



# Underground Injection Control Geologic Sequestration Rule Training Workshop: Class VI Injection Depth Waivers (40 CFR 146.95)

## Purpose: Injection Depth Waivers

- Allows for injection above the lowermost USDW and/or between USDWs
- Requires additional information about confining zones above and below injection zone

States with primacy for Class VI wells have the option to allow the use of injection depth waivers as part of their state regulations.

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The GS Rule requires injection below the lowermost USDW for Class VI wells. This effectively is the “default requirement.” However, there is a provision in the rule (40 CFR 146.95) that enables permit applicants to apply for a waiver of the Class VI injection depth requirements in order to inject either above the lowermost USDW or between USDWs.

Note that states that receive primacy for the Class VI Program are not required to allow injection depth waivers in their UIC regulations and may choose not to make this option available for Class VI wells in their jurisdiction.

If injection depth waivers are allowed, the UIC Program Director can require the owner or operator to submit additional information that:

- Builds upon site characterization data and the AoR delineation model developed during the permit application process
- And provides extensive information on regional water and resource uses.

Also, the Director can expand monitoring requirements during the operation and PISC phases to address protection of USDWs underlying and overlying the injection zone; and, require additional permit conditions to ensure protection of USDWs above and below an injection zone.

## Injection Depth Waivers: Director Reviews & Responsibilities

- Supplemental Report
  - Review waiver application, submitted concurrently with permit application
- Data/information provided to EPA Regional Administrator (RA)
  - Reports data/information submitted with waiver application
  - RA determines whether to grant the waiver

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The UIC Program Director will need to review a supplemental report with the waiver application. The supplemental report needs to be submitted concurrently with the Class VI permit application.

In those states that allow injection depth waivers, the UIC Program Director must provide all injection depth waiver application materials to the EPA Regional Administrator (RA), who will determine whether to grant the waiver. Injection depth waiver applications require additional information that will inform the RA's determination whether to approve or deny the waiver.

## Supplemental Report

- Verifies that:
  - Injection zone is appropriate for GS and is contained by confining units both above and below
  - Well construction, operation, and monitoring are tailored for the site
  - USDWs are not endangered

40 CFR 146.95(a)

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The purpose of the supplemental report is to ensure that the owner or operator collects information demonstrating to the UIC Program Director that: the injection zone is appropriate for GS and is contained by confining units both above and below the injection zone; appropriate well construction, operation, and monitoring are tailored for the site; and USDWs both above and below the injection zone are not endangered.

The UIC Program Director has the discretion to request any additional information that will inform the RA's determination concerning an injection depth waiver application.

## Supplemental Report Components

- Demonstrates that the injection zone:
  - Is laterally continuous
  - Is not hydraulically connected to USDWs
  - Does not outcrop within the AoR
  - Has adequate injectivity, volume, porosity
  - Is bounded by appropriate upper and lower confining units free of transmissive faults/fractures
  - Has appropriate geochemistry

40 CFR 146.95(a)(1)-(2)

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The supplemental report must include:

- The owner or operator must submit geologic or hydrogeologic maps and cross sections of the region and of the site. Ideally, there will be at least two cross sections, oriented perpendicular to each other. These may be the same maps and cross sections submitted for the permit application requirements. EPA recommends that information on any factors that would influence or limit the quality of geophysical surveys be provided.

Maps, cross sections, and geophysical survey results enable the UIC Program Director to verify the lateral continuity of the injection zone and to ascertain whether confining units both above and below form a clear separation between the injection formation and any USDWs; this separation is a crucial component of the injection depth waiver application. This information also demonstrates that the injection formation does not outcrop within the AoR.

- The UIC Program Director will be able to gauge the accuracy of the data by ensuring that the methods of analysis are specified and that quality assurance information (e.g., duplicate measurements) is provided where applicable. The UIC Program Director should determine whether a reasonable number of data points were submitted. More samples may be needed for a site with complex geology than at a site where the geology is homogenous.

## Supplemental Report Components (cont'd.)

Also provided to UIC Program Director:

- Computational modeling showing USDWs will not be endangered
- Demonstration that well design/construction ensure injectate isolation
- How project plans will be tailored for waiver
- Information/location of public water supplies affected or served
- Any additional information required by the UIC Program Director

40 CFR 146.95(a)(3)-(7)

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The UIC Program Director will also need to review:

- **The name of the computational code used to model fluid movement; a description of the model, including physical processes, site characterization data, model areal extent, modeled timeframe, and grid spacing; any relevant model assumptions, including relative permeability/saturation relationships, intrinsic permeability descriptions, carbon dioxide physico-chemical properties, and equations of state; additionally you will evaluate figures detailing model sensitivity analyses; and as required by the UIC Program Director, any model input and output files, including raw code-specific files, output data transformed to site coordinates, and/or interpolated GIS files.**

- Injection wells must be designed to prevent fluid migration to USDWs both above and below the injection zone. The owner or operator will submit plans for injection well design and construction that will likely include: diagrams with well dimensions and well structure; wellhead elevation; total depth of the well; depth to the injection zone; length of the injection zone; and depths of USDWs.

- The owner or operator must submit a Testing and Monitoring Plan that describes the need to monitor below the lower confining zone as well as above the upper confining zone. Similar concepts apply to the Testing and Monitoring Plan supplied with both the permit application and the waiver application, with the addition of testing and monitoring of wells penetrating the lower confining zone as part of the waiver application information

The UIC Program Director may want to ask for additional information if all of the items listed above are not provided. The UIC Program Director may also want to request additional information if he or she believes that the owner or operator may not have identified all public water supplies located within the AoR. In particular, the UIC Program Director will need to verify that the owner or operator has identified any public water supplies served by USDWs below the injection formation.

## Documentation for RA: Evaluation Information

- Integrity of upper/lower confining units
- Suitability of injection zone
- Emergency and Remedial Response Plan and financial responsibility demonstration
- Water resource needs
- Resource exploitation potential

40 CFR 146.95(b)(1)(i)-(ii) & (iv)-(vii)

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Documentation of an evaluation of the following information as it relates to siting, construction, and operation of a geologic sequestration project with a waiver must be submitted to the Regional Administrator by the UIC Program Director. This documentation includes:

- Integrity of the upper and lower confining units.
- Suitability of the injection zone.
- Emergency and Remedial Response Plan.
- Demonstration of financial responsibility.
- Present and future water resource needs.
- Resource exploitation potential of the injection formation and other formations within the AoR.

## Documentation for RA: Evaluation Information (cont'd.)

- Water resource or treatment plan
- Capacity of geologic formations
- Alternative injection sites
- Site characterization data

40 CFR 146.95(b)(1)(iii)-(iv) & (viii)

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- Additionally, the RA needs to review a plan for securing alternative resources or treating USDW formation water in the event of contamination.
- As well as the Potential capacity of geologic formations.
- Availability of alternative injection sites.
- And site characterization data.

## Documentation for Regional Administrator: Public Notification

- A waiver cannot be granted until the PWSS Director(s) or appropriate agency within AoR has been consulted & public has participated
- Clear and transparent public notification process



40 CFR 146.95(b)(2)-(3)

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If allowed by the state, a waiver of injection depth requirements cannot be granted until the UIC Program Director, the state's Public Water System Supervision (PWSS) Director or appropriate agency, and the public have evaluated information specific to the site and the anticipated injection activity. PWS that are within or supplied by the AoR should be included. The determination to waive injection depth requirements must be made using a clear and transparent public notification process. The Rule requires the UIC Program Director to provide the public with appropriate, site-specific and waiver-specific information to inform public comment.

In making a determination of whether to grant a waiver of injection depth requirements, the UIC Program Director must provide information to and consult with the PWSS Director of all states and tribes having jurisdiction over lands within the AoR. In addition, the UIC Program Director must document, as part of the administrative record, written information submitted by the PWSS Directors to the UIC Program Director concerning the waiver application.

## Documentation for RA: Public Notification (cont'd.)

### Components of Public Notice

Depth of injection zone

Location of injection well

Name/depth of USDWs in AoR

Map of AoR

Public water supplies affected or served by  
USDWs in AoR

Results of UIC-PWSS Directors consultation

40 CFR 146.95(c)

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The UIC Program Director must provide public notice that an injection depth waiver application has been submitted. The notice, concurrent with the overall permit application notice, must clearly state:

- The depth of injection zone
- The location of injection well
- The name/depth of USDWs in AoR
- A map of the AoR
- Any public water supplies affected or served by USDWs in AoR
- And results of UIC-PWSS Directors consultation

## Injection Depth Waiver Application: Role of Regional Administrator

- UIC Program Director collects all information from waiver application and public notification process
- RA approves/denies waiver application
  - Decision in writing to UIC Program Director
- Approved waivers posted on EPA's OW Web site within 30 days

40 CFR 146.95(d)-(e)

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Following completion of the public notification process, the UIC Program Director must provide information collected during the waiver application and public notice process to the EPA RA so that he or she can make a determination of whether to issue the injection depth waiver.

The RA will submit in writing to the UIC Program Director, his or her determination regarding the waiver. The purpose of involving the RA in the decision making process is to ensure that multi-state boundary and water resource issues are addressed and to contribute to national consistency in waiver issuance.

Within 30 days of waiver issuance, EPA Headquarters will post the following information on Office of Water's Web site:

- The depth of the proposed injection zone;
- The location of the injection well;
- The name and depth of all USDWs within the AoR;
- A map of the AoR; and,
- The names of any public water supplies affected, reasonably likely to be affected, or served by USDWs in the AoR.

## Class VI Injection Well Operation with a Waiver

- Modified requirements for Class VI injection wells operating under a waiver
  - Construction
  - Testing and monitoring *above and below* injection zone
  - PISC

40 CFR 146.95(f)

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EPA advises that the UIC Program Director be aware that the approval of an injection depth waiver will generate modified requirements for Class VI wells operating under a waiver. In addition to complying with all other requirements, the owner or operator must comply with the following modified requirements:

- For injection well construction:
  - Class VI wells granted a waiver must be constructed and completed to prevent movement of fluids into any unauthorized zones, including USDWs above and below the injection zone.
  - The surface casing must extend through the base of the nearest USDW directly above the injection zone and be cemented to the surface, or, at the UIC Program Director's discretion, another formation above the injection zone and below the nearest USDW above the injection zone.
- For testing and monitoring:
  - The owner or operator must monitor ground water quality, geochemical changes, and pressure in USDWs immediately *above and below* the injection zone.
  - The owner or operator must track the extent of the carbon dioxide plume and the presence or absence of elevated pressure both above and below the injection zone.
- For PISC:
  - The owner or operator must monitor ground water quality, geochemical changes, and pressure in USDWs immediately above and below the injection zone.
  - The owner or operator must perform testing and monitoring to track the extent of the carbon dioxide plume and the presence or absence of elevated pressure above and below the injection zone.

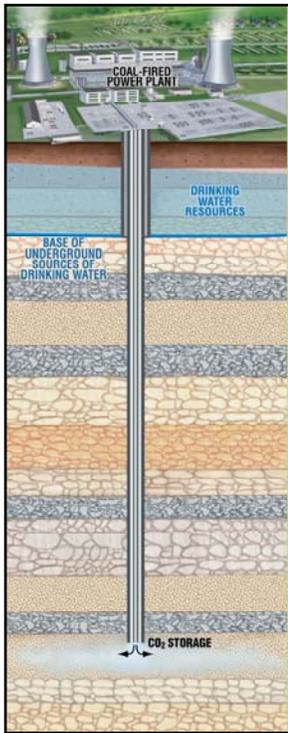
## Some Class VI Program Injection Depth Waiver Resources

- For more information on Class VI injection depth waivers, refer to:
  - Draft UIC Class VI Primacy Application and Implementation Manual
  - EPA's Class VI Web site:  
<http://water.epa.gov/type/groundwater/uic/class6/gclass6wells.cfm>

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Some Class VI Program injection depth waiver resources that are currently available are:

- The Draft UIC Program Class VI Primacy Application and Implementation Manual.
- And EPA's Class VI website:  
<http://water.epa.gov/type/groundwater/uic/class6/gclass6wells.cfm>.



# Open Discussion