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**FILED**

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Cynthia C. Dougherty  
Director  
Office of Ground Water and Drinking Water  
U. S. Environmental Protection Agency  
1200 Pennsylvania Ave., NW.  
Washington, DC 20460

**Jim Ruby, Executive Secretary**  
Environmental Quality Council

Dear Director Dougherty:

The organizations identified below submit these comments and recommendations to the Environmental Protection Agency (EPA) in response to the proposed rule for geologic sequestration of carbon dioxide under the Safe Drinking Water Act (SDWA). "Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells", 73 Fed. Reg. 43491-541 (July 25, 2008). We appreciated the extension of the public comment period that was granted by Assistant Administrator Benjamin Grumbles, announced in the *Federal Register* on November 21 and confirmed in your letter of November 24. The organizations submitting these recommendations represent a broad array of interests in the issues associated with this rulemaking and many of us have been discussing these interests and issues in an effort to reach consensus or at least narrow our differences. We used this extension period to continue efforts toward developing recommendations reflecting common views on a number of the major issues in this rulemaking on which EPA expressly requested comment and several other issues. We share your hope that these comments and recommendations will help the Agency develop a rule that will allow the technology to be permitted under an appropriate injection class while also ensuring protection of underground sources of drinking water as well as human health and the environment.

EPA has noted that the proposed rules do not address "accounting or certification for greenhouse gas (GHG) reductions." 73 Fed. Reg. 43492, 43495 (July 25, 2008). By the same token, the consensus recommendations presented in this letter are solely for the purpose of GS regulation under the Safe Drinking Water Act to protect USDWs and not for the purpose of addressing verification requirements for carbon credits.

**Enhanced recovery of oil or natural gas and geologic sequestration of CO<sub>2</sub>**

EPA's Proposal would continue to regulate and permit injection of CO<sub>2</sub> for EOR/EGR purposes as Class II injection "as long as any production is occurring." EPA has asked for comment on the merits of this approach "since owners or operators of some Class II EOR/EGR wells may wish to use wells for the purposes of production and GS prior to the field being completely depleted." 73 Fed. Reg. at 43502. We recommend that the rules be clarified to provide more certainty about the applicability of Class II requirements where GS of CO<sub>2</sub> occurs in connection with EOR/EGR activities. Specifically, the UIC rules should provide a "bright line" definition as to the applicable

class of wells where CO2 injection for EOR/EGR production and for GS occur in tandem. We recommend the following language to accomplish that objective:

**§ 144.6, 144.80 and 146.5, and Classification of injection wells.**

Injection wells are classified as follows:

\* \* \*

(b) Class II. Wells which inject fluids:

(1) Which are brought to the surface in connection with conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.

(2) For enhanced recovery of oil or natural gas;

(3) For storage of hydrocarbons which are liquid at standard temperature and pressure;

(4) For enhanced recovery of oil or natural gas where geologic sequestration is occurring during or in connection with enhanced recovery of oil or natural gas *provided* (i) there is reasonable expectation of more than insignificant future production volumes or rates as a result of carbon dioxide injection and (ii) operating pressures are no higher than reasonably necessary to produce such volumes or rates;

\* \* \*

(f) Class VI. Wells injecting a carbon dioxide stream for geologic sequestration except those wells described in subsection (b)(4) of this section or otherwise excluded from this Class.<sup>1/</sup>

The undersigned have agreed that proposed language describing wells in classification (b)(4) establishes a "bright line" definition for wells that inject CO2 for EOR/EGR and GS and, consistent with EPA's intent, should remain in Class II and be subject to the current requirements of Class II. We have also agreed that the wells used for GS in oil and gas reservoirs that do not meet the criteria of (b)(4) should be subject to additional requirements. We have tentatively defined such wells as wells used "for geologic sequestration in oil and gas formations and where the criteria of paragraph (b)(4) are not met." But we have not yet attempted to define what specific

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<sup>1/</sup> Please note that well classification for geologic sequestration in certain formations is a matter still under discussion within the multi-stakeholder group and may be addressed further in future recommendations from the group. In the mean time individual participants in these discussions will be expressing views on this and other issues with an openness to revising their views if a consensus can be reached.



requirements should apply to these wells. We are committed to working toward agreement on those requirements (probably within a Class II context) and submitting the results of that effort to EPA by February 28, 2009 for your consideration.

### **Injection Pressure Limitations**

We are concerned about three aspects of proposed section 146.88(a), governing injection pressure limitations. First, it “restricts” fractures in the injection zone “except during stimulation” rather than focusing on maintaining the integrity of the confining zone, which is what really matters for protecting USDWs. Second, it fails to refer specifically to the full range of potential geomechanical failure modes potentially posed by operations at a particular site. Third, the type of geomechanical risk that is addressed (initiation or propagation of fractures), is dealt with in a potentially arbitrary fashion (the 90% of fracture pressure limit), which may not be appropriate in all cases.

Our recommended language addresses these concerns by focusing on maintaining the integrity of the confining zone and including tensile failure and shear failure as transmissivity concerns. It calls for additional geomechanical studies of tensile failure and shear failure only “where appropriate” because there will be locations where experience or existing information will provide sufficient evidence to avoid the need for additional studies. The need for conducting additional tests and for determining which tests would be acceptable is left to the Director’s discretion.

The owner or operator must comply with a maximum injection pressure limit approved by the Director and specified in the permit. In approving a maximum injection pressure limit, the Director shall consider the results of well tests and, where appropriate, geomechanical or other studies that assess the risks of tensile failure and shear failure. The Director shall approve limits that, with a reasonable degree of certainty, will avoid initiation or propagation of fractures in the confining zone or cause otherwise non-transmissive faults transecting the confining zone to become transmissive. In no case may injection pressure cause movement of injection or formation fluids in a manner prohibited by 40 CFR Part 144.12(a).

### **Closure Standard**

We believe there are three problems with the closure standard in proposed section 146.93(b). First, the presumption that monitoring should continue for 50 years is unnecessary and counterproductive. A straight performance standard is preferable to this or any other fixed time period because it provides a clearer standard and an incentive to maximize the understanding of site and project performance and as such is more protective of USDWs. Second, the proposal requires a showing that the CO<sub>2</sub> plume has “stabilized”, which is undefined. Cessation of plume movement is not necessarily essential to show that a project poses no threat of endangerment to USDWs—plumes that are still moving may, nonetheless, remain contained. Instead, it is more protective to show that the plume is not expected to encounter a leakage pathway. Third, the required showing

that “no additional monitoring is needed” does not provide guidance regarding how an operator is to show that no additional monitoring is needed. The proposal below provides specific guidance on what the operator must show.

We recommend the standard in the proposed alternative language for section 146.93(b) below because it sets forth detailed criteria, all of which must be satisfied, to demonstrate that the site does not pose an endangerment to USDWs. The specific criteria listed in our proposal will serve to provide the Director with the requisite information to make the appropriate determination. The advantage of this approach is that it establishes clear criteria that an operator must demonstrate before obtaining site closure based upon particular site characteristics and is, therefore, reasonably applicable to any storage site as opposed to a standard based upon a fixed-duration. Furthermore, it is more stringent than a purely discretionary approach because it establishes specific criteria that must be shown before site closure may be granted. We believe this language, which is an extension of work done by the World Resources Institute and the Ground Water Protection Council, avoids the noted shortcomings and provides stronger protection for USDWs.

146.93 (b) The owner or operator shall monitor the site following the cessation of injection.

(1) The owner or operator shall continue to conduct monitoring as specified in the Director-approved post-injection site care and site closure plan until closure is authorized pursuant to 146.93(b)(3).

(2) The owner or operator can request and demonstrate to the satisfaction of the Director that the post-injection site care and site closure plan should be revised to reduce the frequency of monitoring.

(3) Prior to authorization for site closure, the owner or operator must demonstrate to the Director, based on monitoring, other site-specific data, and modeling that is reasonably consistent with site performance, that no additional monitoring is needed to assure that the geologic sequestration project does not and is not expected to pose an endangerment to USDWs. The Director shall approve closure if the owner or operator demonstrates, based on the current understanding of the site, including monitoring data and/or modeling, all of the following: (i) the estimated magnitude and extent of the project footprint (CO<sub>2</sub> plume and the area of elevated pressure) ; (ii) the estimated location of the detectable CO<sub>2</sub> plume; (iii) that there is no significant leakage of either CO<sub>2</sub> or displaced formation fluids that is endangering USDWs; (iv) that the injected or displaced fluids are not expected to migrate in the future in a manner that encounters a potential leakage pathway into a USDW; (v) that the injection wells at the site completed into or through the injection zone or confining zone are plugged and abandoned in accordance with these



requirements; and (vi) any remaining project monitoring wells at the site are being managed by a person and in a manner acceptable to the Director.

### **Need for adequate implementation resources**

Although not directly addressed in the EPA proposal, the need for adequate resources to implement the regulatory program for geologic sequestration at both the federal and state levels is a major consideration and one that EPA should be addressing both internally and in its discussions with Congress. The annual national budget for the UIC program (approximately \$11 million) has remained static for many years, while UIC agencies have been asked to take on additional responsibilities. Furthermore, inflation of salaries and other expenses has eroded the buying power of the unchanging UIC budget. If state and regional agencies are asked to take on the additional workload of CO<sub>2</sub> injection, while ensuring careful scientific review as well as an expeditious processing time, they will require additional trained staff and other resources.

If the nation is serious about controlling CO<sub>2</sub> through underground injection, significant additional resources will need to be made available to hire new permitting staff and field inspectors. Those new staff, along with the existing cadre of UIC staff and managers, must be trained in subjects that will enable them to make prudent permitting, management, and oversight decisions. As momentum grows to begin sequestering CO<sub>2</sub> underground, EPA and states will need to develop new regulatory requirements for CO<sub>2</sub> wells and prepare to review applications and make permitting decisions. Failure to provide sufficient resources will likely create permitting backlogs, resulting in a bottleneck in the overall geologic sequestration effort.

The Ground Water Protection Council (GWPC) estimated in 2004 that an annual funding increase to \$56 million would be needed just to meet the needs of the existing UIC program at the state level even without the addition of geologic sequestration project permitting.<sup>2/</sup> GWPC has further estimated that EPA will need to provide funding at a level of \$100 million annually to meet the needs for the full UIC program, including the regulation of geologic sequestration.

### **Conclusion**

We greatly appreciate the extension of the public comment period, as it has allowed us to make substantial progress in expanding our shared understanding on the relevant issues and to reach significant agreement on how these issues can be addressed and resolved by EPA. The undersigned submit these recommendations with the request that the recommendations be considered as a whole because the recommendations were developed in combination to accurately reflect our shared understanding. In addition, we are committed to continuing our discussions and to inviting others to participate with an objective of developing additional specific recommendations for improvement of a final rule that could be adopted by your scheduled date in late 2010 or early 2011, including development of the requirements to be applied to oil and gas reservoir geologic sequestration that is

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<sup>2/</sup> GWPC, Class V Resource Needs Survey, Summary (September 2004).

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not conducted in conjunction with enhanced oil and gas production operations. We will be working toward submission of additional recommendations by February 28, 2009.

Sincerely,



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