

**EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)**

FRONT RANGE STORAGE COMPLEX

Facility Information

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Well surface location:	31375 Great Western Drive, Windsor, CO 80550 Lat: 40.454962 Long: -104.859761 NAD 83 (2011)

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List of Acronyms and Abbreviations

AoR = Area of Review	M _L = local magnitude
CFR = Code of Federal Regulations	MMA = maximum monitoring area
CO ₂ = carbon dioxide	PBI = Proprietary Business Information
CSS = Carbon Storage Solutions, LLC	UIC = Underground Injection Control
ERRP = Emergency and Remedial Response Plan	US EPA = United States Environmental Protection Agency
GS = geologic sequestration	USGS = United States Geological Survey
GSDT = Geologic Sequestration Data Tool	USDW = Underground Source of Drinking Water
HAZWOPER = Hazardous Waste Operations and Emergency Response	

H.1. Summary

This Emergency and Remedial Response Plan (ERRP) describes actions that Carbon Storage Solutions, LLC (CSS) 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 CSS obtains evidence that the injected carbon dioxide (CO₂) stream and/or associated pressure front may cause an endangerment to a USDW, CSS must perform the following actions:

1. Initiate shutdown plan for the injection well – See Appendix H.1
2. Take all steps reasonably necessary to identify and characterize any release
3. Notify the permitting agency (Underground Injection Control [UIC] Program Director) of the emergency event within 24 hours – See Appendix H.2
4. Implement applicable portions of the approved Emergency and Remedial Response Plan

H.2. Local Resources and Infrastructure

Local resources and infrastructure are summarized type:

Project Infrastructure: Figure H.2-1 displays locations for the injection well Front Range 1-1; the deep zone monitoring well Front Range 2-1; the monitoring stations MS-1 through MS-6; surface facilities at Front Range Energy, LLC; and surface facilities at Carbon Storage Solutions, LLC.

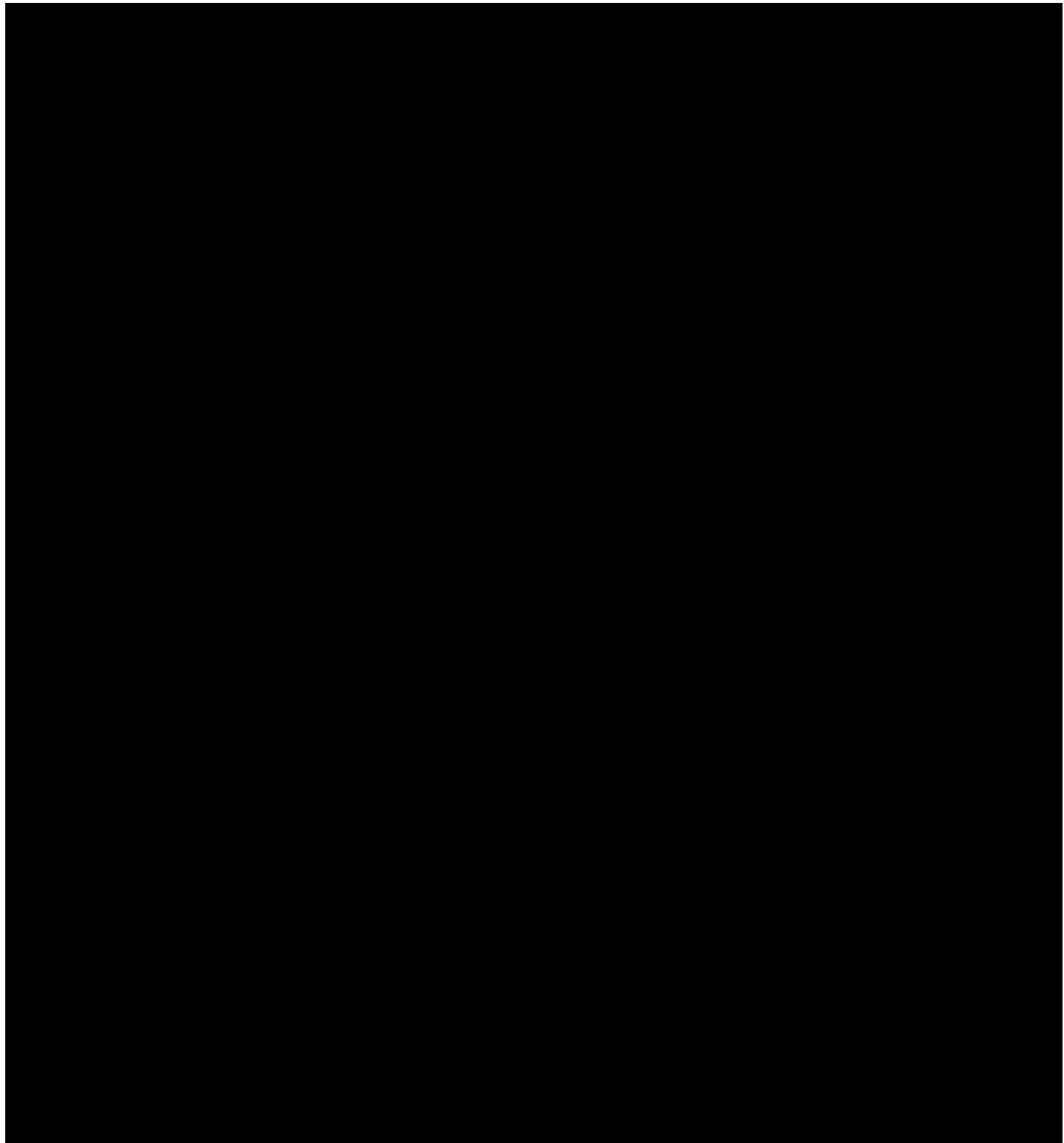
Water Resources: Figure H.2-1 displays locations for surface waters that include the Cache de la Poudre River, un-named tributaries to the Cache de la Poudre River, and multiple surface ponds.

Land Resources: Figure H.2-1 displays locations for grasslands/herbaceous lands, pasture/hay lands, and cultivated crop lands per the United States National Land Cover Database for 2021¹. Public lands are indicated by areas with black hatch marks. No nature preserves have been identified within the geologic sequestration (GS) site or close proximity.

Building Infrastructure: Figure H.2-1 displays locations for multiple industrial and residential buildings.

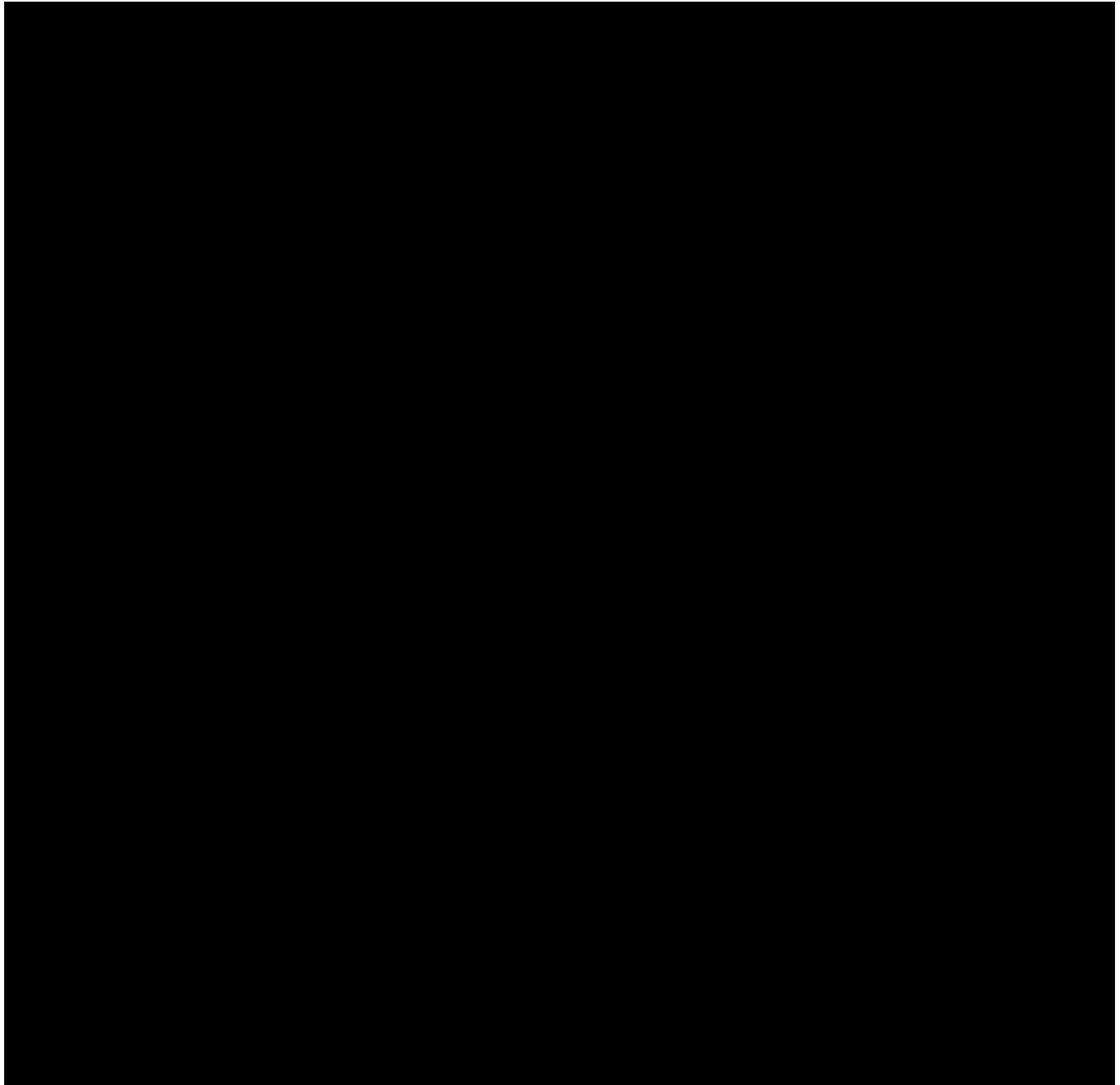
¹ See program overview at: <https://www.usgs.gov/centers/eros/science/national-land-cover-database> and the associated Multi-Resolution Land Characteristics Consortium map viewer at: <https://www.mrlc.gov/viewer/>

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Topographical Depressions: Figure H.2-2 displays locations for topographical depressions within the GS site. These low spots are locations where CO₂ releases could potentially accumulate since CO₂ is heavier than air.

Surface Road and Railroad Infrastructure: Figure H.2-1 displays the routes for Eastman Park Drive (main surface road within the maximum monitoring area [MMA]), various side roads, the Great Western Railway of Colorado (main railway within the MMA), and various rail spurs.



H.3. Potential Risk Scenarios

The following events related to the site that could potentially result in an emergency response:

- Injection or monitoring (verification) well integrity failure;
- Injection well monitoring equipment failure (e.g., shut-off valve or pressure gauge, etc.);
- Fluid (e.g., brine) or CO₂ leakage to a USDW or the surface;
- A natural disaster (e.g., earthquake, tornado, lightning strike); or
- Induced or natural 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 H.3-1.

Table H.3-1. 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.
Minor emergency	Event poses no immediate risk to human health, resources, or infrastructure.

H.4. 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 identified potential risk scenarios are detailed in the subsections that follow.

H.4.1. Well Integrity Failure

Integrity loss of Front Range 1-1 and/or Front Range 2-1 may endanger USDWs. Integrity loss may have occurred if one or more of the following events occur:

- Front Range 1-1 Downhole Pressure (PT-1101) reading exceeds the shutdown pressure specified in the permit.
- Front Range 1-1 annulus pressure differential (PT-3012 less PT-3011) falls below the minimum difference specified in the permit.
- Mechanical integrity test at Front Range 1-1 or Front Range 2-1 identifies a loss of mechanical integrity.

Pursuant to 40 CFR 146.91(c)(3), CSS must notify the United States Environmental Protection Agency (US EPA) UIC Program Director within 24 hours of any triggering of a shut-off system (i.e., down-hole or at the surface).

Severity:

Major, Serious	= Visual evidence of CO ₂ surface leak
Minor	= Potential well integrity failure indicated only by instruments

Timing of event: Injection period, Post-Injection period

Avoidance measures: Planned practices to avoid the scenario include, but are not limited to: injection operations within permitted limits, well maintenance, and implementation of the Testing and Monitoring Plan.

Detection methods: Detection methods described in the Testing and Monitoring Plan include, but are not limited to: Internal Mechanical Integrity Tests, External Mechanical Integrity Tests, Monitoring of Operational Parameters, and Surface CO₂ Monitoring.

Potential response actions:

- Determine the severity of the event based on the information available.
- Notify the US EPA UIC Program within 24 hours – See Appendix H.2.
- For a Major or Serious emergency:
 - Initiate shutdown plan – See Appendix H.1.
 - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the US EPA UIC Program Director).

- For a Minor emergency:
 - Conduct assessment to determine whether there has been a loss of mechanical integrity.
 - If there has been a loss of mechanical integrity, initiate shutdown plan – See Appendix H.1.

Response personnel: Initial response by site personnel listed in this plan, remediation by CSS and its subcontractors.

Equipment: To be provided by CSS and its subcontractors as appropriate.

H.4.2. Injection Well Monitoring Equipment Failure

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

Severity:

Major, Serious	= Strong evidence for over-pressurization of the system
Minor	= Monitoring equipment failure, but weak/no evidence of over-pressurization of the system

Timing of event: Injection period

Avoidance measures: Planned practices to avoid the scenarios include, but are not limited to: preventative maintenance of monitoring equipment, redundancy within monitoring systems, field inspections of monitoring equipment.

Detection methods: Triggering of alarms within the monitoring system.

Potential Response actions:

- Determine the severity of the event based on the information available.
- Notify the US EPA UIC Program within 24 hours – See Appendix H.2.
- For a Major or Serious emergency:
 - Initiate shutdown plan – See Appendix H.1.
 - Identify and, if necessary, implement appropriate remedial actions (in consultation with the US EPA UIC Program Director).
- For a Minor emergency:
 - Conduct assessment to determine whether there has been a loss of mechanical integrity.
 - If there has been a loss of mechanical integrity, initiate shutdown plan – See Appendix H.1.

Response personnel: Initial response by site personnel listed in this plan, remediation by CSS and its subcontractors.

Equipment: To be provided by CSS and its subcontractors as appropriate.

H.4.3. Potential Brine or CO₂ Leakage to USDW or the Surface

Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence of fluid (brine) or CO₂ leakage into a USDW.

Severity:

Major, Serious	= Strong evidence for brine or CO ₂ leakage to USDW or the surface
Minor	= Weak evidence for brine or CO ₂ leakage to USDW or the surface

Timing of event: Injection period, Post-Injection period

Avoidance measures: Planned practices to avoid the scenario include, but are not limited to: injection operations within permitted limits, well maintenance, and implementation of the Testing and Monitoring Plan.

Detection methods: Detection methods described in the Testing and Monitoring Plan include, but are not limited to: Groundwater Quality and Geochemical Monitoring, Soil Gas Monitoring, and Surface CO₂ Monitoring.

Potential Response actions:

- Determine the severity of the event based on the information available.
- Notify the US EPA UIC Program within 24 hours – See Appendix H.2.
- For a Major or Serious emergency:
 - Initiate shutdown plan – See Appendix H.1.
 - If the presence of indicator parameters are confirmed, develop (in consultation with the US EPA UIC Program Director) a case-specific work plan to:
 1. Install additional groundwater monitoring points near the affected groundwater well(s) to delineate the extent of impact; and
 2. Remediate unacceptable impacts to the affected USDW.
 - Proceed with efforts to remediate USDW to mitigate any unsafe conditions (e.g., install system to intercept/extract brine or CO₂, or “pump and treat” to aerate CO₂-laden water).
 - Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by CSS and the US EPA UIC Program Director) until unacceptable adverse USDW impact has been fully addressed.

- For a Minor Emergency
 - Conduct assessment to determine whether there has been brine or CO₂ leakage to USDW or the surface
 - If there has been leakage, initiate shutdown plan – See Appendix H.1.

Response personnel: Initial response by site personnel listed in this plan, remediation by CSS and its subcontractors.

Equipment: To be provided by CSS and its subcontractors as appropriate.

H.4.4. Natural Disaster (Except Earthquakes)

Issues may arise as a result of a natural disaster (e.g., tornado, lightning strike) affecting the normal operation of the injection well.

Severity:

Major, Serious	= Strong evidence for loss of CO ₂ containment in system
Minor	= Minimal or no evidence for loss of CO ₂ containment in system

Timing of event: Injection period, Post-Injection period

Avoidance measures: Not applicable

Detection methods: Observations by staff

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

- Determine the severity of the event based on the information available.
- Notify the US EPA UIC Program within 24 hours – See Appendix H.2.
- For a Major or Serious emergency:
 - Initiate shutdown plan – See Appendix H.1.
 - If contamination or endangerment is detected, identify and implement appropriate remedial actions (in consultation with the US EPA UIC Program Director).
- For a Minor emergency:
 - Conduct assessment to determine whether there has been a loss of mechanical integrity.
 - If there has been a loss of mechanical integrity, initiate shutdown plan – See Appendix H.1.

Response personnel: Initial response by site personnel listed in this plan, remediation by CSS and its subcontractors.

Equipment: To be provided by CSS and its subcontractors as appropriate.

H.4.5. Earthquake: Induced or Natural Seismic Event

The plan is aligned with seismic action plans typically used for Class II injection well in Colorado. A triggering event is defined as a seismic event larger than 2.5 local magnitude (M_L) with an epicenter within a 2.5-mile radius of Front Range 1-1; see the Testing and Monitoring Plan for more detail.

Severity: See Table H.4-1.

Timing of event: Injection period, Post-Injection period.

Avoidance measures: Not applicable

Detection methods: Monitoring of regional United States Geologic Survey (USGS) seismic network.

Potential Response actions: See Table H.4-1

Response personnel: Initial response by site personnel listed in this plan, remediation by CSS and its subcontractors.

Equipment: To be provided by CSS and its subcontractors as appropriate.

Table H.4-1. Response to Seismic Events

Seismic Event State	Threshold Condition	Response Action
Green	No triggering events have occurred within past 24 hours	<ol style="list-style-type: none"> 1. Continue with normal operation within permitted levels.
Yellow	One or more triggering events have occurred within the past 24 hours, but no verified triggering event justify a Red seismic event state	<ol style="list-style-type: none"> 1. Continue with normal operation within permitted levels. 2. Notify one or more response personnel within 1 hour of the triggering event the seismic event state of the geologic sequestration project has changed to Yellow.
Red	One or more verified triggering events have occurred within the past 24 hours that are ≥ 4.5 M _L	<ol style="list-style-type: none"> 1. Initiate shutdown plan – See Appendix H.1. 2. Notify one or more response personnel within 1 hour of the triggering event the seismic event state of the geologic sequestration project has changed to Red. 3. Notify the US EPA UIC Program Director the shutdown plan was implemented due to a triggering seismic event – See Appendix H.2. 4. Limit access to Front Range 1-1 and Front Range 2-1 to authorized personnel only. 5. Identify and implement appropriate corrective actions in consultation with the US EPA UIC Program Director. 6. Re-start operations upon approval of the US EPA UIC Program Director

Note: A triggering event is defined as a seismic event larger than 2.5 M_L with an epicenter located within a 2.5-mile radius of Front Range 1-1. A verified triggering event is a triggering event that has been validated by USGS staff and added to their seismic event database.

H.5. Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP. Site personnel to be notified in case of emergency (in priority order for notification):

1. Incident Commander (or Alternate Incident Commander)
2. Facility Response Team

A contact list containing names and phone numbers for site personnel to be notified in case of emergency is provided as a supporting document in the Geologic Sequestration Data Tool (GSDT) Project Plan Submissions module. The site personnel contact list will be maintained over the life of the project. An updated contact list will be provided to the US EPA UIC Program Director when changes are made.

Table H.5-1. Contact information for Key Local, State, and Other Authorities

Entity	Phone Number
Police Emergency Main – Windsor Police Department (non-emergency)	911 (970) 686-7476
Fire Emergency Main – Windsor Severance City (non-emergency)	911 (970) 686-9594 or (970) 686-2626
Ambulance Emergency	911
Hospitals Workwell Occupational Health Services – Greely Northern Colorado Medical Center Medical Center of the Rockies - Loveland	(970) 356-9800 (970) 352-4121 (970) 624-2500
Weld County Emergency Planning Commission Dispatch Roy Rudsell	(970) 356-4015 ext 2700 Office: (970) 304-6540; Cell: (970) 381-0417
Colorado State Emergency Response Commission Greg Stasinos (CEPC Co-Chair)	(303) 692-3023
Colorado Department of Public Health & Environment 24-Hour Spill Hotline	(877) 518-5608
Colorado Division of Oil and Public Safety	(303) 318-8547
Colorado Energy and Carbon Management Commission	(888) 235-1101
Colorado/Occupational Safety and Health Administration	(303) 844-5285

Entity	Phone Number
Town of Windsor Wastewater Treatment Facility Dennis Markham	Cell: (970) 381-2349
US EPA National Response Center (24-hour)	(800) 424-8802
US EPA Region 8 Douglas Minter – UIC Section Supervisor Emergency Operations Center	(303) 312-6079 (303) 293-1788, or (800) 227-8917

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. CSS and its subcontractors shall be responsible for obtaining specialized equipment (e.g., a drilling rig, wireline truck, logging equipment) when warranted. CSS and its subcontractors shall also be responsible for securing alternative resources or treating USDW formation waters in the event of USDW contamination related to the Class VI injection activity per 40 CFR 146.95(b)(1)(viii).

H.6. Emergency Communications Plan

The CSS Public Relations Manager will communicate to the public about any event that requires an emergency response to ensure that the public understands what happened and whether or not there are any environmental or safety implications. The amount of information, timing, and communications method(s) will be appropriate to the event, its severity, whether any impacts to drinking water or other environmental resources occurred, any impacts to the surrounding community, and their awareness of the event.

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

CSS will also communicate with entities who may need to be informed about or take action in response to the event, including local water systems, landowners, and Regional Response Teams (as part of the National Response Team).

H.7. Plan Review

This EERP shall be reviewed:

- At least once every five years following its approval by the US EPA UIC Program;
- Within one year of an area of review reevaluation;

- Within a prescribed period (to be determined by the permitting agencies) following any significant changes to the injection process or the injection facility, or an emergency event; or
- As required by the permitting agencies.

If the review indicates that no amendments to the EERP are necessary, CSS will provide the permitting agencies with the documentation supporting the “no amendment necessary” determination.

If the review indicates that amendments to the EERP are necessary, amendments shall be made and submitted to the permitting agencies within six months following an event that initiates the EERP review procedure.

H.8. Staff Training and Exercise Procedures

CSS employees and subcontractors that are covered by contractual agreements with CSS performing tasks outlined in this EERP need to meet the initial training requirements outlined in the Occupational Safety and Health Administration regulations 29 CFR 1910.120(e)(3). The CSS supervisor and subcontractors will have certification in the 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) course, and CSS employees will have the 24-hour HAZWOPER training with 8-hour refresher training.

Appendix H.1. Shutdown Plan

Appendix H.1. Shutdown Plan

The phrase “initiate shutdown plan” in most instances means to execute an emergency shutdown of the injection well using the procedures outlined in this appendix. However, in some circumstances and in consultation with the US EPA UIC Program Director, CSS will determine whether a gradual cessation of injection is appropriate and execute such a gradual cessation following its standard operating procedures.

The following steps will be taken to execute an emergency shutdown of the injection well and upstream equipment:

1. Shut-in injection well Front Range 1-1:
 - a. Close automatic shut-in valve PV-3010
2. Initiate shutdown sequence for liquefaction facility:
 - a. Place liquefaction facility into recycle mode.
 - b. Follow normal procedures for full shutdown if Front Range 1-1 is expected to be shut-in for an extended period.
3. Communicate emergency situation to CSS site personnel; Limit access to Front Range 1-1 to authorized personnel only.
4. Determine the extent of the emergency by monitoring operating parameters for Front Range 1-1 (e.g., pressures, temperatures) and other relevant systems as dictated by the nature of the emergency.
5. If the incident is sufficiently severe, contact local authorities to initiate evacuation plans.

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Appendix H.2. Notification of US EPA UIC Program

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1. Within 24-hr of discovery:
 - a. Call US EPA Region 8 UIC Program Director (see Table H.5-1), leave message if no answer.
 - b. If US EPA Region 8 UIC Program Director did not answer call, then call Alternate Contact (see Table H.5-1), leave message if no answer.
 - c. Create incident letter from template (see Appendix H.2 - Figure 1)
 - i. Complete the Word template to describe the incident.
 - ii. Convert to Adobe Acrobat file (.pdf) for electronic submissions.
 - d. Email electronic copy of incident letter to US EPA Region 8 UIC Program Director and cc: to Alternate Contact.
2. Within one (1) business day of discovery, submit an electronic copy of the incident letter into the project US EPA GSDT account as follows:
 - a. Authorized Individual to sign into project GSDT account.
 - b. Open Injection and Post-Injection Reporting Tool, click the checkbox on the Welcome tab if asserting a Proprietary Business Information (PBI) claim.
 - c. Navigate to the Emergency and Remedial Response Tab.
 - d. Click “Create New Notification Tab” (see Appendix H.2 - Figure 2)
 - e. Select appropriate checkbox for Type of Emergency Event. Click the PBI checkbox if asserting a PBI claim.
 - f. Upload electronic copy of incident letter in box below Emergency Notification Letter. Click the checkbox if asserting a PBI claim.
 - g. Complete box with the Notification Letter Date. Click the checkbox if asserting a PBI claim.
 - h. Check appropriate radio button for Are You Providing Any Follow-up Materials at this Time? If “Yes” then upload files and provide a brief description of file contents. Click the checkbox if asserting a PBI claim.
 - i. Click “Save Changes and Exit” the bottom of the reporting tool window.
 - j. Close GSDT window

Appendix H.2 - Figure 1. Incident Letter Template for US EPA Notification



<insert CONFIDENTIAL BUSINESS INFORMATION if asserting a PBI claim>

<insert date>

Mr. Douglas Minter – UIC Section Supervisor
US EPA Region 8, Mailcode: 8WD-SDU
1595 Wynkoop Street
Denver, CO 80202-1129

Sent by Email: minter.douglas@epa.gov
Submitted via GSDT Injection and Post-Injection module

SUBJECT: Notification of Emergency Event at Carbon Storage Solutions

Dear Ms. O'Connor:

This letter provides notification that the emergency event listed below occurred on <insert incident date> at Carbon Storage Solutions (Project ID: R08-CO-002; UIC Facility No.: <to be assigned by EPA>):

Type of Emergency Event (Mark "X" by all that apply):

- Evidence of USDW endangerment
- Noncompliance with a permit condition
- Triggering of a shut-off system
- Failure to maintain mechanical integrity
- Release of CO₂ to the atmosphere or biosphere
- Other

<Insert brief description of incident and emergency response actions>

Sincerely,

<insert name & title>

cc: GSDT account for Carbon Storage Solutions (Project ID: R08-CO-002)

31375 Great Western Drive – Windsor – Colorado- 80550 970-674-2910

Appendix H.2 - Figure 2. GSDT Reporting Tool for US EPA Notification

Class VI UIC Injection and Post-Injection Phase Reporting

Emergency and Remedial Response [40 CFR 146.91(c) and 146.94(b)-(c) or Applicable State Requirements]

Instructions:

1. Hit the "Create New Notification Tab" button. A new sub-tab will appear.
2. Complete the necessary information in the new sub-tab and upload any necessary files. Follow-up information (e.g. demonstration that resuming injection will not endanger USDWs) should be submitted on the same sub-tab as the original notification.

Notification #1

Type of Emergency Event:

Evidence of USDW endangerment PBI
 Noncompliance with a permit condition PBI
 Triggering of a shut-off system PBI
 Failure to maintain mechanical integrity PBI
 Release of CO₂ to the atmosphere or biosphere (from soil gas/surface air monitoring) PBI
 Other, including additional events for which your primacy state may require reporting (specify): PBI
 PBI

Emergency Notification Letter:

PBI

Notification Letter Date: PBI (MM/DD/YYYY)

Are you providing any follow-up materials at this time? Yes No PBI

Follow-up Materials File(s):
 PBI

Description of File Contents:
 PBI

Next Tab **Save Changes** **Save Changes and Exit** **Exit**