EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)

Kern River Eastridge CCS

Facility Information

Facility name:	Kern River Eastridge CCS MC19001INJ, ANO9004INJ, MC19002INJ, ANO9005INJ
Facility contact:	David Wessels – Project Manager 9525 Camino Media, Bakersfield, CA 93311 David.wessels@chevron.com / 661-412-6039
Well location:	Bakersfield, Kern County, CA 93308 35.4404°/-118.9983°; 35.4465°/-119.0012°; 35.4401°/-118.9981°; 35.4462°/-119.0010°

This Emergency and Remedial Response Plan (ERRP) describes actions that Chevron U.S.A., Inc. (Chevron) shall take during the construction, operation, or post-injection site care periods.

If Chevron obtains evidence that the injected CO_2 stream and/or associated pressure front is endangering an Underground Source of Drinking Water (USDW), Chevron will perform the following actions:

1. Initiate shutdown plan for the affected Kern River Eastridge CCS (Project) CO_2 injection well.
2. Take steps reasonably necessary to identify and characterize any release.
3. Notify the permitting agency (Underground Injection Control (UIC) Program Director) of the emergency event within twenty-four (24) hours.
4. Implement applicable portions of the approved ERRP.

Where the phrase “initiate shutdown plan” is used, the following protocol will be employed: Chevron will cease Project injection. However, in some circumstances, Chevron will, in consultation with the Class VI Environmental Protection Agency (EPA) 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

Environmental resources in the vicinity of the Project that the project site that were identified and considered in the development of this Emergency and Remedial Response Plan include:

- Chevron oil and gas resources that are not directly associated with the Project.
- Santa Margarita USDW, which is the lowermost USDW within the Area of Review (AoR) but is not being utilized nor expected to be utilized in the future.
- Other shallower USDWs within the AoR (see Hydrologic and Hydrogeologic Information section of the Project Narrative for more information on USDWs in the AoR).

Infrastructure in the vicinity of the project site that were identified and considered in the development of this Emergency and Remedial Response Plan include:

- Existing Chevron oilfield infrastructure including the Station 36 water treatment plant.

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

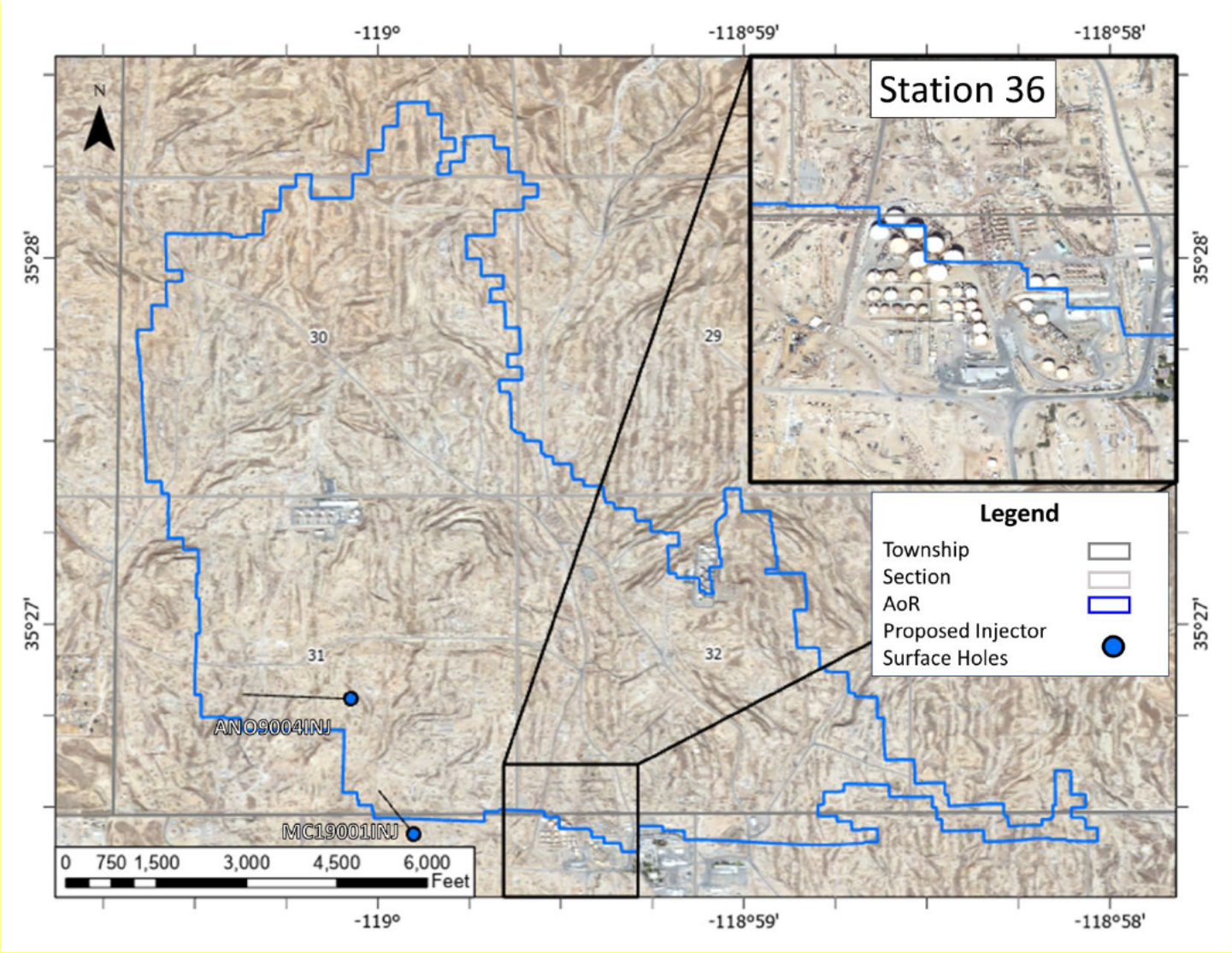

Figure 1. Map of the site resources and surface infrastructure.

Potential Risk Scenarios

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

- Project injection, water production, or monitoring well integrity failure.
- Project injection well monitoring equipment failure (e.g., shut-off valve or pressure gauge).
- Fluid (e.g., formation water) or CO_2 leakage to a USDW or to the surface related to the Project.
- A natural disaster (e.g., large earthquake, lightning strike); or
- Induced or natural seismic event.

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

Table 1. Degrees of risk for emergency events.

Emergency Condition	Definition
Major emergency	Events pose 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.

Emergency Identification and Response Actions

Steps to identify and characterize the event will be dependent on the specific issue identified, and the severity of the event. The potential risk scenarios are detailed below.

Well Integrity Failure

Integrity loss of a Project CO_2 injection well and/or monitoring well may endanger USDWs. Integrity loss may have happened if the following events occur:

- Wellhead injection pressure exceeds maximum allowable injection pressure specified in the permit.
- Annulus pressure indicates a loss of external or internal well containment.
- Pursuant to 40 CFR 146.91(c)(3), Chevron must notify the UIC Program Director within twenty-four (24) hours of any triggering of a shut-off system (i.e., down-hole or at the surface).

- Mechanical integrity test results identify a loss of mechanical integrity.

Severity.

Emergency Condition	Example
Major or serious emergency	Loss of mechanical integrity.
Minor emergency	Wellhead injection pressure exceeds maximum allowable injection pressure specified in the permit. Annulus pressure indicates a loss of external or internal well containment.

Timing of event: Injection and post-injection period.

Avoidance measures: Well construction, well maintenance, and implementation of approved Testing and Monitoring Plan.

Detection methods: Monitoring of operational parameters including pressure, flow rate and temperature, mechanical integrity testing, and periodic fluid sampling.

Potential response actions:

- Notify the UIC Program Director within twenty-four (24) hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within twenty-four (24) hours of notification.
- For a Major or Serious emergency:
    - The carbon capture facility will be immediately notified of a confirmed well integrity event.
    - Initiate shutdown procedure for the affected CO_2 injection well(s). Chevron Operations will complete surveillance to verify all equipment performed as expected and is in the proper isolation state.
    - If fluid (brine) or CO_2 Leakage to a USDW is detected based on the presence of indicator parameters Chevron would follow the emergency response procedures as detailed in the "Potential fluid (brine) or CO_2 Leakage to USDW" Section.
- 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, elevate severity level to major or serious based on severity level descriptions. Follow response plan for major or serious emergency.

Response personnel: For all field emergencies the SJV Central Control Room will be the first contact 661-392-2222 (unless an ambulance or fire department is needed, then 911 will be

contacted first) and they will notify/call-out the appropriate response personnel based on the emergency.

Equipment: Required equipment will be selected based on the event specific evaluations performed.

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.

Severity: Minor – this is a low severity event because it is likely that the equipment can be repaired in the short term, or another method of monitoring can be utilized. This would have a low likelihood of shutting down operations over the long-term.

Timing of event: Injection and post-injection phases.

Avoidance measures: Preventative maintenance schedule, and continuous monitoring of equipment through data acquisition.

Detection methods: Anomalies in data collection, visual observations of equipment failure, and alarm set points on monitoring equipment.

Potential Response actions:

- Notify the EPA's UIC Program Director within twenty-four (24) hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within twenty-four (24) hours of notification.
- For a Minor emergency:
    - Chevron Operations will submit corrective work order.
    - Based on the nature of the equipment failure a decision will be made to continue injection unchanged, divert all injection to the properly functioning well or to shut in the capture facility and cease injection until repairs can be made.
    - Perform necessary reset, repair, or replacement of monitoring devices.

Response personnel: For all field emergencies, the SJV Central Control Room will be the first contact 661-392-2222 (unless an ambulance or fire department is needed then 911 will be contacted first) and they will notify/call-out the appropriate response personnel based on the emergency.

Equipment: Required equipment will be selected based on the event specific evaluations performed.

Potential fluid (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.

Severity:

Emergency Condition	Example
Major or serious emergency	Loss of containment event in which CO_2 is leaking to surface or USDW
Minor emergency	Loss of containment event in which CO_2 is leaking to a saline aquifer or oil-bearing zone.

Timing of event: Injection and post-injection phases**.**

Avoidance measures:

- The project site has been carefully evaluated and is suitable for the project activities, as described in the Project Narrative and the AoR and Corrective Action Plan. The Project Narrative includes site-specific analyses of the injection interval, caprock interval, and any faults within the AoR. The AoR and Corrective Action Plan uses these analyses to build a reservoir simulation that assesses the location of the CO_2 front and the region where the reservoir pressure is elevated beyond the critical pressure.
- Ensuring initial well integrity through the well construction process as described in the Project Narrative and Well Construction Details, which includes descriptions of the well design, material selection, and construction process.
- Detailed evaluations of artificial penetrations within the AoR have been performed and proactive zonal isolation will be performed prior to injection as described in the AoR and Corrective Action Plan.
- CO_2 injection wells will operate within the established permit limits. These limits are described in the Project Narrative, AoR and Corrective Action Plan, and the Well Construction Details; and
- Rigorous monitoring will be performed during injection and post-injection phases of the project per the Testing and Monitoring Plan and the Post Injection Site Care (PISC) and Site Closure Plan. The comprehensive monitoring plan is designed to assess the location of the CO_2 front, the region where the reservoir pressure is elevated beyond the critical pressure, and the non-endangerment of USDW's.

Detection methods: Fluid sampling and monitoring equipment deployed for USDW zones.

Potential Response actions:

- Notify the UIC Program Director within twenty-four (24) hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available.
- For a minor or serious/major emergency:
    - The carbon capture facility will be immediately notified by Chevron Operations of a known or suspected surface or subsurface leak.
    - Initiate shutdown procedure for the affected CO_2 injection well(s). Chevron Operations will complete surveillance to verify all equipment performed as expected and is in the proper isolation state.
    - If the presence of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan which may include the following:
        - Perform additional groundwater monitoring.
        - Expand the suite of analytes for subsequent sampling events.
        - Install additional groundwater monitoring points near the affected groundwater well(s) to delineate the extent of impact.
    - Use monitoring data analysis to determine extent and type of impacts of concern to formulate a remedial action plan. Remedial action may include the following:
        - Re-abandon previously abandoned wells suspected to be the source of the release.
        - Repair active wells suspected to be the source of the release.
        - Developed an enhanced monitoring plan for monitored natural attenuation,
        - Install an active groundwater treatment system (e.g., pump & treat).

Response personnel: For all field emergencies the SJV Central Control Room will be the first contact 661-392-2222 (unless an ambulance or fire department is needed then 911 will be contacted first) and they will notify/call-out the appropriate response personnel based on the emergency.

Equipment: Required equipment will be selected based on the event specific evaluations performed.

Natural Disaster

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

Severity: Minor to Major

Emergency Condition	Example
Major or serious emergency	Loss of containment event in which CO_2 is leaking to surface or subsurface.
Minor emergency	Disruption to operations without loss of containment.

Timing of event: Pre-injection, injection, and post-injection

Avoidance measures: N/A

Detection methods: N/A

Potential Response actions:

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

- Notify the UIC Program Director within twenty-four (24) hours of the emergency event, per 40 CFR 146.91(C).
- Determine the severity of the event, based on the information available, within twenty-four (24) hours of notification.
- For a Major or Serious emergency:
    - The carbon capture facility will be immediately notified by Chevron Operations of a confirmed surface or subsurface leak.
    - Initiate shutdown procedure for the affected CO_2 injection well(s). Chevron Operations will complete surveillance to verify all equipment performed as expected and is in the proper isolation state.
    - If potential fluid (brine) or CO_2 Leakage to a USDW is detected based on the presence of indicator parameters Chevron would follow the emergency response procedures as detailed in the "Potential fluid (brine) or CO_2 Leakage to USDW" Section.
- 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, elevate severity level to major or serious based on severity level descriptions and follow response plan for major or serious emergency.

Response personnel: For all field emergencies the SJV Central Control Room will be the first contact 661-392-2222 (unless an ambulance or fire department is needed then 911 will be contacted first) and they will notify/call-out the appropriate response personnel based on the emergency.

Equipment: Required equipment will be selected based on the event-specific evaluations performed.

Induced or Natural Seismic Event

Based on the project operating conditions, it is highly unlikely that injection operations would induce a seismic event outside a 2-mile radius from the wellhead. Therefore, this portion of the response plan is developed for any seismic event with an epicenter within a 2-mile radius of the CO_2 injection well.

To monitor the area for seismicity, Chevron plans to deploy and maintain a seismic monitoring system consisting of surface and/or shallow borehole seismometers coupled with distributed acoustic sensing (DAS) fiber. DAS fiber will be installed on the two (2) CO_2 injection wells and the four (4) deep monitoring wells that penetrate the injection interval. The combination of these methods will help the Project to detect both the location and magnitude of potential seismic events. For a more detailed description of the geophysical monitoring methods please see the Testing and Monitoring Plan.

Severity: Minor to Major (see Table 2 below)

Timing of event: Pre-injection, injection, and post-injection

Avoidance measures:

- CO_2 injection will be conducted within operational limits.
- To reduce the potential pressure build-up within the Vedder Sand related to CO_2 injection, Chevron plans to include a pressure management water production system that reduces reservoir pressure through the life of the injection.

Detection methods: A seismic monitoring system consisting of surface and/or shallow borehole seismometers coupled with DAS fiber. DAS fiber will be installed on the two (2) CO_2 injection wells and the four (4) deep monitoring wells that penetrate the injection interval.

Potential Response actions:

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

The seismic monitoring system structure is presented in **Table 2**, which corresponds to color-coded levels of operating state with the threshold conditions and associated operational response actions.

Table 2. Seismic monitoring system for seismic events greater than M1.0 with an epicenter within a 2-mile radius of the Project 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 M2.5	1. Continue normal operation within permitted levels. 2. Within twenty-four (24) hours of the incident, notify the UIC Program Director of the operating status of the well.
Orange	Seismic event greater than M1.5 and local observation or felt report	1. Continue normal operation within permitted levels. 2. Within twenty-four (24) hours of the incident, notify the UIC Program Director of the operating status of the well. 3. Review seismic and operational data. 4. Report findings to the UIC Program Director and issue corrective actions.
	Seismic event greater than M2.5 and no felt report	

[1] Specified magnitudes refer to magnitudes determined by local Chevron or USGS seismic monitoring stations or reported by the USGS National Earthquake Information Center using the National Seismic Network.

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

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

Operating State	Threshold Condition[1,2]	Response Action[3]
Magenta	Seismic event greater than M2.5 and local observation or report	1. Within twenty-four (24) hours of the incident, notify the UIC Program Director of the operating status of the well. 2. Limit access to CO_2 injector wellhead to authorized personnel only. 3. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 4. Monitor CO_2 injection well pressure, temperature, and annulus pressure to verify well status and identify equipment failures, if any. If equipment failures are identified, determine the cause and extent of the failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 5. If leaks to the USDW or surface are detected: a. Notify the UIC Program Director within twenty-four (24) hours of the determination. b. Follow the steps identified above. 6. Review seismic and operational data. 7. Report findings to the UIC Program Director and perform corrective actions, if needed.
Red	Seismic event greater than M2.5, and local observation or report, and local report and confirmation of damage[4]	1. Initiate CO_2 injection well shutdown plan. 2. Within twenty-four (24) hours of the incident, notify the UIC Program Director of the operating status of the well. 3. Limit access to CO_2 injector wellhead to authorized personnel only.

[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. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 5. Monitor CO_2 injection well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 6. Determine if leaks to ground water or surface water occurred. 7. If USDW contamination is detected: a. Notify the UIC Program Director within twenty-four (24) hours of the determination. 8. Review seismic and operational data. 9. Report findings to the UIC Program Director and issue corrective actions.

Response personnel: For all field emergencies the SJV Central Control Room will be the first contact 661-392-2222 (unless an ambulance or fire department is needed then 911 will be contacted first) and they will notify/call-out the appropriate response personnel based on the emergency.

Equipment: Required equipment will be selected based on the event specific evaluations performed.

Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this Emergency and Remedial Response Plan. **Table 3** lists site personnel to be notified (not listed in order of notification).

Table 3. Contact information for site and project personnel and local authorities.

Facility	Location	Phone Number
SJV Central Control Room (24hrs)	San Joaquin Valley Operations	(661) 392-2222
Station 36 (Oil/Water) Plant	San Joaquin Valley Operations	(661) 392-2268

A site-specific emergency contact list will be developed and maintained during the life of the project. Chevron will provide the current site-specific emergency contact list to the UIC Program Director (**Table 4**).

Table 4. Contact information for key local, state, and other authorities.

Agency	Contact Information
Local police	9-1-1 (Emergency) 661-861-3110 (non-emergency)
Trans West (dispatches Emergency Response (ER) Teams and connects to Kern County services (Sheriff & Fire Dept.)	(661) 765-4450
California Governor's Office of Emergency Services (Cal OES)	916-845-8506
UIC Program Director (EPA Region 9)	David Albright (albright.david@epa.gov) 415-972-3971
EPA National Response Center (24 hours)	800-424-8802
Kern County Fire Department	9-1-1 (Emergency) 661-324-6551 (non-emergency)
California Air Resources Board (CARB)	800-242-4450
Poison Control Center	800-342-9293
California Office of Emergency Services (24 hours)	800-852-7550
Regional Water Quality Control Board (Central Valley)	661-634-1400
Kern Medical	661-326-2000

Equipment needed in the event of an emergency and remedial response will vary, depending on the emergency event. Response actions (e.g., 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, Chevron shall be responsible for its procurement.

Emergency Communications Plan

Chevron will communicate to the public about events that endanger public health and safety or that have a significant negative impact on environmental resources. The amount of information, timing, and communications method(s) will be appropriate to the event. For responses that occur over the long-term (e.g., ongoing cleanups), Chevron will provide periodic updates on the progress of the response action(s).

If required, Chevron will also communicate with entities who need to be informed about or act in response to the event, including landowners and Regional Response Teams (as part of the

National Response Team), and other departments/authorities as guided by the UIC Program Director.

Plan Review

This Emergency and Remedial Response Plan 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 one (1) year 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, Chevron will provide the EPA with the documentation supporting the "no amendment necessary" determination.

If the review indicates that amendments to the Emergency and Remedial Response Plan are necessary, amendments shall be made and submitted to the EPA within one (1) year following an event that initiates the ERRP review procedure.

Staff Training and Exercise Procedures

Chevron will include ERRP training into onboarding training for employees fit-for purpose. Visitors and occasional workers at the CCS site will receive site-specific training as warranted. Facility personnel and work crews will receive more in-depth training, including emergency response procedures. Desktop or actual drills using probable risk scenarios shall be conducted periodically. Periodic training will be provided to appropriate personnel. The training will document that the appropriate personnel have been trained and possess the required skills to perform their relevant emergency response activities described in the ERRP.