operations

- Completion
    - Stop operation
    - Close BOP
    - Clear floor and secure area
    - Execute well control procedure
    - Continue operations

Response personnel: Rig crew, rig manager, field superintendent, and project manager

4.2 Well Integrity Failure

Integrity loss of the injection well and/or monitoring well may endanger USDWs. Integrity loss may occur during the following scenarios:

- Movement of brine between formations during drilling
- Loss of mechanical integrity due to a tubing or packer leak in the injection well or monitoring well
- Loss of mechanical integrity due to a casing leak in the injection well or monitoring well

4.2.1 Movement of brine during drilling

Movement of brine drilling during could occur if there is a cross flow with losses to the USDW during drilling activities.

Severity: Minor

Timing of event: Construction/Pre-Injection

Avoidance measures: USDW covered with surface casing, casing test after cementing surface casing to check integrity, FIT test to verify shoe integrity, mud used in surface casing based on fresh water and clays, and cement bonding log

Detection methods: tank level sensor, mud lab test, pressure sensors, flow tensors, and tripping sheets

Potential response actions:

- Stop drilling
- Check well level to detect lost circulation or influx
- In case of loss, treat well with lost circulation material and evaluate mud weight and drilling parameters
- In case of influx, control well without compromising shoe integrity
- In case the shoe is identified as leaking, squeeze to regain integrity
- In case the surface casing is identified as leaking, squeeze or casing patch are options

Response personnel: Rig crew, rig manager, field superintendent

4.2.2 Loss of mechanical integrity; tubing or packing leak in injection well

Loss of mechanical integrity due to a tubing or packing leak in the injection well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause communication of the formation fluids with the annulus between the casing and tubing and sustained casing pressure. There is no loss of containment in this scenario.

Severity: Minor

Timing of event: Injection

Avoidance measures: Coated tubing, inhibited packer fluid in annulus, corrosion monitoring plan, dry CO_2 injected, nickel-plated packers, FF trim on tubing hanger and tree, and CR or Inconel carrier for the sensors

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, annular pressure test, and CO_2 leak sensor on the wellhead

Potential response actions:

- Follow protocol to stop operation, vent, or deviate CO_2
- Troubleshoot the well
- If tubing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair tubing

Response personnel: Operations engineer, field superintendent, project manager, and rig crew

4.2.3 Loss of mechanical integrity; tubing or packing leak in monitoring well

Loss of mechanical integrity due to a tubing or packing leak in the monitoring well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause communication of the formation fluids with the annulus between the casing and tubing and sustained casing pressure. There is no loss of containment in this scenario.

Monitoring wells are designed to be outside the projected plume for the majority of the project operation, reducing the risk of contact with CO_2.

Severity: Minor

Timing of event: Injection

Avoidance measures: Inhibited packer fluid in annulus, corrosion monitoring plan, nickel-plated packers, and CR or Inconel carrier for the sensors

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, annular pressure test, and CO_2 leak sensor on the wellhead

Potential response actions:

- Troubleshoot the well
- If tubing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair tubing or abandon the well

Response personnel: Operations engineer, field superintendent, project manager, and rig crew

4.2.4 Loss of mechanical integrity; casing leak in injection well

Loss of mechanical integrity due to a casing leak in the injection well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause a migration of CO_2 and brines through the casing, the cement sheet, and into different formation in the injection target or USDW.

Severity: Minor

Timing of event: Injection

Avoidance measures: CO_2-resistant cement and metallurgy across injection zone, injection through tubing and packer, nickel-plated packers, CR or Inconel carrier sensors, inhibited packer fluid in the annulus, cement to surface, corrosion monitoring plan, and CBL/USIT after installation

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, CO_2 leak sensor on the wellhead, real-time DTS fiber alongside of casing, flow rate monitoring, soil gas probes, neutron-activated logs, and USDW water monitoring

Potential response actions:

- Follow protocol to stop operation, vent, or deviate CO_2
- Troubleshoot the well
- Evaluated if there is movement of CO_2 or brines to USDW
- If USDW is affected, discuss remediation with regulating authority
- If casing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair casing

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.2.5 Loss of mechanical integrity; casing leak in monitoring well

Loss of mechanical integrity due to a casing leak in the monitoring well could occur due to corrosion, damage in the tubulars during installation, fatigue, or higher load profiles. This loss could cause a migration of CO_2 and brines through the casing, the cement sheet, and into different formation in the injection target or USDW.

Severity: Minor

Timing of event: Injection

Avoidance measures: CO_2-resistant cement across injection zone, nickel-plated packers, CR or Inconel carrier sensors, inhibited packer fluid in the annulus, cement to surface, corrosion monitoring plan, and CBL/USIT after installation

Detection methods: real-time pressure and temperature gauges at surface and downhole, electromagnetic casing inspection log, CO_2 leak sensor on the wellhead, soil gas probes, neutron-activated logs, and USDW water monitoring

Potential response actions:

- Troubleshoot the well
- Evaluated if there is movement of CO_2 or brines to USDW
- If USDW is affected, discuss remediation with regulating authority
- If a casing leak is detected, discuss action plan with regulating authority
- Schedule well service to repair casing

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.3 Well Monitoring Equipment Failure

The failure of monitoring equipment for a well may indicate a problem with the well that could endanger USDWs. Failure of the devices could allow for an undetected overpressure of the system and/or damage to equipment, tubulars, or surface facilities.

4.3.1 Injection Well Monitoring Equipment Failure

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

Severity: Minor

Timing of event: Injection / Post-Injection

Avoidance measures: Preventative maintenance program and periodic inspections

Detection methods: Real-time monitoring systems, redundancy, and field inspections

Potential response actions:

- If the failure is a single surface monitoring device (e.g., surface pressure transmitter) that has a redundant device (i.e., second pressure transmitter) still in operation, operations response is required to repair the device. No change to operations will be immediately planned.

- If there is an injury or property damage, contact field superintendent and activate emergency evacuation to secure location
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- Assess mechanical integrity of the system and propose repair actions, if necessary
- Assess environmental impact and discuss remedial action with regulating authority
- If assessment allows, discuss plan with the regulating authority to safety resume injection
- Repair or replace instrumentation; calibrate equipment
- Review monitoring records and if needed, perform a fall-off test to evaluate reservoir

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, emergency teams, geologist, reservoir engineer, and monitoring staff

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.

Severity: Serious

Timing of event: Injection

Avoidance measures: Preventative maintenance program and periodic inspections

Detection methods: Real-time monitoring systems, redundancy, and field inspections

Potential response actions:

- If there is an injury or property damage, contact field superintendent and activate emergency evacuation to secure location
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- Assess mechanical integrity of the system and propose repair actions, if necessary
- Assess environmental impact and discuss remedial action with regulating authority
- If assessment allows, discuss plan with the regulating authority to safety resume injection
- Repair or replace instrumentation; calibrate equipment
- Review monitoring records and if needed, perform a fall-off test to evaluate reservoir

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, emergency teams, geologist, reservoir engineer, and monitoring staff

4.3.2 Monitoring Well Monitoring Equipment Failure

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

Severity: Minor

Timing of event: Injection

Avoidance measures: Preventative maintenance program and periodic inspections

Detection methods: Real-time monitoring systems, redundancy, and field inspections

Potential response actions:

- If the failure is a single surface monitoring device (e.g., surface pressure transmitter) that has a redundant device (i.e., second pressure transmitter) still in operation, operations response is required to repair the device. No change to operations will be immediately planned.
- If there is an injury or property damage, contact the field superintendent and activate emergency evacuation to secure location
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- Assess mechanical integrity of the system and propose repair actions, if necessary
- Assess environmental impact and discuss remedial action with regulating authority
- If assessment allows, discuss plan with the regulating authority to safety resume injection
- Repair or replace instrumentation; calibrate equipment
- Review monitoring records and if needed, perform a fall-off test to evaluate reservoir

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, emergency teams, geologist, reservoir engineer, and monitoring staff

4.4 Potential Brine or CO_2 Leakage to USDW

Potential brine or CO_2 leakage to the USDW from the injection well and/or monitoring well may endanger USDWs. Integrity loss may occur during the following scenarios:

- Vertical migration of CO_2 or brine between formations through the injection well or monitoring well
- Vertical migration of CO_2 or brine between formations through legacy or plugged and abandoned (P&Ad) wells

- Vertical migration of CO_2 or brine between formations due to failure of the confining rock, faults, or fractures
- Lateral migration or CO_2 outside the defined AoR

4.4.1 Vertical migration of brine or CO_2 to USDW; injection well

Vertical migration of brine or CO_2 during injection could occur if there are induced stresses or a chemical reaction on the tubulars or cement of the injection well exposed to the CO_2 pressure or plume.

Severity: Minor

Timing of event: Injection

Avoidance measures: CO_2-resistent cement and metallurgy across injection zone, injection through tubing and packer, cement to surface, CBL/USIT after installation, and USDW covered as section barrier with surface casing and surface cement sheet

Detection methods: CO_2 leak sensors on the wellhead, real-time DTS fiber alongside the casing, soil gas probes, USDW water monitoring, neutron-activated logs to be run for external MI, pressure gauges at surface, and flow rate monitoring

Potential response actions:

- Follow protocol to stop operation, vent, or deviate CO_2
- Troubleshoot the well
- Evaluate if there is movement of CO_2 or brines to USDW
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Discuss plan to repair the well with the regulating authority

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.4.2 Vertical migration of brine or CO_2 to USDW; monitoring well

Vertical migration of brine or CO_2 during injection or post-injection could occur if there are induced stresses or a chemical reaction on the tubulars or cement of the monitoring well exposed to the CO_2 pressure or plume.

Severity: Minor

Timing of event: Injection and Post-Injection

Avoidance measures: CO_2-resistent cement across injection zone, cement to surface, CBL/USIT after installation, and USDW covered as section barrier with surface casing and surface cement sheet

Detection methods: CO_2 leak sensors on the wellhead, soil gas probes, USDW water monitoring, neutron-activated logs to be run for external MI, and pressure gauges at surface

Potential response actions:

- Troubleshoot the well
- Evaluate if there is movement of CO_2 or brines to USDW
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Discuss plan to repair or abandon the well with the regulating authority

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.4.3 Vertical migration of brine or CO_2 to USDW; legacy and P&A wells

Vertical migration of brine or CO_2 during injection or post-injection could occur if there is poor cement bonding, cement degradation, or cracking in the legacy or P&A wells exposed to the CO_2 pressure or plume.

Severity: Serious

Timing of event: Injection and Post-Injection

Avoidance measures: Legacy wells to be properly abandoned for brine movement and CO_2 plume according to the corrective action plan; injectors will be abandoned as soon as CO_2 injection in the project ends unless they are left as monitoring wells

Detection methods: Soil gas probes, CO_2 leak sensors, and seismic surveying during AoR review periods

Potential response actions:

- Evaluate if there is movement of CO_2 or brines to USDW due to a leak in a legacy or P&A well
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Discuss plan to repair the well with the regulating authority

Response personnel: Operations engineer, field superintendent, project manager, rig crew, and remediation contractors

4.4.4 Vertical migration of brine or CO_2 to USDW; failure of confining rock, faults, or fractures

Vertical migration of brine or CO_2 during injection could occur if the pressure of the injection zone exceeds the sealing capacity of the caprock or seal above or if fault or fracture features are reactivated. Brine or CO_2 could leak to a shallower formation, including a USDW.

Severity: Minor

Timing of event: Injection

Avoidance measures: Seismic survey in the area shows no faults crossing the storage formation or the seal, injection is limited to 90% of the fracture gradient, and extensive characterization of the rocks show good sealing capacity

Detection methods: USDW water sampling, 4D seismic, neutron-activated logs in monitoring wells, soil gas monitoring, and surface pressure monitoring

Potential response actions:

- Follow protocol to stop injection
- Assess root cause by reviewing monitoring data
- If required, conduct geophysical survey to delineate potential leak path
- Evaluate if there is movement of CO_2 or brines to USDW due to a failure of confining rock, faults, or fractures
- Discuss remediation options, action plan, and monitoring plan with regulating authority, if necessary
- Actions to restore injection depend on nature of the leak path and the extension

Response personnel: Monitoring staff, geologist, reservoir engineer, project manager, and remediation contractors

4.4.5 Lateral migration of CO_2 to outside the defined AoR

Lateral migration of CO_2 outside the defined AoR could occur during injection or post-injection if the plume moves faster or in an unexpected pattern and expands beyond the secure pore space and AoR for the project.

Severity: Serious

Timing of event: Injection and Post-Injection

Avoidance measures: Detailed geologic model with stratigraphic well as a calibration, seismic survey integrated in the model, extensive characterization of the rocks and formation, AoR review and calibration at least every 5 years, and monitoring of the plume until stabilization

Detection methods: 4D seismic, neutron-activated logs in monitoring wells, and real-time pressure and temperature gauges in monitoring wells

Potential response actions:

- Injection
    - Review monitoring data and trends compared with simulation
    - Discuss findings with regulating authority; request to maintain injection during AoR evaluation if data shows that CO_2 will stay in secured pore space
    - Perform logging in monitoring wells

    - Conduct geophysical survey as required to evaluate AoR
    - Recalibrate model and simulate new AoR
    - Assess if additional corrective actions and pore space are needed
    - Assess if remediation is needed; prepare action plan and review with regulating authority
    - Present AoR review to regulating authority for approval; adjust monitoring plan
- Post-Injection
    - Review monitoring data and trends compared with simulation
    - Discuss findings with regulating authority
    - Conduct geophysical survey as required to evaluate AoR
    - Recalibrate model and simulate new AoR
    - Assess if additional corrective actions and pore space are needed
    - Conduct geophysical survey as required to evaluate AoR
    - Recalibrate model and simulate new AoR

Response personnel: Monitoring staff, geologist, reservoir engineer, and project manager

4.5 Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise as a result of a natural disaster affecting the normal operation of the injection well. A major seismic event may disturb surface and/or subsurface facilities and weather-related disasters (e.g., tornado, lightning strike, or hurricane) may affect surface facilities.

If a natural disaster occurs that affects normal operation of the injection well, perform the following:

Severity: Dependent on severity of event; potentially Major

Timing of event: Injection and Post-Injection

Avoidance measures: N/A

Detection methods: geophones array on surface to monitor induced seismicity will detect naturally occurring major seismic event and operations staff monitoring weather

Potential response actions:

- Major Seismic Event
    - For event above ML 2.0 within 5.6 miles of injection well
        - Review monitoring parameters to validate normal operation
        - If parameters indicate a potential mechanical integrity failure, follow procedure for event above ML 4.0

        - Compare storage behavior with the model
        - If needed, propose adjustments to operating conditions
    - For event above ML 4.0 within 5.6 miles of injection well
        - If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
        - Follow protocol to stop injection
        - Assess mechanical integrity of the system; propose repair actions based on findings
        - Assess environmental impact; discuss remedial action with regulating authority, if necessary
        - Review regional information and monitoring records to determine origin of the event
        - If even is induced, reevaluate model, define new injection parameters, and discuss with regulating authority
        - If assessment allows for resuming injection safely, increase surveillance to validate effectiveness of actions

- Weather Disaster
    - If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
    - Follow protocol to stop injection
        - In the event of a pending, known weather event, gradual cessation of injection may be appropriate to allow for depressuration and idle of pipelines as a measure to mitigate surface risk
    - Assess mechanical integrity of the system; propose repair actions based on findings
    - If assessment allows for resuming injection safely, increase surveillance to validate effectiveness of actions

Response personnel: Operations engineer, field superintendent, project manager, geologist, reservoir engineer, monitoring staff, remediation contractors, and emergency teams

4.6 Induced Seismic Event

Based on the project operating conditions, it is highly unlikely that injection operations would ever induce a seismic event outside a 5.6-mile radius from the wellhead. Therefore, this portion of the response plan is developed for any seismic event with an epicenter within a 5.6-mile radius of the injection well.

A geophone array on surface will be used to monitor the area for seismicity.

Severity: Serious

Timing of event: Injection

Avoidance measures: Seismic survey of the storage complex shows no faults that could be reactivated, detailed geomechanical model created to evaluate the storage complex, and region is seismically stable

Detection methods: Geophone array on surface

Potential response Actions:

- For event above ML 2.0 within 5.6 miles of injection well
    - Review monitoring parameters to validate normal operation
    - If parameters indicate a potential mechanical integrity failure, follow procedure for event above ML 4.0
    - Compare storage behavior with the model
    - If needed, propose adjustments to operating conditions
- For event above ML 4.0 within 5.6 miles of injection well
    - If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
    - Follow protocol to stop injection
    - Assess mechanical integrity of the system; propose repair actions based on findings
    - Assess environmental impact; discuss remedial action with regulating authority, if necessary
    - Review regional information and monitoring records to determine origin of the event
    - If even is induced, reevaluate model, define new injection parameters, and discuss with regulating authority
    - If assessment allows for resuming injection safely, increase surveillance to validate effectiveness of actions

Response personnel: Operations engineer, field superintendent, project manager, geologist, reservoir engineer, monitoring staff, remediation contractors, and emergency teams

4.7 Surface Impacts

Surface impact may cause loss of containment during the follow scenarios

- External impact to the injection wellhead
- External impact to the monitoring wellhead
- External impact to the surface piping or buried pipelines

4.7.1 Loss of containment; external impact to injection wellhead

External impact to the injection wellhead due to heavy trucks or equipment could cause loss of containment of brine or CO_2 if the wellhead is disconnected from the wellpipe or the surface pipeline.

Severity: Serious

Timing of event: Injection

Avoidance measures: Fenced location and bollards installed and signage

Detection methods: Real-time pressure and temperature at the wellhead and surface facilities, field inspections, and OGI cameras

Potential response actions:

- Automated shutdown will initiate; follow protocol to shutdown CO_2 delivery if the automated shutdown devices are not functional
- If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
- Clear the location and secure the perimeter
- Contact well control special team to execute blowout emergency plan that may include capping the well, drilling a relief well to kill injector, repair well, and/or abandon well; discuss plan with regulating authority
- Evaluate environmental impact to soil, water, vegetation; present remediation plan to regulating authority
- Execute remediation and install monitoring system as needed

Response personnel: Operations engineer, field superintendent, project manager, rig crew, remediation contractors, and well control specialist

4.7.2 Loss of containment; external impact to monitoring wellhead

External impact to the monitoring wellhead due to heavy trucks or equipment could cause loss of containment of brine or CO_2 if the wellhead is disconnected from the wellpipe or the surface pipeline.

Severity: Minor

Timing of event: Injection and Post-Injection

Avoidance measures: Fenced location and bollards installed, signage, and reduced pressure in the monitoring well compared with the injection well

Detection methods: Real-time pressure and temperature at the wellhead and surface facilities and field inspections

Potential response actions:

- If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
- Clear the location and secure the perimeter
- Contact well control special team to execute blowout emergency plan that may include capping the well, drilling a relief well to kill injector, repair well, and/or abandon well; discuss plan with regulating authority
- Evaluate environmental impact to soil, water, vegetation; present remediation plan to regulating authority
- Execute remediation and install monitoring system as needed

Response personnel: Operations engineer, field superintendent, project manager, rig crew, remediation contractors, and well control specialist

4.7.3 Loss of containment; external impact to surface piping or buried pipeline

External impact to the surface piping or buried pipeline due to heavy trucks or equipment could cause loss of containment of brine or CO_2 if the pipe is ruptured.

Severity: Serious

Timing of event: Injection

Avoidance measures: Fenced location and bollards installed to protect surface piping, field pipeline is buried, pipeline Right-of-Way identified with signage, and One Call 811 Program

Detection methods: Real-time pressure, temperature, and flow measurement and field inspections

Potential response actions:

- Automated shutdown will initiate; follow protocol to shutdown CO_2 delivery if the automated shutdown devices are not functional
- If there is injured personnel or property damage, contact the field superintendent to activate emergency evacuation and secure location
- Clear the location and secure the perimeter
- Evaluate environmental impact to soil, water, vegetation; present remediation plan to regulating authority
- Execute remediation and install monitoring system as needed

Response personnel: Operations engineer, field superintendent, project manager, remediation contractors, and well control specialist

5.0 Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement the ERRP.

Monitoring, control, and routine maintenance of the injection operations will be the responsibility of the Injection Operations Staff. Site personnel are expected to include, at minimum, the positions listed below in Table ERR-3.

If an adverse event is discovered, the Operations Manager and Emergency Coordinator on duty will be notified immediately. The Emergency Coordinator will be responsible for notifying offsite emergency agencies and resources. The Operations Manager will contact outside emergency response organizations if the Emergency Coordinator is not available. The EPA Region 6 UIC Program Director will be notified within 24 hours, per 40 CFR 146.91(c) and 40 CFR 146.94(b)(3).

Table ERR-3–Operations Staff Descriptions

Position	Function	Qualifications
Emergency Coordinator	Responsible for notification of offsite support agencies in accordance with written procedures. Responsible for coordination and overseeing contact with the media.	Trained in the Communications Plan and Emergency Notification Procedures requirements as contained in the ERRP.
Operations Manager	Serves as the Emergency Response Manager responsible for the overall management of the Incident Response Team. Manages facility operations and personnel during an emergency and is responsible for implementation of appropriate emergency procedures and their follow-up activities.	Trained in the requirements of the ERRP and facility operations.
Project Manager	Serves as the Emergency Response Coordinator responsible for the overall communication between Incident Response Team members. Directs facility operations during an emergency and is responsible for communication between on-site personnel and professional services. Implements emergency procedures and ensures documentation of follow-up activities.	Trained in the requirements of the ERRP and facility operations.
Senior Reservoir Engineer	Responsible for injection operation and monitoring. Lead incident response manager regarding injection and storage zone operation at the facility.	Undergraduate degree in engineering, related to chemical or reservoir, with at least 5 years of experience in reservoir dynamics and relevant monitoring interpretation.
Geologist/ Geophysicist	Professional serving to assist in operation, maintenance, and monitoring of the injection process. Conducts routine data management and interpretation. Assists in implementing response actions regarding injection zone integrity.	Undergraduate degree in geophysics or geology with specialization in hydrology/fluid mechanics.
Operations Engineer	Oversees mechanical and fluid management operation of the injection wells, annulus pressure control system, and wellhead piping systems. Maintains and repairs injection-related equipment, including valves, instruments, and piping. Assists in mechanical and electronic control of the injection process.	Undergraduate degree in engineering, related to mechanical, chemical, or process control. Minimum of 2 years of experience in operation and service of equipment and instruments for pressurized well systems and wellhead controls.

A site-specific emergency contact list will be developed and maintained during the life of the project. The Pelican Sequestration Hub, LLC will provide the current site-specific emergency contact list to the UIC Program Director.

A list of contacts for state agencies having jurisdiction within the AoR and key local emergency agencies is presented below in Table ERR-4.

There are no federally recognized Native American Tribes located within the AoR. If a federally recognized Native American Tribe were to exist in the AoR at the time of a site emergency, then that tribe(s) will be notified of the site emergency at that time.

Table ERR-4–Contact information for key local, state, and other authorities

Agency	Location	Phone
Livingston Parish Fire District	Albany, LA	911 or 225-209-5353
Livingston Police Department	Livinston, LA	911 or 225-686-7153
North Oaks Medical Center	Hammond, LA	985-345-2700
State Police	Baton Rouge, LA	511 or 1-800-469-4828
Livingston Parish Sheriff	Livingston, LA	911 or 225-686-2241
Louisiana Office of Emergency Preparedness	Baton Rouge, LA	225-925-7500
Livingston Parish Office of Homeland Security and Emergency Preparedness (LOHSEP)	Livingston, LA	225-686-3066
US EPA Region 6	Dallas, TX	214-665-2294
Louisiana Stage Geological Survey	Baton Rouge, LA	225-578-5320
Louisiana Department of Natural Resources	Baron Rouge, LA	225-342-5569
US Geological Survey Water Resources for Louisiana	Baron Rouge, LA	225-298-5481

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, the Pelican Sequestration Hub, LLC shall be responsible for its procurement.

6.0 Emergency Communications Plan

The Pelican Sequestration Hub, LLC will communicate to the public about any event that requires an emergency response to ensure that the public understands what happened and whether there are any current or potential 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.

The Pelican Sequestration Hub, LLC will describe what happened, current or potential 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), the Pelican Sequestration Hub, LLC will provide periodic updates on the progress of the response action(s).

The Pelican Sequestration Hub, LLC will communicate with entities who need to be informed about or take action in response to the event, including local water systems, CO_2 source(s), pipeline operators, landowners, and Regional Response Teams (as part of the National Response Team).

If a seismic event occurs, the Pelican Sequestration Hub, LLC will provide information about whether the event was naturally occurring or induced by the injection, whether any damage to the well or other structures in the area occurred, the investigative process, and what responses, if any, were taken by the Pelican Sequestration Hub, LLC or others.

7.0 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 prescribed period (to be determined by the permitting agency) following any significant changes to the injection process or 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, the Pelican Sequestration Hub, 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 six months following an event that initiates the ERRP review procedure.

8.0 Staff Training and Exercise Procedures

All operations employees will receive training related to health and safety, operational procedures, and emergency response according to the roles and responsibilities of their work assignments. Initial training will be conducted by, or under the supervision of, the operations manager or a designated representative. Trainers will be thoroughly familiar with the Operations Plan and ERRP.

Facility personnel will participate in annual training that teaches them to perform their duties in ways that prevent CO_2 discharge. The training will include familiarization with operating procedures and equipment configurations appropriate to the job assignment as well as emergency response procedures, equipment, and instrumentation. New personnel will be instructed before beginning their work.

Refresher training will be conducted at least annually for all operations personnel. Monthly briefings will be provided to operations personnel according to their respective responsibilities and will highlight recent operating incidents, actual experience in operating equipment, and recent storage reservoir monitoring information.

Only personnel who have been properly trained will participate in drilling, construction, operations, and equipment repair at the storage site. A record including the person's name, date of training, and instructor's signature will be maintained.