



Western States Petroleum Association
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Vice President

December 15, 2017

Mr. Sam Wade
Branch Chief
California Air Resources Board
1001 I Street
Sacramento, California 95814

sent via email: Samuel.Wade@arb.ca.gov

Re: WSPA Comments on ARB LCFS CCS Protocol

Dear Sam,

The Western States Petroleum Association (WSPA) appreciates this opportunity to provide feedback on the California Air Resources Board (ARB) Low Carbon Fuel Standard (LCFS) Accounting and Permanence Protocol for Carbon Capture and Geologic Sequestration (CCS Protocol). 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.

General Comment

WSPA appreciates the urgency with which the ARB is attempting to establish a clear and effective protocol for Carbon Capture & Sequestration (CCS). While the CCS Protocol appears comprehensive, risk-based performance criteria used to stipulate well design and testing, characterization, monitoring and post closure site care is generally lacking. The prescriptive approach proposed, therefore, does not reflect the risk profile of CO₂ storage or enhanced oil recovery (EOR). This will likely limit interest in CCS as an LCFS compliance approach in California and beyond.

Specific Comments

Post-injection site care. The length of the post-injection site care (PISC) period (100 years) far exceeds the typical time period that an operator may be able to commit to a subsurface project at final investment decision. The prescribed monitoring program during the PISC period furthermore may not reflect the level of risk that would be known at the end of injection nor is it flexible in terms of the type of monitoring technologies used (i.e., alternatives and new technologies capable of achieving the same assurance goals). By leveraging what is learned during operations and designing a monitoring program that would address remaining, significant risks would be a more practical and protective approach.

Indeed, California law requires ARB to consider the relevant factors and develop a reasonable basis for its proposed requirement, in light of the authorizing statutory requirements. But rather than develop any factual justification for its proposed 100-year PISC period, ARB has taken the position that 100 years of PISC is required by law. This position is incorrect. ARB's 100-year PISC requirement was designated as a definition of permanence deriving from the 100-year protocol compliance requirement in ARB's urban forestry protocol. A trial court previously upheld the urban forestry protocol as "additional" as required by AB 32. See Statement of Decision, *Our Children's Earth Found. v. State Air Resources Board*, Case No. CGC-12-519554 (Jan. 25, 2013);

see also *Our Children's Earth Found. v. State Air Resources Board*, 234 Cal. App. 4th 870 (2015). That court's decision regarding the additionality of the urban forestry offset credits does not require that ARB adopt a 100-year PISC requirement to ensure the permanence of CCS credits. The two concepts are unrelated; "additionality" and "permanence" are separate requirements of AB 32, and that court's holding regarding additionality does not constrain ARB in the context of establishing permanence.

Moreover, these two sequestration approaches (CCS and urban forestry) have absolutely nothing in common in terms of mechanisms of sequestration and risk profile (CCS, even with very unlikely, substantial reversals will achieve a much higher "permanence" metric than afforestation; e.g., near 100% over a geologic time scales vs. 10s% over a multi-generational human time scale). Nor does the California Environmental Quality Act (CEQA) require that ARB establish a 100-year PISC requirement. CEQA does not require 100-year PISC period, or even a PISC period at all. All that CEQA requires is that the lead agency (ARB), in this case evaluate potentially significant impacts of its proposed action in light of substantial evidence of those impacts. In the case of the CCS protocol, this CEQA mandate requires ARB to consider a timescale that is scientifically justified to ensure effectiveness of sequestration. To date, there has been no indication that completed CO₂ injection projects (primarily pilots and demonstrations) have quantifiable losses. For example, a groundwater geochemical study of a long-term (since 1972) CO₂ EOR flood operation in west Texas found no indication of CO₂ infiltration.¹

Area of Review. An Area of Review (AoR) definition that includes the pressure front is problematic given the very large area that elevated pressure will cover. Whereas ARB's objective is to maintain containment within the reservoir, it would be impractical to monitor in the far field area (e.g., obtaining access, drilling wells). A practical alternative is to apply numerical modeling to identify where and when a pressure front is capable of substantially increasing the risk to protected resources.

Plume Stability. "Plume stability" is an undefined term cited as a criterion for reducing PISC monitoring surveys. Given the mobility of CO₂ in the subsurface, plume stability (or an alternate term) should be viewed as a state where history matching of monitoring data and numerical simulations demonstrates that CO₂/pressure plume behavior is understood and that it is unlikely to encounter features (e.g., poorly abandoned wells, faults) through which fluids can migrate to adversely impact protected resources.

Instrument Detection Limits. ARB's proposed scheme to deduct carbon credits for CO₂ "present" below instrument detection limits is problematic. This assumes that leakage is occurring when it is likely not. Furthermore, detection limits of some instruments are low enough (can detect minute concentrations) that it would be difficult or impossible to distinguish signal from noise. Credit deduction would be better based on demonstrated, as opposed to presumed loss.

Calibrating baselines. Soil gas monitoring baselines and surveys are prescribed during all phased of the CCS project lifecycle. Presentations given during ARB's webinar series (University of Texas – Bureau of Economic Geology) illustrate the complexity of such analyses and the potential for misleading interpretations. Whereas calibrating baselines might be appropriate for some CCS projects (to understand the range of variability), we support the concept that in a well-characterized storage venue, monitoring techniques targeting the reservoir and primary seal are superior to surface monitoring.

Well Design and Well Testing. The proposed well design stipulations and well testing procedures / schedule are excessive relative to actual industry experience of well integrity events. The testing procedure schedule is likely to disrupt field and thus capture plant operations. We recommend that CARB adopt currently applied UIC regulations supplemented by API best practices where appropriate to risk and operating experience.

¹ <http://www.beg.utexas.edu/gccc/sacroc.php>

CO₂ EOR Stipulations. The CCS Protocol as applied to CO₂ EOR has some superfluous stipulations, relative to industry experience, relating to well testing, characterization, monitoring and closure. It should be recognized that CO₂ EOR has a decidedly lower risk profile than CO₂ storage, namely because pressure is managed and does not in practice exceed the top seal fracture gradient. Given that actual AoR is constrained due to the typical architecture of hydrocarbon accumulations, additional characterization (rocks, fluids), simulations and monitoring requirements should be limited the risk profile of individual assets. We support the application of current USEPA UIC regulations for USDW and Subpart RR for air protection.

We support flexible provisions of the protocol-related monitoring (at the ARB Executive Director's discretion) and third-party review for project approval (this could be extended to the operational and PISC phases of a project).

WSPA appreciates this opportunity to provide our input regarding the CCS Protocol. If you have any questions, please contact me at (805) 701-9142 or via e-mail at tom@wspa.org.

Sincerely,

A handwritten signature in black ink, appearing to read "Tom Wade", with a stylized flourish at the end.

cc: Catherine Reheis-Boyd, WSPA
Elizabeth Scheehle, ARB