Western States Petroleum Association
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Catherine Reheis-Boyd
President

April 23, 2018

Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: WSPA Comments on the Carbon Capture and Sequestration Protocol (CCSP) under ARB's Proposed Low Carbon Fuel Standard Regulation Amendments

Clerk of the Board:

The Western States Petroleum Association (WSPA) appreciates this opportunity to provide input to the California Air Resources Board (ARB) on the Carbon Capture and Sequestration Protocol (CCSP), dated March 6, 2018, as part of the ARB's Proposed Low Carbon Fuel Standard (LCFS) Regulation Amendments. WSPA is a non-profit trade association representing companies that explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in California and four other western states. WSPA will be providing additional comments regarding other aspects of the proposed LCFS Regulation Amendments in a separate comment letter.

WSPA is concerned that key requirements of the CCSP have no technical basis. Requiring monitoring over unreasonable periods and requiring prescriptive elements which research and experience show will not provide relevant data introduces two areas of concern:

1. Such requirements will likely have a chilling effect on use of an important potential technology, which ARB's E3 study relies on to help the state reach its goals after 2030.

    - For example, the requirement that the "The CCS Project Operator must show proof of exclusive right to use the pore space in the sequestration zone for storing CO_2 permanently" may not be unobtainable but will be a major barrier to on-shore CCS.

    - Although Class VI may not be a perfect construct, it provides consistency nationwide for anyone that wants to do a project. Under the proposed protocol, project proponents would be faced with decisions whether to follow Class VI and the more onerous California Protocol. There is no technical basis for California to go beyond the Class VI program.

2. The data does not, in fact, provide the assurances that the state seeks and thereby misdirecting attention and resources away from valid approaches to monitor and evaluate CCS project success.

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Proposed 100-year Post-Injection Site Care

In Section 5.2(b)(2), Post-injection Site Care and Monitoring, it is stated that:

> *After injection is complete, the CCS Project Operator must continue to conduct monitoring as specified in this section and the Executive Officer-approved Post-Injection Site Care and Site Closure Plan for a minimum of 100 years.*

Pursuant to the November 6, 2017 ARB CCS Workshop and ARB's rollout of the proposed 100-year Post-Injection Site Care (PISC) requirement, stakeholders have questioned the technical basis for secure geologic storage of CO_2 and have conclusively disputed its legal basis relative to the letter and spirit of the Global Warming Solutions Act (GWSA)[1] and the findings of Our Children's Earth Foundation v. ARB:

> *ARB must build substantial evidentiary support for the 100-year provision, consider all relevant factors and demonstrate a rational connection between those factors, the provision, and the purposes of the Global Warming Solutions Act (GWSA). Deepika Nagabhushan – Clean Air Task Force.*
>
> *The specification of 100 years appears to be an arbitrary time period, not based on anything physical, chemical, or project-related. We are advocates of risk- and performance-based monitoring. Arbitrary time periods with no rationale undermine the technical credibility of regulations. Jens Birkholzer – LBNL*
>
> *The CCS technical community has not considered tools that could be used over 100 years post closure. It is not clear how 100 years of monitoring data can be used to further improve a robust model, or be effective in detecting previously unimagined failure. Sue Hovorka – University of Texas – Bureau of Economic Geology*

Included in the quantification methodology (QM) post injection rationale was a linked[2] reference to the IPCC's Special Report on Land Use, Land Use Change, and Forestry (SR-LULUCF), apparently intended to be a technical justification for assigning 100 years PISC as "permanence" for CCS. The IPCC co-chairs of Working Group III, which produced the report, say very clearly in the preface the purpose and substance of the report that "The methodologies and the science assessed here are only intended for LULUCF, not geological sequestration." Indeed, the IPCC's Special Report appears to use 100 years simply as a convenient graphical timeframe (as basis to consistently compare GWPs) to illustrate examples of the net benefits of bio-sequestration, even with reversals ("ton-year" approach).

Thus, by selecting 100 years as the definition of "permanence" for geological CO_2 sequestration, ARB has not only removed itself from a viable comparison of forestry vs. geo-sequestration (https://www.arb.ca.gov/fuels/lcfs/workshops/12042017_coalition.pdf, p. 29-30) but misunderstood the significance of a SP-LULUCF timeframe. Should ARB wish to use the IPCC work as an authoritative basis for regulating long-term CO_2 geological storage, a more logical guide, to start with, is their Special Report for CCS (SR-CCS), published in 2005, five years after the SR-LULUCF and prepared by experts

[1] AB 32 Chapter 488: Legislative Counsel's Digest: "The bill would require the state board to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective greenhouse gas emission reductions, as specified."
[2] http://www.ipcc.ch/ipccreports/sres/land_use/index.php?idp=74

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in CO_2 storage and backed by a range of technical studies. Therein, one statement is particularly relevant (Technical Summary, p. 34; https://www.ipcc.ch/pdf/special-reports/srccs/srccs_technicalsummary.pdf):

> *"With regard to global risks, based on observations and analysis of current CO_2 storage sites, natural systems, engineering systems and models, the fraction retained in appropriately selected and managed reservoirs is very likely [*"Very likely" is a probability of 90 to 99%] *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."*

More recently, at the United Nations Framework Convention on Climate Change (UNFCCC) COP17/CMP meeting in Durban (2011), negotiators representing Parties to the Kyoto Protocol developed the Decision 10 of CMP7 (Annex B, page 28) of the Additional requirements for carbon dioxide capture and storage project activities under the clean development mechanism (CDM), states:

> *16. The monitoring of the geological storage site shall:*
>
> *(a) Begin before injection activities commence, to ensure adequate time for the collection of any required baseline data;*
> *(b) Be conducted at an appropriate frequency during and beyond the crediting period(s) of the proposed project activity;*
> *(c) Not be terminated earlier than 20 years after the end of the last crediting period of the CDM project activity or after the issuance of CERs has ceased, whichever occurs first;*
> *(d) Only be terminated if no seepage has been observed at any time in the past 10 years and if all available evidence from observations and modelling indicates that the stored carbon dioxide will be completely isolated from the atmosphere in the long term. This may be demonstrated through the following evidence:*
>
> > *(i) History matching confirms that there is agreement between the numerical modelling of the carbon dioxide plume distribution in the geological storage site and the monitored behaviour of the carbon dioxide plume;*
> > *(ii) Numerical modelling and observations confirm that no future seepage can be expected from the geological storage site.*

In summary, ARB's proposal for a minimum of 100 years PISC, is an arbitrary construction that has no basis in any CO_2 geological storage technical literature or expert opinion, the legal "precedent" ARB neither cites nor even provides a correct interpretation of the examples in the putative SR-LULUCF analog. This will essentially eliminate California's LCFS and Cap & Trade programs from consideration for deployment of CCS, despite the value of LCFS credits, and thus derail the state's climate goals.

There are viable alternatives that ARB could pursue:

1. Choose a shorter "arbitrary time" (consistent with other jurisdiction precedent) with provision for sound technical work as a basis for reducing this timeframe.

2. Develop an alternative longer-term stewardship program, managed by the state and supported by buffering accounts or another financial mechanism, that acknowledge the very low risk of

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substantial CO_2 leakage, particularly with time (e.g., IPCC SR-SCS "likely" and "very likely" scenarios) or even a "worst case" event[3].

Out-of-State Storage Projects

CCSP, as written, establishes identical requirements for CCS operations that take place outside of California well as in state. While we support rules that establish a common outcome – the secure long-term storage of CO_2 - regardless of location, regulatory requirements in an out-of-state jurisdiction may not allow for identical practices. WSPA is concerned that a strict, to-the-letter interpretation of the permanence terms in the protocol would preclude any CCS projects undertaken outside of California, where regulatory and legal frameworks may impose different terms and requirements.

WSPA recommends that ARB recognize out-of-state jurisdiction rules that deliver functionally equivalent outcomes to California's rules, such as jurisdictions where site closure rules are different and/or liability is transferred to the state, following ARB's protocol may not be possible. In such a case, the operator should be able to demonstrate the risk of leakage to atmosphere or to a connected water column has been reduced to a sufficiently low level to satisfy California's permanence criteria.

Buffer Account Allocations

As proposed, operators are expected to surrender between 3 and 12% of credits into the Buffer Account as insurance against potential leakage or credit invalidation and to update the risk rating every time the project goes under verification. ARB's proposed leakage risk ratings appear to be both arbitrary and excessive. WSPA requests that ARB provide a basis for the overall level of the risks and reassess the relative risk ratings across and within individual categories.

Invalidation of Credits

Some provisions in the proposed CCSP contemplate an invalidation of all credits generated upon specific occurrences, or do not rule out such a possibility. For example:

- If a well loses mechanical integrity and injection does not immediately cease.[4]

- Section C.7.3, which states that "financial responsibility instrument(s) must be sufficient to address the potential endangerment of public health and the environment via atmospheric leakage."

Such an approach does not recognize the accrued benefits to the atmosphere from preventing a CO_2 emission in the first place and keeping it sequestered for a certain period of time, and goes against ARB's own stated justification for using a 100-year period as the definition for permanence, which identifies a partial atmospheric benefit over shorter periods as well.[5]

In cases where CO_2 has been verified to have remained sequestered for a given period in accordance to the requirements set forth in the CCSP (i.e., absent any error, fraud or other occurrence of non-compliance that was not dealt with according to the provisions of the Protocol), ARB should recognize

[3] e.g., Lindberg et al., 2017. (https://www.sciencedirect.com/science/article/pii/S1876610217321227)
[4] ATTACHMENT 1: CCS Protocol – C: Permanence Page 77/175.
[5] Reference to IPCC guidance, ATTACHMENT 2: CCS Protocol Specific Purpose and Rational Page 170/175.

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the atmospheric benefit of sequestration periods shorter than 100 years by applying an up-to-date calculation.

Unintentional CO_2 Leakage

Section B.3(d)(1), provides:

> "All CCS projects must contribute a percentage of LCFS credits to the Buffer Account at the time of LCFS credit issuance by ARB. The CCS project's contribution to the Buffer Account is determined by a project-specific risk rating method, outlined in Appendix G. If CO_2 leakage unintentionally occurs at a CCS project, LCFS credits from the Buffer Account will be retired according to the provisions for invalidation in the LCFS."

In the course of continuous operations, CCS projects may have unintentional CO_2 leakage from various sources. This leakage is accounted for under Section C.2.2 and no LCFS credits generated for CO_2 that is not sequestered: fugitive or emissions from the subsurface to the atmosphere are reported under their own terms and no credits are issued for those quantities. The above language creates some ambiguity as to when and under what circumstances LCFS credits should be invalidated. Presumably, LCFS credits may be invalidated only where the CO_2 leakage exceeds the CO_2 sequestered in a given reporting period.

WSPA offers the following proposed alternative language in the CCSP:

> "All CCS projects must contribute a percentage of LCFS credits to the Buffer Account at the time of LCFS credit issuance by ARB. The CCS project's contribution to the Buffer Account is determined by a project-specific risk rating method, outlined in Appendix G.
>
> If CO_2 leakage unintentionally occurs at a CCS project, and the leakage exceeds the quantity of CO_2 stored by a CCS Project in a given reporting period, LCFS credits from the Buffer Account will be retired according to the provisions for invalidation in the LCFS."

Note that the suggested language is not intended in any way to interfere with operational requirements (relating to the cessation of injection or otherwise) for wells where leakage is detected or loss of mechanical integrity suspected.

Other Comments

In Section A.3(a)(5), the CCSP defines "Assets" to mean "all existing and all probable future economic benefits obtained or controlled by a particular entity." WSPA believes that including "all probable future economic benefits" in the definition is too speculative. A better definition would be: "a resource with economic value that an entity owns or controls with the expectation that it will provide future benefit."

In Section C.1.1.3.3(a)(1)(I), the requirement to provide "Any other information required by the Executive Officer" is overly broad. This requirement should for "Any relevant other information required by the Executive Officer".

In Section C.1.1.3.5(a)(3), it is required that "any" triggering event to be reported with no stated threshold. WSPA requests that ARB consider a threshold for triggering events.

In Section C.3.4, there are several requirements for when injection must cease but no defined process when injection can resume. Related to this comment, it is not clear what amount of leakage would require

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shutting in a well and what standard needs to be met to bring a well back into service. WSPA requests that CCSP provided clarity on these situations.

In Section 3.4(a)(8), the shut-down requirement for "any certification condition or to local regulatory requirements" is overly broad. This requirement should be for ""any relevant certification condition or to local regulatory requirements".

WSPA looks forward to ARB's responses to our comments. If you have any questions, please contact me at this office, or Tom Umenhofer of my staff at (805) 701-9142 or via email at tom@wspa.org.

Sincerely,

cc: Tom Umenhofer - WSPA

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