

Designating Exempted Aquifers for Class VI Wells

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Permitting of CCS Projects

- EPA promulgated underground injection control (UIC) program regulations for geologic sequestration (GS) on December 10, 2010
- The regulations created a new Class VI but truncated the process for approving injection zones by denying designation of exempted aquifers as originally allowed for all classes of injection wells
- The proposed rule would have authorized exempted aquifers but with injection below lowermost USDW
- EPA recognized this could have prevented GS in areas with very deep aquifers having TDS levels <10,000 ppm
- EPA's final approach did not solve this problem
- Designation of exempted aquifers should be allowed

Geologic Sequestration Wells

- Class VI. Wells used for geologic sequestration of carbon dioxide beneath the lowermost formation containing a USDW,
- Except wells used for geologic sequestration of carbon dioxide that have been granted a waiver of the injection depth requirements
- Except wells used for geologic sequestration of carbon dioxide that have received an expansion to the areal extent of an existing Class II enhanced oil recovery or enhanced gas recovery aquifer exemption
- New aquifer exemptions shall not be issued for Class VI injection wells.

Endangerment of Underground Sources of Drinking Water (USDWs)

- UIC program prevents endangerment of USDWs
“Underground injection endangers drinking water sources if such injection may result in the presence in underground water which supplies or can reasonably be expected to **supply any public water system** of any contaminant, and if the presence of such contaminant may result in such system’s not complying with any national primary drinking water regulation or may otherwise adversely affect the health of persons.”

42 USC §300h-1(d)(2)

Definition of USDW

An aquifer or its portion:

- (1)(i) Which supplies any public water system; or
- (ii) Which contains a sufficient quantity of ground water to supply a public water system; and
 - (A) Currently supplies drinking water for human consumption; or
 - (B) Contains fewer than 10,000 mg/l total dissolved solids; and
- (2) **Which is not an exempted aquifer.**

40 CFR §§144.3 & 146.3

Regulatory Background

- EPA's approach to identifying USDWs and exempted aquifers was promulgated in a 1980 rulemaking.
- EPA determined that without aquifer exemptions, certain beneficial uses of underground injection for energy production, solution mining, and waste disposal would be severely limited.
- EPA originally proposed a broad definition of covered underground waters with **exceptions** to allow such activities to continue.
- The original proposal would have required UIC program Directors to identify all USDWs to be protected from endangerment.
- The final rule presumed aquifers to be USDWs if they could produce water <10,000 ppm TDS sufficient to supply a PWS and changed the **exceptions** to criteria for **exempted aquifers** that are not USDWs.

Two-Step Identification Process

- The UIC regulations established a two-part process under which the term “underground source of drinking water” (USDW) is defined
 - (i) by using overly-inclusive criteria to identify aquifers that are potentially capable of producing water for drinking water use, and then
 - (ii) by using the process for identifying exempted aquifers excluded from identification as USDWs because they have “no real potential to be used as drinking water sources.” 40 CFR § 144.1(g).

Exempted Aquifers

- A UIC Director may designate “exempted aquifers” using the criteria in 40 CFR § 146.4.
- Such aquifers are those which would otherwise qualify as “underground sources of drinking water”, but which have no real potential to be used as drinking water sources.
- **Therefore, they are not USDWs.**

40 CFR § 144.1(g)

Separating Sheep from Goats

- Identifying USDWs and exempted aquifers is intended as a separation rather than exclusionary process – one intended to identify the most appropriate use of aquifers.
- Identifying aquifers that are not USDWs is not by statute or regulation limited to formations intended to serve as injection zones.
- Designation of exempted aquifers should be available also for formations overlying and underlying intended injection zones.
- By foreclosing the completion of this process, UIC regulations promulgated for Class VI and other EPA policies prevent sensible application of regulatory intent.

NPRM Allowed Exemptions

- Notice of proposed rulemaking (NPRM) for GS would have allowed designation of exempted aquifers and asked for comments
- NPRM required injection below lowermost USDW
- Recognized “deep marginal USDWs” could be useful but would not qualify “without aquifer exemptions”
- Later NODA asked for comment on allowing injection depth waivers for injection above lowermost USDW
- Still did not propose to disallow exempted aquifers

Concerns Expressed in Comments

EPA described concerns expressed about exemptions

- Concerns about water use, availability, and planning
 - But most areas with very deep aquifers having TDS levels <10,000 ppm also have an abundance of shallower aquifers with lower TDS concentrations
- Concerns that future water needs would lead to desalination of aquifers closer to 10,000 ppm TDS
 - But the cost of producing brackish and saline waters from depths >10,000 feet would rule out such projects
- Concern that CO₂ migration into USDWs might cause leaching and mobilization of contaminants
 - Research has shown this concern to be unfounded

Precluding Proper Designations for GS

- The UIC regulations provide in section 146.4 criteria by which “[a]n aquifer or a portion thereof which meets the [USDW] criteria . . . may be determined . . . to be an ‘exempted aquifer.’”
- But EPA precluded application of those criteria for geologic storage by mandating in section 144.7 that “new aquifer exemptions shall not be issued for Class VI injection wells.”
- This restriction has already prevented the issuance of one Class VI permit for a very scientifically useful project developed by the Big Sky Carbon Sequestration Partnership (BSCSP).

BSCSP Kevin Dome Project

- Intended to demonstrate Kevin Dome as a viable and safe target for regional CO₂ geological storage (GS).
- Planned to extract CO₂ from the dome and pipe the CO₂ approximately 6 miles to the GS injection site.
- Potential additional step would have recovered injected CO₂ for use in enhanced oil recovery (EOR) or reinjection in Kevin Dome where initially produced.
- Project could not obtain Class VI permit for the GS well because the middle Duperow injection zone had <10,000 ppm TDS even though the zone also had high levels of hydrogen sulfide (H₂S).
- If EPA had allowed application of the exempted aquifer criteria, the Kevin Dome project could have pursued a Class VI permit for injection into an exempted aquifer that is not a USDW.

Unwarranted Regulatory Limit

- Class VI rule should not have prohibited the designation of exempted aquifers in conjunction with GS projects.
 - EPA's proposed GS regulations would have allowed designation of exempted aquifers for GS.
 - Many states and other commenters supported this provision
 - Final rule imposed the prohibition, explaining incorrectly that “aquifer exemption removes the injection formation from SDWA protection as a USDW and allows injection (i.e., permitted or rule authorized) into an exempted formation.”
 - Instead, the designation of an exempted aquifer identifies a formation that is **not a USDW**.
- If EPA had allowed application of the exempted aquifer criteria, the Kevin Dome project could have pursued a Class VI permit for injection into naturally contaminated aquifer with 2% H₂S.

EPA Needs to Revise Class VI to Allow Exempted Aquifers for GS

- Best way to address valid concerns about exclusion of deep formations with TDS levels below 10,000 ppm
- Concerns expressed in comments were legitimate but not solved by injection depth waiver alone
- True solution requires both injection depth waiver and ability to recognize that aquifers meeting established exempted aquifer criteria are not USDWs
- Approach would not deny protection of true USDWs from endangerment from injection operations

Questions?

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