U.S. EPA Proposes New Regulations for CO2 Injection Wells for Geologic Sequestration

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On July 15, 2008, the U.S. Environmental Protection Agency (“EPA”) proposed new regulations under the Safe Drinking Water Act (“SDWA”) to regulate the underground injection of carbon dioxide for the purpose of safe, long-term underground storage or “geologic sequestration” of this greenhouse gas. These new rules would establish a new class of underground injection control (“UIC”) injection wells, Class VI, to regulate the geologic sequestration of carbon dioxide “beneath the lowermost formation containing an underground source of drinking water.” The regulations are intended to settle questions on how carbon sequestration can proceed, but raise a number of issues that industry, government and public stakeholders must consider.

Once these proposed rules are published in the Federal Register, which may happen as soon as July 21, 2008, interested members of the public and the regulated community will have a period of 120 days to submit comments to EPA. A September 2008 open forum will also be scheduled.

Background

Geologic carbon sequestration, also known as carbon capture and storage (“CCS”), is an emerging means by which the carbon dioxide (“CO2”) that normally would be released into the atmosphere by burning coal, oil or gas may instead be injected into deep geological voids. It is widely considered to be a promising, if not essential, response to concerns over climate change. The Department of Energy, in a recent report, stated that: “Given the magnitude of carbon reductions needed to stabilize the atmosphere, capture and sequestration could be a major tool for reducing carbon emissions to the atmosphere from fossil fuels; in fact, sequestration may be essential for the continued large-scale use of fossil fuels.” Similarly, a report by the Massachusetts Institute of Technology suggested that “CO2 capture and sequestration is the critical enabling technology that would reduce CO2 emissions significantly while also allowing coal to meet the world’s pressing energy needs.” And EPA recently concluded that if CCS were not commercially available,
the adverse economic impact of a particular emissions reduction bill on Gross Domestic Product would double.

Underground injection of potentially hazardous materials is regulated by EPA under the Safe Drinking Water Act (42 U.S.C. §§ 300f et seq.). Specifically, the SDWA directs EPA to develop minimum federal requirements for underground injection practices, in order to ensure that injection well operations do not contaminate underground sources of drinking water (“USDWs”).

For the past 20 years, EPA’s underground injection control program has categorized UIC wells into five different classes, each with its own set of qualifications, restrictions and obligations. Class I wells are used for injection of hazardous wastes, industrial non-hazardous liquids and municipal wastewater; Class II wells are used for injection in oil and gas operations, including injection for enhanced oil recovery (“EOR”); Class III wells are used for in situ or “solution” mining for minerals; Class IV wells are used for groundwater remediation projects; and Class V is a general category for “experimental” or “other” non-hazardous injection wells. Importantly, under the SDWA, individual States and tribes can apply to EPA to obtain primary authority to administer the UIC program; and in order to be granted such primacy, the State program must be at least as stringent as the federal requirements. See 42 U.S.C. § 300h-4(c)(2).

Until now, there has been considerable uncertainty over how wells for injection of CO2 for geologic sequestration would be classified under the SDWA. CO2 injection wells with EOR applications were presumed to fall within Class II, while other wells were thought to fit nowhere but the catch-all Class V. Indeed, interim guidance issued by EPA in March 2007 indicated that pilot-stage CO2 injection wells should be regulated under Class V. At the same time, States have been making their own determinations and developing their own regulations on the subject. Now under the proposed rule, EPA would establish a new category of UIC wells, Class VI wells, that are specifically for the injection of CO2 for geologic carbon sequestration. In issuing this proposed rule, EPA has taken an important first step toward resolving the current uncertainty over the regulation of underground injection wells used for CCS.

The Proposed Class VI Regulations

As EPA has explained, the UIC program modifications that are contained in the proposed regulations are intended to address some of the unique challenges presented by the injection of CO2 for long-term geologic sequestration. These include: the relative buoyancy of CO2, its corrosivity when present with water, potential impurities that may be entrained in the captured CO2, the mobility of CO2 in underground formations, and the very large injection volumes that are anticipated once CCS technology is fully deployed. The main elements of the proposed regulations are summarized below.

Scope of the Rule

As indicated, the proposed regulations would establish a new class of UIC wells—Class VI wells—that are used for the “long-term containment of a gaseous, liquid or supercritical carbon dioxide stream in subsurface geologic formations.” The regulations would specify that the owner or operator of a proposed Class VI well must apply for and obtain a permit before operating the well.

1 As recently as June 30, 2008, the Washington State Department of Ecology promulgated UIC rules intended to fit CO2 injection wells within Class V.
Content of Permit Applications

The rule would require submission of extensive information regarding a proposed injection well as part of the Class VI permit application. In all, 25 separate categories of information would have to be addressed by the applicant including maps, a site-specific “Area of Review” (“AoR”) determination, a delineation of the potentially affected USDW, testing results, and several distinct operating plans and procedures—all of which must be reviewed and approved by the Director.2 Key components of a permit application include the following:

- **Corrective Action Plan.** As part of the permit application, the applicant would be required to submit a Corrective Action Plan that identifies all wells within the AoR (a region surrounding the sequestration project, defined through computer modeling) and that specifies actions to be taken to protect the USDW from the migration of CO2 and formation fluids. If site monitoring indicates an endangerment to the USDW, the responsible agency must be notified and injection operations must cease. In addition, the corrective action requirements would apply to all known wells penetrating the injection zone of the proposed Class VI well, and measures would be required to ensure that any substandard wells in the AoR do not threaten existing an USDW.

- **Emergency and Remedial Response Plan.** The permit applicant must also submit an Emergency and Remedial Response Plan which identifies the actions that will be taken to address any movement of injection or formation fluids that may cause an endangerment to an USDW during all phases of the life of the well. In addition, if the owner or operator obtains evidence that the injected CO2 stream and associated pressure front may cause an endangerment to an USDW, the owner or operator must immediately cease injection, provide a 24-hour notice to the Director, and implement the Emergency and Remedial Response plan.

- **Financial Responsibility.** Under proposed Section 146.85, the applicant would be required to demonstrate and maintain “Financial Responsibility” for corrective action, well plugging, post-injection site care and the costs of emergency and remedial response. While Financial Responsibility requirements have been a long-time component of EPA’s Resource Conservation and Recovery Act (“RCRA”) hazardous waste management program, under the proposed Class VI UIC program this concept would be applied to the management of something other than a regulated hazardous waste. The cost estimates that make up the Financial Responsibility requirement would be site-specific, and EPA indicates that further guidance on financial surety requirements will be forthcoming.

Closure Plan and Long-Term Monitoring

Under the proposed regulations, the Class VI permit holder would be required to prepare and implement a post-injection site care and site closure plan, which would define post-injection monitoring locations, monitoring methods and proposed monitoring frequency. The proposed plan would have to be included as part of permit application.

The proposed regulations would require the sequestration site to be monitored following cessation of operations, for a presumed period of 50 years, until the sequestration project no longer poses any endangerment to an USDW. Site closure may be authorized by the Director before the end of the 50-year period if the facts demonstrate that the project no longer poses a threat of endangerment to an USDW. On the other hand, according to the proposed rule’s preamble discussion, the monitoring period could be extended to “100 years (or longer)” if the Director concludes this is necessary. Under the proposed regul-
lations, “Site Closure” would be defined as that point in time when the owner or operator of the Class VI well is released from the duty to provide post-injection site care.

After the site has been closed, a closure report would have to be submitted within 90 days. In addition, the owner or operator of the Class VI well would be required to record a notation in the relevant property records which would inform any future purchaser of the land that a CO2 sequestration operation was conducted on the property, the volume of CO2 injected and the period of time in which the injection took place. Records generated during the site closure would have to be maintained for three years.

Technical Requirements

The proposed regulations also contain a number of technical requirements relating to the construction and operation of a Class VI well. These include the following:

- The regulations would establish construction requirements to ensure that a Class VI well, once operational, will not facilitate the movement of fluids into or between an USDW, or into an unauthorized zone. In addition, the Director would be authorized to designate site-specific casing and cementing requirements for the well.

- The owner or operator of the well would be required to conduct appropriate surveys and tests during the drilling and construction of the well in order to assure conformance with the construction requirements, and to establish “baseline data” against which future measurements applicable to the operation of the well will be made. These tests will also measure the mechanical integrity of the well.

- The regulations would also specify various operating requirements. For example, the injection pressure in the well would not be permitted to cause the movement of fluids in such a way as to endanger an USDW; certain types of injection practices would be prohibited; and the loss of mechanical integrity would be grounds to shut down or terminate a CO2 injection operation.

- The regulations would establish testing and monitoring requirements, as well as the requirement to prepare a testing and monitoring plan. This plan would have to include provisions for continuous monitoring and recording devices, corrosion monitoring, monitoring of the CO2 plume that is created by the injection operations, and periodic monitoring of groundwater quality.

- The permit holder would be subject to semi-annual and monthly reporting requirements. Semi-annual reports to the Director would have to include information relating to changes in the relevant characteristics of the injected CO2 stream, and monthly average, maximum and minimum values for injection pressure, flow rate, and volume and annulus pressure, and a description of “any event” that exceeds the permit’s operating parameters or triggered the activation of a shutdown device. The monthly report would have to include information on mechanical integrity tests and well workover or maintenance results.

- Finally, the regulations would establish well plugging standards and would require the preparation of a site-specific well plugging plan that includes specific information on the plugging materials and techniques that will be used.
Issues for Stakeholders

Although the proposed rules provide a solid first step toward defining the regulatory parameters for geologic carbon sequestration, they also raise a number of important issues that stakeholders should consider as they evaluate the potential impacts of this new program. For example:

- EPA proposes that every Class VI well must go below any underground drinking water source, even if there are thousands of feet of rock between the injection zone and the USDW. The preamble cites several situations where that may be inappropriately strict, including most coalbed methane formations, and suggests that the Director could be given the discretion to waive this requirement or to exempt lower USDWs from SDWA protection. But such discretion is not found in the proposed regulations. It is not clear if a half-mile well depth is also being used as a surrogate test, though the preamble disclaims that such a depth is being used to assure EPA that the CO2 will be kept in a supercritical fluid state.

- The presumptive period of 50 years of site care and monitoring, and accompanying financial responsibility requirement, is considerably longer than that suggested by other agencies, such as the Interstate Oil and Gas Compact Commission (“IOGCC”), which proposed a period of 10 years. In the sequestration debates, there are calls for either the government or private enterprise to relieve the well operator from its obligations and liabilities after the passage of some appropriate time period, either by law or by a privately funded insurance, trust or indemnity arrangement. In the preamble, EPA recognizes that as between the facility operator and some trust fund or indemnitior, the fund or indemnitior may shoulder this burden. But under the SDWA authority, EPA feels it must impose this lengthy duty on the well operator.

- There are a number of questions that are raised by the proposed rule, for which EPA has specifically solicited comments from affected stakeholders. These include the following:
  - Should CO2 injection for EOR purposes still be regulated as traditional Class II wells, rather than in the new Class VI category;
  - Should already existing and permitted Class I-V wells be “grandfathered” under the new regulations if they are going to be converted to Class VI wells;
  - Should EPA prohibit injection into coal seams and organic rich shales when above the lowermost USDW;
  - Should the new regulations prohibit the injection of hazardous waste in Class VI wells;
  - Under what circumstances may injected or stored CO2 contain a hazardous substance, such that a release could result in CERCLA release reporting;
  - Should the Director be allowed to require owners to identify additional confining or containment zones in addition to the primary zone;
  - Should the AoR be reevaluated on a periodic basis and under what conditions;
  - Should aquifer exemptions be given for Class VI injection, and under what conditions;
Should there be a minimum injection depth requirement, rather than requiring injection to occur below the lowermost USDW; and

Should financial responsibility adjustments be required as proposed.

Finally, given the complexity and significance of these issues, it will be critical to assess whether a primacy State or EPA will enforce the new regulations and make determinations as to hazardous material content, permitted injection zones, and post-injection site care and monitoring time periods. A total of 33 states have achieved primacy for the existing UIC wells, and we can expect a similar number to seek primacy for the Class VI wells.

Live Link

Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells; Proposed Rule; Environmental Protection Agency Federal Register Part II; July 25, 2008 (PDF, 51 pages)

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