# EPA Class VI Program

United States
Environmental Protection
Agency


# SDWA and the UIC Program

## The Safe Drinking Water Act (SDWA):

- protects public health by regulating the nation’s public drinking water supply.
- protects both surface and underground sources of drinking water.

## The Underground Injection Control (UIC) program:

- is regulated under SDWA.
- protects underground sources of drinking water (USDWs) from contamination caused by injection of fluids into the subsurface for disposal or storage.
  - USDWs are aquifers or parts of aquifers that currently are, or in the future could be, a drinking water source.

# UIC Program Activities and Well Classes

**UIC Injection Well Regulations Cover:**

- Site/well characterization
- Permitting and site inspections
- Reporting requirements and compliance


**Six UIC Well Classes for Different Types of Fluids**

Class I: Hazardous and nonhazardous wastes

Class II: Fluids from oil and gas production

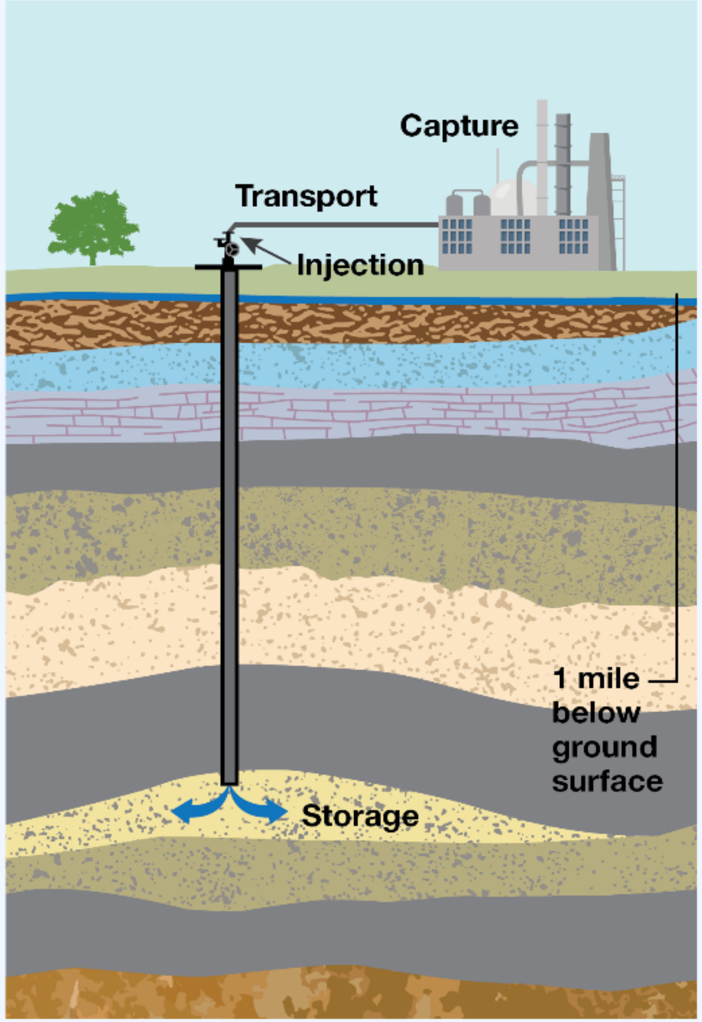
Class III: Fluids to dissolve and extract minerals

Class IV: Shallow hazardous and radioactive (banned)

Class V: Nonhazardous wastes into or above USDWs

**Class VI: Geologic sequestration (GS) of carbon dioxide ($CO_2$)**

# Geologic Sequestration and UIC Class VI Regulations




**UIC Regulations Cover a GS Project from Start to Finish**

- Siting (selection of location)
- Well Construction
- Operations
- Well and Site Closure

**UIC regulations are designed to protect USDWs by preventing movement of $CO_2$ out of the injection formation.**

**Protective aspects of UIC Class VI regulations include:**

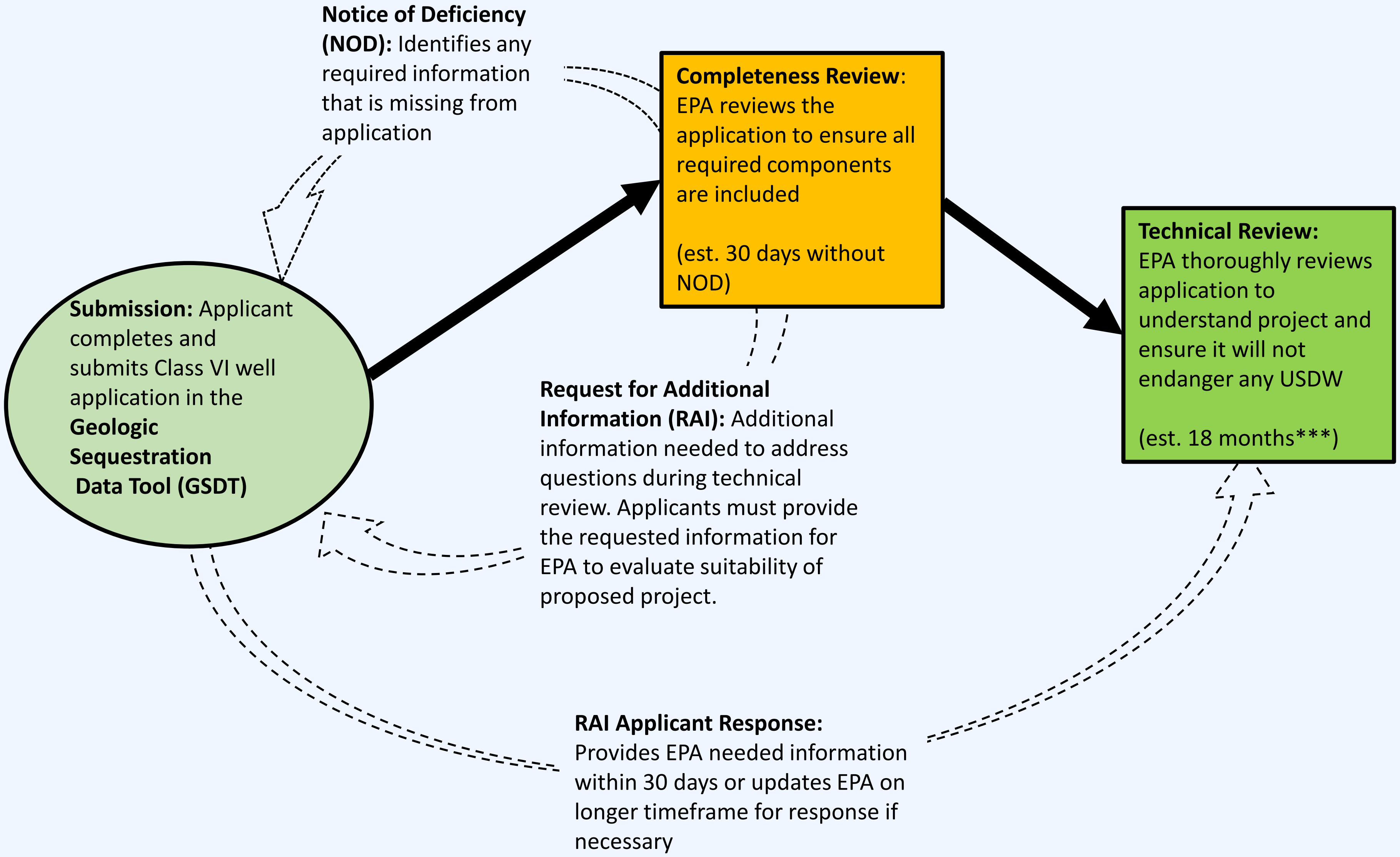
- Multiple safeguards to protect USDWs
- Development of written plans for operating a GS project
- Tracking the movement of the “plume” of $CO_2$ and any other potential changes in the subsurface.

# Class VI Permitting Process

**Submission:** Applicant completes and submits Class VI well application in the **Geologic Sequestration Data Tool (GSDT)**

Relevant Federal Regulation:

40 CFR Part 146 Subpart H – Criteria and Standards Applicable to Class VI Wells


**Notice of Deficiency (NOD):** Identifies any required information that is missing from application
**Completeness Review**: EPA reviews the application to ensure all required components are included
(est. 30 days without NOD)
**Technical Review:** EPA thoroughly reviews application to understand project and ensure it will not endanger any USDW
(est. 18 months***)
**Submission:** Applicant completes and submits Class VI well application in the **Geologic Sequestration Data Tool (GSDT)**
**Request for Additional Information (RAI):** Additional information needed to address questions during technical review. Applicants must provide the requested information for EPA to evaluate suitability of proposed project.
**RAI Applicant Response:** Provides EPA needed information within 30 days or updates EPA on longer timeframe for response if necessary

**Submission:** Applicant completes and submits Class VI well application in the **Geologic Sequestration Data Tool (GSDT)**

**Notice of Deficiency (NOD):** Identifies any required information that is missing from application

**Completeness Review**: EPA reviews the application to ensure all required components are included

(est. 30 days without NOD)

**Request for Additional Information (RAI):** Additional information needed to address questions during technical review. Applicants must provide the requested information for EPA to evaluate suitability of proposed project.

**Technical Review:** EPA thoroughly reviews application to understand project and ensure it will not endanger any USDW

(est. 18 months***)

**RAI Applicant Response:** Provides EPA needed information within 30 days or updates EPA on longer timeframe for response if necessary

**Prepare Draft Permit:** If the application passes technical review, EPA prepares a draft permit specifying well operating conditions

(est. 60 days)

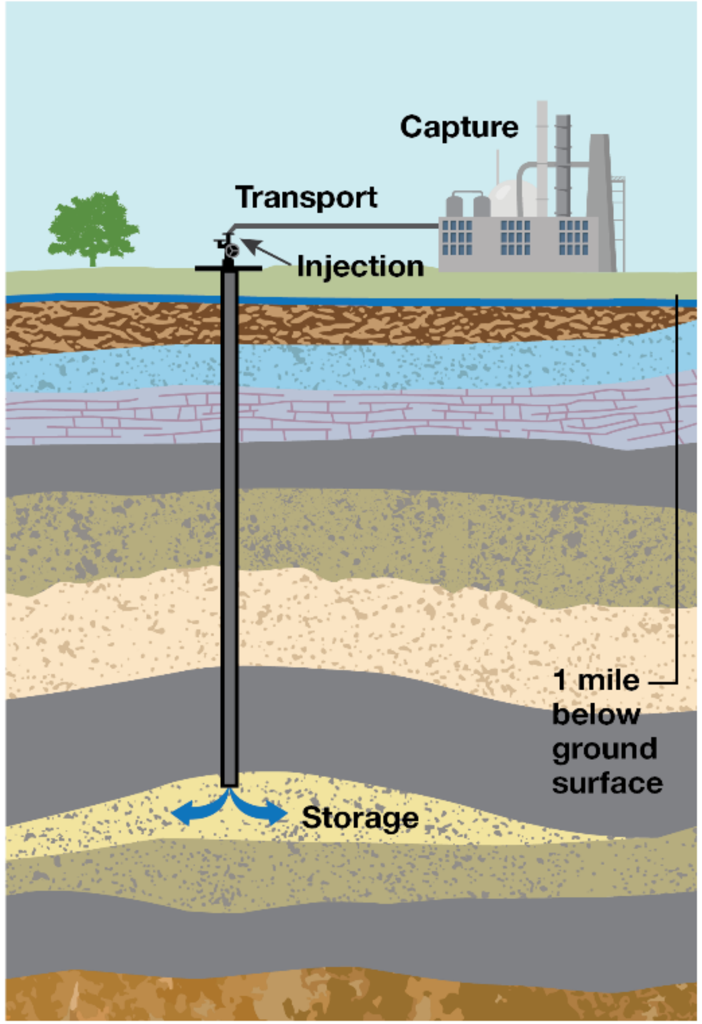
**Public Comment Period:** Allows public opportunity to review and provide comment on the draft permit through written comment and a public hearing

(est. 30-45 days)

**Prepare Final Permit Decision:** EPA considers public comments and prepares the final permit decision

(est. 90 days)

# Class VI Permit Components




- Siting (Demonstration of suitable geologic system)
- Well Construction
- Operations
- Well and Site Closure

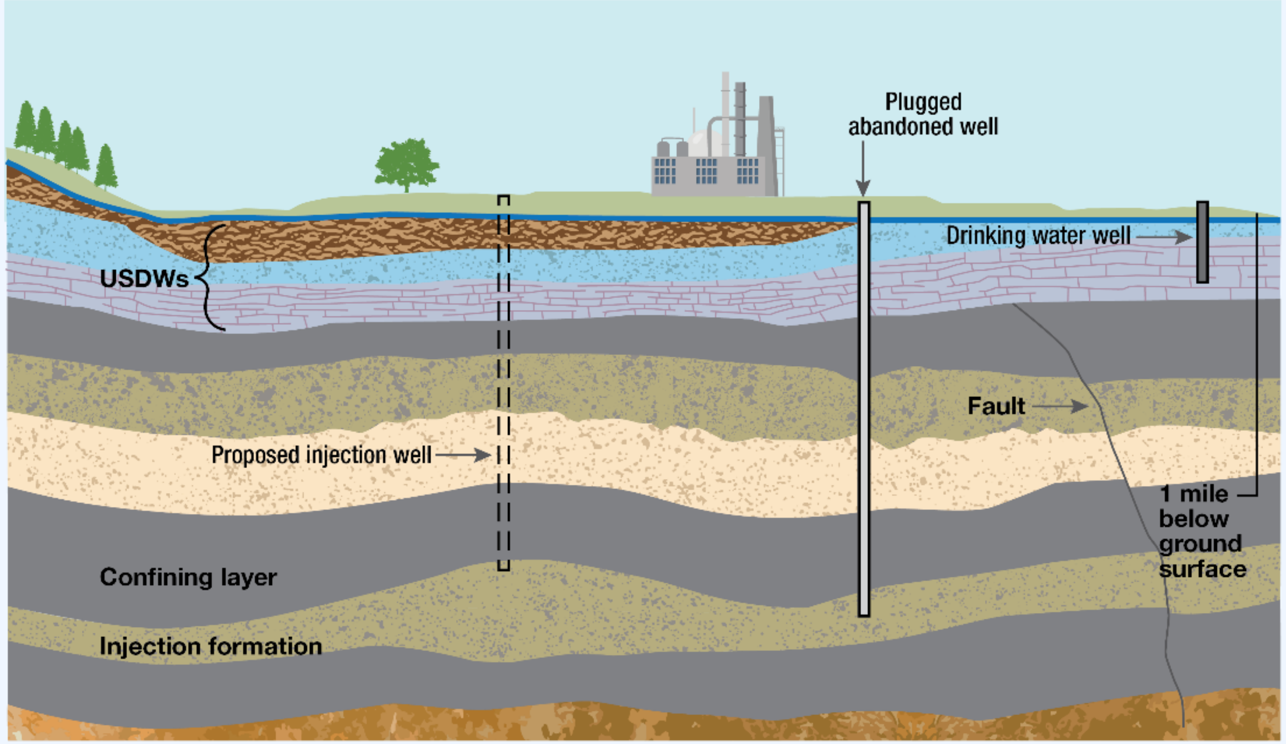
# Siting

**Goal:** Demonstrate that the geologic system at the proposed site is suitable for CO2 sequestration

**How:**

Geological logging/geophysical surveying, computational modeling, and analysis to show the following:

- **Injection Zone**—can hold the injected $CO_2$
- **Confining Layer**— will prevent $CO_2$ from migrating upward
- **Faults**—if present, test to verify they are inactive and will not act as a conduit for $CO_2$ migration
- **Compatibility**—verify that there will be no negative chemical reactions between injected $CO_2$ and the injection formation

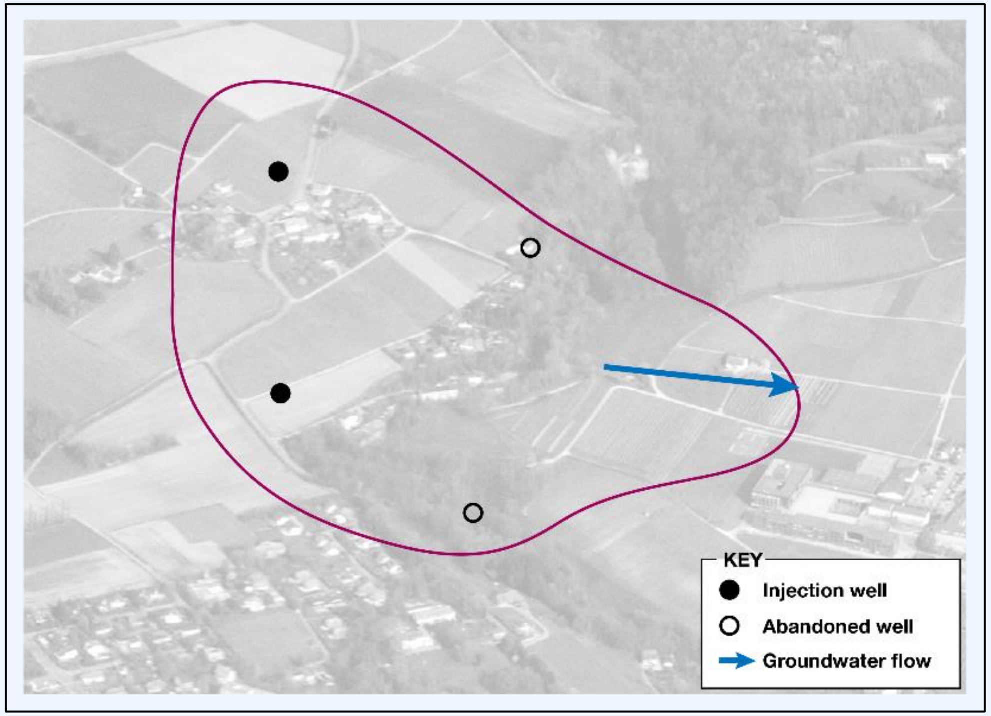


# Defining and Characterizing the Area of Review (AoR)

**Goal:** Identify the footprint likely to be influenced by $CO_2$ injection. Take measures to protect USDWs in that area during and after injection.

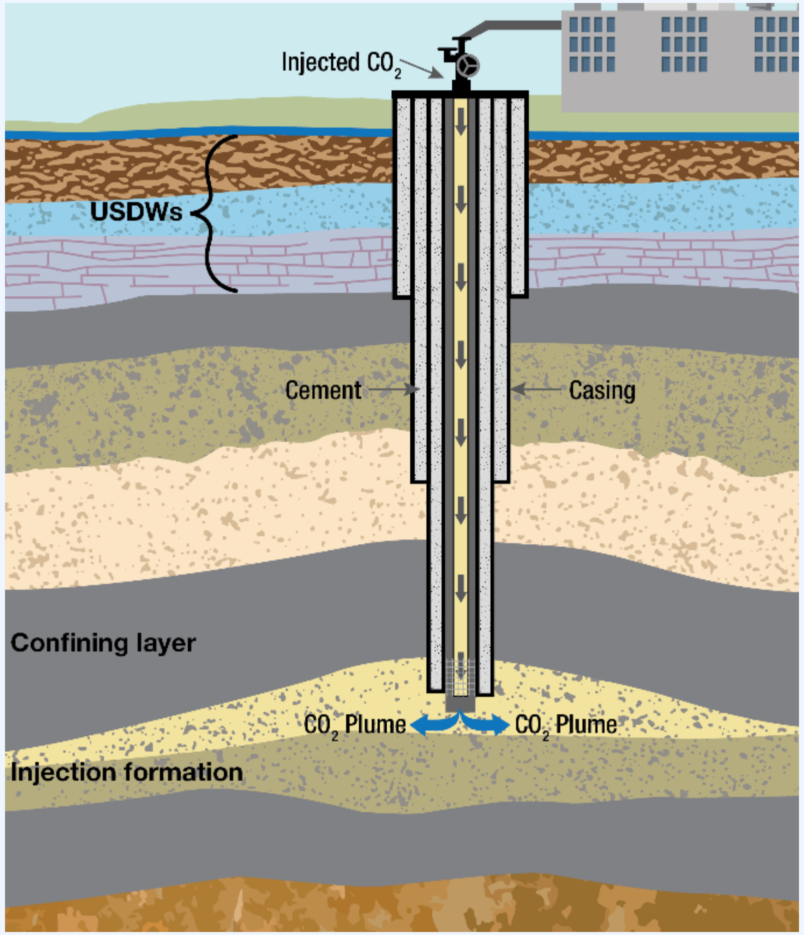
**How:**

- Develop computational model to predict where the $CO_2$ is expected to spread and where pressure in the formation will increase
- The AoR is checked for all existing wells, including old and abandoned wells that could be conduits for $CO_2$ leaks
- Improperly abandoned wells may need remediation
- AoR can be revised based on monitoring data during injection
- Guided by plan approved by UIC Director




Adapted from: U.S. EPA, 2013. Geologic Sequestration of Carbon Dioxide Underground Injection Control (UIC) Program Class VI Well Area of Review Evaluation and Corrective Action Guidance. https://www.epa.gov/uic/final-class-vi-guidance-documents.

# Injection Well Construction




**Goals:** Develop a site-specific well construction plan that includes multiple layers of protection (e.g., casing and cement) and a continuously monitored well annulus to reduce the risk of CO2 and formation fluid migration along the wellbore.

**How:**

- Demonstrate that the proposed well materials (e.g., tubing/casing/packer) are corrosion-resistant
- Cement around the long strong casing must extend from surface to the bottom of the well to isolate formations and prevent $CO_2$ movement between formations along the well
- After construction and before injection, wells are tested to:
  - Verify structural soundness
  - Check cement quality
  - Check for leaks in tubing, casing, and packer

# Safe Operations: Injection Rate and Pressure

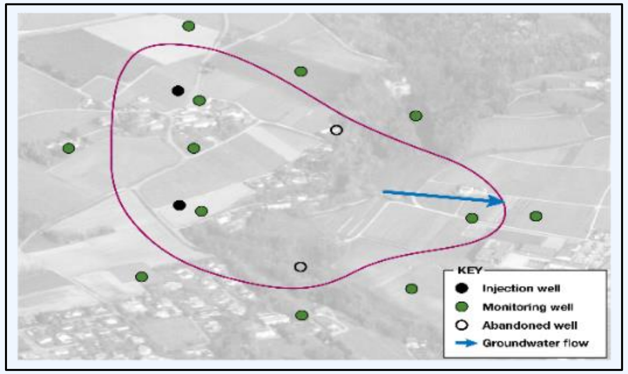
**Goal:** Avoid fracturing the injection formation or confining layer to ensure that injected $CO_2$ remains where intended and does not migrate to other formations, including USDWs.

**How:**

- Testing to determine a safe maximum allowable injection pressure that includes a safety margin
- Set maximum injection pressure that is below the pressure threshold of the confining layers and injection zone
- Flow rate and injection pressure continuously monitored at the wellhead during injection

https://www.usgs.gov/media/images/co2-injection-well-mississippiv

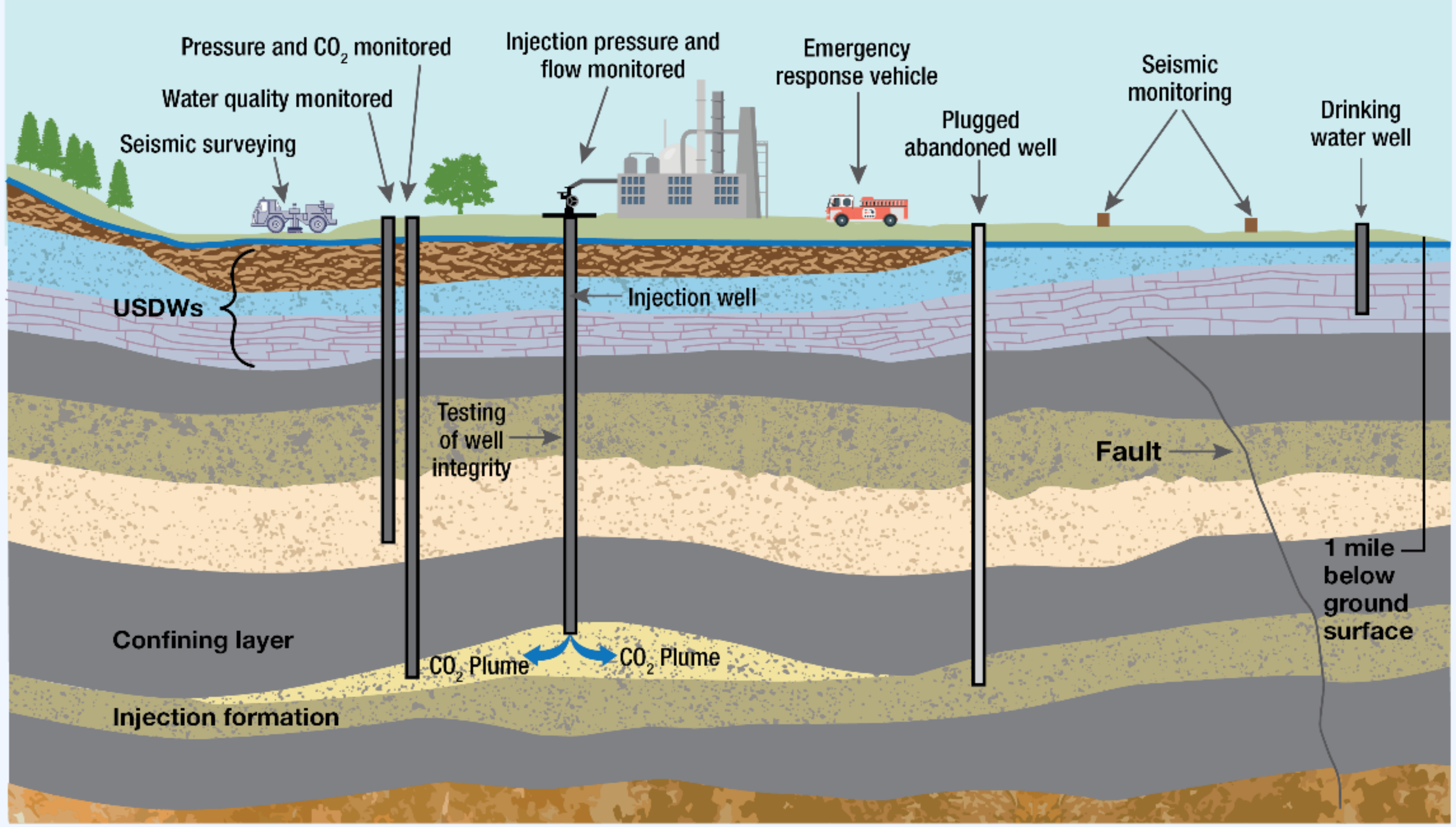
# Testing and Monitoring




**Goals:** Assess $CO_2$ injection, $CO_2$ movement, and pressure. Define mechanisms to assess leakage, problems with the injection well, or other unexpected changes in the subsurface.

**How:**

- Refinement of computational model based on logging results from well drilling/construction and injectivity/pressure fall off tests
- Pressure and $CO_2$ monitoring at monitoring wells
- Monitor zones above confining layer(s)
- Seismic surveying to image the location and size of the $CO_2$ plume
- Assess physical integrity of injection wells regularly
- Retain site records for 10 years after site closure
- Guided by plan approved by the UIC Director



# Emergency Response

**Goal:** Develop a plan to respond quickly to any events that could pose a danger to human health or the environment


**How:**

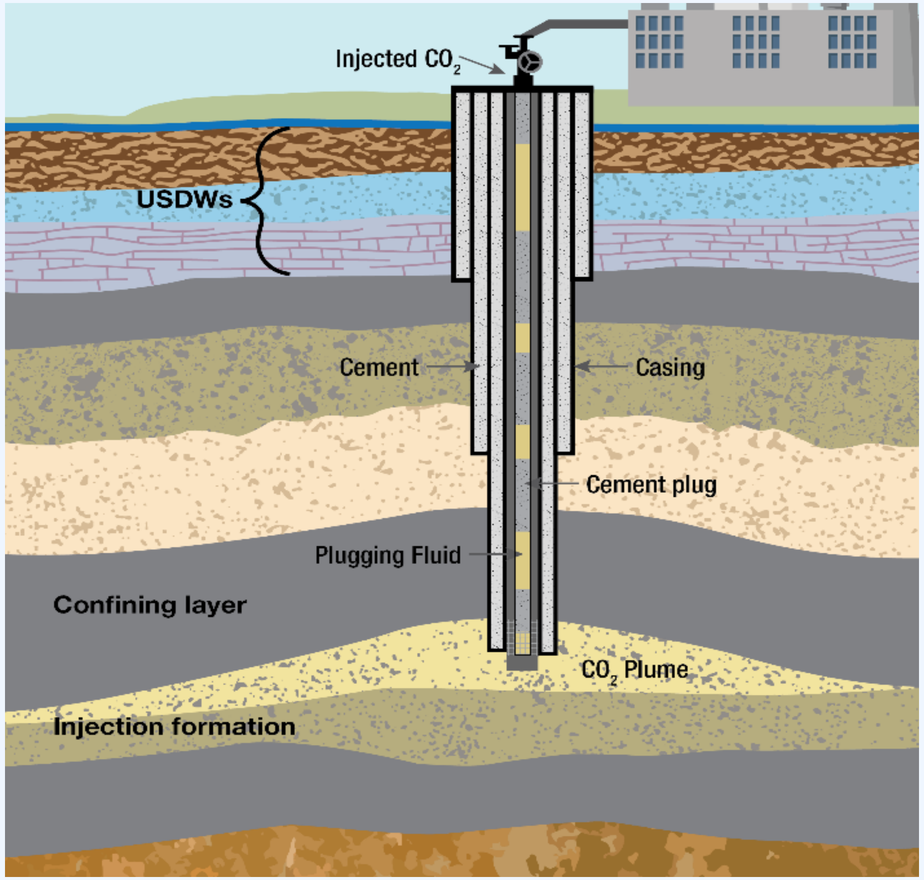
- Develop a site-specific emergency response plan
- Protocols to identify:
    - Evidence of $CO_2$ leakage
    - Noncompliance with permit conditions
    - Malfunction of the injection system
- Well owners/operators are required to report any evidence of potential dangers to a USDW within 24 hours
- Subsequent steps include:
    - Formulating an appropriate owner/operator response
    - Follow-up monitoring and testing
    - Authorization to resume injection

# Post-Injection Site Care and Site Closure

**Goals:** Demonstrate to the UIC Director that the project site will pose no danger to USDWs in the future. Close and restore the project site.

**How:**

- After injection ceases, monitoring continues according to an approved post-injection site care plan
- Well plugging plan must be approved by EPA
- To prepare to close the project site:
  - Demonstrate the plume and pressure in the injection formation are stable
- Site closure—remove surface equipment and restore site to condition approved by UIC Director



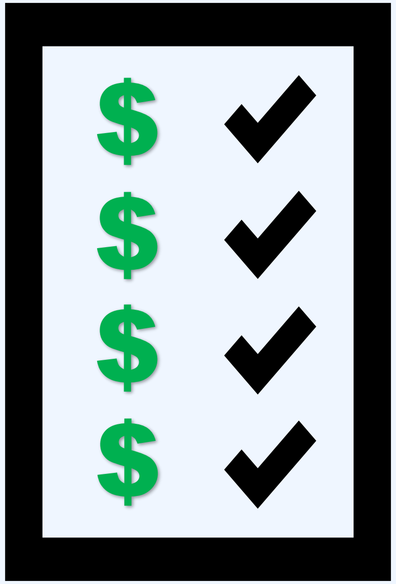

Adapted from: U.S. EPA, 2016. Geologic Sequestration of Carbon Dioxide Underground Injection Control (UIC) Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance. https://www.epa.gov/uic/final-class-vi-guidance-documents.

# Financial Responsibility

**Goal:** Ensure that the private costs of GS – including possible costs after the well is plugged – are not passed along to the public

**How:**

- Demonstration of financial responsibility
- Well owners/operators must provide documentation to the UIC Director showing that they have established a financial instrument with a third-party or have self-insurance



# How the Public Can Participate

**Goals:** Provide transparency, publicly available information, and opportunities for stakeholder input on concerns regarding risks to USDWs. Develop a robust permit that addresses such concerns.

**How is this done?**

- Draft permits published for public comment (at least 30 days)
- Public can request a hearing during public comment period
- Individuals that have filed comments on a draft permit or have participated in a public hearing may file an appeal on a final permit with the Environmental Appeals Board
  - Individuals that did not participate in public comments or hearing can appeal changes between draft and final permit

http://clipart-library.com/participation-cliparts.html

# UIC Class VI Primacy Process

- SDWA section 1422 establishes requirements for states and Tribes seeking to regulate their own UIC programs ("primacy").
- Primacy application must demonstrate that the state's Class VI program meets federal requirements to protect USDWs, including jurisdiction over underground injection and provisions for civil and criminal enforcement remedies
- Bipartisan Infrastructure Law provides 50 million in grant awards to states/tribes that wish to apply for Class VI primacy
  - The Alaska Oil and Gas Conservation Commission (AOGCC) has applied for a grant of $1.93 Million to set up and begin regulating Alaska's Class VI UIC program

# Class VI Resources

- **Final Class VI Guidance Documents:** https://www.epa.gov/uic/final-class-vi-guidance-documents
- **Data Repository:** Contains Class VI permitting materials, such as permit applications, final draft permits, final permits, final Environmental Justice documents, testing and monitoring reports, and permit violation notifications. https://udr.epa.gov/ords/uicdr/r/uicdr_ext/uicdr-pub/map
- **Permit Application Outline:** An overview of items and associated activities an applicant may complete during the Class VI permit application process. https://www.epa.gov/uic/class-vi-permit-application-outline
- **Permit application templates.** These templates streamline the development and evaluation of applications and submission of reports. https://www.epa.gov/uic/class-vi-permit-application-templates
- **Completeness Review Checklist:** A list of information that must be submitted with a Class VI permit application for that application to be deemed administratively complete by the permitting authority. https://www.epa.gov/uic/class-vi-geologic-sequestration-permit-application-and-permitting-tools##completeness_checklist
- **GS Rules and Tools Crosswalk:** This report, published by DOE's National Energy Technology Lab (NETL) with contributions from EPA, summarizes computational tools and methods that may be used to address specific requirements of the Class VI permit application process. https://www.epa.gov/uic/class-vi-geologic-sequestration-permit-application-and-permitting-tools#RulesAndTools
- **GSDT video tutorials:** EPA has released five GSDT video tutorials to provide an overview of GSDT capabilities as well as technical instructions. https://www.epa.gov/uic/geologic-sequestration-data-tool-gsdt-video-tutorials
- **CCS Regulations Table:** Regulatory and statutory authorities relevant to carbon capture and storage (CCS) projects. https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-carbon-dioxide#authorities
- **Class VI Risk Mitigation Brochure:** Offers information on how UIC Class VI regulations protect USDWs throughout project planning, construction, injection, and site closure. https://www.epa.gov/system/files/documents/2023-04/EPA%20Pamphlet_How%20Class%20VI%20Regulations%20Ensure%20Groundwater%20Protection.pdf

# Additional Information

**For more information on the UIC program, please visit:**

https://www.epa.gov/uic

https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-carbon-dioxide

**Who to contact with questions:**

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