EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)

Sugarberry CCS Hub

Facility Information

Facility name: Sugarberry CCS Hub

Facility contact: Sugarberry CCS, LLC
14302 FNB Parkway
Omaha, NE 68154

RRC Organization Report Number: 102245

Well locations: Projection WGS84

Well	County/State	Latitude	Longitude
SB-01	Hopkins, TX	33.202707	-95.338539
SB-02	Hopkins, TX	33.189225	-95.375952
SB-03	Hopkins, TX	33.196028	-95.405035
SB-04	Hopkins, TX	33.219565	-95.434859
SB-05	Hopkins, TX	33.207361	-95.385666

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List of Acronyms and Abbreviations

ANSI	American National Standards Institute
API	American Petroleum Institute
AoR	Area of Review
BOP	Blow Out Preventer
CBL	Cement Bond Logs
CCS	Carbon Capture and Sequestration
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
DAS	Distributed Acoustic Sensing
DTS	Distributed Temperature Sensing
EPA	Environmental Protection Agency
ERRP	Emergency and Remedial Response Plan
ESD	Emergency Shutdown System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
Ft-BGS	Feet Below Ground Surface
HAZCOM	Hazard Communication
LOC	Loss of Containment
LOTO	Lock Out/Tag Out
MIT	Mechanical Integrity Testing
OSHA	Occupational Safety and Health Administration
P&A	Plugged and Abandoned
PISC	Post-Injection Site Care
PLC	Programmable Logic Controller
PNC	Pulsed Neutron Capture
PSI	Pounds per square inch
QASP	Quality Assurance and Surveillance Plan
RRC	Railroad Commission of Texas
SCADA	Supervisory Control and Data Acquisition
SFHA	Special Flood Hazard Area
STEAR	State of Texas Emergency Assistance Registry
TAC	Texas Administrative Code
UIC	Underground Injection control
UPS	Uninterrupted Power Supply
USDW	Underground Source of Drinking Water
VSP	Vertical Seismic Profile

The purpose of this **Emergency and Remedial Response Plan** (ERRP) is to meet the federal requirements of 40 CFR 146.94 and Texas requirements at 16 TAC 5.203(l). This document describes the actions that Sugarberry CCS, LLC will take to address unplanned movement of the carbon dioxide (CO_2) stream or formation fluid in a manner that may endanger an underground source of drinking water (USDW) at the Sugarberry CCS Hub in Hopkins County, Texas (the "project'). This ERRP will be followed during the construction, operation, and post-injection site care periods of the permitted injection wells. This plan functions as an addition to emergency management plans associated with the operation and maintenance of surface facilities and is not intended to duplicate the requirements of those plans.

If Sugarberry CCS, LLC obtains evidence that the injected CO_2 stream and/or associated pressure front may cause an endangerment to a USDW, Sugarberry CCS, LLC will perform the following actions (40 CFR 146.94(b); 16 TAC 5.206(h)(3)):

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

Where the phrase "initiate shutdown plan" is used, the following protocol will be employed: Sugarberry CCS, LLC will immediately cease injection. However, in some circumstances, Sugarberry CCS, LLC will, in consultation with the UIC Program Director, determine whether gradual cessation of injection (using the parameters set forth in **Section 6, Summary of Requirements**) is appropriate.

A. Local Resources and Infrastructure

The location of the project is illustrated on **Figure 10-1** and **Figure 10-2** with resources, structures, land parcels, oil and gas wells, water supply wells, and the maximum extent of the AoR in portions of Hopkins and Franklin Counties.

Nearby resources that may be affected as a result of an emergency event include:

- USDWs: Quaternary alluvial aquifer, Carrizo-Wilcox Aquifer and the Trinity Aquifer, and formations that have been identified by the RRC's Groundwater Advisory Unit between approximately 1,600 and 1,800 ft BGS, detailed in Section B of the **Application Narrative (Section 1**).

- Surface bodies of water: White Oak Creek, Stouts Creek, Crosstimber Creek, Briar Branch, and multiple unnamed streams and ponds.

There is limited existing infrastructure within the project area. Based on the dynamic parcel map from AcreValue.com, land parcels within the project area include a mix of agricultural land and some residential properties. Nearby infrastructure that may be affected as a result of an emergency includes several churches, local businesses, cemeteries, Interstate 30, U.S. Highway 67, several

county and local access roads, transmission lines, shallow water supply wells, and oil and gas wells and pipelines.

There are a few drinking water treatment plants located between 3.79 miles to 63.57 miles outside the AoR. These drinking water treatment plants are depicted on **Figure 10-3** and listed below:

- North Hopkins Water Supply, 9364 Texas Highway 19 N, Sulphur Springs, TX 75482;
- Brinker Water Supply, 4534 I-30 E, Sulphur Springs, TX 75482;
- Cypress Springs Special Utility District, 114 FM 115, Mount Vernon, TX 75457;
- Sulphur Springs Water Treatment Plant, 205 Jefferson St E, Sulphur Springs, TX 75482;
- Shirley Water Supply Corporation, 6684 FM-1567, Sulphur Springs, TX 75482; and
- North Texas Municipal Water District, 501 E Brown St, Wylie, TX 75098.

B. Potential Risk Scenarios

The following is a list of events related to the project that could potentially result in an emergency response:

- Fluid (e.g. brine) or CO_2 leakage to a USDW or the surface;
- Injection or monitoring (verification) well integrity failure;
- Injection well monitoring equipment failure (e.g., shutoff valve or pressure gauge, etc.);
- Migration of CO_2 outside of AoR;
- External impact to project wellheads or pipelines;
- Accident or unplanned event (e.g., electrical outage, unauthorized activity);
- Induced or natural seismic event; or
- A natural disaster (e.g., tornado, lightning strike, flood, wildfire).

Response actions will depend on the severity of the event(s) triggering an emergency response and if the event occurs during construction, injection, or post closure. The degrees of risk for emergency events are defined in **Table 10-1**. A summary of the severity of the scenarios covered in **Appendix A** along with their lookup numbers is shown in **Table 10-2**.

Table 10-1. Degrees of Risk for Emergency Events

Emergency Condition	Definition
Major emergency	Event poses immediate substantial risk to human health, resources, or infrastructure. Emergency actions involving local authorities (evacuation or isolation of areas) should be initiated.
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.

Emergency Condition	Definition
Minor emergency	Event poses no immediate risk to human health, resources, or infrastructure.

Table 10-2. Risk Scenario Reference

Risk Scenario	Construction/ Pre-injection Period	Injection Period	Post-Injection Site Care (PISC) Period	Degree of Risk	Appendix A/Table Reference Number
Fluid leakage between formations while drilling	X	-	-	Serious to Major	1-2
Fluid leakage into or near USDW or ground surface through wellbore (injection, monitoring, P&A, or other), surface equipment failure, faults, fractures, or confining zone failure	-	X	X	Minor to Major	4-7, 9-17
Loss of mechanical integrity (injection or monitoring well)	X	X	X	Minor to Major	5-7
Loss of containment (vertical migration via injection well)		X		Minor to Major	18
Loss of containment (vertical migration via monitoring well)		X	X	Minor to Major	19
Migration of CO_2 outside of defined AoR/Pressure propagation	-	X	X	Minor to Major	20-21
External impact to project wellheads, monitoring wells or pipelines	-	X	X	Serious to Major	22-24
Injection or monitoring equipment failure/malfunction	-	X	X	Minor to Serious	25-28
Seismic event / earthquake (induced or natural)	X	X	X	Minor to Major	Table 10-3
Natural disaster (tornado, lightning, floods, wildfire)	X	X	X	Minor to Major	29, 30
Accident or unplanned event (e.g., electrical outage causing injection to stop, unauthorized activity)	X	X	X	Minor	3, 8, 31-32

C. 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 outlined in the preceding section (**Section B,** above) are summarized in **Appendix A**, and emergency contact information is in **Appendix B**.

The appropriate course of action hinges upon both the emergency's nature and its severity, which should be determined as soon as possible but no later than 24 hours after the event. A comprehensive risk assessment will precede any request for operational permission, with a formal report on risk severity furnished to the UIC Program Director.

The potential risk scenarios, specified in Table 10-2 and elaborated upon in Appendix A, are conceptual in nature. Response plans, provided in accordance with 16 TAC 5.203(l)(2), may be subject to adjustment in collaboration with the UIC Program Director, considering the unique health, safety, and environmental factors of each situation.

C.1. Seismic Sensing

During injection, Sugarberry CCS, LLC will monitor the pressure and plume and control injection rates, in accordance with 16 TAC 5.203(l)(3)(H) (see **Section 7, Testing and Monitoring Plan**). The seismicity of the region is discussed in the Site Characterization Narrative of the **Project Narrative** (**Section 1**). The direct influence of tectonic activity on seismic risks within the area is minimal. As a result, the potential for high-magnitude earthquakes or significant fault reactivation is substantially reduced, indicating that the AoR is subject to minimal seismic hazard risk due to its remote location from active tectonic zones. The mapping of these features offers critical insights for assessing potential risks and planning for seismic hazards in the area.

To monitor the area for natural seismicity, Sugarberry CCS, LLC will rely on established USGS and State real-time seismic monitoring networks. There is one station (Station N4 Z38B) within 35 miles of the proposed injection wells. Data from this monitoring station can be viewed at the following website: https://earthquaketrack.com/p/united-states/texas/recent#google_vignette .

If a felt event is identified based on local reports or a significant event is located at an injection site using the regional array (magnitude [M] >= 2.0), Sugarberry CCS, LLC will, in consultation with the UIC Program Director, develop an alternate seismicity monitoring plan using additional local geophone deployment.

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 (**Table 10-3**). The operating state is determined using threshold criteria which correspond to the site's potential risk and level of seismic activity. The operating state provides operating personnel information about the potential risk of further seismic activity and guides them through a series of response actions.

Table 10-3. Seismic Monitoring System, for Seismic Events > M1.0 with an Epicenter within a 10-Mile Radius of an 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.

[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]
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan. 2. Vent CO_2 from surface facilities if required. 3. Within 24 hours of the incident, notify the UIC Program Director, of the operating status of the well. 4. Limit access to wellhead to authorized personnel only. 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 Shutdown Plan. c. Shut in well (close flow valve) d. Vent CO_2 from surface facilities e. Identify and implement appropriate remedial actions (in consultation with UIC Program Director) 9. Review seismic and operational data. 10. Report findings to the UIC Program Director and issue corrective actions.
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 shut down plan. 2. Vent CO_2 from surface facilities. 3. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well. 4. Limit access to wellhead to authorized personnel only. 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. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 9. Review seismic and operational data. 10. 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.

D. Response Personnel and Equipment

The Project Manager during construction or the Operations Manager during operation and post-injection site care is responsible for implementing this ERRP and is the 24-Hour Emergency Contact for the Project. Project personnel and local authorities will also be relied upon to implement this ERRP. Please refer to **Appendix B** for an emergency contact list which will be updated annually at a minimum.

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, Sugarberry CCS, LLC shall be responsible for its procurement.

E. Emergency Communications Plan

In accordance with 16 TAC 5.203(3)(G), in the event of an emergency requiring outside assistance, the lead project contact will notify the 24-Hour Emergency Contact identified in **Appendix B** of this ERRP as soon as possible after requesting outside assistance from local emergency responders. Sugarberry CCS, LLC will communicate to the public about any event that requires an emergency response to ensure the public understands what happened and whether there are any environmental, health, or safety implications. The amount of information, timing, and communication method(s) will be tailored to the event; its severity; impacts on drinking water, other environmental resources, or the surrounding community; and the public's awareness of the event. In adherence with the **Environmental Justice Plan,** communication with the public in Hopkins and Franklin Counties will be in both English and Spanish.

Sugarberry CCS, LLC will work closely with the local broadcasting and news agencies in Hopkins and Franklin Counties to communicate necessary details about the emergency to the public. Sugarberry CCS, LLC will provide periodic updates to the broadcasting and news agencies to be communicated to the public. Within the Texas Regional Alert Program 15, regional networks are available in Franklin and Hopkins Counties. It is necessary to contact Shawn Vaughn at Texarkana Police Department by phone at (903) 798-3114 or via email at vaughns@txkusa.org to submit a request to activate appropriate regional and/or state networks.

In the case of an emergency that requires an evacuation, Sugarberry CCS, LLC will communicate and work with the Texas Division of Emergency Management and local office of Emergency Management in Hopkins and Franklin Counties to evacuate the public from the affected areas. Sugarberry CCS, LLC will provide shelters for the public affected by the emergency. Sugarberry CCS, LLC will encourage the public to register for the State of Texas Emergency Assistance Registry (STEAR) through direct communication in tandem with evacuation assistance in an emergency. In addition, Sugarberry CCS, LLC will work closely with the mayors and judges in the affected areas to issue a mandatory evacuation order for the public, if necessary.

Sugarberry CCS, LLC will describe what happened, any actual 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), Sugarberry CCS, LLC will provide periodic updates on the progress of the response action(s).

Sugarberry CCS, LLC will work with the Regional Response Teams and local environmental agencies to map the impacted zone and identify the areas with the highest risk potential. Also, Sugarberry CCS, LLC will map the nearby environmentally sensitive areas, well locations, facility location, and entrances and exits to be communicated to the response team.

Sugarberry CCS, LLC will communicate with entities who may need to be informed about or act in response to the event, including local water system(s), management organization(s), CO_2 source(s), management organization(s), pipeline operator(s), landowners, Regional Response Teams (as part of the National Response Team), local authorities, RRC, and the Texas Commission on Environmental Quality.

F. 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 30 days following any significant changes to the injection process or the injection facility, or an emergency event; or
- As required by the permitting agency; and
- At least annually for the Emergency Contact List in Appendix B of this ERRP.

An amended ERRP should be submitted to the UIC Program Director within one (1) year of an AoR reevaluation, following any significant changes to the facility, or when required by the UIC Program Director. Amendments must be approved by the UIC Program Director and incorporated into the permit and are subject to permit modification requirements. If the review indicates that no amendments to the ERRP are necessary, Sugarberry CCS, LLC will provide the permitting agency with the documentation supporting the "no amendment necessary" determination. Updating the Emergency Contact List and clarifications or corrections are not considered an amendment to the ERRP and do not require permit modification (40 CFR 144.41).

G. Staff Training and Exercise Procedures

Sugarberry CCS, LLC will integrate the ERRP into its existing operating procedures and training protocols in accordance with 16 TAC 5.203(l)(4). Sugarberry CCS, LLC will determine the required training programs for each employee commensurate with their job function, safety requirements, and regulatory requirements. All hub employees will be trained. This training will be documented prior to commencing injection. Sugarberry CCS, LLC will conduct mandatory project orientation and health and safety awareness training for all project personnel and onsite subcontractors. This will include holding safety meetings with each contractor prior to commencement of any new contract work on the project with emergency measures specific to the

contractor's work explained. Sugarberry CCS, LLC will provide information about employee training status, schedules, and coursework to RRC upon request and prior to commencing injection.

All project field personnel will be trained and equipped with the necessary skills to ensure a safe working environment and to respond correctly in case of an emergency. Sugarberry CCS, LLC will reference the following standards established by the American Petroleum Institute (API) in their training program:

- API Recommended Practice 54 – Recommended Practice for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations
- API Recommended Practice 74 – Recommended Practice for Occupational Safety for Onshore Oil and Gas Production Operations
- API Bulletin 75L – Guidance Document for the Development of a Safety and Environmental Management System for Onshore Oil and Natural Gas Production Operations and Associated Activities.
- API Recommended Practice 76 – Contractor Safety Management for Oil and Gas Drilling and Production Operations
- API Standard 2220 – Contractor Safety Performance Process

These recommended practices will be reviewed by Sugarberry CCS, LLC to design and implement training programs that are adequate for the field personnel generally and specific for unique job functions. The field personnel will go through a field probation period of no less than a month. This probation period will ensure that personnel can respond adequately and quickly in case of an emergency.

Sugarberry CCS, LLC intends to provide training courses for field personnel that may include, but are not limited to:

- Emergency action planning.
- Hazard communication (HAZCOM).
- Basic fire extinguishers.
- Major emergency response.
- Occupational Safety and Health Administration (OSHA) 10-hour and 30-hour general industry.
- Cardiopulmonary Resuscitation (CPR) and Basic First Aid.
- Risk management for oil and gas field operations.

Periodic training will be provided, not less than annually, to construction personnel, well operators, maintenance personnel, project safety personnel, environmental personnel, the operations manager, and corporate communications. The training plan will record that the necessary personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.

H. Communications with Landowners in the AoR and Emergency Response Personnel

Information related to communications with landowners in the AoR and emergency response personnel is provided in accordance with 16 TAC 5.203(l)(3)(F). Prior to the start of CO_2 injection operations, Sugarberry CCS, LLC will attempt to promptly communicate with landowners living within the AoR to provide information of the nature of the operations, potential risks, and appropriate response approaches under various emergency scenarios. This will include briefings on the potential hazards and characteristics of CO_2.

Sugarberry CCS, LLC's point of contact for any landowner is attached to the applications materials as a .shp file.

Appendix A

Table 10-A-1: Emergency Remedial & Response Risk Scenarios

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
1	Construction Period	***Fluid Leakage - Drilling operations:*** Hydrostatic column controlling the well decreases below the formation pressure, resulting in a sudden influx of fluid, causing a well control event with loss of containment.	• Flow sensor • Pressure sensor • Tank level indicator • Tripping displacement practices • Mud weight control	• Blowout prevention (BOP) equipment • Kill fluid • Well control training • BOP drills • BOP testing protocol • Kick drill • Lubricators for wireline operations	<u>Drilling:</u> • Stop operation • Close BOP • Clear floor and secure area • Execute well control procedure • Evaluate drilling parameters to identify root cause • If major emergency, call 911 • Notify 24-Hour Emergency Contact and UIC Program Director and propose an action plan based on the finding • Continue operations <u>Completion:</u> • Stop operations • Close BOP • Clear floor and secure area • Execute well control procedure • If major emergency, call 911 • Notify 24-Hour Emergency Contact and UIC Program Director and propose remediation plans • Continue operations • In case of influx, control the well, without compromising the shoe integrity • In the case of the shoe leaking, squeeze to regain integrity • In the case of the surface casing leaking, squeeze or install a casing patch	• Project manager • Rig crew • Rig manager • Field superintendent
2	Construction Period	***Fluid Leakage - Drilling operations:*** Failure of surface casing completion to protect USDW while drilling resulting in cross flow of brine between formations resulting in fluid losses into the USDW.	• Pressure sensors • Cement bond log (CBL) • Rig pit volume totalizer (PVT) system	• Pressure sensors • USDW will be covered with the surface casing • Casing test after cementing surface casing to check integrity • CBL to check cement bonding	• In case of influx, control the well, without compromising the shoe integrity • In the case of the shoe leaking, squeeze to regain integrity • In the case of the surface casing leaking, squeeze or install a casing patch • If major emergency, call 911 • Notify 24-Hour Emergency Contact and UIC Program Director and propose remediation plans	• Project manager • Rig crew • Rig manager • Field superintendent
3	Construction period	***Unauthorized access/activity:*** Unauthorized activity on filed site	• Field personnel logs	• Fencing around well sites • Security in place	• Notify 24-Hour Emergency Contact • Report any incidents to local Sheriff`s office	• Field superintendent • Company man
4	Construction Period	***Fluid Leakage - Drilling through USDW:*** Improper well control during the drilling of one or more monitoring or injection wells, the drilling fluid weight exceeds the aquifer reservoir pressure, and the drilling fluid migrates into the pores and contaminates a USDW.	• Flow sensor • Pressure sensor • Mud weight control • Rig pit volume totalizer (PVT) system	• Well control training • Overbalance mud program • Sufficient drilling fluid reserve • Rig solids control system	<u>Drilling:</u> • Stop operation • Close BOP • Clear floor and secure area • Execute well control procedure • Evaluate drilling parameters to identify root cause • If major emergency, call 911 • Notify 24-Hour Emergency Contact and UIC Program Director and propose remediation plans • Implement corrective actions • Continue operations	• Project manager • Rig crew • Rig manager • Field superintendent

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
5	Injection Period	***Fluid Leakage – UIC Wellbores*** A loss of mechanical integrity in the injection well causing a tubing/packer to leak due to corrosion damage, damage to the tubulars during installation, fatigue, higher load profiles, and other issues, that could cause communication of the CO_2 stream or formation fluids with the annular casing tubing as well as sustained casing pressure. There is no loss of containment (LOC) in this scenario.	• Pressure and temperature gauges on surface and downhole real time • Pulsed-neutron logs • Annular pressure test • CO_2 leak sensors on the wellhead	• Corrosion resistant or coated tubing • Inhibited packer fluid in annulus • Corrosion monitoring plan • Dry CO_2 injected • Corrosion resistant packers • Corrosion resistant tubing tailpipes below packers • New tubing or inspection of tubing before reinstalling	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • Follow protocol to stop operation, vent, or deviate CO_2 • Notify 24-Hour Emergency Contact • Troubleshoot the well • If tubing leak is detected, notify UIC Program Director and propose an action plan based on the finding • Schedule well service to repair tubing	• Operations manager • Field superintendent • Project manager
6	Injection/ Post Injection Site Care Period	***Fluid Leakage – MW Wellbores*** A loss of mechanical integrity in the monitoring well causing a tubing/packer to leak due to corrosion damage, damage to the tubulars during installation, fatigue, higher load profiles, and others and could cause a communication of the CO_2 stream or formation fluids with the annular casing tubing as well as sustained casing pressure. There is no LOC in this scenario.	• Pressure and temperature gauges on surface and downhole real time • Pulsed-neutron logs • Annular pressure test. • CO_2 leak sensors on the wellhead	• Corrosion resistant or coated tubing • Inhibited packer fluid in annulus • Corrosion monitoring plan • Corrosion resistant packers • Corrosion resistant tubing below/between packers • Corrosion resistant or Inconel carrier for the sensors • New tubing or inspection of tubing before reinstalling • Cased hole logging program • Observation wells are designed to be outside of the projected plume for most of the project which reduces the risk of contact with CO_2	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • Notify 24-Hour Emergency Contact • Troubleshoot the well • Notify UIC Program Director and propose an action plan for well service • Schedule well service to repair tubing, isolate CO_2 zone, or abandon the well	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors
7	Injection Period	***Fluid Leakage – UIC Wellbores:*** A loss of mechanical integrity in the injection wells causing a casing leak due to corrosion, damage in the tubulars during installation, fatigue, higher load profiles, or others. This event could cause migration of CO_2 and brines through the casing, the cement sheet, and into different formations of the injection target or into USDW.	• Pressure and temperature gauges on surface and downhole real time • CO2 leak sensors on the wellhead • DTS fiber real time alongside the casing • Flow rate monitoring • Pulsed-neutron logs • CBL/Ultra-sonic logging • USDW water monitoring	• CO_2-resistant cement and metallurgic across injection zone • Injection through tubing and packer • Inhibited packer fluid in the annular • Cement to surface • Corrosion monitoring plan • Cased hole logging program • New casing and tubing installed	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • Follow protocol to stop operation, vent, or deviate CO_2 • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Troubleshoot the well • Evaluate if there is a movement of CO_2 or brines to USDW. In the remote event that USDW is affected, discuss remediation options with the UIC Program Director • Notify UIC Program Director and propose an action plan based on the finding and location of the leak • Schedule well service to repair the casing	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors • Remediation contractors
8	Injection period	***Unauthorized access/activity:*** Unauthorized activity on field site	• Field personnel logs	• Fencing around well sites • Security in place	• Notify 24-Hour Emergency Contact • Report any incidents to local Sheriff's office	• Field superintendent • Company man

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
9	Injection Period/ Post Injection Site Care Period	***Fluid Leakage – MW Wellbores:*** A loss of mechanical integrity in the monitoring well causing a casing leak due to corrosion, damage in the tubulars during installation, fatigue, higher load profiles, and others. This event could cause a migration of CO_2 and brines through the casing, the cement sheet, and into different formations of the injection target or into USDW.	• Pressure and temperature gauges on surface and downhole real time • CO_2 leak sensors on the wellhead • Pulsed-neutron logs • CBL/Ultra-sonic logging • USDW water monitoring	• CO_2-resistant cement across injection zone • Corrosion resistant packers • Inhibited packer fluid in the annular • Cement to surface • Corrosion monitoring plan • Cased hole logging program • New casing • New or inspected tubing before reinstallation • Observation wells are designed to be outside of the projected plume for most of the project's life cycle which minimizes the risk of contact with CO_2	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Troubleshoot the well • Evaluate if there is a movement of CO_2 or brines to USDW. In the remote event that USDW is affected, discuss remediation options with the UIC Program Director • Notify UIC Program Director and propose an action plan based on the findings and the location of the leak. • Schedule well service to repair the casing	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors • Remediation contractors
10	Injection Period / Post Injection Site Care Period	***Fluid Leakage – Legacy Wellbores:*** Brines and CO_2 could migrate through poor cement bonding, cement degradation, or cracking in the cement of plugged and abandoned (P&A) wells.	• Time-lapse vertical seismic profile survey • USDW water sampling	• Legacy wells are properly abandoned for brine movement because of pressurization of injection zone • Deep injection wells will be abandoned as soon as CO_2 injection ends, except if they are left as observation wells	• If major emergency, call 911 • Notify 24-Hour Emergency Contact • Evaluate if it's a positive CO2 release because of a leak in the legacy/P&A well • Notify regulator and propose plan to repair the well, delineate the area, and identify potential resources affected • Discuss specific remediation actions and monitoring plans • Execute program, monitor, and evaluate efficacy	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors • Remediation contractors
11	Injection	***Fluid Leakage – Faults and Fractures:*** During injection, the pressurization of the injection zone exceeds the sealing capacity of the confining zone above or if there are features such as fault or fractures that are reactivated, creating a leakage pathway for CO_2 and brine to migrate to a shallower formation, including a USDW.	• USDW water sampling • Time-lapse vertical seismic profile survey • Pulsed-neutron log in deep injection and observation wells	• Injection is limited to 90% of frac gradient • Extensive characterization of the rocks shows good sealing capacity • If CO_2 migrates out of the Paluxy, the confining Eagle Ford Shale will act as a buffer formation before CO_2 or brines are able to reach the USDW	• If major emergency, call 911 • Notify 24-Hour Emergency Contact • Assess root cause by reviewing monitoring data • Notify UIC Program Director • If necessary, follow protocol to stop injection • If necessary, conduct geophysical survey to delineate potential leak path • Evaluate if there is a movement of CO_2 or brines to USDW. If USDW is affected, discuss with UIC Program Director remediation options, action plan, and monitoring program • Actions to restore injection will depend on the nature of the leak path and the extent. Operator needs to reevaluate model and discuss action plan with UIC Program Director	• Operations manager • Field superintendent • Geologist • Reservoir engineer • Project manager • Remediation contractors
12	Injection Period	***Fluid Leakage - Geomechanical Seal Failure*** Elevated well bottomhole pressure (BHP) either exceeds the permitted maximum injection pressure or the estimated maximum injection pressure is inaccurate (i.e., the true fracture pressure is lower than the estimated maximum pressure) in the injection zone, resulting in the failure of the confining system and leading to vertical migration of CO_2 or brine to a USDW, the surface or atmosphere (CO_2 only).	• Pressure gauges on surface and downhole real time • USDW water sampling • Time-lapse seismic profile survey • Pulsed-neutron log in deep injection and observation wells	• Injection is limited to less than 90% of the fracture gradient • Core and geomechanical testing and geochemical modeling of the upper confining zone show good sealing capacity and fluid compatibility, respectively • If CO_2 migrates out of the Paluxy, the Eagle Ford Shale will act as a buffer formation before CO_2 or brines are able to reach the USDW • Microfracture test prior to receiving authorization to operate, confirm formation breakdown pressure.	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • Follow protocol to stop injection • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Assess root cause by reviewing monitoring data • If required, conduct geophysical survey to delineate potential leakage pathway • Evaluate if there is a movement of CO_2 or brines to USDW • Notify UIC Program Director and propose remediation options, action plan, and monitoring program • Actions to restore injection will depend on the nature of the leak path and the extent. Operator needs to reevaluate model and discuss action plan with UIC Program Director	• Operations manager • Field superintendent • Monitoring staff • Geologist • Reservoir engineer • Project manager • Remediation contractors

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
13	Injection Period	***Fluid Leakage - Surface Infrastructure:*** Vehicle strikes other surface equipment (e.g., tank battery pumps/compressors, etc.), causing the release of CO_2 at the surface.	• Use of protective equipment, such as bollards, fences, locking gates • Use of appropriate fencing and signage	• Temperature-controlled building and/or containment, as required by regulation or law, will be proposed to protect the surface equipment and other instrumentation (i.e., interrogator, gauges, meters, etc.).	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • If major emergency, call 911 • Follow protocol to shut down CO_2 delivery • If there are injured personnel, call emergency team, and execute evacuation protocol • Notify 24-Hour Emergency Contact • Clear location and secure the perimeter. If possible, install containment devices around the location • Evaluate environmental impact (soil, water, fauna, vegetation) • Assess mechanical integrity of the system • Notify UIC Program Director and propose repair actions • Repair or replace equipment	• Operations manager • Field superintendent • Project manager • Plant manager • Remediation contractors
14	Injection Period	***Fluid Leakage - Surface Infrastructure:*** Failure of a valve results in leakage of CO_2 with potential impacts to health, safety, and the environment, particularly if the leak is not detected and corrected.	• Routine field inspections • Routine inspection of emergency alert systems, monitoring systems and controls.	• Equipment upstream or downstream of the failed valve can be used to isolate the problem as necessary • Preventative maintenance • Periodic inspections	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Notify 24-Hour Emergency Contact • Clear location and secure the perimeter • Evaluate environmental impact (soil, water, fauna, vegetation) • Assess mechanical integrity of the system • Notify UIC Program Director and propose repair actions • Repair or replace equipment	• Operations manager • Field superintendent • Plant manager • Remediation contractors • Emergency teams
15	Injection Period	***Fluid Leakage – Surface Infrastructure:*** The CO_2 stream is blocked between valves on the surface, heated (e.g., by the sun), and expands to rupture the line or flowline on the site is plugged and the pressure sensor fails to detect the change, resulting in a CO_2 leak.	• Pressure, temperature, and flowmeter sensors in real time • Field inspections	• Relief valves (e.g., Pressure Safety Valves) in areas where this is a risk as part of the design process • Equipment upstream or downstream of the failed valve can be used to isolate the problem as necessary • Cleaning protocols: • Wiping the lines • Testing with water • Performing cleaning runs to remove any debris. • Witches hat (cone strainer) filters can be used to filter out large pieces of debris on startup	• Trigger Emergency isolation valves • SCADA alarms notification to operations staff • Follow protocol to shut down CO_2 delivery • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Notify 24-Hour Emergency Contact to activate emergency plan, reverse 9-1-1 protocol for residents or occupants in proximity to occurrence. • Clear location and secure the perimeter. If possible, install containment devices around the location • Evaluate environmental impact (soil, water, fauna, vegetation) • Assess mechanical integrity of the system • Notify UIC Program Director and propose repair actions • Repair or replace equipment	• Operations manager • Field superintendent • Plant manager • Remediation contractors

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
16	Injection Period	***Fluid Leakage – Natural Disaster:*** A natural disaster event - e.g., hurricane, lightning, tornadoes, floods, landslides – impacts the pipelines or flowlines at the storage location, forcing the release of CO_2 at the surface.	• Pressure and flowmeter sensors in real time • Field inspections	• HAZOP review • ESD valve installed near the wellhead so it will cease injection whenever any leak occurs downstream or upstream of the ESD • Weather monitoring	• Trigger Emergency isolation valves • SCADA alarms notification to operations staff • Follow protocol to shut down CO_2 delivery if the automatic shutoff device is not functional • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Notify 24-Hour Emergency Contact • Clear the location and secure the perimeter. If possible, install containment devices around the location. • Assess mechanical integrity of the pipelines or flowlines • Notify UIC Program Director and propose action plan • Evaluate environmental impact (soil, water, fauna, vegetation), and present remediation plan to the UIC Program Director for approval • Execute remediation, and install additional monitoring system as needed	• Operations manager • Field superintendent • Project manager • Remediation contractors • Emergency teams
17	Injection Period	***Fluid Leakage – Surface Infrastructure:*** Failure of CO_2 transport flowlines from the CO_2 capture system to project injection wellhead.	• Surface P/T gauges and flowmeters at inlet and delivery point.	• Preventive maintenance • Periodic inspections • Monitoring devices at both ends of the transmission pipeline and flowline	• Trigger emergency isolation valves • SCADA alarms notification to operations staff • Follow protocol to shut down CO2 delivery • Detect CO2 stream release and its location • If major emergency, call 911 and initiate evacuation plan • Notify 24-Hour Emergency Contact • Transmission line and/or flowline failure will be inspected to determine the root cause of the failure • Notify UIC Program Director and propose action plan • Repair/replace the damaged transmission line or flowline, and if warranted, put in place the measures necessary to eliminate such events in the future	• Operations manager • Field superintendent • Remediation contractors • Emergency teams • Plant manager/contact
18	Injection Period	***Loss of Containment - Vertical Migration via injection well:*** During the life of the deep injection wells, there are induced stresses and chemical reactions on the tubulars and cement exposed to the CO_2 pressure and plume. Changes in temperature and injection pressure create stresses in the tubulars trying to expand or contract, and it can lead to microannulus effects, resulting in fugitive movement of brines/CO_2.	• CO_2 leak sensors on the wellhead • DTS fiber real time alongside the casing • USDW water monitoring • Pulsed-neutron logs (PNL) to be run for external integrity • CBL/Ultra-sonic logging • Pressure gauges at surface • Flow rate monitoring	• CO_2-resistant cement and metallurgy across injection zone • Injection through corrosion resistant tubing and packers • Cement to surface • Cased hole logging program • USDW covered as second barrier with surface casing and surface cement sheet • New corrosion resistant casing installed	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • Follow protocol to stop operation, vent, or deviate CO_2 • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Troubleshoot the well • Evaluate if there is a movement of CO_2 or brines to USDW • Notify UIC Program Director and discuss action plan to repair the well or P&A based on the findings of the assessment	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors • Remediation contractors
19	Injection Period/ Post Injection Site Care Period	***Loss of Containment - Vertical Migration via monitoring well:*** During the life of the deep injection wells, there are induced stresses and chemical reactions on the tubulars and cement exposed to the CO_2 pressure and plume. Changes in temperature and injection pressure create stresses in the tubulars trying to expand or contract, and it can lead to microannulus effects, resulting in fugitive movement of brines/CO_2.	• CO_2 leak sensors on the wellhead • USDW water monitoring • Pulsed-neutron logs to be run for external integrity • CBL/Ultra-sonic logging • Pressure gauges at surface	• CO_2-resistant cement across injection zone • Cement to surface • Cased hole logging program • USDW covered as second barrier with surface casing and surface cement sheet • New corrosion resistant casing installed • Observation wells are designed to be outside of the plume for most of the injection period	• Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Troubleshoot the well • Evaluate if there is a movement of CO_2 or brines to USDW • Notify UIC Program Director and discuss action plan to repair the well or P&A based on the findings of the assessment	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors • Remediation contractors

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
20	Injection Period/ Post Injection Site Care Period	***Loss of Containment-Lateral Migration of CO_2 Outside Defined AoR:*** The CO_2 plume moves faster or in an unexpected pattern and expands beyond the secured pore space for the project and the AoR.	• Time-lapse vertical seismic profile surveys • Pulsed-neutron logs in observation wells • Pressure and temperature gauges real time in observation wells	• Detailed geologic model with stratigraphic wells as calibration • Seismic survey integrated in the model • Extensive characterization of the rocks and formation • Periodic review of CO_2 and pressure plume within AoR every 5 years • Monitor the plume over PISC	• Injection period: • Trigger Emergency Shutdown System • SCADA alarms notification to operations staff • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Review monitoring data and trends and compare with the simulation. • Notify UIC Program Director, propose action plan and request to keep injection process while AoR is reviewed, if the data show that CO_2 will stay in the secured pore space. • Perform logging in observation wells. • Conduct geophysical survey as required to evaluate AoR. • Recalibrate model and simulate new AoR • Assess if additional corrective actions are needed and if it's required to secure additional pore space • Assess if any remediation is needed, and discuss action plan with UIC Program Director • Present AoR review to UIC Program Director for approval and adjust monitoring plan <u>Post Injection Site Care Period</u>: • SCADA alarms notification to monitoring personnel • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Review monitoring data and trends, compare with the simulation • Notify UIC Program Director and propose action plan • Conduct geophysical survey as required to evaluate AoR • Recalibrate model, and simulate new AoR • Assess if additional corrective actions are needed and if it's required to secure additional pore space • Assess if any remediation is needed, and discuss action plan with UIC Program Director	• Operations manager • Field superintendent • Geologist • Reservoir engineers • Project manager

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
21	Injection Period/ Post Injection Site Care Period	***Containment - Pressure Propagation:*** A "pressure front" that exceeds the minimum pressure necessary to cause fluid flow from the injection zone into a USDW through a hypothetical conduit (i.e., an artificial penetration that is perforated in both intervals).	• Pulsed-neutron logs • Pressure gauges on surface and downhole real time • USDW water monitoring • Flow rate monitoring • Time-lapse vertical seismic profile survey (AoR review periods) • Incremental leakage modeling to validate a lack of potential for fluid movement into the USDW.	• Detailed geologic model with stratigraphic wells as calibration • Seismic survey integrated in the model • Extensive characterization of the rocks and formation • Periodic review of CO_2 and pressure plume within AoR every 5 years • Monitor the plume until stabilization (min 10 years) • USDW covered as second barrier with surface casing and surface cement sheet • Cased hole logging program	<u>Injection period:</u> • Identification by monitoring staff • Notify 24-Hour Emergency Contact • Review monitoring data and trends and compare with the simulation • If endangerment to USDW is suspected follow shut down procedure. • Notify UIC Program Director and propose action plan and request to keep injection process while AoR is reviewed, if the data shows that the CO_2 will stay in the secured pore space • Perform logging in observation wells • Conduct geophysical survey as required to evaluate AoR • Recalibrate model and simulate new AoR • Assess if additional corrective actions are needed and if it's required to secure additional pore space • Assess if any remediation is needed, and discuss action plan with UIC Program Director • Present AoR review to UIC Program Director for approval and adjust monitoring plan <u>Post Injection Site Care Period:</u> • Identification by monitoring staff • Notify 24-Hour Emergency Contact • Review monitoring data and trends and compare with simulations • Notify UIC Program Director and propose action plan • Conduct geophysical survey as required to evaluate AoR • Recalibrate model, and simulate new AoR • Assess if additional corrective actions are needed and if it's required to secure additional pore space • Evaluate if there is a movement of CO_2 or brines to USDW. In the remote event that USDW is affected, discuss remediation options with the UIC Program Director	• Operations manager • Field superintendent • Monitoring staff • Geologist • Reservoir engineers • Project manager • Remediation contractors
22	Injection Period	***External impact – UIC Well:*** During injection, the wellhead is hit by a massive object that causes major damage to the equipment. The well gets disconnected from the pipeline and from the shutoff system and leads to a loss of containment of CO_2 and brine.	• Pressure, temperature, and flow sensors in real time • Field inspections	• Fence location and block direct access to the wellhead • Bollards and/or concrete barriers installed to protect installation • Wellhead located in scarcely populated area	• Trigger emergency isolation valves • SCADA notification to monitoring or operations staff • Follow protocol to shut down CO_2 delivery if the automatic shutoff device is not functional • If major emergency, call 911 • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • If there are injured personnel, call emergency team, and execute evacuation protocol • Notify 24-Hour Emergency Contact • Clear the location and secure the perimeter. If possible, install containment devices around the location. • Contact well control special team to execute blowout emergency plan that may include but is not limited to capping the well, secure location, drill relief well to kill injector, properly repair or abandon injection well. This plan would be discussed with UIC Program Director • Evaluate environmental impact (soil, water, fauna, vegetation) • Notify UIC Program Director and propose action plan • Execute remediation, and install monitoring system as needed	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors • Remediation contractors • Well control specialist

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
23	Injection Period/ Post Injection Site Care Period	***External impact – MW:*** The wellhead of the deep monitoring well is hit by a massive object that causes major damage leading to a LOC. Since the well is open to the formation pressure at the injection zone, the CO_2 stream or formation fluids have the potential to flow and spill on the location.	• Pressure, temperature, and flow sensors in real time • Field inspections • Incremental leakage modeling to validate a lack of potential for fluid movement into the USDW	• Fence location and block direct access to the wellhead • Bollards and/or concrete barriers installed to protect installation • No populated area • Lined pads • Reduced pressure in the monitoring well compared with the deep injection well on bottom	• SCADA alarms notification to operations staff • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • If there are injured personnel, call emergency team, and execute evacuation protocol • If major emergency, call 911 • Notify 24-Hour Emergency Contact • Clear the location and secure the perimeter. If possible, install containment devices around the location. • Contact well control special team to execute blowout emergency plan that may include, but is not limited to, capping the well, securing the location, drilling relief well to kill the injector, properly repairing, or abandoning the injection well. • Evaluate environmental impact (soil, water, fauna, vegetation) • Notify UIC Program Director and propose action plan • Execute remediation, and install monitoring system as needed	• Operations manager • Field superintendent • Project manager • Rig crew and DH contractors • Remediation contractors • Well control specialist
24	Injection Period	***External impact – Pipeline:*** During injection, the CO_2 pipeline is hit causing major damage and LOC of the CO_2.	• Pressure, temperature, and flowmeter sensors in real time • Field inspections • Bollards and/or concrete barriers installed to protect aboveground piping at valve stations • Appropriate warning signage/painting • Appropriate fencing	• Buried pipe • Bollards and/or concrete barriers installed to protect aboveground piping at valve stations • Painting for visibility in varied weather conditions • Signage along right of way as needed • Pipeline is part of One Call system	• Trigger emergency isolation valves • SCADA alarms notification to operations staff • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • Verify CO_2 flow was shut off by the system or start protocol to stop flow • Notify 24-Hour Emergency Contact • Clear the location and secure the perimeter. If possible, install containment devices around the location. • Evaluate environmental impact (soil, water, fauna, vegetation) • Notify UIC Program Director and propose action plan • Execute remediation, and install monitoring system as needed	• Operations manager • Field superintendent • Remediation contractors • Emergency teams • Plant manager/contact
25	Injection Period	***Monitoring Equipment Failure or Malfunction:*** Failure of the monitoring system/ alarm devices that lead to over pressurization of the system or reservoir beyond the design limits, causing fracturing of the reservoir, leaks or failure on equipment and tubulars, and damage of the facilities.	• Real-time pressure monitoring system and redundancy • Field inspections	• Preventive maintenance • Periodic inspections	• SCADA alarms notification to operations staff • Follow protocol to shut down CO_2 delivery if the automatic shutoff device is not functional • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • Notify 24-Hour Emergency Contact • Assess mechanical integrity of the system, and propose repair actions if needed • Assess any potential environmental impact • Notify UIC Program Director and propose action plan • Repair or replace instrumentation. Calibrate equipment. • Review monitoring records, and if needed, perform an injectivity test or falloff test to evaluate reservoir	• Operations manager • Field superintendent • Project manager • Remediation contractors • Emergency teams • Geologist • Reservoir engineers • Monitoring staff

No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
26	Injection Period/ Post Injection Site Care Period	***Injection or Monitoring Equipment Failure:*** Failure of surface injection or monitoring equipment including injection pumps, valves, gauges, meters, sensors, electrical, or other equipment results in potentially unsafe operating conditions and requires an emergency response at the site.	• Real-time monitoring system and redundancy • Field inspections • Routine inspection/testing of emergency alert systems, monitoring systems and controls systems.	• Preventive maintenance • Periodic inspections	• SCADA alarms notification to operations staff • Follow protocol to shut down CO_2 delivery if the automatic shutoff device is not functional • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • Notify 24-Hour Emergency Contact • Assess mechanical integrity of the system, and propose repair actions if needed • Assess any potential environmental impact • Notify UIC Program Director and propose action plan • Perform Lockout/Tagout (LOTO) for defective equipment until it is properly replaced • Repair or replace instrumentation. Calibrate equipment. • If the assessment allows resuming injection safely, discuss plan with the UIC Program Director and get approval	• Operations manager • Field superintendent • Project manager • Remediation contractors • Emergency teams • Geologist • Reservoir engineers • Monitoring staff
27	Injection Period/ Post Injection Site Care Period	***Injection or Monitoring Equipment Failure:*** Malfunction of subsurface injection/monitoring well subsurface equipment including gauges, fiber, cables, or capillary string, requiring an emergency response at the site.	• Real-time monitoring system and redundancy • Field inspections • Routine inspection/testing of emergency alert systems, monitoring systems and controls systems.	• Preventive maintenance • Periodic inspections	• SCADA alarms notification to operations staff • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Notify 24-Hour Emergency Contact • Assess mechanical integrity of the system, and propose repair actions if needed • Assess any potential environmental impact • Notify UIC Program Director and propose action plan • If the assessment allows resuming injection safely, discuss plan with the UIC Program Director and get approval • Repair or replace instrumentation. Calibrate equipment. • Review monitoring records, and if needed, perform an injectivity test or falloff test to evaluate reservoir	• Operations manager • Field superintendent • Project manager • Remediation contractors • Emergency teams • Geologist • Reservoir engineers • Monitoring staff
28	Injection Period	***Injection or Monitoring Equipment Failure:*** A large pressure drop in the CO_2 stream results in low temperatures that could cause harm to personnel or damage/brittleness in materials (e.g., carbon steel and elastomers).	• Real time monitoring system of the CO_2 injection stream	• Use of materials that are rated for low temperatures • Controlled CO_2 stream composition	• SCADA alarms notification to operations staff • Follow protocol to shut down CO_2 delivery if the automatic shutoff device is not functional • If major emergency, call 911 • If there are injured personnel, call emergency team, and execute evacuation protocol • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • Notify 24-Hour Emergency Contact • Assess mechanical integrity of the system, and propose repair actions if needed • Assess any potential environmental impact, and propose remedial action with the UIC Program Director, if needed • If the assessment allows resuming injection safely, discuss plan with the UIC Program Director and obtain approval • Repair or replace any damaged equipment and recalibrate • Review monitoring records and, if needed, adjust CO_2 accordingly	• Operations manager • Field superintendent • Plant manager • Emergency teams

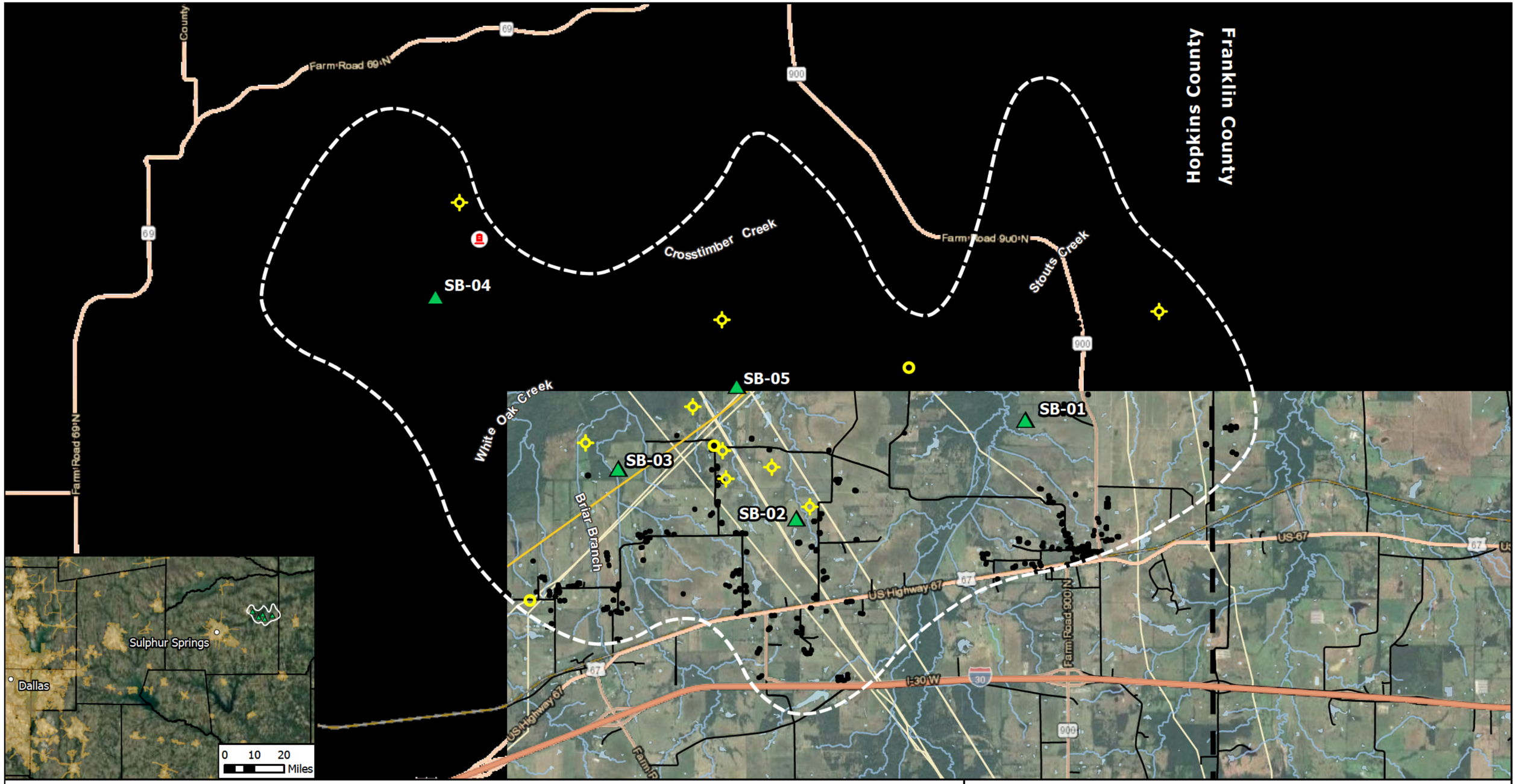
No.	Project Phase	Risk Scenario	Monitoring Equipment	Control In Place	Response Action	Response Personnel
29	Construction/ Injection Period/ Post Injection Site Care Period	***Other Major Natural Disaster*** Natural disaster that limits or endangers the normal operation of the project.	• Weather monitoring	• Project safety program • Condition/atmospheric monitoring. • Emergency shut down valves	• SCADA alarms notification to operations staff • If major emergency, call 911 • If there is injured personnel or property damage, call emergency team, and execute evacuation protocol and secure location • Follow protocol to stop injection • Notify 24-Hour Emergency Contact • Assess mechanical integrity of the system • Assess any potential environmental impact • Notify UIC Program Director and propose repair actions based on findings • If the assessment allows resuming injection safely, increase surveillance to validate effectiveness of the actions	• Operations manager • Field superintendent • Project manager • Remediation contractors • Emergency teams • Geologist • Reservoir engineers • Monitoring staff
30	Injection Period/ Post Injection Site Care Period	***Other Major Natural Disaster*** *Flooding* SB-02 is located in Zone A, a Special Flood Hazard Area, therefore, additional precautions such as structural elevation, enhanced floodproofing, and emergency response planning will be required for this well. The other wells, located in Zone X, are subject to minimal risk, but continuous monitoring and proactive maintenance of flood defenses are recommended to ensure safety.	• Weather radar • Satellite monitoring system • Flooding alerts and warning system	• Wellheads, control panels and storage facilities installed above the known flood levels • Use of flood resistant materials and installing watertight enclosures • Natural vegetation as barrier • Infrastructure Development incompliance with zoning regulations and guidelines	• If major emergency, call 911 • If there is injured personnel or property damage, call emergency team, and execute evacuation protocol and secure location • Follow protocol to stop injection • Implement protocols for shutting down operations in vulnerable areas, including automated systems that can power down equipment to prevent damage or hazardous situations. • Employ temporary measures such as deploying mobile pumps and placing sandbags around key facilities can reduce floodwater incursion. • Implement a well-structured evacuation plan that ensures the safety of personnel, providing clear guidance on safe evacuation routes and shelter locations. • Notify UIC Program Director and propose repair actions based on findings • If the assessment allows resuming injection safely, increase surveillance to validate effectiveness of the actions	• Operations manager • Field superintendent • Project manager • Remediation contractors • Emergency teams • Geologist • Reservoir engineers • Monitoring staff
31	Injection Period	***Accidents or Unplanned Event:*** Loss of electricity causing injection to cease.	• Field inspections	• PLC with Uninterrupted Power Supply (UPS) • "Fail-Closed" shut down valves • Consider backfeed to redundant generation sources or generation sources • Install industry standard weather mitigation on distribution lines • Solar Back-up if required	• SCADA alarms notification to operations staff • PLC/UPS programmed to initiate a closure of shut down valves in fail safe position (Fail-Closed) • PLC/UPS will continue to monitor the shut down and report back to the SCADA system for personnel • If major emergency, call 911 • Designate an exclusion zone, and provide appropriate PPE for protection of onsite personnel • Verify CO2 flow was shut off by the system or start manual protocol to stop flow, visual inspection, and manually close valves. • Notify 24-Hour Emergency Contact • Notify UIC Program Director within 24-hours of shut-in • Notify UIC Program Director of start-up procedure.	• Operations manager • Field superintendent • Project manager
32	Post-injection period	***Unauthorized access/activity:*** Unauthorized activity on field site	• Field personnel logs	• Fencing around well sites • Security in place	• Notify 24-Hour Emergency Contact • Report any incidents to local Sheriff's office	• Field superintendent • Company man

Appendix B: Emergency Contact List

Sugarberry CCS Hub, Hopkins County, Texas
Updated 12/31/24

Facility Contacts	Phone Number
24-Hour Emergency Contact During Construction: Project Manager	TBD
24-Hour Emergency Contact During Operation and Post-Injection: Operations Manager	TBD
Environmental Services Contractor	TBD
Local Agencies	
EMERGENCY – Local Emergency Responders	911
Hopkins County Office of Emergency Management	270-821-5717
Hopkins County Sheriff's Office	270-821-5661
Franklin County Office of Emergency Management	903-537-4539
Franklin County Sheriff's Office	903-537-4539
Sulphur Bluff Fire Department	903-348-7291
Sulphur Springs Fire Department	903-885-7602
Como Fire Department	903-488-3434
State Agencies	
Texas Spill Reporting Hotline (24-hour)	800-832-8224
Railroad Commission of Texas – UIC Program Director	512-463-2259
Railroad Commission of Texas – Gas Pipeline Safety	512-463-7058
Texas Emergency Management Agency	512-424-2208
Texas Commission on Environmental Quality – Region 5	903-535-5100
Federal Agencies	
U.S. EPA Region 6 - UIC Program Director	241-665-8473
National Response Center (24 hours)	800-424-8802

FIGURES



Legend

- Injection Wells
- Area of Review
- Permitted Location (3)
- Dry Hole (9)
- Rivers and Streams
- Lakes and Ponds
- Pipelines
- Transmission Lines
- Surface Structures
- Cemetery
- Cities
- County Line
- U.S. Interstate 30
- U.S. and State Highways
- Roads

FIGURE 10-1
SITE RESOURCES AND INFRASTRUCTURE WITH OIL AND GAS WELLS WITHIN AOR
SUGARBERRY CCS HUB
SUGARBERRY CCS, LLC
HOPKINS COUNTY, TEXAS

SCS ENGINEERS
Wichita, KS | May 2025

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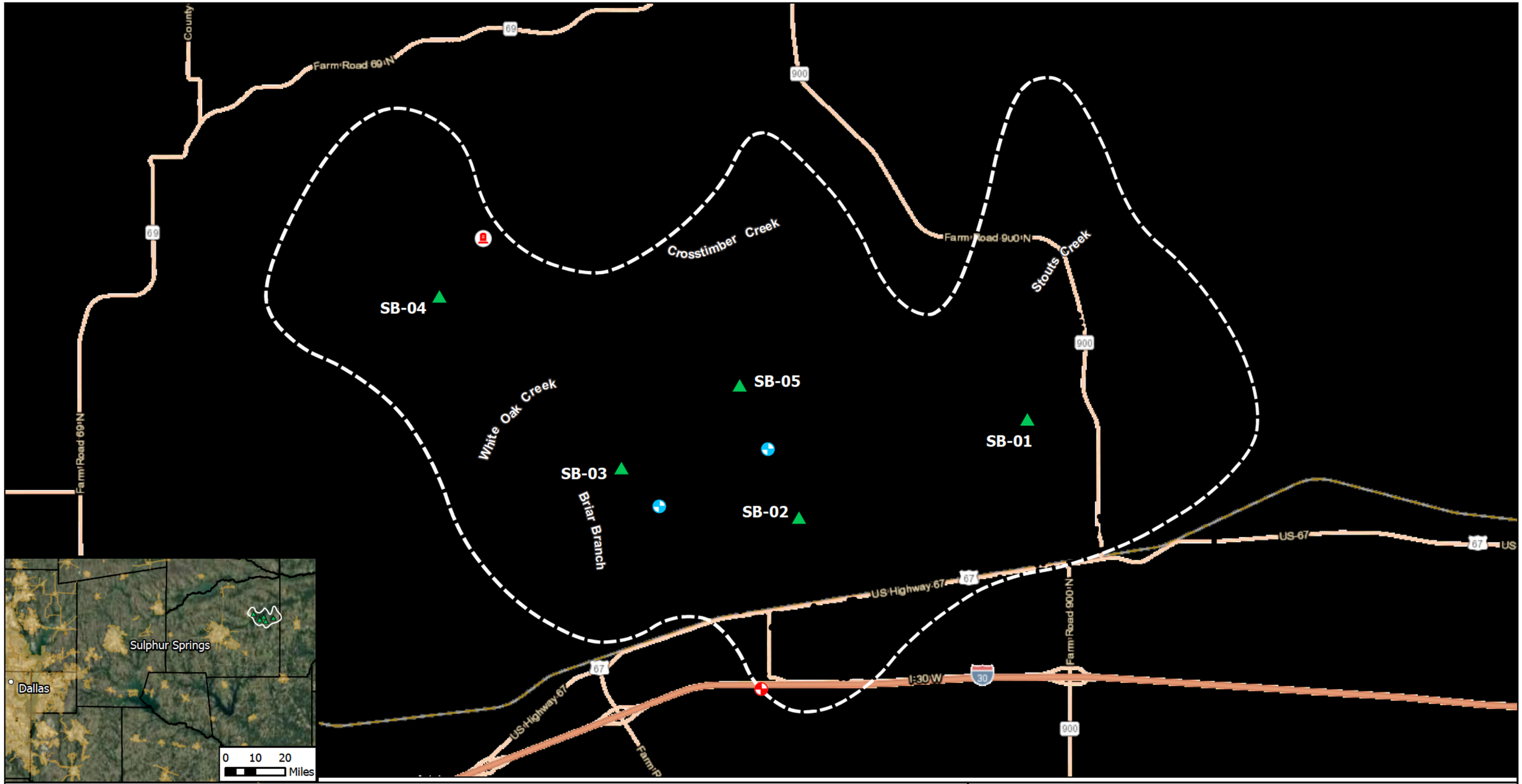


Legend

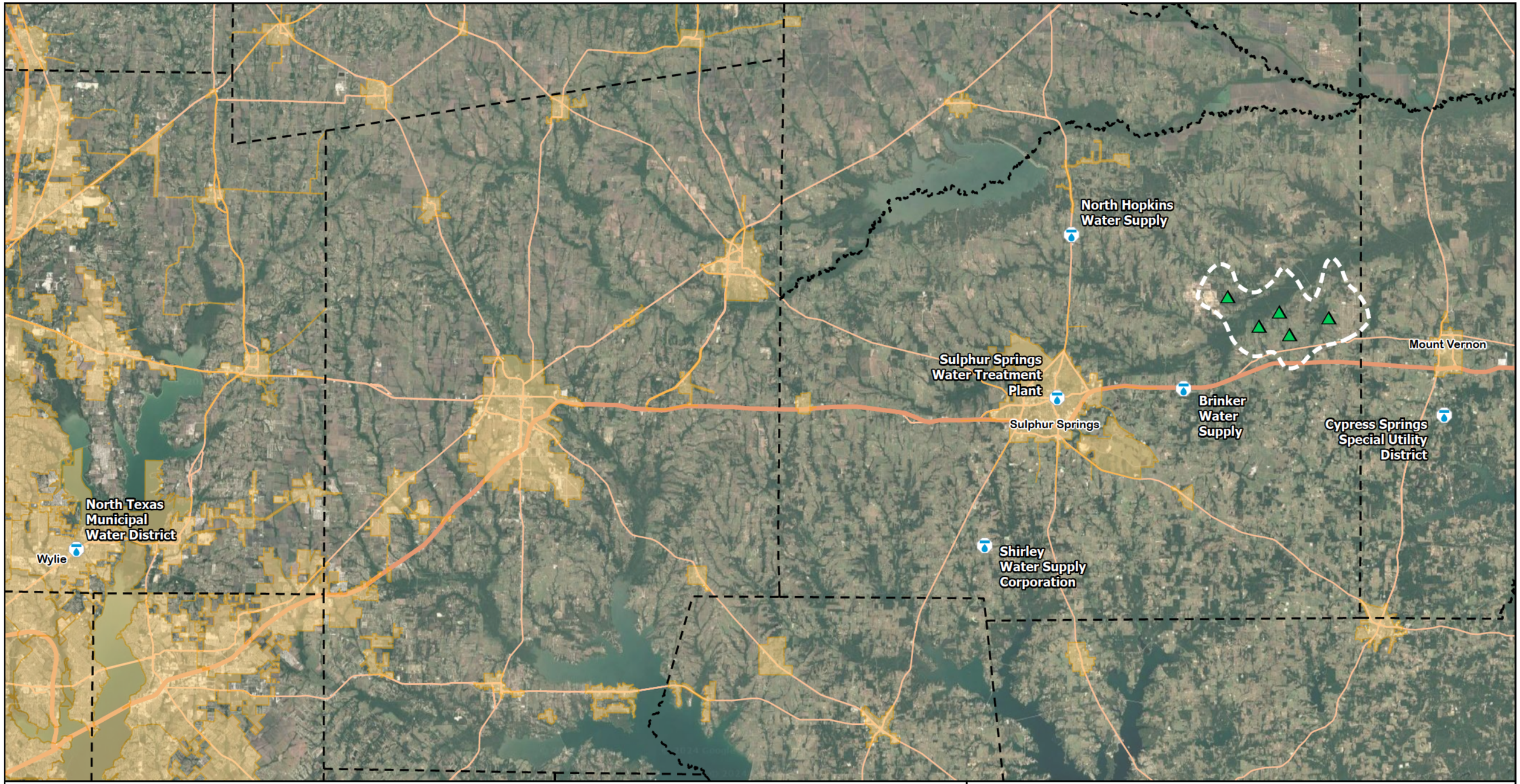
- Injection Wells
- Area of Review
- Plugged Monitoring Well (1)
- BRAC Database Water Wells (2)
- Rivers and Streams
- Lakes and Ponds
- Pipelines
- Transmission Lines
- Surface Structures
- Cemetery
- Cities
- County Line
- U.S. Interstate 30
- U.S. and State Highways
- Roads

FIGURE 10-2
SITE RESOURCES AND INFRASTRUCTURE WITH WATER WELLS WITHIN AOR
SUGARBERRY CCS HUB
SUGARBERRY CCS, LLC
HOPKINS COUNTY, TEXAS

SCS ENGINEERS
Wichita, KS | May 2025

0 1 2 Miles

N



Legend

- Injection Wells
- Area of Review
- Water Supply and Treatment Facilities
- Cities
- County Lines
- U.S. Interstate 30
- U.S. and State Highways

FIGURE 10-3
AREA WATER SUPPLY AND TREATMENT FACILITIES
SUGARBERRY CCS HUB
SUGARBERRY CCS, LLC
HOPKINS COUNTY, TEXAS

SCS ENGINEERS
Wichita, KS | May 2025

0 5 10 Miles

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