



December 4th, 2017

Mr. Samuel Wade
Chief, Transportation Fuels Branch
Industrial Strategies Division
California Air Resources Board
1001 I Street
P.O. Box 2815
Sacramento, CA 95812

Re: Comments on Draft CCS Accounting and Permanence Protocol, and on Draft Regulatory Amendments to the Low Carbon Fuel Standard as these pertain to CCS technology

Dear Mr. Wade:

The Natural Resources Defense Council (“NRDC”), which has more than 3 million members and activists, more than 380,000 of whom are Californians, appreciates the opportunity to comment on the Accounting and Permanence Protocol for CCS and the Draft LCFS Regulatory Text (Sep.22, 2017 Update).

Carbon Capture & Storage (CCS) is a technology that could play an important role in the state’s climate mitigation portfolio, as well as at the national and global level. We commend the California Air Resources Board’s (ARB) staff and leadership for their pioneering efforts to admit CCS under California’s climate programs provided adequate safeguards are met. This is an important effort that could help in- and out-of-state projects contribute to California’s climate mitigation efforts, as well as much needed efforts to improve air quality.

NRDC has submitted extensive technical joint comments as part of a larger, multi-stakeholder group. NRDC has spent considerable resources over the course of the past 15 years examining the science fundamentals that underpin CCS technology in depth. We are also fortunate to have a geologist on staff who has worked on a large carbon dioxide (CO₂) injection project. We believe that our joint comments are based on sound science, and we stand ready to explain the basis of these comments to ARB or stakeholders.

We hereby submit supplemental comments to cover additional topics that are particularly important to our organization, and to further clarify some substantive matters.

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We firmly believe that, with some changes that can be readily incorporated in the current architecture of the proposed Protocol, ARB can strike the needed balance between safety and environmental integrity, public assurance, and strengthening California’s climate mitigation portfolio by making safe and effective CCS projects financeable under the umbrella of its climate programs.

The role of regulation in minimizing risks from CCS

Confidence in the security of storage in properly selected and operated sites does not come about easily to non-experts. Through our extensive research over the years, we are confident that CCS projects can be sited, operated and decommissioned safely and effectively. Examining multiple natural and engineered analogues, as well as direct experience with CCS projects, the Intergovernmental Panel on Climate Change (IPCC) concluded the following in its exhaustive Special Report on Carbon Dioxide Capture and Storage:

“based on observations and analysis of current CO₂ storage sites, natural systems, engineering systems and models, the fraction retained in appropriately selected and managed reservoirs is very likely¹ to exceed 99% over 100 years, and is likely to exceed 99% over 1000 years. Similar fractions retained are likely for even longer periods of time, as the risk of leakage is expected to decrease over time as other mechanisms provide additional trapping.”²

The remaining 1% is a number used by IPCC authors to take into account any uncertainties such as very small amounts of CO₂ that might be vented during the operation of sites due to human factors over those very long periods, and does not reflect reduced confidence in the underlying geology or the ability of formations to retain the overwhelming majority of the injected CO₂. There is every possibility that even this tiny fraction will not reach the atmosphere with proper site operation and regulation, bringing the total retained fraction to 100%. The 1% figure in no way implies leakages that could harm human health or the environment.

In other words, there is every reason to expect all of the injected CO₂ to remain securely stored underground for many centuries. As time goes by and geologic trapping mechanisms reinforce, the security of storage also increases.

Underpinning these expected levels of performance as a necessary condition is the assumption of sound regulation. ARB’s efforts fulfill precisely this need, and their importance cannot be stressed enough. ARB’s efforts have surpassed those of any other jurisdiction to date. Sound regulation has been repeatedly shown to play a powerful role in ensuring selection of sites with the right geology to permanently store CO₂, project design and operation that prevents leakage and minimizes any risks, and decommissioning that “seals” the fate of the injected CO₂.

Our recent report³ on the role of regulation in ensuring secure storage in CO₂-enhanced oil recovery (EOR) projects is an extensive treatise on the shortcomings of its existing regulatory structures. We present case

¹ “Very likely” is a probability of 90 to 99%.

² [IPCC, Special Report on CCS](#), Technical Summary.

³ Mordick, B. and Peridas, G. “[Strengthening the Regulation of Enhanced Oil Recovery to Align It with the Objectives of Geologic Carbon Dioxide Sequestration](#)”.

studies of both sound and problematic projects. Those that proved problematic would have been entirely preventable under ARB's proposed Permanence Protocol.

We believe that ARB's proposed Permanence Protocol fills a critical regulatory gap in the geologic sequestration of CO₂, including for EOR, and are pleased to see California yet again leading the way nationally. Below, we submit comments and clarifications in addition to our larger joint technical comments.

We Oppose Providing Windfall Credits to Existing CCS Operations

We support ARB's efforts to refrain from crediting CCS projects that have capture, transport, and injection already in operation when the Protocol is finalized, in order to prevent what would amount to a windfall. Under the LCFS, our understanding is that the intent of the program is to reduce the carbon intensity of the transportation fuel supply chain directly. A secondary benefit is to spur innovation in CO₂ capture in the transportation and other sectors. We support ARB's efforts to avoid providing valuable LCFS credits for emission reductions that would occur anyway.

This restriction on credit generation should not apply to the expansion of an existing capture facility, or supplying additional CO₂ to an existing sequestration project, but rather to those projects that are already fully operational when the protocol goes into effect. If there are currently operating projects that may be terminated but for LCFS credits, such as EOR fields that are economically depleted, the ability to be awarded such credits should be considered on a case-by-case basis.

Lifecycle accounting for EOR projects [Accounting and Permanence Protocol, Section B]

We also support ARB's proposal to account for emissions over the entire lifecycle of an EOR project. The EOR process introduces equipment and energy expenditures that are different to CCS projects in saline formations. These need to be incorporated into the accounting in order to fully evaluate the net climate impacts of EOR and to ensure that credits are issued only when there is a net reduction in CO₂ emissions. ARB has expended considerable effort over the years in developing the analytical basis for such accounting. We urge ARB to continue refining its lifecycle modeling for EOR, taking into account the latest literature that is publicly available and incorporating actual operational data to the extent possible.

Applicability of Permanence Protocol to jurisdictions outside California and to existing EOR projects [Accounting and Permanence Protocol, Section C]

As part of our joint comments, we recommend that the Protocol, through a new (sub)section, provide the Executive Officer with the option to accept certain requirements, data sources, methods or techniques used in EOR in lieu of any relevant specific requirements in the Protocol, provided these offer an equivalent or better level of assurance in permanence than the requirements in the Protocol.

As we do in the joint comments we want to underline that we are not advocating for more lenient or favorable treatment for projects in other jurisdictions or for CO₂-enhanced oil recovery (EOR) projects.

We simply want to ensure that projects also governed by other requirements, or that use practices that are equivalent or better than those that would qualify under the Protocol, are not excluded from eligibility due to inconsequential mismatches in those requirements or practices.

In addition, for cases where the Executive Officer has the discretion to approve a particular method or course of action provided that it is equivalent or better than a specific one listed in the Protocol, we believe that ARB should provide sufficient public notice and invite public input through comments or workshops.

Stewardship and Liability Issues [Accounting and Permanence Protocol, Section C, §5.2 and §7]

We are concerned that placing a duty on a commercial entity to perform monitoring tasks for 100 years is likely to create a gap in duties. We can think of few, if any, corporations that have survived this long, and we are not confident that corporate successorship through takeovers, mergers or related developments will leave the duty to monitor intact.

Even though the draft Protocol's Financial Responsibility requirements include Post-Injection Site Care and Site Closure [§7(a)(2)(C)], ARB should not create a regulatory construct whereby the ability to monitor (or remediate) depends solely on corporations' prolonged existence or on financial responsibility instruments.

The use of financial responsibility instruments is best viewed as a last-resort option, and we strongly advise against relying on those instruments as a matter of routine. We see a large degree of variability in the effectiveness of the financial responsibility instruments listed under §7(a)(1) (for example, self-insurance or a letter of credit would likely be far less trustworthy than an escrow account). Even if the list of instruments were to be narrowed, ensuring if the need arises that the funds end up in the hands of an entity that has the jurisdiction and ability to administer them towards annual monitoring for the remainder of the 100-year period, and actually commissioning the monitoring tasks for that period would likely be slow, cumbersome and inefficient.

Such predicaments are best avoided by ensuring a shorter period of exposure to the risk of corporate discontinuity, and a clear and preemptive transfer of responsibilities to another entity with pre-defined duties and procedures using only a subset of the proposed financial responsibility instruments⁴ or Buffer Account contributions. Common law liability and statutory liability to deal with issues such as negligence, fraud, newly-emerged non-compliance and others would still apply to operators after injection stops regardless of whether an operator is required to monitor.

⁴ We have a higher degree of confidence in those instruments that can be readily liquidated, such as surety bonds and escrow accounts, compared instruments such as self-insurance.

Conclusion

We thank ARB staff for its consideration of these comments and continued work on this important topic, and look forward to working together during the final stages of the process.

Respectfully submitted,



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