



# EPA NATIONAL DRINKING WATER ADVISORY COUNCIL

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December 23, 2008

Mr. Stephen L. Johnson  
Administrator  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, N.W.  
Washington, D.C. 20460

Dear Administrator Johnson:

On July 25, 2008, EPA published in the *Federal Register* the Agency's proposed *Federal Requirements under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells*. The National Drinking Water Advisory Council (NDWAC) has reviewed this proposed rule as well as associated documents and offers the following comments for your consideration.

First, the NDWAC recognizes the overall importance of the potential for geologic sequestration of CO<sub>2</sub> as one method to address climate change and appreciates that EPA has undertaken a regulatory approach to address the underground sequestration of CO<sub>2</sub> uniquely from other disposal techniques in the current UIC program. It is apparent that EPA has reached out to a broad stakeholder group and has collected input from experts from the oil and gas industry in the field of underground injection of CO<sub>2</sub>. A considerable amount of complex technical information has been evaluated in a relatively short period of time to prepare the proposed rule. We commend EPA for that effort.

The NDWAC also recognizes that the geologic sequestration of CO<sub>2</sub> has neither been conducted in the manner proposed using existing technologies nor at the scale that could be envisioned in this proposal. Since the use of geological formations to store man-made CO<sub>2</sub> is an unnatural phenomenon, injection sites must be planned and designed to ensure that

environmental, public health, and public safety issues are not passed to future generations. Although we recognize the need to address this very important application in a unique rulemaking effort as EPA is proposing, we urge the Administration to employ an adaptive management approach to avoid outcomes that could be unforeseen, undesirable and difficult to remediate in the future. We are particularly concerned about the potential for significant and irreversible contamination of current and future drinking water supplies. Specifically, the NDWAC recognizes that there are many potential risks and vulnerabilities to the implementation of GS wells in the following areas:

- **Assessment of potential GS sites** - It is important that adequate assessment is performed and can be validated by the permitting agency. Currently available models to evaluate the potential migration of CO<sub>2</sub> are complex and it is critical for members of the reviewing agency to be sufficiently skilled to assess the assumptions made, and conclusions reached, in their approval process. In addition, the technical and highly sophisticated level of modeling to be applied to the evaluation of GS sites will increase the burden on EPA and State Agencies to evaluate the modeling provided in support of an application.
- **Well construction and long-term reliability** - Not only will the injection wells be subjected to extremely high pressures, the wells will also be functioning in a highly corrosive environment. Therefore, it is critical that EPA be fully satisfied that the well design, materials, and monitoring programs are sufficient to ensure reliable long-term operation and that any leakage can be discovered immediately so that proper remedial measures, including discontinuing operation, can be implemented. The NDWAC also recognizes that EPA has assumed that the CO<sub>2</sub> injected will not have impurities at a level that classifies it as a hazardous waste. The NDWAC supports EPA's proposal that the applicant must demonstrate that the CO<sub>2</sub> is not hazardous before the application can be approved.
- **Site stewardship** - Long-term operation, post-injection facility closure, potential implementation of corrective action plans and overall site stewardship can only be successful if the owner/operator can demonstrate adequate financial responsibility over the duration of the injection and post-injection period.

Given this suite of potential issues, the NDWAC recommends that:

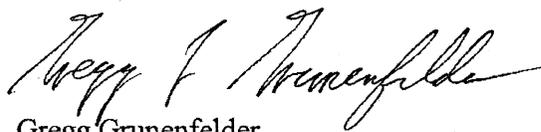
1. The approval of GS sites should move forward cautiously. Current site specific modeling should be used to evaluate proposed injection sites as we recognize that each potential injection location is unique in its geologic characteristics and behavior. The NDWAC proposes incorporating the following recommendations into the final rule:
  - a. Proprietary models can be considered that have been peer-reviewed and the owners or operators have disclosed the code assumptions, relevant equations and scientific basis as proposed in the rule. These models are complex and it is critical for members of the reviewing agency to be sufficiently skilled to assess the assumptions made, and conclusions reached, in their approval process.

- b. The overall Area of Review re-evaluations should be conducted periodically as proposed. These re-evaluations should utilize the most current modeling applicable to the specific site and GS operation, not necessarily the model utilized in the initial evaluation. As GS and other similar technologies advance, data obtained from monitoring programs and validation of models will result in improvements in model sophistication and capabilities. These improvements should be utilized to provide improved data on the conditions and predicted affects in the GS Area of Review.
    - c. EPA should determine a process to evaluate the capabilities of primacy agencies to assess submissions and confidently execute the permitting process. A fee mechanism that would provide the financial resources for the agencies to retain appropriate peer review support for evaluation of site specific models is critical.
  2. An application for a permit site should include:
    - a. A site specific monitoring plan that incorporates baseline (pre-injection) data, operational monitoring, and post-injection monitoring. Appropriate monitoring throughout the process is important to protecting present and potential future underground sources of drinking water (USDWs) and validating the predictive modeling in advance of impacts to provide for implementation of corrective action plans.
    - b. Corrective action plans that cover the full range of potential failure scenarios for the specific site, including an evaluation of potential future water supply sources if the injection of CO<sub>2</sub> irreparably damages a primary source of drinking water. In addition, the evaluation should address how changes that make ground water more difficult to treat will be prevented, including the potential introduction or release of compounds with Maximum Contaminant Levels.
  3. An adaptive management approach should be undertaken with initial approval only granted to those sites for which:
    - a. The geologic conditions are well understood and there are or have been CO<sub>2</sub> injections or similar practices at the site to provide a database from which to build. For example, an initial application would be appropriate in mature oil and gas fields because of the substantial knowledge base for these formations from which to build.
    - b. There is isolation from current and potential drinking water sources.
    - c. The potential interaction between the injected CO<sub>2</sub> plumes from proximate wells is eliminated.
    - d. The consequences of well leakage or unexpected CO<sub>2</sub> migration are minimal.
  4. The injection of carbon dioxide for GS should be prohibited in areas of vulnerability and/or where there are inadequate data to provide a high level of assurance that injection and retention will be successful. Some of the following areas should be prohibited from GS until more research demonstrates that the GS practices could be protective of USDWs:
    - a. Injection of carbon dioxide above minimum depths that would maintain it in a supercritical, liquid state.

- b. Un-mineable coal seams (regardless of whether it is below a current or potential drinking water source), basalt formations, and salt domes/shales.
  - c. Location above USDWs.
  - d. Active fault areas based upon a seismic evaluation under current and fully loaded conditions.
5. Special consideration should be made for stakeholder involvement, particularly with respect to homeowners, public water systems, water agencies, local and regional water planning entities, environmental groups, and other parties whose drinking water supply might be affected by the proposed injection site. It should be the applicant's responsibility to identify, contact and engage appropriate stakeholders concurrent with the application preparation.
6. An appropriate model for financial responsibility should be established which addresses cost of long-term stewardship of GS sites through closure and afterwards. The owners and/or operators of GS sites and operations must demonstrate adequate financial responsibility throughout the site stewardship period proposed of at least 50 years, depending upon the duration of post-injection impacts. The financial responsibility must be maintained at current cost levels over the term of the stewardship period and be independent of the owner and/or operator's future viability.
7. EPA should reevaluate criteria for defining underground potable water supplies beyond the current definition of ground waters with a total dissolved solids content <10,000 mg/L. This reflects that the definition of a viable ground water source continually expands as supplies become more limited and technology improves in creating potable supplies from marginal sources.
8. EPA should coordinate with other agencies to ensure that appropriate site security is considered in the application process.

Thank you for considering this request. The NDWAC members look forward to continuing to fulfill our role of providing EPA with valuable feedback. If you have any questions, please contact Veronica Blette, Designated Federal Officer for the NDWAC, at (202) 564-4094.

Sincerely,



Gregg Grunenfelder

Chair

National Drinking Water Advisory Council

cc: Benjamin H. Grumbles, Assistant Administrator for Water  
Cynthia C. Dougherty, Director, Office of Ground Water and Drinking Water  
EPA Docket - ID No. EPA-HQ-OW-2008-0390