Class VI Injection Well Application

Contains proprietary business information.

Attachment 09: Emergency and Remedial Response Plan

40 CFR §146.94(a)

Maple Project
Putnam County, Ohio

9 September 2025

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List of Acronyms and Abbreviations

AoR	Area of Review
BHFP	bottomhole flowing pressure
BOP	blow out preventer
CFR	Code of Federal Regulations
CO_2	carbon dioxide
Director	EPA UIC Program Director
EPA	Environmental Protection Agency
ERRP	Emergency and Remedial Response Plan
MAIP	maximum allowable injection pressure
MIT	mechanical integrity test
MPL ACZ1	Maple Above Confining Zone Well 1
MPL INJ1	Maple Injection Well 1
MPL OBS1	Maple Deep Observation Well 1
O&G	oil and gas
P&A	plug and abandon (plugged and abandoned)
PBI	proprietary business information
PNL	pulsed neutron logging
psi	pound-force per square inch
PSM	passive seismic monitoring
QASP	Quality Assurance and Surveillance Plan
SOP	standard operating procedure
TBD	to be determined
UIC	Underground Injection Control
USDW	underground source of drinking water
USGS	United States Geological Survey

Project Information

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1. Introduction

This Emergency Remedial and Response Plan (ERRP) describes actions that the Project Operator, Vault GSL CCS LP, shall take to address and remediate mechanical integrity issues, seismic events, or other events that could allow for the movement of the injection fluid, annulus fluid, brine, or formation fluid including, but not limited to, the movement of fluid into an underground source of drinking water (USDW) or any other unauthorized zones during the construction, operation, or post-injection site care periods for the Maple Project.

In accordance with 40 CFR §146.94 (b), should Vault GSL CCS LP obtain evidence that the injected carbon dioxide (CO_2) stream and/or associated pressure front may cause an endangerment to a USDW, Vault GSL CCS LP will perform the following general actions:

1. Initiate shutdown plan for the injection well (if appropriate), including immediate cessation of injection.
2. Take all steps reasonably necessary to identify and characterize any release.
3. Notify the Environmental Protection Agency (EPA) Underground Injection Control (UIC) Program Director (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: Vault GSL CCS LP will immediately cease injection, unless Vault GSL CCS LP determines, in consultation with the Director, that gradual cessation of injection is necessary for safety. As used in this ERRP, the term “wells” unless otherwise specified, refers to the Maple Project injection and all wells. As used in this ERRP, the term “Area of Review” or “AoR” unless otherwise specified, refers to the AoR as defined in the permit.

2. Local Resources and Infrastructure

Per 40 CFR §146.82(a)(2), there are no deep stratigraphic boreholes; State or Federal EPA approved subsurface clean-up sites; springs; surface or subsurface mines; quarries; State, Tribal, or Territory boundaries; or faults known or suspected within the Area of Review (AoR). The injection well, known active and abandoned oil and gas (O&G) wells, surface bodies of water, water wells, other surface features and structures, and roads within the AoR are shown in Figure 1. Lists of the O&G wells and water wells within the AoR are included in Attachment 02: AoR and Corrective Action Plan, (2025).

Table 1 and Figure 1 summarize the local resources and infrastructure within the AoR that may be affected as a result of an emergency event at the Maple Project site; these include shallow USDWs, surface bodies of water, population centers, and public infrastructure.

Table 1: Local Resources and Infrastructure.

Local Resources/ Infrastructure	Feature
Shallow Aquifers	• Undifferentiated Quaternary Sediments,Salina Group, and • Lockport Dolomite, the lowermost USDW.
Surface Bodies of Water	• Brush Creek, • Little Yellow Creek, • Hammer Creek, and • Small unnamed ponds, wetlands, and ditches.
Population Centers and Towns	• Bellmore, Ohio, • Prentiss, Ohio, an unincorporated community, • Portions of Leipsic, Ohio, • Portion of West Leipsic, Ohio, and • Portions of Leipsic Junction, Ohio.
Public Infrastructure (religious organizations, parks, etc.)	• Belmore United Methodist Church, • Belmore Town Hall, • Belmore Fire Department, • West Belmore Cemetery, • East Belmore Cemetery, and • Leipsic Church of the Nazarene.

The Maple AoR is defined by the maximum extent of the critical delta front (151 pound-force per square inch (psi)) plus 0.25 miles, which encompasses the maximum extent of the CO_2 plume over 62 years (12 years of injection and a 50-year post-injection site care (PISC)). Any potential emergency arising from pressure-related brine migration would be within the AoR, and any well-related incident will be spatially restricted to near the well sites. Therefore, any potential emergency that might arise associated with the project will likely be located within the defined AoR, and any impact to public infrastructure in the general vicinity of the project beyond the limits of the AoR is not expected. Public infrastructure in the general vicinity of the AoR is shown in Figure 1 and includes schools, libraries, medical centers, churches, government buildings, and other areas where people tend to congregate.

No major water sources or freshwater treatment facilities are located within the AoR. However, there is a wastewater treatment facility for the Village of Leipsic located near the southern edge of the AoR. A 2024 report from the Village of Leipsic indicates drinking water is supplied by seven local water wells (Village of Leipsic, 2024), and these are inferred to have primarily been drilled into the shallow glacial deposits and Salina Group Silurian bedrock. The locations of four Village of Leipsic water wells are publicly available and shown on the maps in Figure 1 and Figure 2. The locations of the remaining three water wells were determined to be located outside of the AoR based on the location of Drinking Water Source Protection Area (DWSPA) Inner Management Zones (Figure 2). The DWSPA is defined as the surface and subsurface area that will provide water to a well within one year. As the water source wells are outside the project AoR, it is not expected that they would be impacted by an event associated with the project. The Village of Leipsic is planning to discontinue the use of groundwater wells for water supply and convert to a surface water membrane treatment plant by June 2029 (Blasius, 2024; Ohio Atomic Press, 2025).

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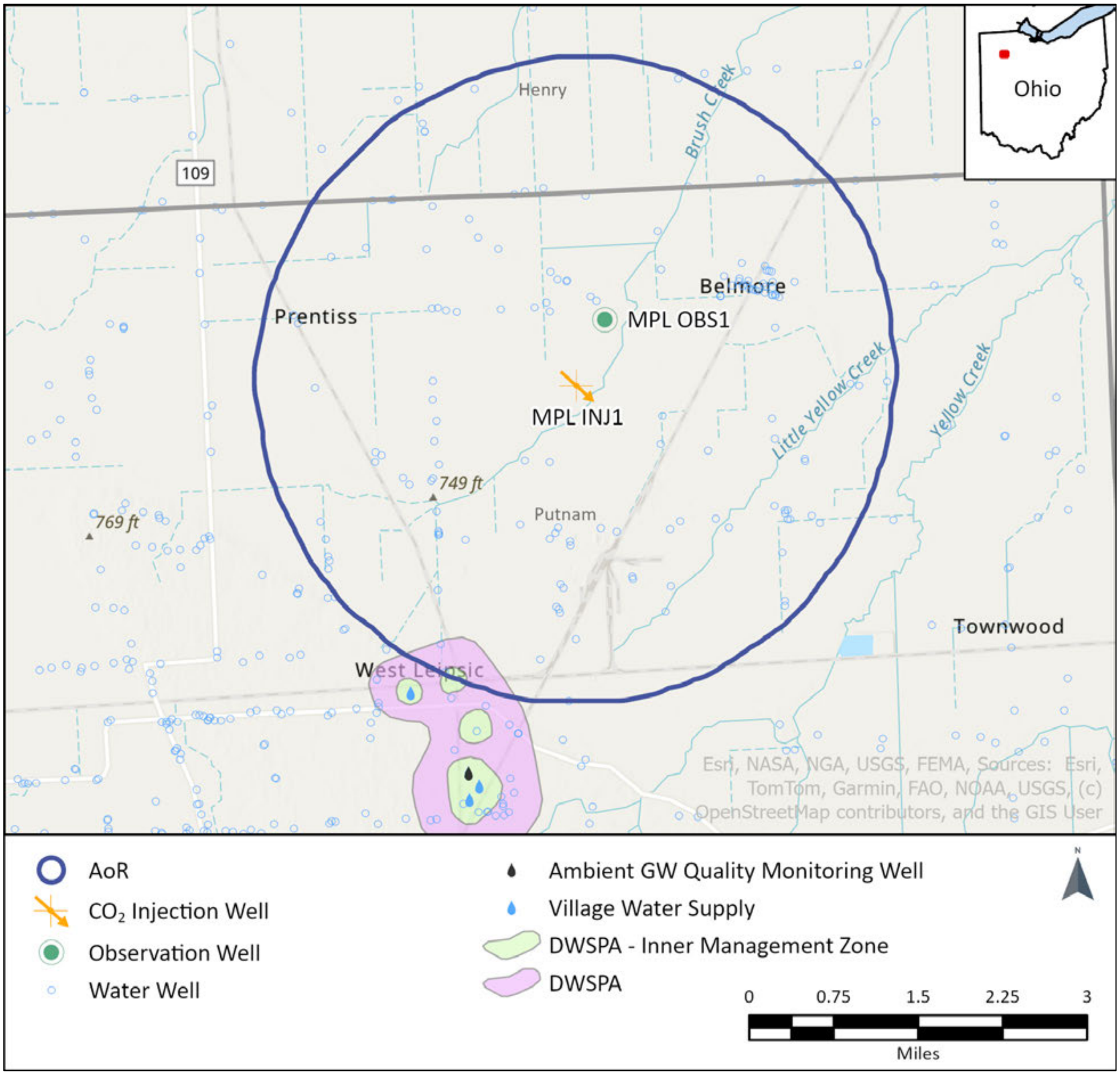

Figure 2: Map of the Village of Leipsic water supply wells and associated Drinking Water Source Protection Areas.

3. Potential Risk Scenarios

The following events related to the Maple Project that could potentially result in an emergency response for Maple Injection Well 1 (MPL INJ1) are shown in Table 2. This table lists the types of potential adverse incidents that will trigger response actions to protect USDWs and prevent CO_2, brines, annulus fluid, or formation fluid migration into any unauthorized zones if the incidents occur during the construction, injection, or post-injection site care periods. Vault GSL CCS LP will undertake emergency or remedial actions in response to these incidents. This is a non-exhaustive list of potential risk scenario events.

Table 2: Potential emergency events.

Construction/Pre-injection Period

• Well construction event during drilling or completion with loss of containment.
• Evidence suggesting potential leakage to a USDW or other unauthorized zone (including the surface), for example:
  ◦ Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence suggesting potential fluid leakage into a USDW or other Unauthorized Zone (including the surface).
  ◦ Unanticipated emergency corrective action(s) needed on a well(s) within the AoR.
  ◦ Evidence of migration of CO_2, brines, annulus fluid, or formation fluid between formations through injection or monitoring well bores.
  ◦ Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone through plugged and abandoned (P&A) wells or undocumented wells in the AoR.
  ◦ Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone through failure of the confining zone, faults, and fractures (loss of containment).
  ◦ Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone, including due metal leaching or corrosion due to prolonged wetted CO_2 exposure.
  ◦ Evidence of migration of CO_2, brines, annulus fluid, or formation fluid outside of the AoR.
• Severe weather disaster (e.g., tornado, hurricane, lightning strike).
• Seismic event. (e.g., natural or induced).

Injection Period

• Mechanical integrity failure, for example:
  ◦ Loss of internal mechanical integrity due to tubing, packer, or casing leak in injection or monitoring wells.
  ◦ Loss of external mechanical well integrity due to fluid movement through vertical channels adjacent to well bores.
  ◦ Loss of external mechanical well integrity from metal leaching or corrosion due to prolonged wetted CO_2 exposure.
• Evidence suggesting potential leakage to a USDW or other unauthorized zone (including the surface), for example:
  ◦ Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence suggesting potential fluid leakage into a USDW or other unauthorized zone (including the surface).
  ◦ Unanticipated emergency corrective action(s) needed on a well(s) within the AoR.
  ◦ Evidence of migration of CO_2, brines, annulus fluid, or formation fluid between formations through injection or monitoring well bores.

- Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone through plugged and abandoned (P&A) wells or undocumented wells in the AoR. - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone through failure of the confining zone, faults, and fractures (loss of containment). - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone, including metal leaching or corrosion due to prolonged wetted CO_2 exposure. - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid outside of the AoR. • Well monitoring equipment failure or malfunction (e.g., all valves and gauges, pressure, and temperature sensors downhole and at the wellheads, etc.). • Severe weather disaster (e.g., tornado, hurricane, lightning strike). • Seismic event (e.g., natural or induced).
Post-injection Site Care Period
• Mechanical integrity failure, for example - Loss of internal mechanical integrity due to tubing, packer, or casing leak in injection or monitoring wells. - Loss of external mechanical well integrity due to fluid movement through vertical channels adjacent to the well bores. • Evidence suggesting potential leakage to a USDW or other unauthorized zone (including the surface), for example: - Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence suggesting potential fluid leakage into a USDW or other unauthorized zone (including the surface). - Unanticipated emergency corrective action(s) needed on a well(s) within the AoR. - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid between formations through injection or monitoring well bores. - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone through P&A wells or undocumented wells in the AoR. - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone through failure of the confining zone, faults, and fractures (loss of containment). - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid from the injection zone, including metal leaching or corrosion due to prolonged wetted CO_2 exposure. - Evidence of migration of CO_2, brines, annulus fluid, or formation fluid outside of the AoR. • Well monitoring equipment failure or malfunction (e.g., all valves and gauges, pressure, and temperature sensors downhole and at the wellheads, etc.) • Severe weather disaster (e.g., tornado, hurricane, lightning strike). • Seismic event. (e.g., natural or induced).

4. Emergency Identification and Response Actions

Vault GSL CCS LP will report to the Director within 24 hours if there is any evidence that the injected CO_2 stream or associated pressure front may cause an endangerment to a USDW, including migration of fluid into an unauthorized zone (40 CFR §146.91(c)(1)); any noncompliance with a Permit Condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs (40 CFR §146.91(c)(2)); any triggering of a shut-off system (i.e. down-hole or at the surface (40 CFR §146.91(c)(3)); and any failure of mechanical integrity (40 CFR §146.91(c)(4)). If required by the Director, any release of CO_2 to the atmosphere or biosphere must also be reported within 24 hours (40 CFR §146.91(c)(5)); this excludes the release of CO_2 to the atmosphere as a result of well maintenance or workover activities.

Steps required to identify and characterize an event related to potential risk scenarios will be dependent on the specific issue identified and the severity of the event. The potential risk scenarios identified in Table 2 are detailed below.

Once equipment placement and location are finalized and prior to injection, figures will be provided to the Director that display the following:

- Major facility components,
- Project wells,
- Monitoring equipment,
- Emergency shut-down equipment, and
- Flowlines.

It is important to note that in emergency events, certain actions may be taken to minimize the impact of such events before they are listed in the following action plans. Additionally, as part of the minimization of these events, emergency services may be contacted prior to any other actions taking place.

Within this ERRP, several mentions are made to evacuation plans. A formal evacuation plan will be provided as part of the final ERRP. Different evacuation plans will be provided for each of the following groups:

- Non-key site personnel,
- Key site personnel,
- Offsite personnel.

In addition, primary and secondary muster points will be provided for each of these groups. These plans will be provided as part of operator training and dispersed throughout the Maple Project facility.

Should an event such as a natural disaster, severe fire, or other event occur that requires the evacuation of the ethanol production part of the Maple Project and CO_2 production ceases, the control system will automatically shut in the injection well. The only situation when a manual shut-in will be required is if the control system is inoperable, and it is safe to operate the shut-in valves manually. An event at the ethanol production facility that ceases CO_2 production will not be considered an emergency directly related to the Maple Project unless the event otherwise triggers the ERRP.

4.1 Well Construction Event

Loss of containment could occur during drilling and completion operations if the hydrostatic column controlling the well decreases below the formation pressure, allowing fluids to enter the well. Table 3 summarizes the expected timing, avoidance measures, and detection methods as well as the expected response actions, required personnel, and equipment needed for a well construction event. Additional contingency personnel, actions, and equipment are provided in the Well Construction Plan (Attachment 04: Injection Well Construction Plan, 2025).

Table 3: Summary of timing, avoidance measures, detection methods, and response actions, personnel, and equipment for a well construction event. Lists are non-exhaustive.

Category	Item
Timing of Event	• Construction/Pre-injection
Avoidance Measures [1]	• Well control training, • Blow out preventer (BOP) equipment and testing protocols, • Kill fluid, • Kick drill, • Lubricators for wireline operations.
Detection Methods	• Flow sensor, • Pressure sensor, • Tank level indicator, • Tripping displacement practices, • Mud weight control.
Response Actions	• Notify the Director about the emergency event within 24 hours. • Stop operation. • Close BOP. • Clear floor and secure area. • Execute well control procedure. • Evaluate drilling parameters and identify root cause.
Response Personnel	• Rig crew, • Rig supervisor, • Vault GSL CCS LP Operations Supervisor, • Project Manager (notify if not present), • Plant Manager (notify if not present), • Third party contractors (i.e., wireline crew), (if present).
Response Equipment	• BOP, • Pressured accumulator, • Full open safety valve, on rig floor, • Mud pump, • Mud weighting agent, • Trip tank, • Casing (if required), • Cement (if required), • High pressure lubricator (if required).
[1] Avoidance and detection measures identified throughout this ERRP do not replace or supersede any terms or conditions of the permit	

4.2 Mechanical Integrity Failure

Loss of integrity in MPL INJ1 and in-zone deep observation well (MPL OBS1) may endanger USDWs through the movement of CO_2, brines, annulus fluid, or formation fluid into an unauthorized zone. Set points for alarms and shutdown points are provided in Table 4. All set points will be updated based on results from the Pre-operational Testing Program (Attachment 05: Pre-operational Testing Program, 2025).

Further details on the alarm set points are discussed in the Well Operations Plan, Testing and Monitoring Plan, and the Quality Assurance and Surveillance Plan (QASP) - Table 8 (Attachment 05: Pre-operational Testing Program, 2025; Attachment 06: Testing and Monitoring, 2025; Attachment 10: Quality Assurance and Surveillance Plan, 2025).

Bottomhole flowing pressure (BHFP) refers to the pressure at the top of the injection zone during injection. BHFP will be determined by adding the surface injection pressure to the established hydrostatic correction to determine the BHFP at the top of the injection zone.

Table 4: Operational emergency shut down set points. (psi = pound-force per square inch)

Alarm Type		Set Point	Unit
Maximum Injection Pressure, Surface	Maximum allowable injection pressure (MAIP)[1]	1,982	psi
	Shutdown point: 5% less than MAIP [2]	1,880	psi
Maximum Injection Pressure, Bottomhole	Maximum allowable BHFP [1]	1,968	psi
	Shutdown point: 5% less than maximum allowable BHFP [2, 3]	1,870	psi
Annulus Pressure [1]	Maximum	1,500	psi
	Minimum	100	psi

[1] As determined in Attachment 01: Narrative, (2025).
[2] Rounded down to the lowest 10.
[3] Calculated using surface pressure gauges and determined fluid gradient.

Integrity loss may have occurred if the following events occur (note, this is not an exhaustive list):

- Automatic shutdown devices are activated (Table 4).
- Wellhead pressure exceeds the shutdown pressure specified in the permit and in Table 4. Shutdown pressure limit will be set to 5% less than the maximum allowable injection pressure (MAIP) in the permit.
    - BHFP (as measured using surface gauges and fluid gradient) exceeds the maximum allowable BHFP specified in the permit and in Table 4. Shutdown pressure limit will be 5% less than the maximum allowable BHFP.
    - Annulus pressure indicates a loss of well containment.
    - The annulus pressure is outside (above or below) of the emergency shutdown points detailed in Table 4.
- Mechanical integrity test results identify a loss of mechanical integrity:

- Loss of mechanical integrity due to a tubing or packer leak in MPL INJ1 or MPL OBS1.
- Loss of mechanical integrity due to a casing leak in MPL INJ1 and MPL OBS1.

Table 5 summarizes the expected timing, avoidance measures, and detection methods as well as the expected response actions, required personnel, and equipment needed for a mechanical integrity loss event.

Table 5: Summary of timing, avoidance measures, detection methods, and response actions, personnel, and equipment for a mechanical integrity failure. Lists are non-exhaustive.

Category	Item
Timing of Event	• Injection • Post-injection
Avoidance Measures	• Injecting within operational parameters • Utilizing properly rated equipment • Thorough pre-operational assessment of cement, casing, and other materials • Following manufacturer care and safe handling guidance
Detection Methods	• Mechanical integrity testing • Monitoring operational parameters • Inspection of corrosion coupons

Response Actions (MPL INJ1 and MPL OBS1)	• In the case of a shutdown event, Vault GSL CCS LP will first determine the nature of the shutdown event and whether it was spurious or due to an actual loss of well integrity.
	• If loss of well integrity has occurred, notify the Director about the emergency event within 24 hours of the loss of well integrity (40 CFR §146.94(b)(3); 40 C.F.R. §146.91(c)).
	• Initiate the shutdown plan (40 CFR §146.94(b)(1).
	  o Shut in the well (all necessary valves closed and locked out).
	  o Vent CO_2 from surface lines and CO_2 facility as necessary.
	  o Limit access to wellhead and sequestration facilities to only those authorized (caution tape and/or rope may be used to limit access).
	  o Monitor wellhead pressure (tubing and annulus) and temperature as is feasible. This information should be used to assess and determine the nature or cause and extent of the mechanical integrity failure.
	• Identify and implement appropriate remedial actions to repair damage to the well (in consultation with the Director).
	• If loss of mechanical integrity has resulted in a failure of monitoring equipment, implement response actions from this table.
	• If there is evidence suggesting potential fluid leakage into a USDW or unauthorized zone, implement response actions from Table 8.
	• Perform mechanical integrity test prior to bringing well back online and resuming injection.

Response Actions (other monitor wells)	Other monitoring wells • Notify the Director about the emergency event within 24 hours (40 CFR §146.94(b); 40 CFR §146.91(c)). • Identify and implement appropriate remedial actions to repair the well (in consultation with the Director). Within 30 days of the event, inform the Director of the schedule for repairs. • Identify and implement appropriate remedial actions (in consultation with the Director).
Response Personnel	• Facility operations staff, • Vault GSL CCS LP Operations Supervisor, • Project Manager, • Plant Manager, • Third party contractors, • Rig crew, • Rig supervisor.

Category	Item
Response Equipment	• Tubing, • Cement, • Casing patches, • Wellhead equipment, • Packer, • Logging equipment, • Workover rig.

4.3 Well Monitoring Equipment Failure or Malfunction

The failure of monitoring equipment for wellhead pressure, temperature, and/or annulus pressure, including a malfunctioning monitoring well, may indicate a problem that could pose a risk of endangerment to USDWs. Table 6 summarizes the well monitoring equipment that may fail or malfunction. Table 7 summarizes the expected timing, avoidance measures, and detection methods as well as the expected response actions, required personnel, and equipment needed for a well monitoring equipment failure or malfunction event.

Table 6: Project wells and monitoring equipment that may fail or malfunction.

Well	Equipment
MPL INJ1	• Wellhead injection pressure (surface gauge), • Wellhead injection temperature (surface sensor), • Downhole pressure at packer (downhole pressure/temperature gauge), • Downhole temperature at packer (downhole pressure/temperature gauge), • Annulus pressure, • Annulus fluid volume, • Injection flowrate.
MPL OBS1	• Wellhead tubing pressure (surface gauge), • Downhole pressure at packer (downhole pressure/temperature gauge), • Annulus pressure, • Annulus fluid volume.
MPL ACZ1	• Wellhead pressure
Shallow groundwater wells	• PVC casing collapse

Table 7: Summary of timing, avoidance measures, detection methods, and response actions, personnel, and equipment for a well monitoring equipment failure. Lists are non-exhaustive.

Category	Item
Timing of Event	• Injection • Post-injection
Avoidance Measures	• Utilizing properly rated equipment. • Following all manufacturer handling and operational specifications and guidelines. • Routine maintenance and calibration.
Detection Methods	• Continuous monitoring devices. • Redundant monitoring devices.
Response Actions (MPL INJ1 and MPL OBS1	• Notify the Director in the event of any failure of well monitoring equipment caused by a well integrity failure within 24 hours (40 CFR §146.94(b)(3); 40 CFR §146.91(c)). Routine repairs of surface well monitoring equipment not associated with well integrity failure will not be reported to the Director. • Determine the impact of the event based on the information available within 24 hours of the event occurring. This includes: o Assessing the impact of the lost monitoring equipment. o Determine and implement a viable alternative monitoring method if surface equipment replacement is not possible within 24 hours. o Report this information to the Director. o Note that a viable alternative monitoring method is not a substitute for any permit condition, including compliance with the Testing and Monitoring Plan. • If there has been a loss of mechanical integrity, implement response action from Section 4.2 *Mechanical Integrity Failure*. • Identify and implement appropriate remedial actions to repair the well (in consultation with the Director). • Assess whether there is evidence suggesting potential fluid leakage into a USDW or unauthorized zone and, if there is such evidence, implement Response Actions from Table 8. • Assess the cause of the equipment failure and report the details to the Director within 30 days. • Replacement of equipment (if needed) should be done as soon as is feasible based on operational conditions and suitability of the alternative method of monitoring. • Assess (in consultation with the Director) whether monitoring capabilities at the project are sufficient to ensure non-endangerment to USDWs. If monitoring capabilities are not sufficient, treat the event as an immediate risk and see Response Actions listed below. o Initiate the shutdown plan (40 CFR §146.94(b)(1)). o Shut in the well (all necessary valves closed and locked out) and isolate monitoring wells. o Vent CO_2 from surface lines and CO_2 facility as necessary. o Limit access to wellhead and sequestration facilities to only those authorized (caution tape and/or rope may be used to limit access). o Monitor wellhead pressure (tubing and annulus) and temperature as is feasible. This information should be used to assess and determine the nature or cause and extent of the mechanical integrity failure.
Response Actions (MPL ACZ1)	• Notify the Director in the event of any failure of well monitoring equipment caused by a well integrity failure within 24 hours (40 CFR §146.94(b)(3); 40 CFR §146.91(c)). Routine repairs of surface well monitoring equipment not associated with well integrity failure will not be reported to the Director. • Determine the impact of the event based on the information available within 24 hours of the event occurring. This includes: o Assessing the impact of the lost monitoring equipment. o Determine and implement a viable alternative monitoring method should surface equipment replacement is not possible within 24 hours. o Report this information to the Director. o Note that a viable alternative monitoring method is not a substitute for any permit condition, including compliance with the Testing and Monitoring Plan. • If there has been a loss of mechanical integrity, implement response action from Section 4.2 *Mechanical Integrity Failure*.

Category	Item
	• Identify and implement appropriate remedial actions to repair the well (in consultation with the Director). • Assess whether there is evidence suggesting potential fluid leakage into a USDW or unauthorized zone, and if there is such evidence, implement Response Actions from Table 8. • Assess the cause of the equipment failure and report the details to the Director within 30 days. • Replacement of equipment (if needed) should be done as soon as is feasible based on operational conditions and suitability of the alternative method of monitoring. • Assess (in consultation with the Director) whether monitoring capabilities at the project are sufficient to ensure non-endangerment to USDWs. If monitoring capabilities are not sufficient, treat the event as an immediate risk and see Response Actions listed below. o Initiate the shutdown plan (40 CFR §146.94(b)(1)). o Shut in the well (all necessary valves closed and locked out) and isolate monitoring wells. o Vent CO_2 from surface lines and CO_2 facility as necessary. o Limit access to wellhead and sequestration facilities to only those authorized (caution tape and/or rope may be used to limit access). • Monitor wellhead pressure (tubing and annulus) and temperature as is feasible. This information should be used to assess and determine the nature or cause and extent of the mechanical integrity failure
Response Actions Shallow groundwater wells	• Notify the Director about the event within one week. • Identify an alternative monitoring method as appropriate (in consultation with the Director). • If any of the shallow groundwater wells are damaged or become inaccessible for monitoring: o A different existing shallow groundwater well(s) for monitoring will be selected, or o A new well(s) will be drilled in an appropriate location.
Response Personnel	• Facility operations staff, • Vault GSL CCS LP Operations Supervisor, • Project Manager, • Plant Manager, • Third party contractors, • Rig crew (if workover is required), • Rig supervisor (if workover is required).
Response Equipment	• Pressure gauges (if necessary), • Temperature sensors (if necessary), • Logging equipment, • Workover rig, • Auxiliary temporary monitoring equipment.

4.4 Evidence Suggesting Potential Fluid Leakage into a USDW or Other Unauthorized Zone (including the Surface)

Potential CO_2, brine, annulus fluid, or formation fluid leakage to a USDW or other unauthorized zone may endanger USDWs. Table 8 summarizes the expected timing, avoidance measures, and detection methods as well as the expected response actions, required personnel, and equipment needed for a potential fluid leakage event. This scenario includes but is not limited to:

- Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence suggesting potential fluid leakage into a USDW or other unauthorized zone (including the surface).
- Unanticipated emergency corrective action(s) needed on a well(s) within the AoR.
- Evidence of migration of CO_2, brine, annulus fluid, or formation fluid between formations through injection, monitoring, or water withdrawal well bores.
- Evidence of migration of CO_2, brine, annulus fluid, or formation fluid from the injection zone through P&A wells or through undocumented wells in the AoR.
- Evidence of migration of CO_2, brine, annulus fluid, or formation fluid from the injection zone through failure of the confining zone, faults, and fractures (loss of containment).
- Evidence of migration of CO_2, brine, annulus fluid, or formation fluid from the injection zone, including due to metal leaching or to corrosion due to prolonged wetted CO_2 exposure.
- Evidence of migration of CO_2, brine, annulus fluid, or formation fluid outside of the AoR.

Table 8: Summary of timing, avoidance measures, detection methods, and response actions, personnel, and equipment for scenario when evidence suggests potential fluid leakage into a USDW or other unauthorized zone. Lists are non-exhaustive.

Category	Item
Timing of Event	• Construction/Pre-injection • Injection • Post injection
Avoidance Measures	• Routine mechanical integrity testing • Regular inspection and servicing of valves and surface equipment • Thorough site characterization during the pre-operational and well construction phase • Evaluation of monitoring data • Strict adherence to approved operational parameters • Period surface seismic surveys
Detection Methods	• Surface gas/CO_2 monitors • Continuous monitoring parameters • Routine mechanical integrity testing • Pulsed Neutron Logs • Routine groundwater sampling
Response Actions	If Vault GSL CCS LP obtains evidence of potential CO_2 brines, annulus fluid, or formation fluid leakage to a USDW or other unauthorized zone, Vault GSL CCS LP must perform the following actions: • Notify the Director about the emergency event within 24 hours (40 CFR §146.94(b)(3); 40 C.F.R. 146.91(c)). • Initiate the shutdown plan (40 CFR §146.94(b)(1). o Shut in the well (all necessary valves closed and locked out). o Vent CO_2 from surface lines and CO_2 facility as necessary. o Limit access to wellhead and sequestration facilities to only those authorized (caution tape and/or rope may be used to limit access). o Monitor wellhead pressure (tubing and annulus) and temperature as is feasible. This information should be used to assess and determine the nature or cause and extent of the mechanical integrity failure. o Take all steps reasonably necessary to identify and characterize any release within 24 hours (40 CFR §146.94(b)(2)), including: Collection of confirmation samples of USDWs or any other potentially relevant formation(s) (in consultation with the Director) and performance of constituent analysis to determine elevated parameters. • The parameters to be tested are provided in the Testing and Monitoring Plan and QASP (Attachment 06: Testing and Monitoring, 2025; Attachment 10: Quality Assurance and Surveillance Plan, 2025). o If the presence of leaked fluid or other contamination is confirmed in a USDW or other unauthorized zone: ▪ Identify and implement a remediation plan (in consultation with the Director) as soon as possible and no later than 30 days. ▪ Arrange for an alternate potable water supply if the USDW was being utilized for water supply and the contamination has caused an exceedance of drinking water standards ▪ Continue USDW monitoring (in consultation with the Director) until potential endangerment of or adverse impacts to USDWs have been fully addressed.
Response Personnel	• Facility operations staff • Vault GSL CCS LP Operation Supervisor • Project Manager • Plant Manager • Third party contractors • Rig crew • Rig supervisor • Groundwater remediation contractors
Response Equipment	• Tubing • Cement • Casing patches • Wellhead equipment • Packer • Logging equipment • Workover rig • Pump and treat groundwater remediation equipment and infrastructure if required (Attachment 03: Financial Assurance Plan, 2025) • Other response actions may include supplying replacement residential water and installation of reverse osmosis units at impacted locations.

4.5 Severe Weather Disaster

Well problems (integrity loss, leakage, or malfunction) may arise as a result of a natural disaster affecting the normal operation of MPL INJ1. Weather-related disasters (e.g., tornado, hurricane, or lightning strike) may affect project facilities. Table 9 summarizes the expected timing, avoidance measures, and detection methods as well as the expected response actions, required personnel, and equipment needed for a natural disaster event.

Disturbance or damage as a result of a severe weather disaster may impact the normal operation of the project.

A non-exhaustive list of examples of such potential events and the impact to the project they may cause are:

- Lightning strikes the wellhead and damages all surface monitoring equipment,
- Severe flooding (i.e., 100-year flood) limits access to the well or injection facility.

These events may impact or damage the ability to properly operate the well or utilize the facility for the intended purposes of the project. Should a natural severe weather event occur that causes extended power loss, the facility is designed to automatically shut down the injection systems safely. The system does not have an onsite backup power generation that allows CO_2 injection to continue in the event the power grid is offline. A backup power system is in place to control the safe shutdown of all facility equipment in the event of power loss.

Table 9: Summary of timing, avoidance measures, detection methods, and response actions, personnel, and equipment for a severe weather disaster. Lists are non-exhaustive.

Category	Item
Timing of Event	• Construction/Pre-injection • Injection • Post-injection
Avoidance Measures	• Installing equipment to lessen the impact of naturally occurring events (i.e., lightning rod in elevated position). • Elevate well, wellsite, and wellsite access roads above local elevation. • Following appropriate building codes.
Detection Methods	• Observance of local forecasts
Response Actions	• Notify the Director about the emergency event within 24 hours (40 CFR §146.91(c) and (e)). • Trigger alarm by the monitoring system or monitoring personnel. • If appropriate, contact the Plant Manager to activate emergency evacuation and secure the location. • If there has been a loss on mechanical integrity, implement Response Actions from Table 5. • Determine if all monitoring equipment remains functional. If there has been a failure of monitoring equipment, implement Response Actions from Table 7. • Conduct assessment to determine if there is evidence suggesting potential fluid leakage into a USDW or unauthorized zone. If there is such evidence, implement Response Actions from Table 8. • Assess potential impact to the project and the Local Resources and Infrastructure (Section 2 *Local Resources and Infrastructure*). Identify and implement appropriate remedial actions (in consultation with the Director).
Response Personnel	• Vault GSL CCS LP Operations Supervisor • Project Manager (if present) • Plant Manager (if present) • Third party contractors (i.e., supervisory control and data acquisition (SCADA) technician)
Response Equipment	• Pressure gauge (if necessary) • Temperature sensors (if necessary) • SCADA equipment • Wellhead or wellhead components

4.6 Seismic Event(s)

A major natural seismic event may disturb the surface or subsurface facilities. There is also a possibility that injection operations may cause induced seismicity. This portion of the response plan is developed for any seismic event with an epicenter within the AoR.

Natural seismicity is not expected to affect the project, as the project site approximately 25 miles north of the Moderate Shaking Zone associated with the Anna Seismic Zone in western Ohio. Vault GSL CCS LP plans to inject CO_2 into the Mt. Simon Sandstone and will monitor for natural and induced seismicity in the area.

A surface-based passive seismic monitoring (PSM) array will be used to accurately determine the locations and magnitudes of potential injection-induced seismic events with the primary goals of:

- Addressing public and stakeholder concerns related to induced seismicity,
- Qualitatively monitoring the spatial extent of the pressure front from the distribution of seismic events,
- Identification of activity that may indicate failure of the confining zone and possible containment loss.

Claimed as PBI

[redacted]

Based on the continuous analysis of the observed level of seismic activity, and any local reporting of felt events, the site will be assigned an operating state. The operating state is determined using threshold criteria which correspond to the site's potential risk and level of seismic activity. The operating state provides site personnel with information about the potential risk of further seismic activity and guides them through a series of response actions.

The PSM system operating state structure is presented in Table 10. The table corresponds each level of operating state with the threshold conditions and operational response actions.

Personnel who may be involved in the response as well as equipment that may be required in the response are provided in Table 11.

Table 10: Seismic monitoring system for seismic events within the project AoR.

Operating State	Threshold Condition [1]	Response Action [2]
Green	Seismic events less than or equal to M1.5	1. Continue normal operation within permitted levels.
Yellow	Five 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 event, notify the Director of the operating status of the well. 3. Review seismic and operational data to determine the cause of the events.
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 Director, of the operating status of the well. 3. Review seismic and operational data to determine the cause of the events. 4. Report findings to the Director and identify and implement appropriate remedial actions (in consultation with the Director), if necessary.
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan (in consultation with the Director). 2. Within 24 hours of the incident, notify the Director, of the operating status of the well. 3. Limit access to wellhead to authorized personnel only. 4. Communicate with facility personnel and local authorities to initiate evacuation plans, if necessary. 5. Review seismic and operational data to determine the cause of the events. 6. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure. 7. Report findings to the Director and identify and implement appropriate remedial actions (in consultation with the Director), if necessary. 8. If there has been a loss mechanical integrity at any of the wells, implement Response Actions from Section 4.2 *Mechanical Integrity Failure*. 9. Determine if all monitoring equipment remains functional. If there has been a failure of monitoring equipment, implement Response Actions from Section 4.3 *Well Monitoring Equipment Failure or Malfunction*. 10. Conduct assessment to determine if there is evidence suggesting potential fluid leakage into a USDW or unauthorized zone. If there is such evidence, implement Response Actions from Section 4.4 *Evidence Suggesting Potential Fluid Leakage into a USDW or Other Unauthorized Zone*.
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage Seismic event >M3.5	1. Initiate shutdown plan. 2. Within 24 hours of the incident, notify the Director of the emergency event (40 CFR §146.94(b)(3)) 3. Limit access to wellhead to authorized personnel only. 4. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 5. Review seismic and operational data to determine the cause of the events. 6. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the extent of any failure. 7. Report findings to the Director and identify and implement appropriate remedial actions (in consultation with the Director), if necessary. 8. If there has been a loss of mechanical integrity, implement Response Actions from Section 4.2 *Mechanical Integrity Failure*. 9. Determine if all monitoring equipment remains functional. If there has been a failure of monitoring equipment, implement Response Actions from Section 4.3 *Well Monitoring Equipment Failure or Malfunction*. 10. Conduct assessment to determine if there is evidence suggesting potential fluid leakage into a USDW or Unauthorized Zone. If there is such evidence, implement Response Actions from Section 4.4 *Evidence Suggesting Potential Fluid Leakage into a USDW or Other Unauthorized Zone*.

[1] Specified magnitudes refer to magnitudes determined by local seismic monitoring stations or United States Geological Survey (USGS) seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network. "Felt report" and "local observation or report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.

[2] Remedial action will occur within 25 business days (five weeks).

Table 11: Timing of potential events, response personnel, and equipment for a seismic event.

Category	Item
Timing of Major Event	Construction, injection, and post-injection
Response Personnel (including but not limited to)	Vault GSL CCS LP Operations Supervisor Project Manager Plant Manager Third party contractors Vault GSL CCS LP Geologist Vault GSL CCS LP Reservoir Engineer
Response Equipment	Additional monitoring stations (if required)

5. Unforeseen Events

Should unforeseen events occur (i.e., global pandemic, etc.) that could impact the operations and integrity of the project, proposed response steps will be provided to the Director within 7 days and implemented once approved.

6. Overall Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP. The injection and monitoring wells are located in Putnam County. As such, local responders from the area will be utilized for emergency contacts and will be notified of an incident, as necessary. In addition, state agencies may need to be notified as well.

In addition to the Director, site personnel to be notified (not listed in order of notification):

1. Project Engineer(s),
2. Plant Safety Manager(s),
3. Environmental Manager(s),
4. Project Manager,
5. Project Operations Manager.

All staff will be trained in the methods described in Section 9 *Staff Training and Exercise Procedures* of this document.

Table 12 is the current list of contact information for key local, state, and other authorities. A site-specific emergency contact list will be developed, maintained, and periodically updated during the life of the project. The list will include phone numbers and email addresses for facility emergency 24-hour contacts. Vault GSL CCS LP will provide the current site-specific emergency contact list to the Director prior to commencement of injection operations.

Table 12: Local, state, and other authorities.

Agency	Phone Number
Emergency Dispatch – Police, Fire, or Medical Emergency	911
Leipsic Fire Department	419-943-2009
Putnam County Sheriff's Office	419-523-3208
Putnam County Office of Public Safety (Emergency Management Agency (EMA)/ Emergency Medical Services (EMS))	419-538-7315
Ohio State Highway Patrol – Lima Patrol Post	419-228-7072
Environmental services contractor to be determined (TBD)	TBD
US EPA Region 5 Director	312-353-7648
US EPA Region 5 UIC Class VI Wells/Carbon Sequestration	312-353-3944 (Class VI UIC Wells/Carbon Sequestration)
EPA National Response Center (24 hours)	800-424-8802
Ohio Environmental Protection Agency	800-282-9378 (Emergency Spill Hotline)
Ohio Department of Natural Resources (ODNR) Division of O&G Resources	844-642-2551 (Emergency Response)

Equipment required in the event of an emergency and remedial response will vary and depend upon the 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 workover rig or logging equipment, is required, Vault GSL CCS LP shall be responsible for its procurement.

7. Emergency Communications Plan

Subject to provisions elsewhere in this ERRP requiring notification to EPA, the order of contact when an emergency occurs is the following:

1. Plant Manager,
2. Necessary emergency authorities,
3. Impacted landowners (if any),
5. Vault GSL CCS LP Management Teams,
6. Vault GSL CCS LP Public Response Personnel (Section 6 *Overall Response Personnel and Equipment*).

Based on the appropriate level of emergency response and the magnitude of the event, a crisis event center will be established. For minor emergencies, this will be held on company property. For major or serious emergencies, a crisis event center will be established at a safe location. This will serve as the headquarters for communication about the emergency. Vault GSL CCS LP will communicate with the public and impacted landowners.

Vault GSL CCS LP will communicate to the public and impacted landowners about any event that requires an emergency response to ensure that the public understands what happened and whether 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.

Vault GSL CCS LP 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), Vault GSL CCS LP will provide periodic updates on the progress of the response action(s).

Vault GSL CCS LP will also communicate with entities who may need to be informed about or take action in response to the event, including local water systems, CO_2 source(s) and pipeline operators, landowners, and Regional Response Teams (as part of the National Response Team). A detailed list of these people will be developed and updated periodically.

8. Plan Review

In accordance with 40 CFR §146.94(d), Vault GSL CCS LP shall periodically review this ERRP. If the review indicates that no amendments to the ERRP are necessary, Vault GSL CCS LP will provide a demonstration to the Director with documentation supporting the "no amendment necessary" determination. If the review indicates that amendments to the ERRP are necessary, Vault GSL CCS LP shall submit an amended emergency and remedial response plan to the Director pursuant to the timelines listed below depending on the event triggering the review. Any approved amendments to the ERRP will be incorporated into the Permit.

Amended plans or demonstrations shall be submitted to the Director as follows:

- Any significant changes to the facility, such as an addition of injection or monitoring wells, on a schedule determined by the Director.
- At least once every five years following its approval by the permitting agency,
- Within one year of an AoR re-evaluation,
- Within six months following the occurrence of an emergency event under the ERRP, and
- When required by the Director (40 CFR §146.94(d)(3)).

9. Staff Training and Exercise Procedures

Vault GSL CCS LP will develop a standard operating procedure (SOP) in tandem with the contractors that provide the surface capture and compression equipment, the surface monitoring system, and among other contractors that detail the operational procedures to be followed in the event of an emergency.

Included in this SOP will be specific details that can be used to train the project operators regarding the ERRP. Based on these SOPs, annual training and testing will be provided to all those involved with the project as well as those identified in Section 6 *Overall Response Personnel, and Equipment* of this document. All personnel identified and assigned as response personnel in the document will complete initial training prior to the commencement of operations. This initial training, as well as annual certifications, will be documented and retained.

Vault GSL CCS LP will integrate the ERRP into the plant-specific SOPs and training program.

10. References

Attachment 01: Narrative, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 02: AoR and Corrective Action Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 03: Financial Assurance Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 04: Injection Well Construction Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 05: Pre-operational Testing Program, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 06: Testing and Monitoring, 2025, Underground Injection Control Class VI Permit Application: Maple.

Attachment 10: Quality Assurance and Surveillance Plan, 2025, Underground Injection Control Class VI Permit Application: Maple.

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