For assistance with 508 accessibility, please reach out to Anna Miller (email: miller.anna@epa.gov, phone: 312-886-7060)

EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)

One Earth CCS

Facility Information

Facility name:	One Earth Sequestration, LLC OES #1
Facility contact:	Mark Ditsworth, VP of Technology and Special Projects, One Earth Sequestration, LLC, 202 N Jordan Drive, Gibson City, IL. 60936, (217) 784-5321 ext. 215 An additional list of facility contacts will be developed and maintained during the life of the project.
Well location:	McLean County, IL 40.845427°N, -88.480010°W (NAD 1983)

This plan is provided to meet the requirements of 40 CFR 146.94. The Emergency and Remedial Response Plan (ERRP) describes actions the owner/operator (One Earth Sequestration, LLC) will take in the unlikely event of an emergency within the project Area of Review (AoR) during construction, operation, or post-injection site care. Unexpected events may include unplanned CO_2 release or detection of unexpected CO_2 movement or associated fluids in or from the injection zone. This plan demonstrates how One Earth Sequestration, LLC will comply with 40 CFR 146.94. The AoR is shown in **Figure 1**.

This ERRP describes actions that One Earth Sequestration, LLC shall take to address movement of the injection fluid or formation fluid in a manner that may endanger an underground source of drinking water (USDW) during the construction, operation, or post-injection site care periods.

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

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

Where the phrase “initiate shutdown plan” is used, the following protocol will be employed: One Earth Sequestration, LLC will immediately cease injection. However, in some circumstances, One Earth Sequestration, LLC will, in consultation with the UIC Program Director, determine whether

gradual cessation of injection (using the parameters set forth in the Summary of Requirements of the Class VI permit) is appropriate.

Local Resources and Infrastructure

Hydrologic resources in the vicinity of the One Earth CCS injection wells that may be impacted because of an emergency event at the project site include: underground sources of drinking water (USDWs) and potable water wells **Figure 2**). Within the AoR, the lowermost USDW is the St. Peter sandstone. Most local domestic potable water supplies are derived from the shallow unconfined aquifer (<250 feet below ground surface (bgs). There is no known development of the St. Peter aquifer within the AoR.

The land within the AoR is used primarily for agriculture (**Figure 3**). Gibson City and Saybrook are two communities within the AoR. Residences and farm-related buildings are scattered across the land surface, particularly along roads.

Surface water features such as creeks, streams, and impoundments formed by small earthen dams are present in the area. This includes the West Branch Drummer Creek. The Mackinaw River and the Sangamon River are situated outside of the AoR. **Figure 3** shows the major surface water features within the AoR. **Figure 2** shows additional surface features in the survey area.

Figure 4 shows transportation and utility infrastructure in the AoR and adjacent area. There are no major highways within the AoR. Transportation infrastructure includes a railroad line through Gibson City, several state routes, and paved and unpaved rural routes. Other infrastructure includes several hydrocarbon transmission lines, electric power transmission lines, and a wind farm.

The location and design of the CO_2 pipeline from the ethanol plant to the injection wells has not been determined.

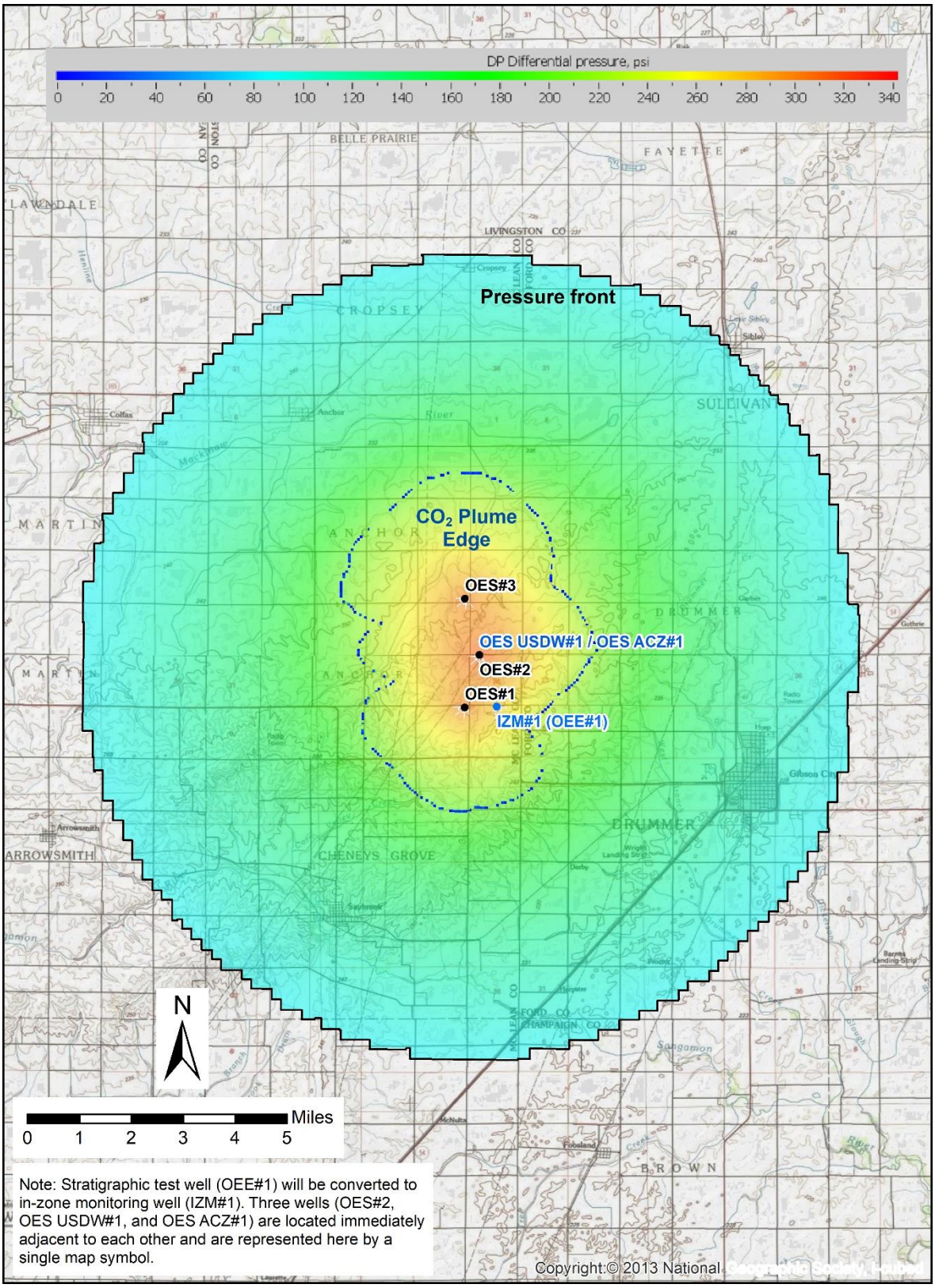

Figure 1. *One Earth CCS Area of Review*

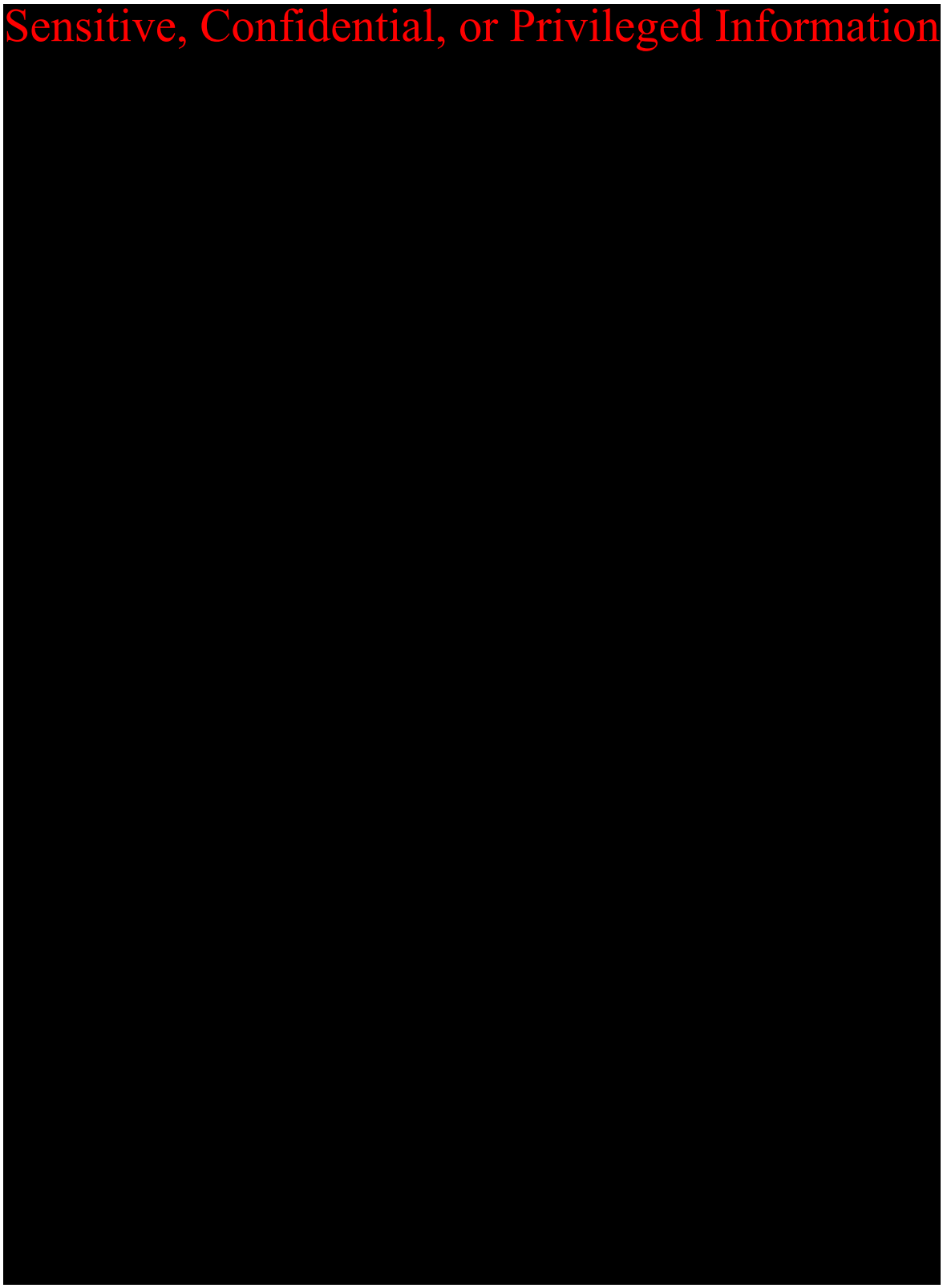

Figure 2. *Potable water well locations within AoR.*

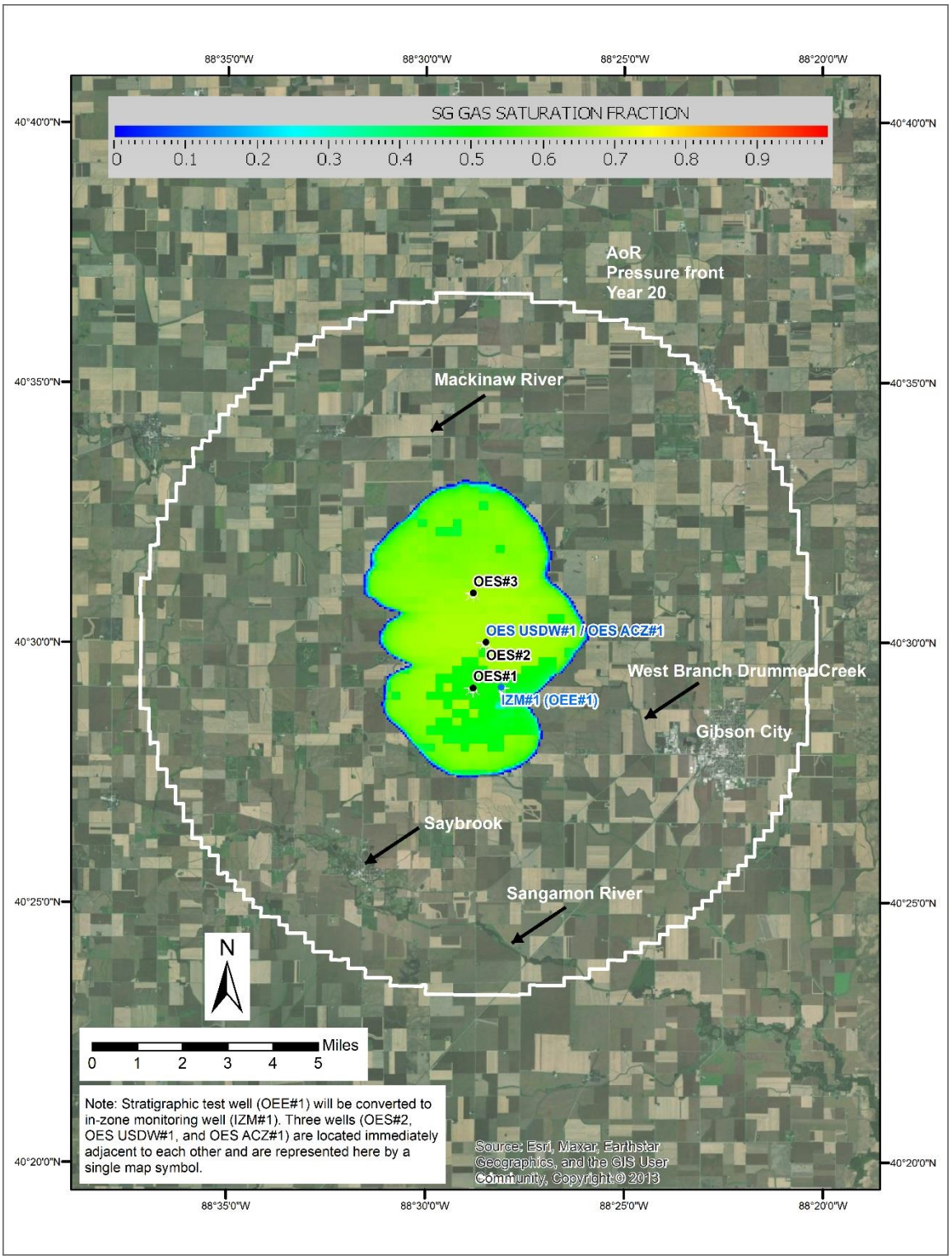

Figure 3. *Aerial photo with AoR. Note that primary land use is agricultural. Named surface water features and communities located within the AoR are identified.*

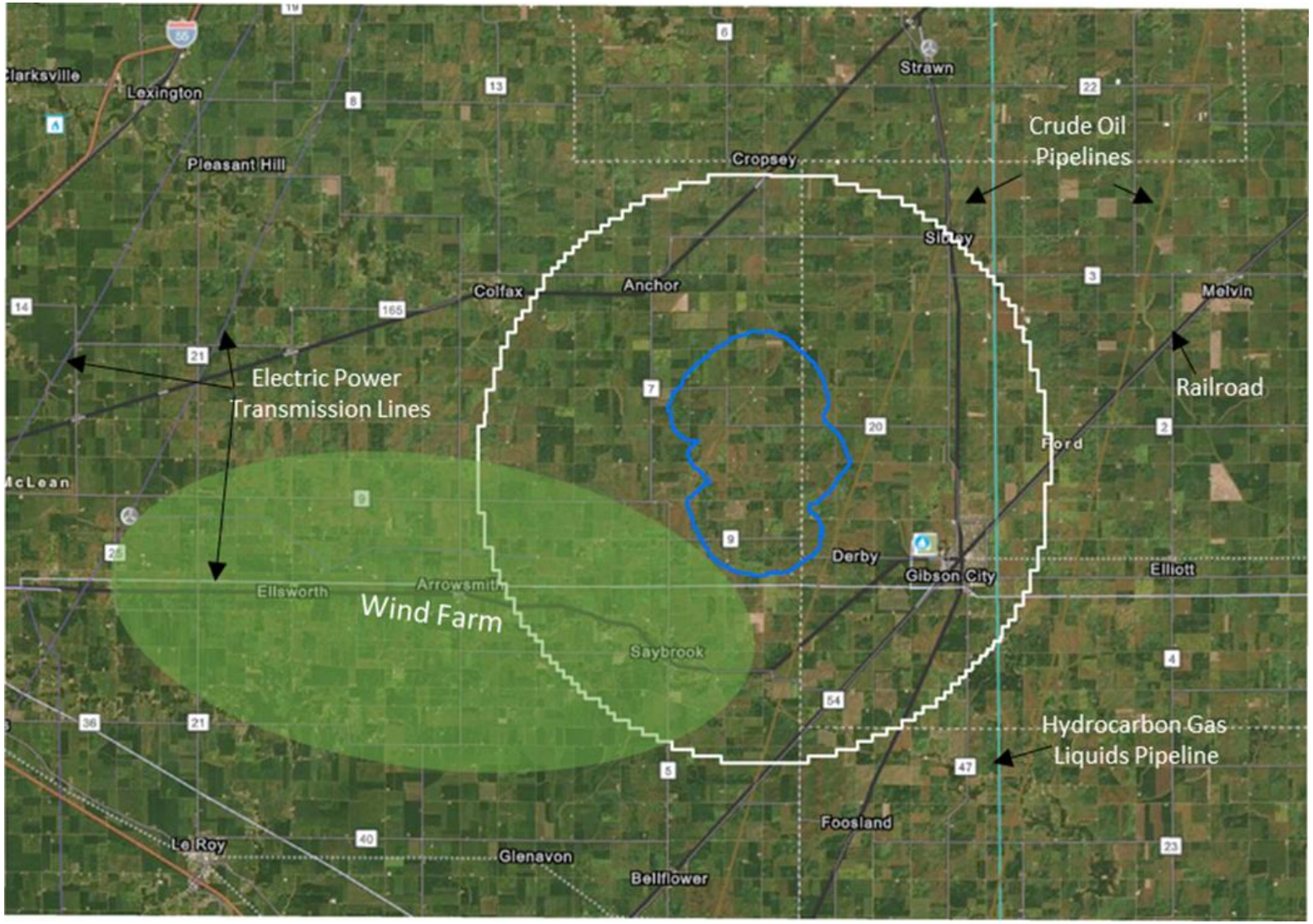

Figure 4. *Other infrastructure. Information is from U.S. Energy Information Administration (EIA) website (https://atlas.eia.gov). Note CO_2 plume (in blue) and AoR (white) outlines have been generalized.*

Potential Risk Scenarios

The following events related to the One Earth CCS project 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.).
- A natural disaster (e.g., earthquake, tornado, lightning strike).
- Fluid (e.g., brine) leakage to a USDW.
- CO_2 leakage to USDW or land surface; or
- Induced seismic event.

Response actions will depend on the severity of the event(s) triggering an emergency response. "Emergency events" are categorized as shown in **Table 1**.

Table 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.

In the event of an emergency requiring cessation of injection, CO_2 slated for injection may be released to the atmosphere.

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 and discussed in the following sections. The order of notification for an event is shown in **Table 2**.

Table 2. *In the event of an emergency requiring outside assistance, the lead contact shall call the One Earth Sequestration, LLC control room at (217) 784-5321, option 1 and One Earth Sequestration, LLC, Vice President at (217) 766-3252.*

CALL ORDER	CONTACT INFORMATION	PHONE NUMBER
1	Control Room	(217) 784-5321- #1
2	Vice President	(217) 766-3252
3	USEPA UIC Program Director (within 24 hrs.)	(312)-353-6288

Well Integrity Failure

Integrity loss of the injection well and/or verification well may endanger USDWs. Integrity loss may have occurred if the following events occur:

- Automatic shutdown devices are activated:
    - Wellhead pressure exceeds the specified shutdown pressure specified in the permit.
    - Annulus pressure indicates a loss of external or internal well containment.
    - ***One Earth Sequestration, LLC is required to notify the UIC Program Director within 24 hours (40 CFR 146.91(c)(3) of <u>any triggering</u> of a shut-off system (i.e., down-hole or at the surface).***
- Mechanical integrity test results identify a loss of mechanical integrity.
- Response actions:
    - Immediately notify the One Earth Sequestration, LLC Vice President or designee.
    - Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
    - The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
    - Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
    - For a Major or Serious emergency:
        - Initiate shutdown plan.
        - Shut in well (close flow valve).
        - Vent CO_2 from surface facilities
        - Restrict access to wellhead to authorized and emergency personnel only.
        - Initiate communications plan.
        - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).
        - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the 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.
        - Shut in well (close flow valve).
        - Vent CO_2 from surface facilities.

- Reset automatic shutdown devices.
- Monitor well pressure, temperature, and annulus pressure to verify cause and extent of emergency; identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

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.

Response actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- For a Major or Serious emergency:
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized and emergency personnel only.
    - Communicate with One Earth Sequestration, LLC and One Earth Energy LLC personnel and local authorities to initiate evacuation plans, as necessary.
    - Monitor well pressure, temperature, and annulus pressure to determine the cause and extent of failure.
    - Identify and, if necessary, implement appropriate remedial actions (in consultation with the 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.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Reset automatic shutdown devices.

- Monitor well pressure, temperature, and annulus pressure to determine cause and extent of emergency.
- Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

Potential Brine or CO_2 Leakage to USDW

Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence of fluid (brine) or CO_2 leakage into a USDW.

Response Actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- For all Emergencies (Major, Serious, or Minor)
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Collect confirmation sample(s) of groundwater and analyze for indicator parameters. (Potential indicators are listed in the Testing and Monitoring Plan.)
    - If the presence of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan to:
        - Install additional groundwater monitoring points near the impacted groundwater well(s) to delineate the extent of impact; and
        - Remediate unacceptable impacts to the impacted USDW.
    - Arrange for an alternate potable water supply, if the USDW was being utilized and has been caused to exceed drinking water standards.
    - Proceed with efforts to remediate USDW to mitigate any unsafe conditions (e.g., install system to intercept/extract brine or CO_2 or "pump and treat" to aerate CO_2-laden water).
    - Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by One Earth Sequestration, LLC and the UIC Program Director) until unacceptable adverse USDW impact has been fully addressed.

Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise because of a natural disaster affecting the normal operation of the injection well(s). An earthquake may disturb surface and/or subsurface facilities; and weather-related disasters (e.g., tornado or lightning strike) may affect surface facilities.

Response actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). The plant superintendent will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major or Serious emergency:
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized and emergency personnel only
    - Communicate with One Earth Sequestration, LLC and One Earth Energy LLC personnel and local authorities to initiate evacuation plans, as necessary.
    - Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure.
    - Determine if any leaks to groundwater or surface water occurred
    - If contamination or endangerment is detected, identify, and implement appropriate remedial actions (in consultation with the 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.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized personnel only.
    - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of any failure.
    - Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

Induced Seismic Event

Induced seismic events typically refer to minor seismic events that are caused by human activity that alters the stresses and fluid pressures in the earth's crust. Induced seismicity could potentially result from the injection of fluids into subsurface formations that lubricate and or change the stress state of pre-existing faults which causes fault plane movement and energy release. Most induced seismic events are extremely small but in some instances are great enough to be felt by humans.

A tiered approach and response will be taken based on event magnitude and proximity to the storage site.

After a seismic event has been identified, a decision must be made regarding the level of impact a given event could have on storage site operations, whether a response is required, and what the appropriate response will be. This decision and response framework will consist of an automated event location and magnitude determination, followed by an alert for a technical review to reduce the likelihood of false positives.

To monitor the area for seismicity, distributed acoustic sensors (DAS) will be installed in each injection well and the in-zone monitoring well(s). The acoustic sensors are fiber optic and will terminate above the perforated zone of each well. (In addition, a permanent geophysical array is under consideration for installation at the One Earth CCS project site. The design and deployment of the permanent array is to be determined.) The seismic monitoring program is presented in more detail in the Testing and Monitoring Plan. Baseline seismic data will be acquired for six months prior to the start of injection operations. Triggered seismic event data will be processed to provide magnitude and location information on a real-time basis and results will be reviewed by a data processor on a daily basis.

Identification of events with sufficient magnitude or that are in a sensitive area (caprock) should be used as input for decisions that guide the adaptive strategy. Seismic events that affect the operations of CO_2 injection can be divided into two groups/tiers:

1) events that create felt seismicity at the surface and may lead to public concern or structural damage.
2) events not included in group one, but that might indicate failure or impending failure of the caprock. The operational protocol for responding to events in group one (Tier I) will follow a "traffic light" approach (modified after Zoback 2012; National Research Council 2013) that uses three operational states.

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

In the following table (**Table 3**) the One Earth CCS project's seismic monitoring protocol is presented. The table corresponds each level of operating state with the threshold conditions and operational response actions.

***Table 3**. Seismic monitoring system, for seismic events > M1.0 with an epicenter within an 8-mile radius of the injection well.*

Operating State	Threshold Condition[1,2]	Response Action[3]
Green	Seismic events less than or equal to M1.5	1. Continue normal operation within permitted levels.
Yellow	Five (5) or more seismic events within a 30-day period having a magnitude greater than M1.5 but less than or equal to M2.0	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications of the operating status of the well.
Orange	Seismic event greater than M1.5 and local observation or felt report Seismic event greater than M2.0 and no felt report	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 3. Review seismic and operational data. 4. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.

[1] Specified magnitudes refer to magnitudes determined by local One Earth CCS project's seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network.

[2] "Felt report" and "local observation and report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.

[3] Reporting findings to the UIC Program Director and issuing corrective action will occur within 25 business days (five weeks) of change in operating state.

Operating State	Threshold Condition[1,2]	Response Action[3]
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan. 2. Vent CO_2 from surface facilities. 3. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 4. Limit access to wellhead to authorized personnel only. 5. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 6. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 7. Determine if leaks to ground water or surface water occurred. 8. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Initiate shutdown plan. c. Shut in well (close flow valve). d. Vent CO_2 from surface facilities. e. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 9. Review seismic and operational data. 10. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage[4]	1. Initiate shutdown plan. 2. Shut in well (close flow valve) 3. Vent CO_2 from surface facilities

[4] Onset of damage is defined as cosmetic damage to structures, such as bricks dislodged from chimneys and parapet walls, broken windows, and fallen objects from walls, shelves, and cabinets.

Operating State	Threshold Condition[1,2]	Response Action[3]
	Seismic event >M3.5	4. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 5. Limit access to wellhead to authorized personnel only. 6. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 7. 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). 8. Determine if leaks to ground water or surface water occurred. 9. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Initiate shutdown plan. c. Shut in well (close flow valve). d. Vent CO_2 from surface facilities. e. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 10. Review seismic and operational data. 11. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.

The process by which seismic data are acquired, transmitted, processed, and evaluated by One Earth Sequestration, LLC to support the process include the following;

1. Seismic data is recorded in real time from all stations.
2. Data from specific stations is transferred to a central data acquisition system where it is processed to determine the magnitude of the seismic event.
3. An email alert notification is sent out for events with magnitudes greater than M1.0.
4. If the seismic activity results in the site's operational state escalating above yellow, additional data from remote seismic stations will be retrieved.
5. The seismic data will undergo additional processing to refine the magnitude and determine the location of the event(s).
6. The data will be evaluated by subject matter experts and a report of findings and recommendations will be issued within 25 business days.

Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP. The injection well, the CO_2 plume, and most of the AoR are in rural McLean County and Ford County. The AoR extends into Champaign County to the southeast (**Figure 1**). Therefore, county emergency responders (as well as state agencies) may need to be notified in the event of an emergency.

Site personnel to be notified (not listed in order of notification):

1. One Earth Sequestration, LLC (VP Technology and Special Projects)
2. One Earth Energy (Safety Manager)
3. One Earth Energy (Environmental Manager)
4. One Earth Energy (Operations Manager)
5. One Earth Energy (CEO)
6. REX American Resources (CEO)

A site-specific emergency contact list will be developed and maintained during the life of the project. One Earth Sequestration, LLC will provide the current site-specific emergency contact list to the UIC Program Director. A list of emergency contacts in included in **Table 4**.

Table 4. *Local authorities and other emergency contacts.*

Agency	Phone No.
City of Gibson City Police Department	217-424-2711
City of Gibson City	217-424-2811
Ford County Sheriff	217-379-2324
McLean County Sheriff	309-888-5034
Champaign County Sheriff	217-384-1204
Illinois State Police	217-786-7107
Illinois Emergency Management Agency	800-782-7860
Ford County Emergency Management Agency	217-379-9415
McLean County Emergency Management Agency	309-888-5020
Champaign County Emergency Management Agency	217-384-3826
Bodine Environmental Services	800-637-2379
UIC Program Director (US EPA Region V)	312-353-7648
US EPA National Response Center (24 hr.)	800-424-8802

Equipment needed in the event of an emergency and remedial response will vary, depending on the triggering emergency event. Response actions (cessation of injection, well shut-in, and evacuation) will generally not require specialized equipment to implement. Where specialized equipment (such

as a drilling rig or logging equipment) is required, the designated SubcontractorProject Manager shall be responsible for its procurement.

Emergency Communications Plan

One Earth Sequestration, LLC will communicate to the public about any event that requires an emergency response, inconsultation with the UIC Program Director.

In the event of an emergency requiring outside assistance, the project contact lead or Vice President shall call the One Earth Energy control room at (217) 784-5321 and the One Earth Energy CEO at (217) 781-4284.

- Emergency communications with the public will be handled by One Earth Energy CEO or One Earth Sequestration, LLC Vice President.
- One Earth Sequestration, LLC Vice President, in consultation with the UIC Program Director, will determine the method, frequency, and extent of public communication based upon the emergency event's severity and impact to the public.
- One Earth Sequestration, LLC Vice President 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 (including any updates, as necessary).
- One Earth Energy CEO or One Earth Sequestration, LLC Vice President will manage all media communications with the public (through either interview, press release, Web posting, or other) in the event of an emergency related to the injection project.
- The individual to be designated by One Earth Sequestration, LLC will be the first contact during an emergency event.
- This individual will contact the crisis communication team as appropriate. Emergency responses to the media from One Earth Sequestration, LLC will be dealt with ONLY by the personnel so designated by One Earth Sequestration, LLC.
- Those individuals should try to be reachable 24 hours a day for contact in the event of an emergency.

If anyone else at One Earth Sequestration, LLC or One Earth Energy is contacted to comment on any situation deemed an "emergency event," the media contact should be directed to One Earth Sequestration, LLC's designated first contact at the 24/7 contact number provided.

Plan Review

This ERRP shall be reviewed:

- At least once every five (5) years following its approval by the permitting agency.
- Within one (1) year of an area of review (AOR) reevaluation.
- Within six (6) 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, One Earth Sequestration, LLC will provide the permitting agency with the documentation supporting the "no amendment necessary" determination.

If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the permitting agency within six (6) months following an event that initiates the ERRP review procedure.

Staff Training and Exercise Procedures

One Earth Sequestration, LLC will integrate the ERRP into the plant specific standard operating procedures and training program as described in the FRP entitled Facility Response Plan "*Self-Inspection. Drills/Exercises, and Response Training"* Periodic training will be provided, not less than annually, to well operators, plant safety and environmental personnel, all managers, and designated media communications. The training plan will document that the above listed personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.

References

National Research Council. 2013. *Induced Seismicity Potential in Energy Technologies*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13355.

Zoback, Mark D. and Steven M. Gorelick, 2012. *Earthquake triggering and large-scale geologic storage of carbon dioxide*. Edited by Pamela A. Matson, Stanford University, Stanford, CA, and approved May 4, 2012 (received for review March 27, 2012) June 18, 2012 https://doi.org/10.1073/pnas.1202473109

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40 CFR 146.94(a)

One Earth CCS

Facility Information

Facility name:	One Earth Sequestration, LLC OES #2
Facility contact:	Mark Ditsworth, VP of Technology and Special Projects, One Earth Sequestration, LLC, 202 N Jordan Drive, Gibson City, IL. 60936, (217) 784-5321 ext. 215 An additional list of facility contacts will be developed and maintained during the life of the project.
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The location and design of the CO_2 pipeline from the ethanol plant to the injection wells has not been determined.

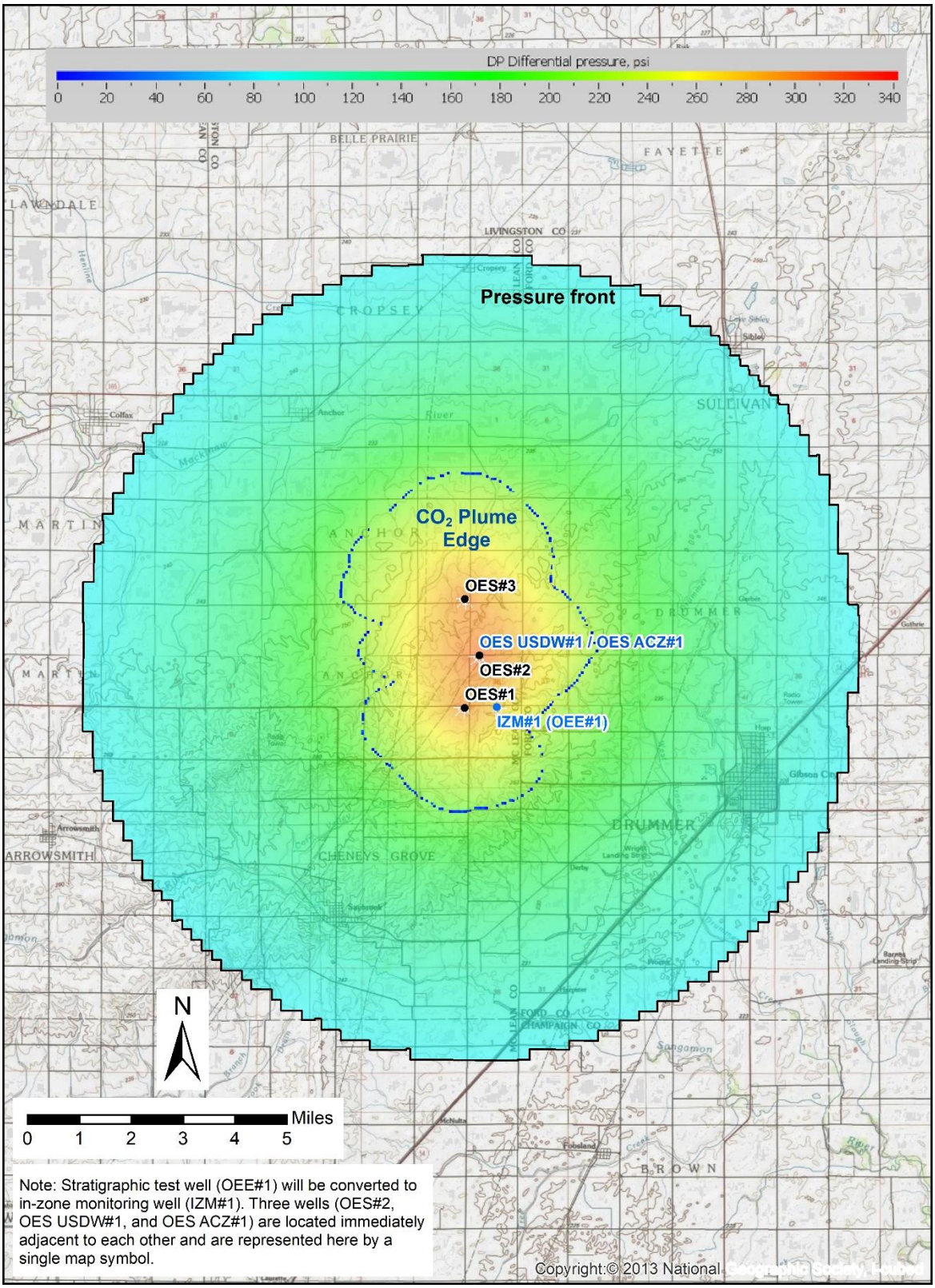

Figure 1. *One Earth CCS Area of Review*

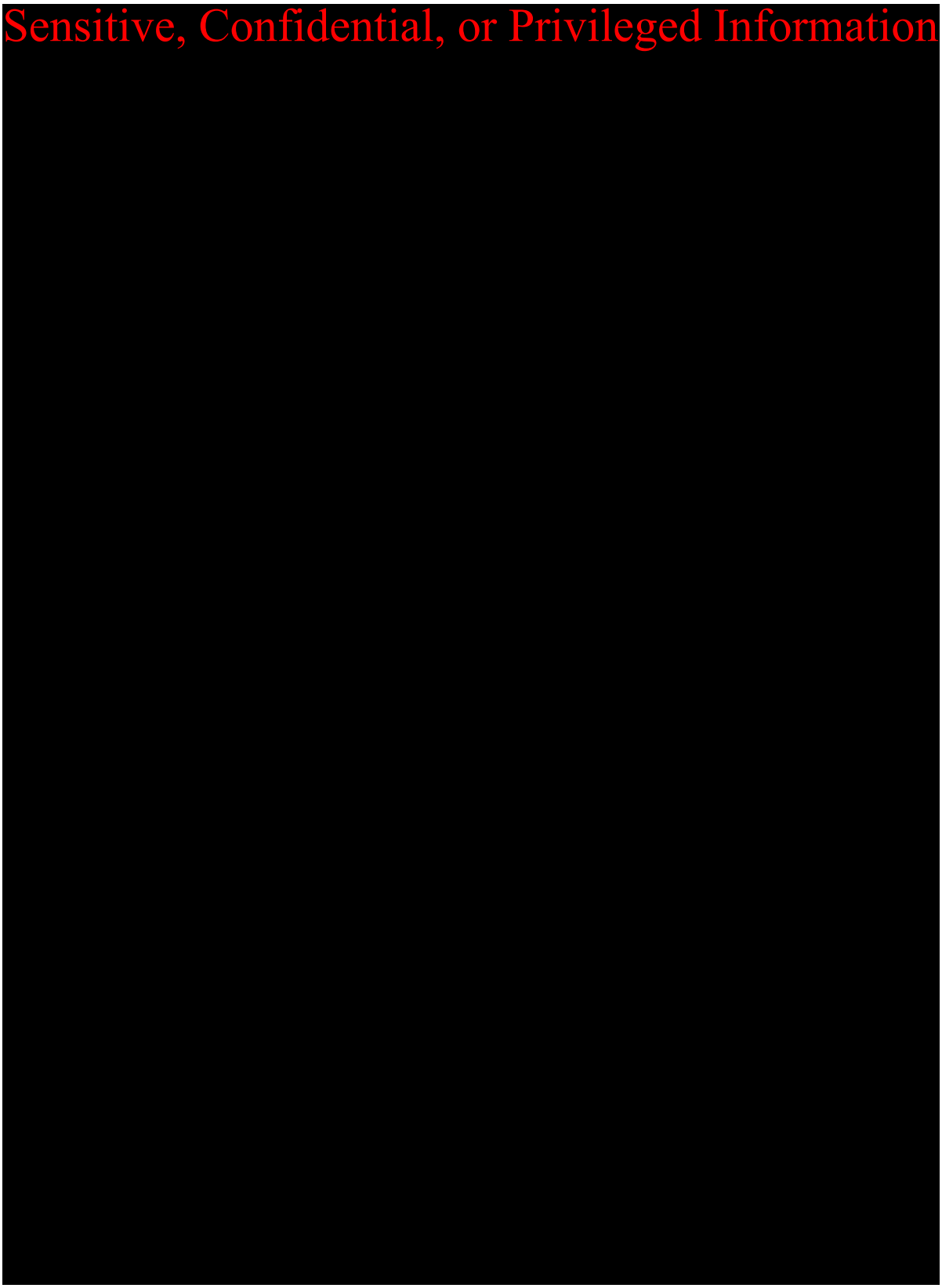

Figure 2. *Potable water well locations within AoR.*

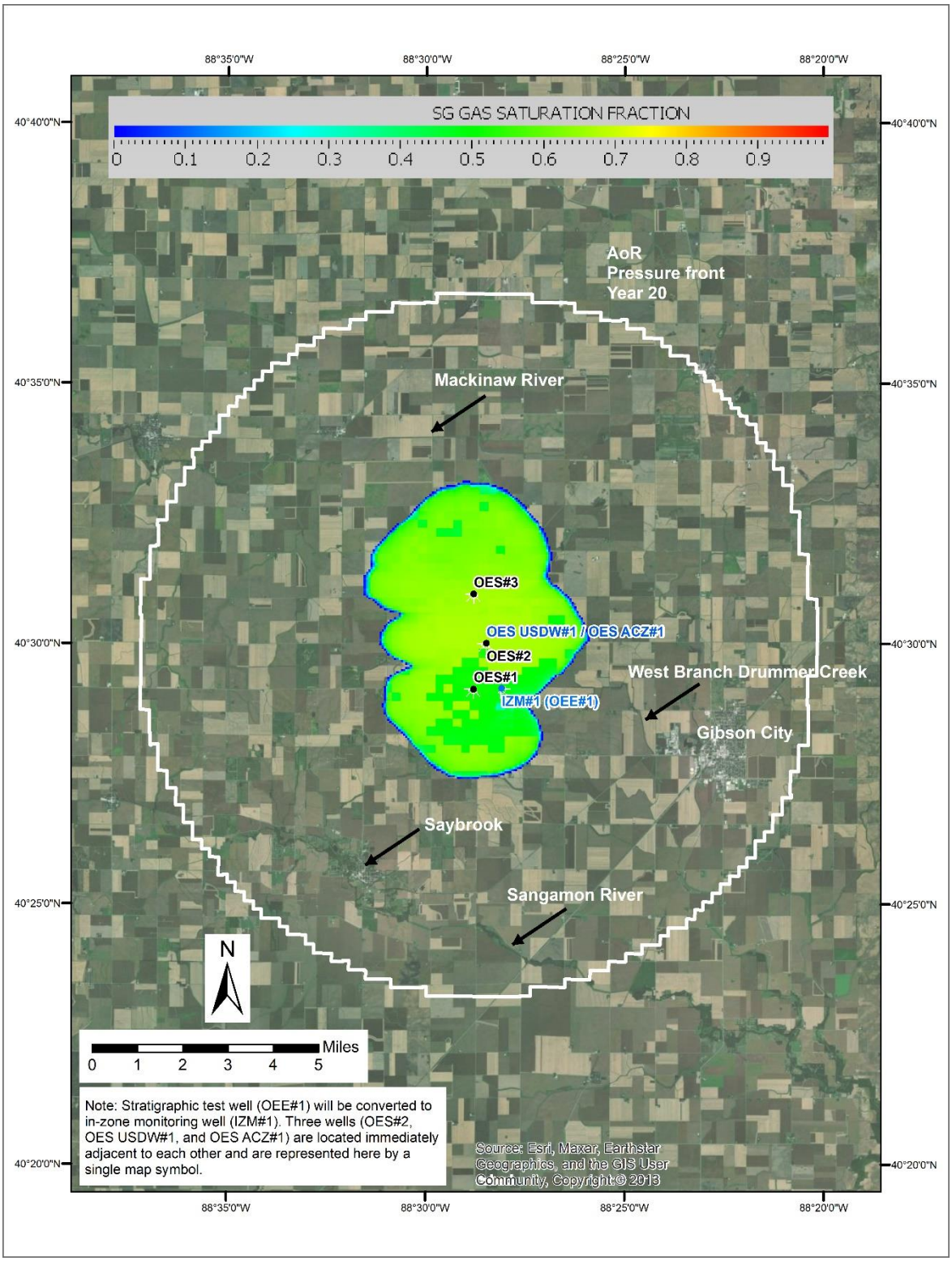

Figure 3. *Aerial photo with AoR. Note that primary land use is agricultural. Named surface water features and communities located within the AoR are identified.*

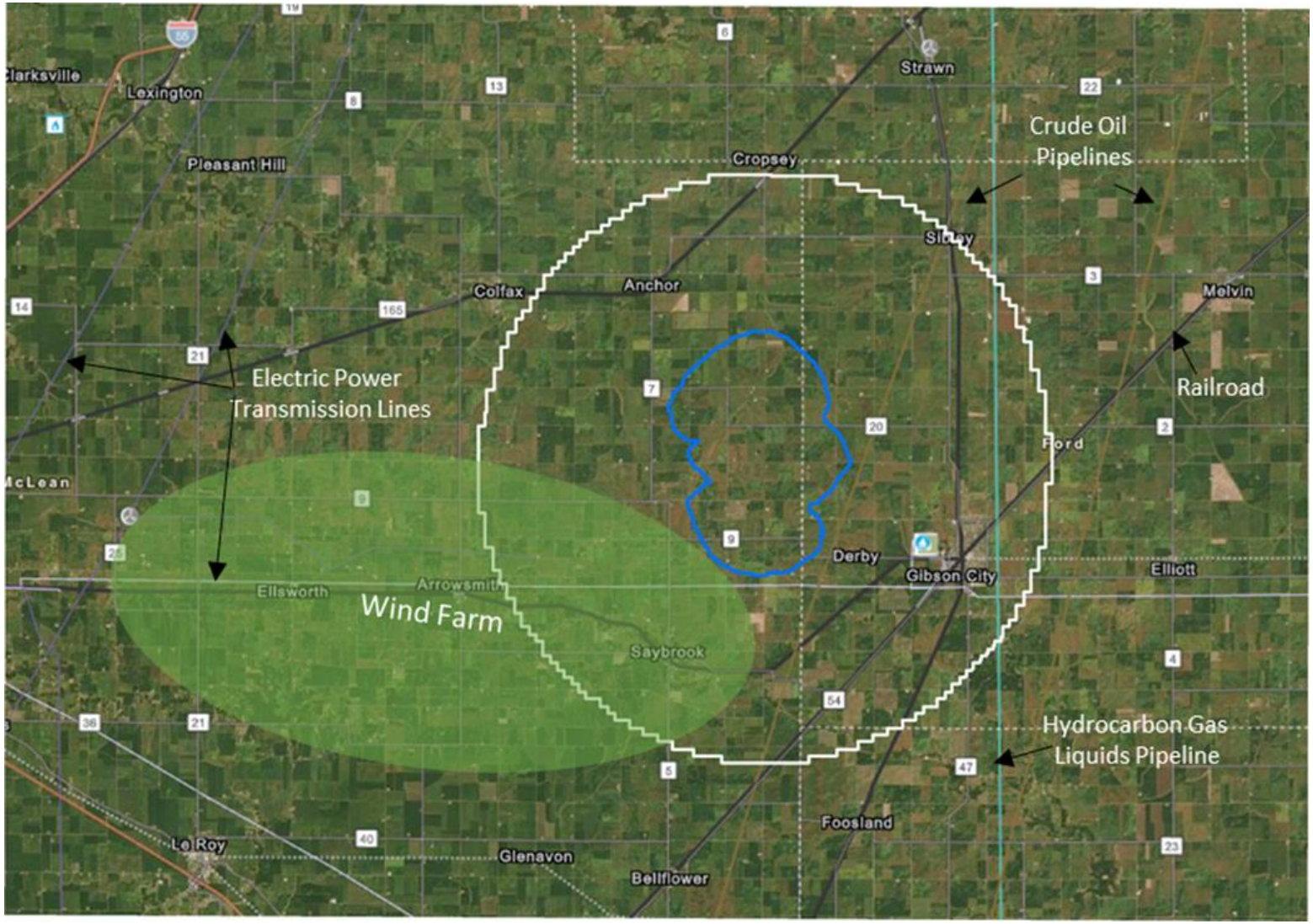

Figure 4. *Other infrastructure. Information is from U.S. Energy Information Administration (EIA) website (https://atlas.eia.gov). Note CO_2 plume (in blue) and AoR (white) outlines have been generalized.*

Potential Risk Scenarios

The following events related to the One Earth CCS project 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.).
- A natural disaster (e.g., earthquake, tornado, lightning strike).
- Fluid (e.g., brine) leakage to a USDW.
- CO_2 leakage to USDW or land surface; or
- Induced seismic event.

Response actions will depend on the severity of the event(s) triggering an emergency response. "Emergency events" are categorized as shown in **Table 1**.

***Table 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.

In the event of an emergency requiring cessation of injection, CO_2 slated for injection may be released to the atmosphere.

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 and discussed in the following sections. The order of notification for an event is shown in **Table 2**.

***Table 2.** In the event of an emergency requiring outside assistance, the lead contact shall call the One Earth Sequestration, LLC control room at (217) 784-5321, option 1 and One Earth Sequestration, LLC, Vice President at (217) 766-3252.*

CALL ORDER	CONTACT INFORMATION	PHONE NUMBER
1	Control Room	(217) 784-5321- #1
2	Vice President	(217) 766-3252
3	USEPA UIC Program Director (within 24 hrs.)	(312)-353-6288

Well Integrity Failure

Integrity loss of the injection well and/or verification well may endanger USDWs. Integrity loss may have occurred if the following events occur:

- Automatic shutdown devices are activated:
    - Wellhead pressure exceeds the specified shutdown pressure specified in the permit.
    - Annulus pressure indicates a loss of external or internal well containment.
    - ***One Earth Sequestration, LLC is required to notify the UIC Program Director within 24 hours (40 CFR 146.91(c)(3) of <u>any triggering</u> of a shut-off system (i.e., down-hole or at the surface).***
- Mechanical integrity test results identify a loss of mechanical integrity.
- Response actions:
    - Immediately notify the One Earth Sequestration, LLC Vice President or designee.
    - Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
    - The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
    - Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
    - For a Major or Serious emergency:
        - Initiate shutdown plan.
        - Shut in well (close flow valve).
        - Vent CO_2 from surface facilities
        - Restrict access to wellhead to authorized and emergency personnel only.
        - Initiate communications plan.
        - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).
        - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the 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.
        - Shut in well (close flow valve).
        - Vent CO_2 from surface facilities.

- Reset automatic shutdown devices.
- Monitor well pressure, temperature, and annulus pressure to verify cause and extent of emergency; identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

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.

Response actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- For a Major or Serious emergency:
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized and emergency personnel only.
    - Communicate with One Earth Sequestration, LLC and One Earth Energy LLC personnel and local authorities to initiate evacuation plans, as necessary.
    - Monitor well pressure, temperature, and annulus pressure to determine the cause and extent of failure.
    - Identify and, if necessary, implement appropriate remedial actions (in consultation with the 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.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Reset automatic shutdown devices.

- Monitor well pressure, temperature, and annulus pressure to determine cause and extent of emergency.
- Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

Potential Brine or CO_2 Leakage to USDW

Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence of fluid (brine) or CO_2 leakage into a USDW.

Response Actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- For all Emergencies (Major, Serious, or Minor)
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Collect confirmation sample(s) of groundwater and analyze for indicator parameters. (Potential indicators are listed in the Testing and Monitoring Plan.)
    - If the presence of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan to:
        - Install additional groundwater monitoring points near the impacted groundwater well(s) to delineate the extent of impact; and
        - Remediate unacceptable impacts to the impacted USDW.
    - Arrange for an alternate potable water supply, if the USDW was being utilized and has been caused to exceed drinking water standards.
    - Proceed with efforts to remediate USDW to mitigate any unsafe conditions (e.g., install system to intercept/extract brine or CO_2 or "pump and treat" to aerate CO_2-laden water).
    - Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by One Earth Sequestration, LLC and the UIC Program Director) until unacceptable adverse USDW impact has been fully addressed.

Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise because of a natural disaster affecting the normal operation of the injection well(s). An earthquake may disturb surface and/or subsurface facilities; and weather-related disasters (e.g., tornado or lightning strike) may affect surface facilities.

Response actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event,per 40 CFR 146.91(c). The plant superintendent will make an initial assessment of the situation and determine which other project personnel tonotify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major or Serious emergency:
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized and emergency personnel only
    - Communicate with One Earth Sequestration, LLC and One Earth Energy LLC personnel and local authorities to initiate evacuation plans, as necessary.
    - Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure.
    - Determine if any leaks to groundwater or surface water occurred
    - If contamination or endangerment is detected, identify and implement appropriate remedial actions (in consultation with the 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.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized personnel only.
    - Monitor well pressure, temperature, and annulus pressure to verifyintegrity loss and determine the cause and extent of any failure.
    - Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

Induced Seismic Event

Induced seismic events typically refer to minor seismic events that are caused by human activity that alters the stresses and fluid pressures in the earth's crust. Induced seismicity could potentially result from the injection of fluids into subsurface formations that lubricate and or change the stress state of pre-existing faults which causes fault plane movement and energy release. Most induced seismic events are extremely small but in some instances are great enough to be felt by humans.

A tiered approach and response will be taken based on event magnitude and proximity to the storage site.

After a seismic event has been identified, a decision must be made regarding the level of impact a given event could have on storage site operations, whether a response is required, and what the appropriate response will be. This decision and response framework will consist of an automated event location and magnitude determination, followed by an alert for a technical review to reduce the likelihood of false positives.

To monitor the area for seismicity, distributed acoustic sensors (DAS) will be installed in each injection well and the in-zone monitoring well(s). The acoustic sensors are fiber optic and will terminate above the perforated zone of each well. In addition, a permanent geophysical array is under consideration for installation at the One Earth CCS project site. The design and deployment of the permanent array is to be determined. The seismic monitoring program is presented in more detail in the Testing and Monitoring Plan. Baseline seismic data will be acquired for six months prior to the start of injection operations. Triggered seismic event data will be processed to provide magnitude and location information on a real-time basis and results will be reviewed by a data processor on a daily basis.

Identification of events with sufficient magnitude or that are in a sensitive area (caprock) should be used as input for decisions that guide the adaptive strategy. Seismic events that affect the operations of CO_2 injection can be divided into two groups/tiers:

1) events that create felt seismicity at the surface and may lead to public concern or structural damage.
2) events not included in group one, but that might indicate failure or impending failure of the caprock. The operational protocol for responding to events in group one (Tier I) will follow a "traffic light" approach (modified after Zoback 2012; National Research Council 2013) that uses three operational states.

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

In the following table (**Table 3**) the One Earth CCS project's seismic monitoring protocol is presented. The table corresponds each level of operating state with the threshold conditions and operational response actions.

Table 3. *Seismic monitoring system, for seismic events > M1.0 with an epicenter within an 8-mile radius of the injection well.*

Operating State	Threshold Condition[1,2]	Response Action[3]
Green	Seismic events less than or equal to M1.5	1. Continue normal operation within permitted levels.
Yellow	Five (5) or more seismic events within a 30-day period having a magnitude greater than M1.5 but less than or equal to M2.0	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications of the operating status of the well.
Orange	Seismic event greater than M1.5 and local observation or felt report Seismic event greater than M2.0 and no felt report	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 3. Review seismic and operational data. 4. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.

[1] Specified magnitudes refer to magnitudes determined by local One Earth CCS project's seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network.

[2] "Felt report" and "local observation and report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.

[3] Reporting findings to the UIC Program Director and issuing corrective action will occur within 25 business days (five weeks) of change in operating state.

Operating State	Threshold Condition[1,2]	Response Action[3]
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan. 2. Vent CO_2 from surface facilities. 3. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 4. Limit access to wellhead to authorized personnel only. 5. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 6. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 7. Determine if leaks to ground water or surface water occurred. 8. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Initiate shutdown plan. c. Shut in well (close flow valve). d. Vent CO_2 from surface facilities. e. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 9. Review seismic and operational data. 10. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage[4]	1. Initiate shutdown plan. 2. Shut in well (close flow valve) 3. Vent CO_2 from surface facilities

[4] Onset of damage is defined as cosmetic damage to structures, such as bricks dislodged from chimneys and parapet walls, broken windows, and fallen objects from walls, shelves, and cabinets.

Operating State	Threshold Condition[1,2]	Response Action[3]
	Seismic event >M3.5	4. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 5. Limit access to wellhead to authorized personnel only. 6. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 7. 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). 8. Determine if leaks to ground water or surface water occurred. 9. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Initiate shutdown plan. c. Shut in well (close flow valve). d. Vent CO_2 from surface facilities. e. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 10. Review seismic and operational data. 11. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.

The process by which seismic data are acquired, transmitted, processed, and evaluated by One Earth Sequestration, LLC to support the process include the following;

1. Seismic data is recorded in real time from all stations.
2. Data from specific stations is transferred to a central data acquisition system where it is processed to determine the magnitude of the seismic event.
3. An email alert notification is sent out for events with magnitudes greater than M1.0.
4. If the seismic activity results in the site's operational state escalating above yellow, additional data from remote seismic stations will be retrieved.
5. The seismic data will undergo additional processing to refine the magnitude and determine the location of the event(s).
6. The data will be evaluated by subject matter experts and a report of findings and recommendations will be issued within 25 business days.

Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP. The injection well, the CO_2 plume, and most of the AoR are in rural McLean County and Ford County. The AoR extends into Champaign County to the southeast (**Figure 1**). Therefore, county emergency responders (as well as state agencies) may need to be notified in the event of an emergency.

Site personnel to be notified (not listed in order of notification):

1. One Earth Sequestration, LLC (VP Technology and Special Projects)
2. One Earth Energy (Safety Manager)
3. One Earth Energy (Environmental Manager)
4. One Earth Energy (Operations Manager)
5. One Earth Energy (CEO)
6. REX American Resources (CEO)

A site-specific emergency contact list will be developed and maintained during the life of the project. One Earth Sequestration, LLC will provide the current site-specific emergency contact list to the UIC Program Director. A list of emergency contacts in included in **Table 4**.

***Table 4**. Local authorities and other emergency contacts.*

Agency	Phone No.
City of Gibson City Police Department	217-424-2711
City of Gibson City	217-424-2811
Ford County Sheriff	217-379-2324
McLean County Sheriff	309-888-5034
Champaign County Sheriff	217-384-1204
Illinois State Police	217-786-7107
Illinois Emergency Management Agency	800-782-7860
Ford County Emergency Management Agency	217-379-9415
McLean County Emergency Management Agency	309-888-5020
Champaign County Emergency Management Agency	217-384-3826
Bodine Environmental Services	800-637-2379
UIC Program Director (US EPA Region V)	312-353-7648
US EPA National Response Center (24 hr.)	800-424-8802

Equipment needed in the event of an emergency and remedial response will vary, depending on the triggering emergency event. Response actions (cessation of injection, well shut-in, and evacuation) will generally not require specialized equipment to implement. Where specialized equipment (such

as a drilling rig or logging equipment) is required, the designated SubcontractorProject Manager shall be responsible for its procurement.

Emergency Communications Plan

One Earth Sequestration, LLC will communicate to the public about any event that requires an emergency response, inconsultation with the UIC Program Director.

In the event of an emergency requiring outside assistance, the project contact lead or Vice President shall call the One Earth Energy control room at (217) 784-5321 and the One Earth Energy CEO at (217) 781-4284.

- Emergency communications with the public will be handled by One Earth Energy CEO or One Earth Sequestration, LLC Vice President.
- One Earth Sequestration, LLC Vice President, in consultation with the UIC Program Director, will determine the method, frequency, and extent of public communication based upon the emergency event's severity and impact to the public.
- One Earth Sequestration, LLC Vice President 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 (including any updates, as necessary).
- One Earth Energy CEO or One Earth Sequestration, LLC Vice President will manage all media communications with the public (through either interview, press release, Web posting, or other) in the event of an emergency related to the injection project.
- The individual to be designated by One Earth Sequestration, LLC will be the first contact during an emergency event.
- This individual will contact the crisis communication team as appropriate. Emergency responses to the media from One Earth Sequestration, LLC will be dealt with ONLY by the personnel so designated by One Earth Sequestration, LLC
- Those individuals should try to be reachable 24 hours a day for contact in the event of an emergency.

If anyone else at One Earth Sequestration, LLC or One Earth Energy is contacted to comment on any situation deemed an "emergency event," the media contact should be directed to One Earth Sequestration, LLC's designated first contact at the 24/7 contact number provided.

Plan Review

This ERRP shall be reviewed:

- At least once every five (5) years following its approval by the permitting agency.
- Within one (1) year of an area of review (AOR) reevaluation.
- Within six (6) 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, One Earth Sequestration, LLC will provide the permitting agency with the documentation supporting the "no amendment necessary" determination.

If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the permitting agency within six (6) months following an event that initiates the ERRP review procedure.

Staff Training and Exercise Procedures

One Earth Sequestration, LLC will integrate the ERRP into the plant specific standard operating procedures and training program as described in the FRP entitled Facility Response Plan "*Self-Inspection. Drills/Exercises, and Response Training"* Periodic training will be provided, not less than annually, to well operators, plant safety and environmental personnel, all managers, and designated media communications. The training plan will document that the above listed personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.

References

National Research Council. 2013. *Induced Seismicity Potential in Energy Technologies*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13355.

Zoback, Mark D. and Steven M. Gorelick, 2012. *Earthquake triggering and large-scale geologic storage of carbon dioxide*. Edited by Pamela A. Matson, Stanford University, Stanford, CA, and approved May 4, 2012 (received for review March 27, 2012) June 18, 2012 https://doi.org/10.1073/pnas.1202473109

EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)

One Earth CCS

Facility Information

Facility name:	One Earth Sequestration, LLC OES #3
Facility contact:	Mark Ditsworth, VP of Technology and Special Projects, One Earth Sequestration, LLC, 202 N Jordan Drive, Gibson City, IL. 60936, (217) 784-5321 ext. 215 An additional list of facility contacts will be developed and maintained during the life of the project.
Well location:	McLean County, IL 40.515829°N, -88.479947°W, (NAD 1983)

This plan is provided to meet the requirements of 40 CFR 146.94. The Emergency and Remedial Response Plan (ERRP) describes actions the owner/operator (One Earth Sequestration, LLC) will take in the unlikely event of an emergency within the project Area of Review (AoR) during construction, operation, or post-injection site care. Unexpected events may include unplanned CO_2 release or detection of unexpected CO_2 movement or associated fluids in or from the injection zone. This plan demonstrates how One Earth Sequestration, LLC will comply with 40 CFR 146.94. The AoR is shown in **Figure 1**.

This ERRP describes actions that One Earth Sequestration, LLC shall take to address movement of the injection fluid or formation fluid in a manner that may endanger an underground source of drinking water (USDW) during the construction, operation, or post-injection site care periods.

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

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

Where the phrase "initiate shutdown plan" is used, the following protocol will be employed: One Earth Sequestration, LLC will immediately cease injection. However, in some circumstances, One Earth Sequestration, LLC will, in consultation with the UIC Program Director, determine whether

gradual cessation of injection (using the parameters set forth in the Summary of Requirements of the Class VI permit) is appropriate.

Local Resources and Infrastructure

Hydrologic resources in the vicinity of the One Earth CCS injection wells that may be impacted because of an emergency event at the project site include: underground sources of drinking water (USDWs) and potable water wells **Figure 2**). Within the AoR, the lowermost USDW is the St. Peter sandstone. Most local domestic potable water supplies are derived from the shallow unconfined aquifer (<250 feet below ground surface (bgs). There is no known development of the St. Peter aquifer within the AoR.

The land within the AoR is used primarily for agriculture (**Figure 3**). Gibson City and Saybrook are two communities within the AoR. Residences and farm-related buildings are scattered across the land surface, particularly along roads.

Surface water features such as creeks, streams, and impoundments formed by small earthen dams are present in the area. This includes the West Branch Drummer Creek. The Mackinaw River and the Sangamon River are situated outside of the AoR. **Figure 3** shows the major surface water features within the AoR. **Figure 2** shows additional surface features in the survey area.

Figure 4 shows transportation and utility infrastructure in the AoR and adjacent area. There are no major highways within the AoR. Transportation infrastructure includes a railroad line through Gibson City, several state routes, and paved and unpaved rural routes. Other infrastructure includes several hydrocarbon transmission lines, electric power transmission lines, and a wind farm.

The location and design of the CO_2 pipeline from the ethanol plant to the injection wells has not been determined.

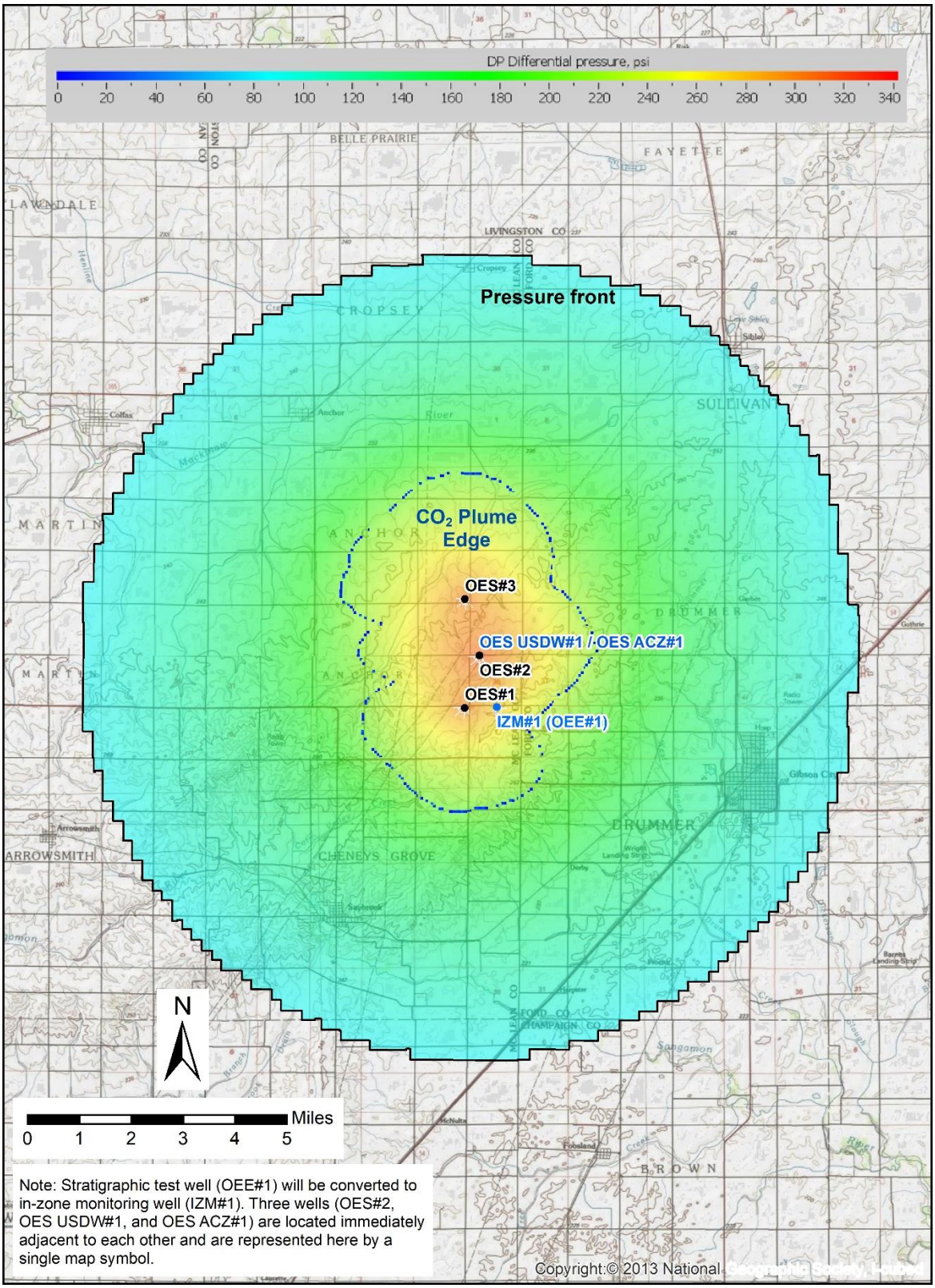

Figure 1. *One Earth CCS Area of Review*

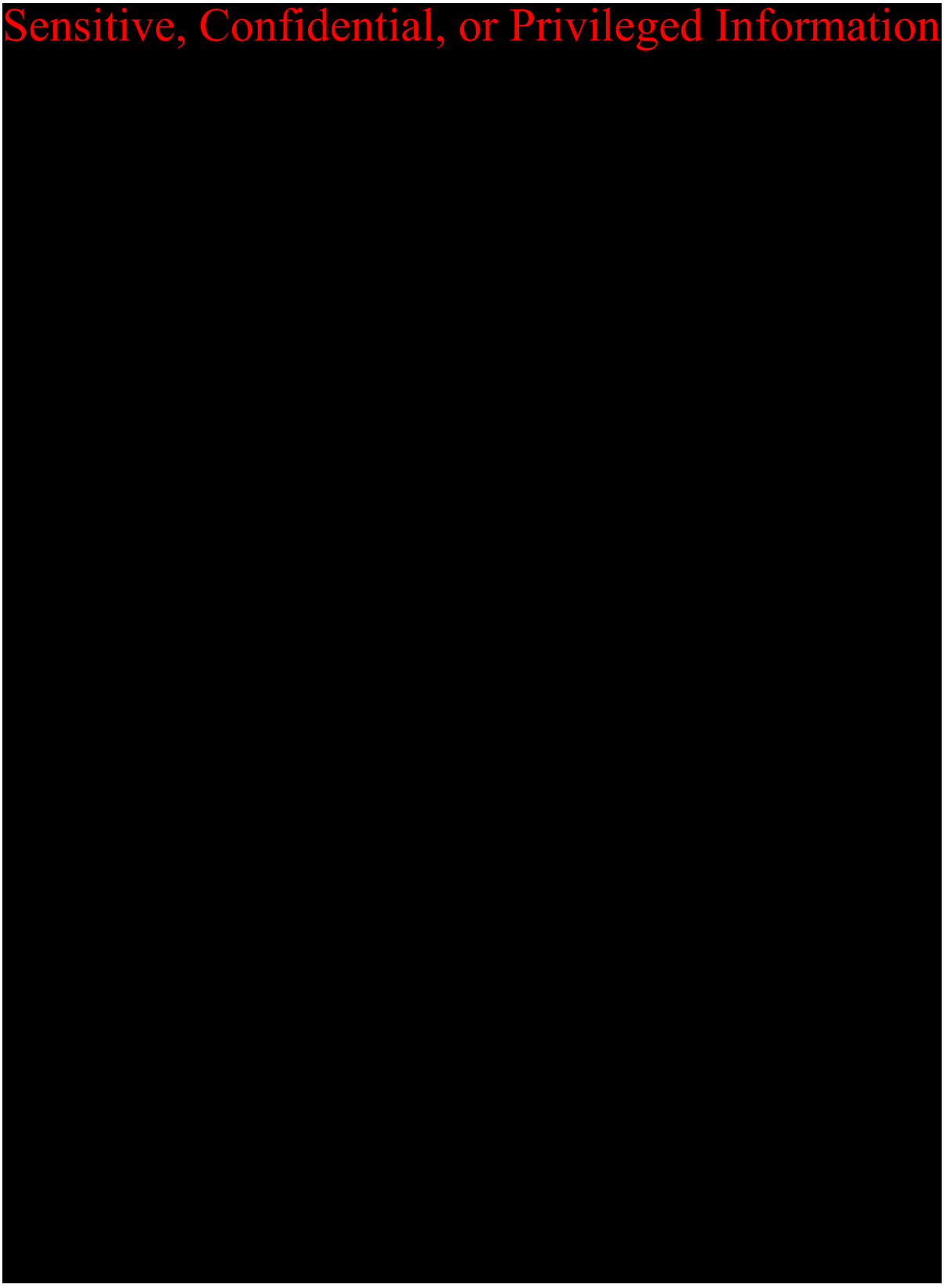

Figure 2. *Potable water well locations within AoR.*

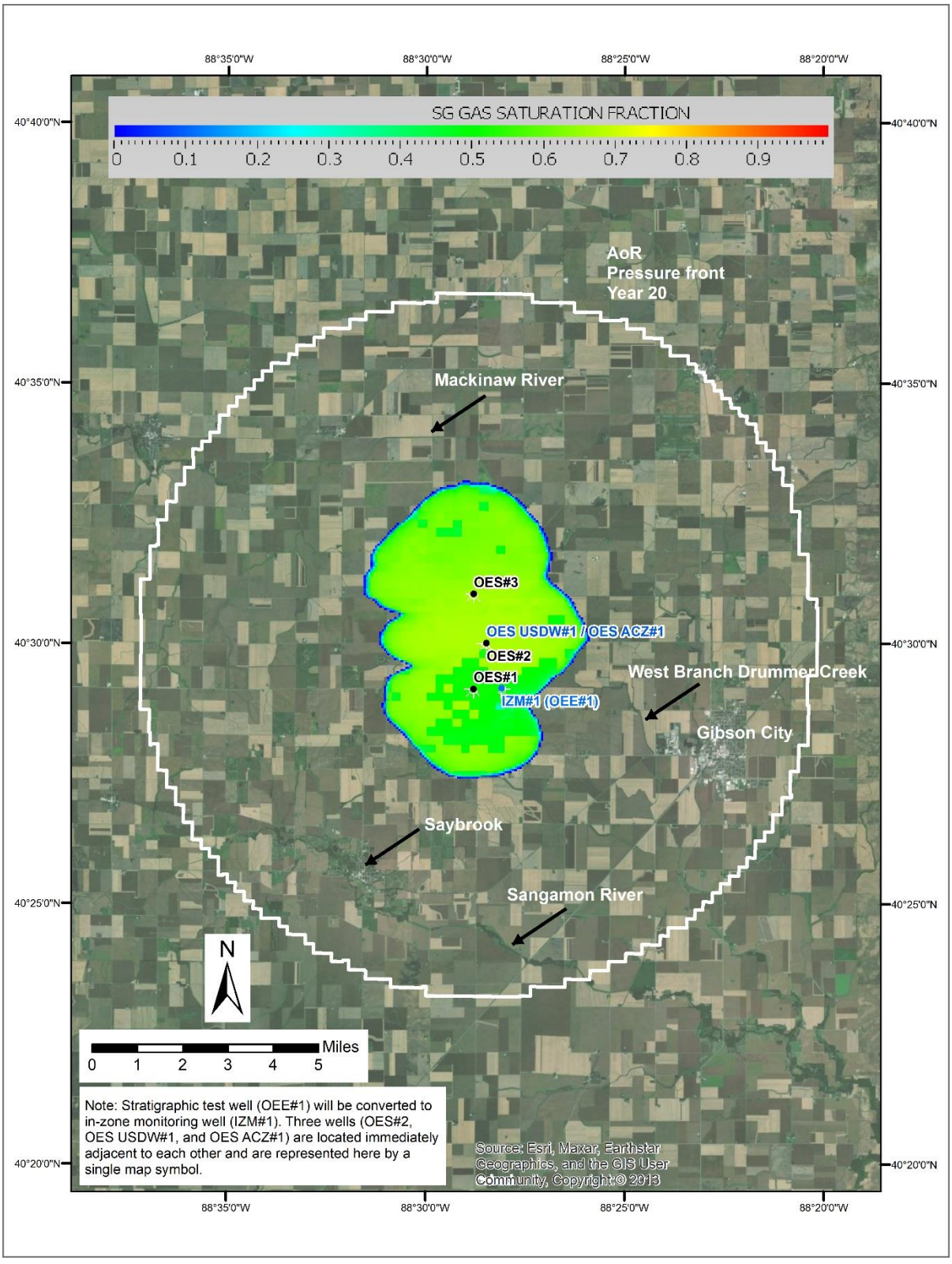

Figure 3. *Aerial photo with AoR. Note that primary land use is agricultural. Named surface water features and communities located within the AoR are identified.*

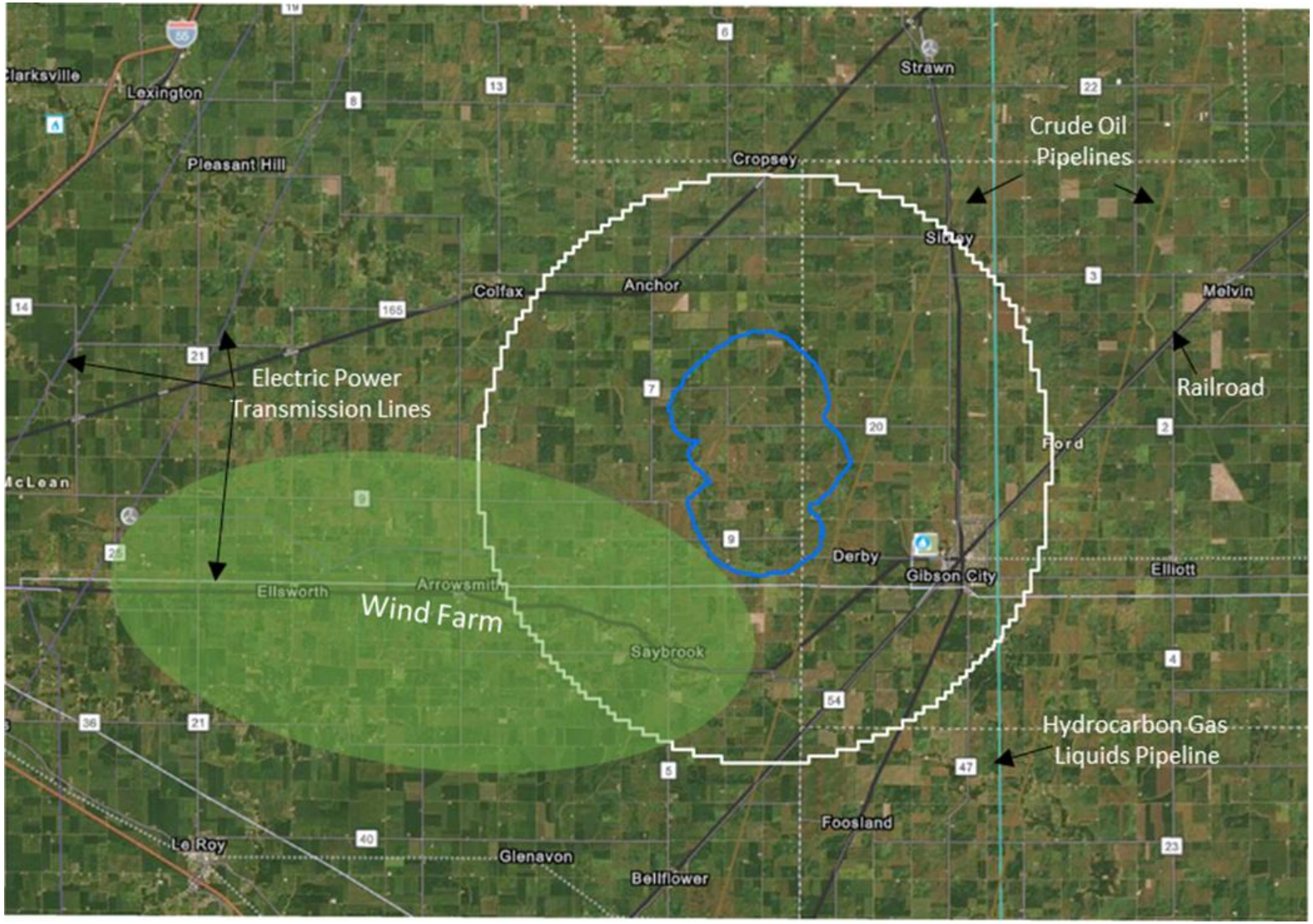

Figure 4. *Other infrastructure. Information is from U.S. Energy Information Administration (EIA) website (https://atlas.eia.gov). Note CO_2 plume (in blue) and AoR (white) outlines have been generalized.*

Potential Risk Scenarios

The following events related to the One Earth CCS project 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.).
- A natural disaster (e.g., earthquake, tornado, lightning strike).
- Fluid (e.g., brine) leakage to a USDW.
- CO_2 leakage to USDW or land surface; or
- Induced seismic event.

Response actions will depend on the severity of the event(s) triggering an emergency response. "Emergency events" are categorized as shown in **Table 1**.

***Table 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.

In the event of an emergency requiring cessation of injection, CO_2 slated for injection may be released to the atmosphere.

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 and discussed in the following sections. The order of notification for an event is shown in **Table 2**.

***Table 2.** In the event of an emergency requiring outside assistance, the lead contact shall call the One Earth Sequestration II, LLC control room at (217) 784-5321, option 1 and One Earth Sequestration, LLC, Vice President at (217) 766-3252.*

CALL ORDER	CONTACT INFORMATION	PHONE NUMBER
1	Control Room	(217) 784-5321- #1
2	Vice President	(217) 766-3252
3	USEPA UIC Program Director (within 24 hrs.)	(312)-353-6288

Well Integrity Failure

Integrity loss of the injection well and/or verification well may endanger USDWs. Integrity loss may have occurred if the following events occur:

- Automatic shutdown devices are activated:
    - Wellhead pressure exceeds the specified shutdown pressure specified in the permit.
    - Annulus pressure indicates a loss of external or internal well containment.
    - ***One Earth Sequestration, LLC is required to notify the UIC Program Director within 24 hours (40 CFR 146.91(c)(3) of <u>any triggering</u> of a shut-off system (i.e., down-hole or at the surface).***
- Mechanical integrity test results identify a loss of mechanical integrity.
- Response actions:
    - Immediately notify the One Earth Sequestration, LLC Vice President or designee.
    - Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c). Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
    - The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
    - Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
    - For a Major or Serious emergency:
        - Initiate shutdown plan.
        - Shut in well (close flow valve).
        - Vent CO_2 from surface facilities.
        - Restrict access to wellhead to authorized and emergency personnel only.
        - Initiate communications plan.
        - Monitor well pressure, temperature, and annulus pressure to verify integrity loss and determine the cause and extent of failure; identify and implement appropriate remedial actions to repair damage to the well (in consultation with the UIC Program Director).
        - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the 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.
        - Shut in well (close flow valve).
        - Vent CO_2 from surface facilities.

- Reset automatic shutdown devices.
- Monitor well pressure, temperature, and annulus pressure to verify cause and extent of emergency; identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

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.

Response actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- For a Major or Serious emergency:
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized and emergency personnel only.
    - Communicate with One Earth Sequestration, LLC and One Earth Energy LLC personnel and local authorities to initiate evacuation plans, as necessary.
    - Monitor well pressure, temperature, and annulus pressure to determine the cause and extent of failure.
    - Identify and, if necessary, implement appropriate remedial actions (in consultation with the 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.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Reset automatic shutdown devices.

- Monitor well pressure, temperature, and annulus pressure to determine cause and extent of emergency.
- Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

Potential Brine or CO_2 Leakage to USDW

Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence of fluid (brine) or CO_2 leakage into a USDW.

Response Actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- The Vice President will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- For all Emergencies (Major, Serious, or Minor)
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Collect confirmation sample(s) of groundwater and analyze for indicator parameters. (Potential indicators are listed in the Testing and Monitoring Plan.)
    - If the presence of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan to:
        - Install additional groundwater monitoring points near the impacted groundwater well(s) to delineate the extent of impact; and
        - Remediate unacceptable impacts to the impacted USDW.
    - Arrange for an alternate potable water supply, if the USDW was being utilized and has been caused to exceed drinking water standards.
    - Proceed with efforts to remediate USDW to mitigate any unsafe conditions (e.g., install system to intercept/extract brine or CO_2 or "pump and treat" to aerate CO_2-laden water).
    - Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by One Earth Sequestration, LLC and the UIC Program Director) until unacceptable adverse USDW impact has been fully addressed.

Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise because of a natural disaster affecting the normal operation of the injection well(s). An earthquake may disturb surface and/or subsurface facilities; and weather-related disasters (e.g., tornado or lightning strike) may affect surface facilities.

Response actions:

- Immediately notify the One Earth Sequestration, LLC Vice President or designee.
- Notify the UIC Program Director within 24 hours of the emergency event,per 40 CFR 146.91(c). The plant superintendent will make an initial assessment of the situation and determine which other project personnel to notify.
- Project contacts will determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major or Serious emergency:
    - Initiate shutdown plan.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized and emergency personnel only.
    - Communicate with One Earth Sequestration, LLC and One Earth Energy LLC personnel and local authorities to initiate evacuation plans, as necessary.
    - Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure.
    - Determine if any leaks to groundwater or surface water occurred
    - If contamination or endangerment is detected, identify, and implement appropriate remedial actions (in consultation with the 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.
    - Shut in well (close flow valve).
    - Vent CO_2 from surface facilities.
    - Limit access to wellhead to authorized personnel only.
    - Monitor well pressure, temperature, and annulus pressure to verifyintegrity loss and determine the cause and extent of any failure.
    - Identify and, if necessary, implement appropriate remedial actions (in consultation with the UIC Program Director).

Induced Seismic Event

Induced seismic events typically refer to minor seismic events that are caused by human activity that alters the stresses and fluid pressures in the earth's crust. Induced seismicity could potentially result from the injection of fluids into subsurface formations that lubricate and or change the stress state of pre-existing faults which causes fault plane movement and energy release. Most induced seismic events are extremely small but in some instances are great enough to be felt by humans.

A tiered approach and response will be taken based on event magnitude and proximity to the storage site.

After a seismic event has been identified, a decision must be made regarding the level of impact a given event could have on storage site operations, whether a response is required, and what the appropriate response will be. This decision and response framework will consist of an automated event location and magnitude determination, followed by an alert for a technical review to reduce the likelihood of false positives.

To monitor the area for seismicity, distributed acoustic sensors (DAS) will be installed in each injection well and the in-zone monitoring well(s). The acoustic sensors are fiber optic and will terminate above the perforated zone of each well. (In addition, a permanent geophysical array is under consideration for installation at the One Earth CCS project site. The design and deployment of the permanent array is to be determined.) The seismic monitoring program is presented in more detail in the Testing and Monitoring Plan. Baseline seismic data will be acquired for six months prior to the start of injection operations. Triggered seismic event data will be processed to provide magnitude and location information on a real-time basis and results will be reviewed by a data processor on a daily basis.

Identification of events with sufficient magnitude or that are in a sensitive area (caprock) should be used as input for decisions that guide the adaptive strategy. Seismic events that affect the operations of CO_2 injection can be divided into two groups/tiers:

1) events that create felt seismicity at the surface and may lead to public concern or structural damage.
2) events not included in group one, but that might indicate failure or impending failure of the caprock. The operational protocol for responding to events in group one (Tier I) will follow a "traffic light" approach (modified after Zoback 2012; National Research Council 2013) that uses three operational states.

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

In the following table (**Table 3**) the One Earth CCS project's seismic monitoring protocol is presented. The table corresponds each level of operating state with the threshold conditions and operational response actions.

Table 3. *Seismic monitoring system, for seismic events > M1.0 with an epicenter within an 8-mile radius of the injection well.*

Operating State	Threshold Condition[1,2]	Response Action[3]
Green	Seismic events less than or equal to M1.5	1. Continue normal operation within permitted levels.
Yellow	Five (5) or more seismic events within a 30-day period having a magnitude greater than M1.5 but less than or equal to M2.0	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications of the operating status of the well.
Orange	Seismic event greater than M1.5 and local observation or felt report Seismic event greater than M2.0 and no felt report	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 3. Review seismic and operational data. 4. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.

[1] Specified magnitudes refer to magnitudes determined by local One Earth CCS project's seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network.

[2] "Felt report" and "local observation and report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.

[3] Reporting findings to the UIC Program Director and issuing corrective action will occur within 25 business days (five weeks) of change in operating state.

Operating State	Threshold Condition[1,2]	Response Action[3]
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan. 2. Vent CO_2 from surface facilities. 3. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 4. Limit access to wellhead to authorized personnel only. 5. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 6. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 7. Determine if leaks to ground water or surface water occurred. 8. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Initiate shutdown plan. c. Shut in well (close flow valve). d. Vent CO_2 from surface facilities. e. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 9. Review seismic and operational data. 10. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage[4]	1. Initiate shutdown plan. 2. Shut in well (close flow valve) 3. Vent CO_2 from surface facilities

[4] Onset of damage is defined as cosmetic damage to structures, such as bricks dislodged from chimneys and parapet walls, broken windows, and fallen objects from walls, shelves, and cabinets.

Operating State	Threshold Condition[1,2]	Response Action[3]
	Seismic event >M3.5	4. Within 24 hours of the incident, notify the UIC Program Director and One Earth Sequestration, LLC communications, of the operating status of the well. 5. Limit access to wellhead to authorized personnel only. 6. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 7. 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). 8. Determine if leaks to ground water or surface water occurred. 9. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. b. Initiate shutdown plan. c. Shut in well (close flow valve). d. Vent CO_2 from surface facilities. e. Identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 10. Review seismic and operational data. 11. Report findings to the UIC Program Director and issue corrective actions within 25 business days (five weeks) of change in operating state.

The process by which seismic data are acquired, transmitted, processed, and evaluated by One Earth Sequestration, LLC to support the process include the following;

1. Seismic data is recorded in real time from all stations.
2. Data from specific stations is transferred to a central data acquisition system where it is processed to determine the magnitude of the seismic event.
3. An email alert notification is sent out for events with magnitudes greater than M1.0.
4. If the seismic activity results in the site's operational state escalating above yellow, additional data from remote seismic stations will be retrieved.
5. The seismic data will undergo additional processing to refine the magnitude and determine location of the event(s).
6. The data will be evaluated by subject matter experts and a report of findings and recommendations will be issued within 25 business days.

Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP. The injection well, the CO_2 plume, and most of the AoR are in rural McLean County and Ford County. The AoR extends into Champaign County to the southeast (**Figure 1**). Therefore, county emergency responders (as well as state agencies) may need to be notified in the event of an emergency.

Site personnel to be notified (not listed in order of notification):

1. One Earth Sequestration, LLC (VP Technology and Special Projects)
2. One Earth Energy (Safety Manager)
3. One Earth Energy (Environmental Manager)
4. One Earth Energy (Operations Manager)
5. One Earth Energy (CEO)
6. REX American Resources (CEO)

A site-specific emergency contact list will be developed and maintained during the life of the project. One Earth Sequestration, LLC will provide the current site-specific emergency contact list to the UIC Program Director. A list of emergency contacts in included in **Table 4**.

***Table 4**. Local authorities and other emergency contacts.*

Agency	Phone No.
City of Gibson City Police Department	217-424-2711
City of Gibson City	217-424-2811
Ford County Sheriff	217-379-2324
McLean County Sheriff	309-888-5034
Champaign County Sheriff	217-384-1204
Illinois State Police	217-786-7107
Illinois Emergency Management Agency	800-782-7860
Ford County Emergency Management Agency	217-379-9415
McLean County Emergency Management Agency	309-888-5020
Champaign County Emergency Management Agency	217-384-3826
Bodine Environmental Services	800-637-2379
UIC Program Director (US EPA Region V)	312-353-7648
US EPA National Response Center (24 hr.)	800-424-8802

Equipment needed in the event of an emergency and remedial response will vary, depending on the triggering emergency event. Response actions (cessation of injection, well shut-in, and evacuation) will generally not require specialized equipment to implement. Where specialized equipment (such as a drilling rig or logging equipment) is required, the designated SubcontractorProject Manager shall be responsible for its procurement.

Emergency Communications Plan

One Earth Sequestration, LLC will communicate to the public about any event that requires an emergency response, inconsultation with the UIC Program Director.

In the event of an emergency requiring outside assistance, the project contact lead or Vice President shall call the One Earth Energy control room at (217) 784-5321 and the One Earth Energy CEO at (217) 781-4284.

- Emergency communications with the public will be handled by One Earth Energy CEO or One Earth Sequestration, LLC Vice President.
- One Earth Sequestration, LLC Vice President, in consultation with the UIC Program Director, will determine the method, frequency, and extent of public communication based upon the emergency event's severity and impact to the public.
- One Earth Sequestration, LLC Vice President 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 (including any updates, as necessary).
- One Earth Energy CEO or One Earth Sequestration, LLC Vice President will manage all media communications with the public (through either interview, press release, Web posting, or other) in the event of an emergency related to the injection project.
- The individual to be designated by One Earth Sequestration, LLC will be the first contact during an emergency event.
- This individual will contact the crisis communication team as appropriate. Emergency responses to the media from One Earth Sequestration, LLC will be dealt with ONLY by the personnel so designated by One Earth Sequestration, LLC
- Those individuals should try to be reachable 24 hours a day for contact in the event of an emergency.

If anyone else at One Earth Sequestration, LLC or One Earth Energy is contacted to comment on any situation deemed an "emergency event," the media contact should be directed to One Earth Sequestration, LLC's designated first contact at the 24/7 contact number provided.

Plan Review

This ERRP shall be reviewed:

- At least once every five (5) years following its approval by the permitting agency.
- Within one (1) year of an area of review (AOR) reevaluation.
- Within six (6) 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, One Earth Sequestration, LLC will provide the permitting agency with the documentation supporting the "no amendment necessary" determination.

If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the permitting agency within six (6) months following an event that initiates the ERRP review procedure.

Staff Training and Exercise Procedures

One Earth Sequestration, LLC will integrate the ERRP into the plant specific standard operating procedures and training program as described in the FRP entitled Facility Response Plan "*Self-Inspection. Drills/Exercises, and Response Training"* Periodic training will be provided, not less than annually, to well operators, plant safety and environmental personnel, all managers, and designated media communications. The training plan will document that the above listed personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.

References

National Research Council. 2013. *Induced Seismicity Potential in Energy Technologies*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13355.

Zoback, Mark D. and Steven M. Gorelick, 2012. *Earthquake triggering and large-scale geologic storage of carbon dioxide*. Edited by Pamela A. Matson, Stanford University, Stanford, CA, and approved May 4, 2012 (received for review March 27, 2012) June 18, 2012 https://doi.org/10.1073/pnas.1202473109