10. EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94

CASS SEQUESTRATION

Facility Information

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Well name:	[redacted]
Well location:	CASS COUNTY, INDIANA [redacted]

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10.0 Emergency and Remedial Response Plan

10.1 Introduction (CFR 40 146.94 (a)(b)(c))

Cass Sequestration, LLC ("Cass Sequestration") will operate the Cass Sequestration project, inclusive of the capture plant, pressure lines and injection well.

This Emergency and Remedial Response Plan (ERRP) describes response actions that Cass Sequestration will take to address events that have the potential to cause 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 of injection well [redacted], in accordance with 40 CFR 146.94. This plan additionally describes the local resources and infrastructure within the Area of Review (AoR).

This plan complements the existing [redacted], Emergency Action Plan.

An emergency shutdown of the injection well will be triggered if Cass Sequestration obtains evidence that the injected carbon dioxide (CO_2) stream and/or associated pressure front may cause endangerment to a USDW. In an emergency shutdown situation Cass Sequestration will perform the following actions:

1. Immediately cease injection and initiate shutdown plan for the injection well.
2. Take all steps reasonably necessary to identify and characterize any release.
3. Notify the permitting agency/EPA Region 5 UIC Program Director of the emergency event within 24 hours.
4. Implement applicable portions of the ERRP.

If a serious or major emergency shutdown should occur, CO_2 injection will only resume with the consent of the UIC Program Director. If Cass Sequestration can demonstrate that the injection operation will not endanger USDWs, the UIC Program Director may allow the resumption of injection prior to remediation.

If a minor emergency shutdown of the CO_2 injection system is required, the operator will complete the shutdown in a stepwise approach to prevent over-pressure situations and/or damage to the equipment.

10.2 Local Resources and Infrastructure

Local resources and infrastructure in the vicinity of the Cass Sequestration project that may be affected as a result of an emergency event at the project site are highlighted in **Figure 10-1**.

The deepest USDW (>10,000 ppm TDS) in the vicinity is the [redacted], while most water wells in the AoR are drilled into a shallow unconsolidated aquifer system consisting of glacial

sediments (Unterreiner, 2008). This is discussed in detail in Permit Section 1.2.7 - Project Narrative 'Hydrologic and Hydrogeologic Information'. Details of their use (irrigation, domestic etc.) are given in Permit Section 2.4.1 of the AoR and Corrective Action Plan.

The main water body within the AoR is the [redacted] All water features within the AoR are shown below in **Figure 10-1**.

The majority of the land within the AoR is cropland and farmsteads. [redacted]

The local industrial infrastructure in the area consists of [redacted]

Resources and infrastructure addressed in this plan are shown in **Figure 10-1**.

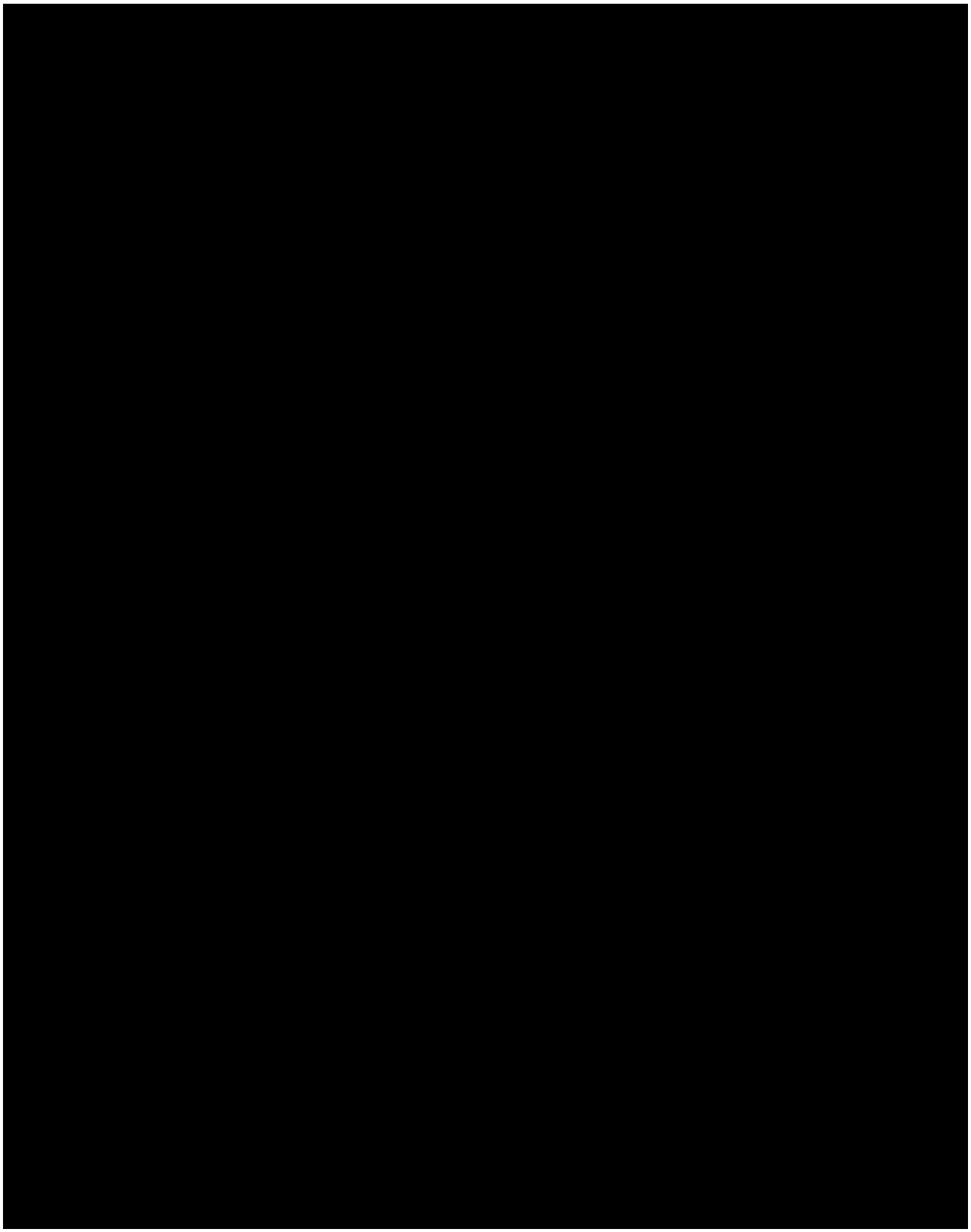

Figure 10-1: Infrastructure Map of Cass Sequestration project showing surface infrastructure, FEMA flood zones, proposed Injection Well [redacted] and AoR. All existing water wells within the AoR are shown.

10.3 Potential Risk Scenarios

The following events related to the Cass Sequestration project could potentially result in an emergency response:

1. Injection well or deep monitoring well integrity failure
2. Injection well monitoring equipment failure (e.g., shut-off valve or pressure gauge, etc.)
3. A natural disaster (e.g., tornado, lightning strike, flooding).
4. Fluid (e.g., brine) leakage to a USDW.
5. CO_2 leakage to USDW or land surface.
6. Seismic event.

Response actions will depend on the severity of the event(s) triggering an emergency response and are categorized below in **Table 10-1**.

Emergency Condition	Definition
Major emergency	Event poses immediate substantial risk to human health, USDWs, other 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.

Table 10-1: Severity of risk for emergency events.

10.4 Emergency Identification and Response Actions

Steps to identify and characterize an emergency event will be dependent on the specific issue identified and the severity of the event. Each of the potential risk scenarios identified in the previous section are detailed below.

10.4.1 Well Integrity Failure

Integrity loss of the injection well and/or the deep monitoring well may endanger USDWs. A potential well integrity failure may occur if the following events occur

- Automatic shutdown devices are activated due to:
    - Wellhead (injection) pressure exceeds the maximum allowable injection pressure specified in the permit.
    - Annulus pressure indicates a loss of external or internal well containment.

- Mechanical integrity test (MIT) results identify a loss of mechanical integrity.

The timing of these events could be during the injection phase of the project or during the post-injection site care and site closure (PISC) phase prior to monitor well plugging and abandonment.

Avoidance measures for these events will include adhering to all elements of Permit Section 6 – Well Operations Plan and Permit Section 7 – Testing and Monitoring Plan. All equipment and material manufacturer operating guidelines will also be followed.

Detection methods for these events will be based on activities described in Permit Section 7 – Testing and Monitoring Plan.

Response actions for the situations listed above are detailed below in **Table 10-2**.

Emergency Condition	Response Action and Notification Procedures
All	1. Notify DTE Vantage Environmental Supervisor. 2. Determine the severity of the event, based on the information available, within 24 hours of notification. 3. Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). 4. After an initial assessment, the COO will notify other Project Management and Operational Personnel.
Major or Serious	1. Initiate shutdown plan as follows. a. Shut in well (close master wellhead valve). Prior to closing the master valve, notify plant personnel to direct CO_2 to the primary vent. b. Mark an exclusion zone around the affected area/well to limit access to authorized personnel only, if warranted. c. Notify plant safety manager that the well has been shut down. d. Notify local authorities and plant personnel, as necessary. e. If the evacuation plan must be implemented, notify all surrounding businesses and offices, as warranted and local authorities. f. Evaluate the most recent and current well conditions (i.e., pressures, temperatures, and annulus pressure) to determine potential causes and the extent of any failure, as well as any additional steps in the emergency procedure. 2. Evaluate whether any leaks to groundwater or surface water occurred. 3. If contamination of groundwater or surface water is detected, identify, and implement appropriate remedial actions (in consultation with the UIC Program Director).
Minor	1. Conduct assessment to determine whether there has been a loss of mechanical integrity. 2. If there has been a loss of mechanical integrity, initiate shutdown plan. 3. For shutdown plan, implement the following: a. Shut in well (close master valve). Prior to closing the master valve, notify plant personnel to direct CO_2 to the primary vent. b. Mark an exclusion zone around the affected well to limit access to the well to authorized personnel only. c. Notify plant safety personnel that the well has been shut down. d. Monitor well conditions (i.e., pressures, temperatures, and annulus pressure) to determine potential causes and the extent of any failure. e. Identify and, if necessary, implement appropriate remedial actions in consultation with the UIC Program Director.

Table 10-2: Response actions to an emergency associated with well integrity failure.

10.4.2 Injection Well Monitoring Equipment Failure

The failure of monitoring equipment for wellhead pressure, temperature, and/or annulus pressure may limit the capability to monitoring injection operation despite duplication and redundancies built into the monitoring program. Most equipment failures can be addressed by replacing failed pieces of equipment and are not likely to be major emergencies. However, if the situation results in an inability to effectively monitor the injection operation, system shutdown and reduce injection pressure may be required.

The timing of these events could be at any time during the injection phase of the project or during the post-injection site care and site closure (PISC) phase prior to monitor well plugging and abandonment.

Avoidance measures for these events will include adhering to all elements of Permit Section 6 – Well Operations Plan and Permit Section 7 – Testing and Monitoring Plan. All equipment and material manufacturer operating guidelines will also be followed.

Detection methods for these events will be based on activities described in Permit Section 7 – Testing and Monitoring Plan. The response actions to an emergency associated with well equipment failure are detailed below in **Table 10-3**.

Emergency Condition	Response Action and Notification Procedures
All	1. Notify DTE Vantage Environmental Supervisor. 2. Determine the severity of the event, based on the information available, within 24 hours of notification. 3. Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). 4. After an initial assessment, the COO will notify other Project Management and Operational Personnel.
Major or Serious	1. Initiate shutdown plan as follows. a. Shut in well (close injection valve). Prior to closing the injection valve, notify plant personnel to direct CO_2 to the primary vent. b. Mark an exclusion zone around the affected well to limit access to area/well to limit access to authorized personnel only, if warranted. c. Notify plant safety manager that the well has been shut down. d. Notify local authorities and plant personnel, as necessary. e. Monitor the well conditions (i.e., pressures, temperatures, and annulus pressure) to determine additional steps in the emergency procedure. f. Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).
Minor	1. Conduct assessment to determine whether there has been an injection well equipment failure. 2. If there has been an injection well equipment failure and necessitate a shutdown, initiate shutdown plan as follows. 3. For shutdown plan, implement the following: a. Shut in well (close master valve). Prior to closing the master valve, notify plant personnel to direct CO_2 to the primary vent b. Reset or repair automatic shutdown devices, if necessary. c. Monitor the well conditions (i.e., pressures, temperatures, and annulus pressure) to determine potential causes and the extent of any failure. d. 4. If assessment conclude there is no shutdown is needed, continue monitoring injection. 5. Repair or replace monitoring equipment that failed. 6. Identify and, if necessary, implement appropriate remedial actions in consultation with the UIC Program Director.

Table 10-3: Response actions to an emergency associated with well equipment failure.

10.4.3 Potential Brine or CO_2 Leakage to USDW

Elevated concentrations of indicator parameter) in groundwater samples from groundwater wells or increased pressures in the above confining zone (ACZ) well may indicate fluid (brine) or CO_2 leakage into a USDW.

The timing of this event could be at any time during the injection phase of the project. It will be less likely during the post-injection site care and site closure (PISC) phase.

Avoidance measures for this event will include adhering to all elements of Permit Section 6 – Well Operations Plan and Permit Section 7 – Testing and Monitoring Plan. All equipment and material manufacturer operating guidelines will also be followed. The risk associated with this event will be specifically mitigated by routine mechanical integrity testing.

Detection methods for this event will be based on activities described in Permit Section 7 – Testing and Monitoring Plan.

The response actions to an emergency associated with potential brine or CO_2 leakage to a USDW are detailed below in **Table 10-4**.

Emergency Condition	Response Action and Notification Procedures
All	1. Notify DTE Vantage Environmental Supervisor. 2. Determine the severity of the event, based on the information available, within 24 hours of notification. 3. Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). 4. After an initial assessment, the COO will notify other Project Management and Operational Personnel. 5. For all cases of confirmed migration of CO_2 to a USDW: a. Initiate shutdown plan. i. Shut in well (close master valve). Prior to closing the master valve, notify plant personnel to direct CO_2 to the primary vent. ii. Mark an exclusion zone around the affected well to limit access to the affected area/well to limit access to authorized personnel only, if warranted. iii. Notify plant safety manager that the well has been shut down. iv. Notify local authorities and plant personnel, as necessary. v. Monitor the well conditions (i.e., pressures, temperatures, geochemical parameter, temperature data, etc.) to determine additional steps in the emergency procedure. b. Collect confirmation sample(s) of groundwater and analyze indicator parameters. See Table 7-6 of the Testing and Monitoring Plan. 6. If the leakage of CO_2 is confirmed, develop (in consultation with the UIC Program Director) a case-specific plan with various methods to address any unacceptable impacts to the affected USDW while achieving certain goals. The goals and proposed methods are as follows: a. Install additional groundwater monitoring points near the affected groundwater well(s) to delineate the extent of impact, if warranted. b. Remediate the affected USDW to mitigate any unsafe conditions through the installation of: i. A system to intercept and extract non-native fluid or CO_2; or ii. A pump-and-treat type system to aerate the water contaminated with CO_2 to purge the CO_2 from the water. c. Arrange for an alternate potable water supply if the USDW was being utilized as a drinking water source and has exceeded drinking water standards by CO_2 or brine infiltration. d. Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by Cass Sequestration and the UIC Program Director) until unacceptable adverse USDW impact has been addressed.

Table 10-4: Response actions to an emergency associated with potential Brine or CO_2 leakage to a USDW.

10.4.4 Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise because of a natural disaster affecting the normal operation of the injection well. Weather-related disasters (e.g., tornado, flooding or lightning strike) may disturb surface and/or subsurface facilities. The Cass Sequestration project [redacted] The EERP related to a seismic event is detailed in section 10.4.5.

The timing of this event could be at any time during the injection phase or post-injection site care and site closure (PISC) phase of the project.

Avoidance measures for this events will include adhering to all elements of Permit Section 6 – Well Operations Plan and Permit Section 7 – Testing and Monitoring Plan.

Detection methods for this event will be based on activities described in Permit Section 7 – Testing and Monitoring Plan and monitoring of local weather forecasts.

The response actions to an emergency associated with a natural disaster are detailed below in **Table 10-5**.

Emergency Condition	Response Action and Notification Procedures
All	1. Notify DTE Vantage Environmental Supervisor. 2. Determine the severity of the event, based on the information available, within 24 hours of notification. 3. Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). 4. After an initial assessment, the COO will notify other Project Management and Operational Personnel.
Major or Serious	1. Initiate shutdown plan. a. Confirm no leakage from the CO_2 injection system. b. Shut in well (close flow valve). Prior to closing the flow valve, notify plant personnel to direct CO_2 to the primary vent. c. Mark an exclusion zone around the affected well to limit access to authorized personnel only, if warranted. d. Notify local authorities and plant personnel, as necessary. e. Determine if any leaks to groundwater or surface water occurred. f. Monitor the well conditions (i.e., pressures, temperatures, etc.) to determine additional steps in the emergency procedure. 2. If contamination or endangerment is detected, identify, and implement appropriate remedial actions (in consultation with the UIC Program Director).
Minor	1. Conduct assessment to determine whether there has been a loss of mechanical integrity. 2. If there has been a loss of mechanical integrity, initiate shutdown plan. For shutdown plan, implement the following: i. Shut in well (close master valve). Prior to closing the master valve, notify plant personnel to direct CO_2 to the primary vent. ii. Monitor the well conditions (i.e., pressures, temperatures, and annulus pressure) to determine potential causes and the extent of any failure. 3. Identify and, if necessary, implement appropriate remedial actions in consultation with the UIC Program Director.

Table 10-5: Response actions to an emergency associated with a natural disaster.

10.4.5 Seismic Event

The Cass Sequestration site is in a stable tectonic region with a low frequency of natural seismicity (Permit Section 1.2.6 – Project Narrative, Seismic History). Seismicity monitoring will be conducted in accordance with section seven the testing and monitoring plan.

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 based on the protocol described in **Table 10-6**. 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.

Operating State	Threshold Condition	Response Action
Green	Seismic events less than or equal to M2.5	1. Continue normal operation within permitted levels.
Yellow	Five (5) or more seismic events within a 30-day period having a magnitude greater than M2.5 but less than or equal to M3.0 with no felt report	1. Continue normal operation within permitted levels. 2. Within 24 hours of the fifth event, notify the UIC Program Director of the operating status of the well.
Orange	Seismic event greater than M2.5 and local observation or felt report Seismic event greater than M3.0 and no felt report	1. Continue normal operation within permitted levels. 2. Review seismic and operational data. 3. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well. 4. Report findings to the UIC Program Director and issue corrective actions.
Magenta	Seismic event greater than M3.0 and local observation or report	1. Review seismic and operational data. 2. Reduce injection rate. 3. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well. 4. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 5. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 6. Determine if leaks to ground water or surface water occurred. 7. If USDW contamination is detected, notify the UIC Program Director within 24 hours of the determination. 8. Report findings to the UIC Program Director and issue corrective actions.
Red	Seismic event greater than M3.0, and local observation or report, and local report and confirmation of damage Seismic event >M3.5	1. Review seismic and operational data. 2. Initiate shutdown plan. 3. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well. 4. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 5. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 6. Determine if leaks to ground water or surface water occurred. 7. If USDW contamination is detected, notify the UIC Program Director within 24 hours of the determination. 8. Report findings to the UIC Program Director and issue corrective actions.

Table 10-6: Seismicity protocol for seismic events located with an epicenter within the AoR.

10.5 Response Personnel and Equipment

Site personnel, off-site project personnel, and local authorities will be relied upon to implement this ERRP.

The current emergency contact list can be found in the most recent [redacted], Emergency Action Plan which will be provided to the UIC Program Director.

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, Cass Sequestration shall be responsible for its procurement.

10.6 Emergency Communications Plan

Cass Sequestration will communicate to the public about any event that require an emergency response to ensure that the public understands what happened and whether there are any environmental or safety implications, in consultation with the UIC Program Director. 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.

Cass Sequestration 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), Cass Sequestration will provide periodic updates on the progress of the response action(s).

Cass Sequestration will also communicate with entities who may need to be informed about or act in response to the event, including local water systems, CO_2 source(s) and pipeline operators and landowners.

Emergency situations related to the injection project and described in this ERRP, including any associated media communications will be managed by the sequestration operator.

Individuals assigned the emergency response communications duties should have availability 24-hours a day once an emergency is declared.

10.7 Plan Review (40 CFR 146.94 (d))

This ERRP shall be reviewed:

- At least once every five years or as necessary following its approval by the permitting agency.

- Within one-year of an AoR re-evaluation.
- Within six months following any significant changes to the injection process or the injection facility, or an emergency event; or
- As required by the permitting agency.

If the review indicates that no amendments to the ERRP are necessary, Cass Sequestration will provide the permitting agency with the documentation supporting the "no amendment necessary" determination.

If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the permitting agency within six months following a determination that the ERRP needs to be revised.

10.8 Staff Training and Exercise Procedures

Cass Sequestration will integrate this ERRP into the project-specific standard operating procedures and training program. Periodic training will be provided on an as-needed basis, for appropriate personnel. The training plan will document that the personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.

Appendix A – Local Emergency Contact List for Cass Sequestration

The local emergency contact list for Cass Sequestration is shown below in **Table 10-7.**

Local Emergency Contact	Address	Number
[redacted]		
Indiana State Police		765-822-3535
Cass County Sheriff	100 Court St, Logansport, IN 46947	574-753-7800
National Emergency Response Center		1-800-424-8802

Table 10-7: Local emergency contact list for Cass Sequestration