

Comments of Members of the CCS Alliance Regarding Proposed Washington Department of Ecology CCS Rules

Interested Members of the CCS Alliance submit the following comments in response to Department of Ecology AO #07-11, a proposal to adopt a greenhouse gases emissions performance standard for baseload electric generation and to establish criteria to implement and enforce the emissions performance standard. In particular, these comments focus on the proposed amendments to Chapter 173-218, amending the State's Underground Injection Control (UIC) program.

The CCS Alliance is a coalition conducting policy advocacy at the State and federal levels on risk mitigation issues related to carbon capture and storage (CCS). Its members include, among others, MidAmerican Energy Holdings Company, parent of Pacificorp, whose operating company Pacific Power provides service to consumers in Washington; and the National Rural Electric Cooperative Association.¹ The group also includes a major property casualty insurer and reinsurer. The CCS Alliance is formed by companies and entities sharing a common interest in removing impediments to investment in and development of CCS technologies posed by risk and liability issues arising as a matter of law and public policy. The CCS Alliance's purpose is to consider ways of promoting the development and use of CCS technologies and to support efforts by the private sector, States, the federal government, nongovernmental organizations, and others to help ensure that these technologies are developed and widely, efficiently and cost-effectively deployed in furtherance of any greenhouse gas emissions reduction strategy implemented at the State, regional, or federal level.

Commentary

The commenting members of the CCS Alliance recommend that the proposed amendments to Chapter 173-218 be modified to encourage deployment of CCS technologies. Some of the provisions proposed under the guise of protecting human health and the environment may in fact discourage such protection by discouraging CCS development.

ESSB 6001 on the whole will make it more difficult to build new fossil fuel-fired generation in the State of Washington, and may affect the value of existing fossil generation assets. It will discourage acts - e.g., upgrades that may increase power from existing units, or dispositions - that trigger the requirement that existing baseload meet the greenhouse gas emissions performance standard. We provide the comments below to make the State aware that especially given this context, it will need to be particularly sensitive to whether the CCS regulations promote capital formation and availability of risk management mechanisms for CCS projects. Those matters are not only important to economic interests, but also to the State's interest in maintaining affordable and reliable electricity.

¹ Pacific Power was a member of the Department of Ecology's ESSB 6001 Stakeholder Committee. See http://www.ecy.wa.gov/laws-rules/activity/wac173407_218_meetings.html. Comments filed here by members of the CCS Alliance reflect many of the same concerns expressed during the stakeholder process last fall.

CCS is a technology that policy makers - including the U.S. Environmental Protection Agency and many in Congress - want to encourage. It is expensive, not vital to production of the commodity, and has a poorly understood risk profile. It is under consideration because it may provide societal benefit and play a critical role in meeting the ambitious goals set by the State of Washington to address climate change.² As such, a regulatory scheme should promote its construction and safe operation and avoid discouraging it.

Well classification

Under the proposed regulations, injection wells used to inject carbon dioxide for geologic sequestration will be considered Class V wells. This is in keeping with guidance issued by the U.S. Environmental Protection Agency (EPA) in March 2007.

The EPA has announced its intent to issue proposed CCS rules in July of this year. Final rules may be issued in 2009 or 2010. The agency has indicated that because of unique features of CCS - including the low viscosity of supercritical CO₂, its high buoyancy, and injection volumes that could dwarf those for other well classes - it is likely to propose that CCS injection wells be regulated as a new class or subclass (e.g., as a new Class VI).

Under the federal Underground Injection Control program, States wishing to take lead implementation and enforcement responsibility must have in place regulations no less stringent than federal regulations. By adopting regulations now that regulate CCS wells under a Class V regime, Washington may invite a conflict with future federal standards. Washington cannot today know what the to-be-proposed EPA regulations will provide. When EPA's regulations take effect, applicants should clearly know whether the EPA or the Washington regulations apply, and whether the State or the EPA will have primary implementation and enforcement authority. In the interest of having one clearly applicable regulatory regime, Washington would be best served by applying existing Class V regulation to CCS wells, to be modified to be equal to or no less stringent than new federal regulations for CCS wells upon their adoption. If Washington decides to enact a new regulatory regime that may present conflicts with federal regulations, it should provide that it will incorporate by reference any new federal standards applicable to CCS injection wells.

Regulation of CO₂ as a Hazardous Waste

Washington is an associate member of the Interstate Oil and Gas Compact Commission (IOGCC). In September 2007, the IOGCC issued model State guidelines and regulations for CCS wells. As a general matter, Washington's proposed regulatory regime goes far beyond the

² The Electric Power Research Institute's "prism analysis" of technologies that must be deployed to return U.S. carbon dioxide emissions to 1990 levels by 2030 allocates responsibility for bringing about the largest portion of reductions in carbon dioxide emissions below the "business as usual" scenario to CCS technologies. See "The Power to Reduce CO₂ Emissions: The Full Portfolio," Revis James, Richard Richels, Geoff Blanford, and Steve Gehl, Electric Power Research Institute, August 2007.

regulatory structure proposed by the IOGCC, and is directly contrary to one of its key recommendations, which is the treatment of CO₂ as a commodity rather than a waste.

The IOGCC, led by States with familiarity with underground injection of CO₂ for enhanced oil recovery, concluded that:

although contaminants and pollutants such as H₂S, NO_x, SO₂ and other emission stream constituents should remain regulated for public health and safety and other environmental considerations, CO₂, which is generally considered safe and non-toxic and is not now classified at the federal level as a pollutant/waste/contaminant, should continue to be viewed in a manner that allows beneficial uses of CO₂ following removal from regulated emission streams. The Task Force strongly believes that treatment of geologically stored CO₂ as a waste using waste disposal frameworks rather than resource management frameworks will diminish significantly the potential to meaningfully mitigate the impact of CO₂ emissions on the global climate through geologic storage.³

Though the concept of treating CO₂ as a commodity in States where it has few or no markets may seem foreign, the notion that it is not necessary to regulate it as a waste remains clear.

Sequestering 99 Percent for 1,000 Years

Washington proposes that its permits will require that the site provide for “permanent sequestration” of CO₂. Permanent sequestration, according to the new definition proposed in WAC 173-407-110, requires “retention of greenhouse gases . . . that creates a high degree of confidence that substantially ninety-nine percent of the greenhouse gases will remain contained for at least one thousand years.” This may be an appropriate standard for certain activities with a known high risk profile. However, this requirement is inappropriate for CO₂ injection wells.

First, CO₂ is not a dangerous gas, except potentially in very high concentrations.⁴ Humans are constantly in its presence. We consume it and exhale it. The proposed standard is not related to effects on human health or the environment from a potential leak.

Second, if CO₂ is released from the area where it was intended to be geologically sequestered, even in large quantities, that does not mean that a result harmful to human health or the environment will occur. For example, if the CO₂ plume simply migrates beyond the

³ Interstate Oil and Gas Compact Commission, “Storage of Carbon Dioxide in Geologic Structures: A Legal and Regulatory Guide for States and Provinces,” p. 11, September 25, 2007.

⁴ Concentrations of greater than 15,000 parts per million can harm the environment and human health. See January 30, 2008 presentation of S. Julio Friedmann, Lawrence Livermore National Laboratory, to the California Air Resources Board, Chair’s Air Pollution Seminar, accessed April 6, 2008 at <http://arb.ca.gov/research/seminars/friedmann/friedmann.pdf>.

boundary within the containment formation where it was intended to be stored, there would not necessarily be any consequence to human health or the environment. A secondary containment formation may prevent its further migration. Furthermore, we have learned a great deal from natural geologic trapping of oil and gas for millions of years, and from injection of supercritical CO₂ and other fluids into underground formations. Such experience has shown that while quantities of supercritical CO₂ are likely to remain mobile over long periods, trapping mechanisms beyond structural and stratigraphic trapping apply increasingly over time.⁵ Residual phase trapping can maintain CO₂ within the pore spaces of the sedimentary formation within which it is injected. Over time, an increasing portion of the CO₂ will dissolve into the brine in the formation. Finally, the CO₂ becomes mineralized. Rates of these occurrences will differ by formation. If CO₂ injectate does not show a likelihood in the near term of escaping a formation in a manner that may cause adverse effects to human health and the environment, it is increasingly unlikely to do so over time.⁶

Third, a 1,000 year standard, even with such softening phrases as “a high degree of confidence” and “substantially” 99 percent, is not suitable for engineering prognoses. It is the sort of standard one might see for radiological materials, which, in contrast to CO₂, are clearly harmful to humans, have decay ratios that are easier to model than the entrainment of supercritical CO₂ in deep subsurface formations, and are easier to track. In addition, ensuring containment generally depends on proper site selection and characterization. We strongly recommend devising a standard that encourages detailed engineering inquiry rather than a political standard that instead may encourage creative application writing.

Finally, the 1,000 year standard will discourage investors and risk managers from supporting CCS projects, as it may lead to or at least imply a longer than necessary period of financial responsibility, especially since Washington does not specify a set post-closure financial responsibility period. If this standard implies a period of financial responsibility, it is not a relevant one from a financial responsibility context since the risk of failure declines over time, as discussed above. Stated flatly, insurers would not provide coverage for projects obligated under such terms. Without insurance, projects will not go forward.

Design of Containment Facilities

Casing materials and cement must be designed to contain the fluids “during the lifetime of the geologic sequestration project, including the post-closure period.” There is no defined post-closure period in the proposed regulations, nor is one already established under Washington regulations. In some cases CO₂ stored in CCS wells may be retrieved for future use; however, in

⁵ Id. At a February 28, 2008 U.S. EPA workshop in advance of the proposal of Underground Injection Control regulations, panelist Iain Wright of BP commented that at the Sleipner site, one of the world’s largest CCS facilities, CO₂ has been trapped by capillary action. This is the physical mechanism that, for example, causes water to become absorbed into a sponge.

⁶ Id.

most cases it is expected to be stored permanently. Does this mean the State intends that the casing materials and cement must be designed for durability of permanent length?

Rather than apply an unworkable standard, Washington would be served better by requiring casing and cement quality to meet a more appropriate standard and, as the regulations already propose, instituting a monitoring, mitigation and validation program that provides assurance of safe long-term storage. A standard based on clear-eyed protection of human health and the environment, in conjunction with setting a defined financial responsibility period in the range of 10 to 30 years, depending on site-specific factors, would promote the State's interests. If CCS is to be a real rather than a theoretical practice, policy makers must set financial responsibility periods with real timelines, not theoretical ones.

Shutdown Ramifications for Non-Compliance

If a site is not in compliance, proposed WAC 173-218-115 would require the operator to “stop injecting immediately, until the project obtains approval for redefining the geologic containment system and its relevant dimensions by the department.”⁷ In conjunction with the requirement for permanent sequestration described above, this language means that if CO₂ migrates out of the expected containment area but poses no threat to human health or the environment, injection would be required to cease immediately.

If injection ceases immediately, a new baseload generation unit that without the operation of CCS equipment would emit in excess of 1,100 pounds of greenhouse gases per megawatt hour may be required to stop operating. Baseload generating units are units that essentially operate all the time to provide electricity. Interrupted operation, especially for a prolonged period but even potentially for a short time, at a minimum would degrade electric reliability, and could potentially result in blackouts.

If injection is interrupted for more than 180 days, perhaps as a result of regulatory proceedings to address non-compliance matters that may be of little environmental or health consequence, closure proceedings for the injection site must begin.⁸ This provision subjects owners of new baseload generation facilities relying on CCS to substantially increased risks. If the injection site is closed, generation owners relying on CCS in order to operate in compliance with State law would be required to inject elsewhere, if available. It may take a substantial period of time to characterize and permit a new injection facility and put in place the pipeline and other equipment that may be necessary to its operation.

Again, investors, insurers, and others may be deterred from involvement in facilities subject to such conditions – not only CCS facilities, but coal-fired generation plants as well.

⁷ Proposed WAC Section 173-218-115 at 4(d)(iii).

⁸ Closure proceedings may be delayed by 180 days upon written request. However, this may not correlate to the unknown length of time that may be required to resolve potential compliance issues.

There are less draconian means of reducing CO₂ emissions. For example, during a period of interrupted injection, generating facilities relying on the injection site could purchase carbon offsets, rather than shut down.

Interaction with Other Laws

The CCS Alliance is concerned about potential liability for CO₂ storage developers, owners, operators, investors and others under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Clean Air Act (CAA) and similar State laws related to environmental damage or contamination.

Unless owners and operators know the limits on their liability, and investors and lenders can be assured of a return on their investment, the needed capital will not be mobilized and private insurance carriers will be unwilling to provide sufficient insurance coverage. The CCS Alliance therefore requests, to the extent that the Department of Ecology has the authority to do so, that it clarify that CERCLA and RCRA and similar State laws will not apply to CO₂ injections pursuant to the UIC program if the injections are done in compliance with the proposed regulations.

Geologic Sequestration of Carbon Dioxide

The department's proposed regulations define "geologic sequestration of carbon dioxide" as "injection of carbon dioxide, usually from human activities like burning coal or oil, into subsurface geologic formations to prevent its release into the atmosphere for a defined length of time."

It is unclear what a "defined length of time" is expected to be, or through what process the length of time is expected to be defined, as no such process is described in the proposal. In some cases, the CO₂ may be recovered for beneficial purposes. In other cases, it will be intended to be stored permanently.

The words "to prevent its release into the atmosphere for a defined length of time" in the above definition raise a potential concern. We do not read that phrase to suggest that anything less than 100 percent retention of CO₂ within the injection formation constitutes geologic sequestration; however, the department should take care to avoid interpreting the phrase in such manner, as this interpretation may unduly limit the applicability of the practice. The State would be better served by defining "geologic sequestration of carbon dioxide" as "injection of carbon dioxide into subsurface geologic formations to minimize its release into the atmosphere and drinking water during the period of injection, closure, and post-closure" (in conjunction with a defined post-closure period, as recommended above).

Finally, it is unnecessary to state the source of the CO₂, whether it be from industrial or natural sources.

AKART for Removal of Pollutants

The department's draft regulations propose to require that operators use "all known, available and reasonable methods of prevention, control and treatment (AKART) to remove contaminants, such as sulfur compounds and other contaminants, from the injected CO₂."⁹ There is no explanation of why such a level of contaminant removal is necessary.

There are legitimate reasons to remove contaminants from injected CO₂, such as assuring its injectivity, avoiding corrosion of pipelines and injection wells, maintaining integrity of the injection area, and preventing operators from avoiding more stringent regulatory regimes for hazardous materials by injecting them together with CO₂. However, depending on how the requirement is implemented, mandating the application of AKART may lead to an unnecessarily and wastefully expensive treatment CO₂ purification regime.

We recommend that the standard of CO₂ purity be tied to protecting public health and the environment during injection and long-term storage, and to ensuring that more stringent State requirements are not intentionally skirted by mixing other materials with CO₂. We suggest that the State request commentary on the specific level of CO₂ purity that would meet these objectives in Washington.¹⁰

Monitoring

Monitoring is required for leaks into groundwater, surface water, and the atmosphere, notwithstanding that the UIC program is for protection of groundwater. The EPA stated publicly that it is likely to decline to require monitoring for atmospheric leaks since the mission of the UIC program is groundwater protection. Surface monitoring would be wasteful unless there is some indication that the injected CO₂ has moved out of the containment formation, and should not be required absent such a circumstance.

No Defined Post-Operation Financial Responsibility Period

As noted above, Washington does not have a defined post-closure period for Class V wells, and none is provided in the draft regulations. In proposed Section 173-218-115(6), the Department proposes:

The post-closure period shall continue until the department determines that modeling and monitoring demonstrate that conditions in the geologic containment system indicate that there is little or no risk of future environmental impacts and there is high confidence in the effectiveness of the containment system and related trapping mechanisms.

⁹ Proposed Section 173-218-115 at (1)(b)(iii).

¹⁰ See, e.g., August 17, 2007 presentation of S. Julio Friedmann, Lawrence Livermore National Laboratory, to the California Air Resources Board, Chair's Air Pollution Seminar, accessed April 15, 2008 at <http://arb.ca.gov/research/seminars/friedmann/friedmann.pdf>. ("High purity (>95%) CO₂ streams are required for storage.")

While flexibility is welcome and helpful in a variety of regulatory areas, the proposed regulations may deter investment in CCS projects by leaving too open-ended the period of post-closure responsibility and the duration of which a site owner or operator must maintain financial assurance. Contrast the department's amorphous standard with the time-limited financial responsibility period proposed by the IOGCC.¹¹ Somewhere between lies a financial responsibility period that gives sufficient certainty to project developers, owners, operators, financiers in order for CCS projects to go forward, and the flexibility to take into account site specific factors. Risk profiles - both for types of sites with which there is little experience at present, such as deep saline formations, as well as specific injection sites - will become clearer as more experience is gained. We suggest including a sufficiently protective specified time limit for financial responsibility in the regulations, which would be shortened as information is developed to promote a clearer risk picture and higher degree of confidence.

The State should develop and employ risk indicators to track and characterize the (likely diminishing) risk levels as operation progresses and eventually ceases, and post-closure monitoring begins. This will encourage appropriate allocation of resources.

The IOGCC's CCS Task Force proposed a two-stage period, following the cessation of operations, for which it used the nomenclature "closure" and "post-closure." An "industry-funded and state-administered trust fund" would assure the financial ability to respond to releases during the post-closure period.

We support this concept and strongly encourage the State to consider such a mechanism. State-chartered carbon mutual trusts could act as a "first loss reserve" for CO₂ leakage or damages, beyond the damages to be covered by the operator through private insurance programs. Such a risk sharing measure encourages better site review, selection, management and monitoring by both the State and the project developer, while avoiding the potential moral hazard for government agencies. Private commercial insurance could be negotiated for the CO₂ transportation and injection period and capped at a reasonable level. The "first loss" reserve protection of a state-chartered carbon mutual trust would cover losses in excess of those covered by negotiated private insurance instruments. This protection could be coupled with a Federal backstop for long term, indefinite losses and the long-term post-closure period.

Capitalization for a carbon mutual trust could come from a number of sources--a royalty fee on coal; an injection fee or adder applied to the rates approved by the State Public Service Commission (PUC) and charged by the storage facility and/or coal-burning power plant; a wires charge or carbon levy applied to regulated transmission entities; and/or from a percentage of the

¹¹ "The Closure Period is defined as that period of time (10 years unless otherwise designated by the State Regulatory Agency) after injection activities cease and the injection well is plugged. During this Closure period, the operator of the storage site would be responsible to maintain an operational bond and individual well bonds. The individual well bonds would be released as the wells are plugged. At the conclusion of the Closure Period, the operational bond would be released and the liability for ensuring that the site remains a secure storage site during the Post-Closure Period would transfer to the state." IOGCC report, p. 11.

State taxes generated from one or more CCS projects in the state. Each state could have one or more carbon mutual trusts, which could be capitalized by multiple projects, as the sector evolves. Or states could collaborate regionally as on other issues to charter the same trust operating in multiple territories. The trusts could be privately administered in compliance with state insurance regulations; in this manner the state has final governance authority by charter status, while private industry can bring fiduciary and engineering analysis resources to bear which would be expensive for states to match.