Summary and Response to Peer Review

A draft of the *Methodology for the Quantification, Monitoring, Reporting, and Verification of Greenhouse Gas Emissions Reductions and Removals from Carbon Capture and Storage Projects* was developed ACR for potential approval.

All new methodologies and methodology modifications, whether developed internally or brought to ACR by external parties, undergo a process of public consultation and scientific peer review prior to approval. Comments and responses to scientific peer-review are documented here.

#	REVIEWER	CITATION REFERENCE	REVIEWER COMMENT	AUTHOR RESPONSE	REVIEWER COMMENT (R2)	AUTHOR RESPONSE (R2)	REVIEWER COMMENT (R3)
1	3	1, page 6	The standard describes geologic CO_2 as having “no benefit to address climate change.” It would be more accurate to say that the production and transport of Geologic CO_2 contributes to climate change.	Updated to state "which not only has no benefit to addressing climate change, but in fact contributes to it."	Closed.	N/A	N/A
2	1	1 p. 13, 2nd para	Capture of CO_2 already present in atmospheric concentrations is typically known as CDR (provided the net carbon footprint it negative).	The authors agree that carbon dioxide removal, or CDR, is the process of capturing CO_2 already present in the atmosphere. Under this methodology,	Closed.	N/A	N/A

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				CDR projects can achieve net removal of CO_2 from the atmosphere through various approaches that capture and permanently store that CO_2 in secure geologic formations. CDR is defined in the Definitions section of the Methodology as "CO_2 removal directly from the atmosphere through biological or technological means. Carbon dioxide removal includes direct air capture with CCS (DACCS), the use of sustainable biomass for bioenergy in combination with storage (bioenergy carbon capture and storage, or BECCS), or the use of sustainable biomass in combination with storage (biomass with carbon removal and storage, or BiCRS). To be eligible as a removal under			

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				this Methodology, biomass must meet the definition of 'sustainable biomass' in accordance with Appendix D."			
3	1	1, p13, 2nd para	Initially, CO_2 was not captured from underground sources, but mined/produced from these "domes". Later, CO_2 was captured from produced natural gas with high CO_2 concentrations, as well as industrial processes.	Changed the word "captured" to "mined."	Closed.	N/A	N/A
4	1	1, p13, 3rd para	The >800m threshold that renders the CO_2 supercritical, is not an absolute requirement for permanent storage, but is conducive.	The authors agree that the >800 m depth requirement is conducive to ensuring permanent CO_2 storage. At depths greater than 800 m, reservoir pressure and temperature conditions typically maintain CO_2 in a dense, supercritical phase, which significantly	Closed.	N/A	N/A

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				increases storage efficiency and minimizes buoyant migration risks. This depth also ensures sufficient geostatic and hydrostatic pressure to promote structural and residual trapping while maintaining adequate separation from USDWs (Bruant et al., 2002; IEAGHG, 2011). Requiring injection below 800 m enhances the assurance to ACR of containment integrity and supports confidence in the long-term stability of stored CO_2.			
5	1	1, p13, 3rd para	There will usually be "one or more" impermeable layers overlying the storage interval.	Changed phrasing to "one or more impermeable layers."	Closed.	N/A	N/A
6	1	1, p14, last para	PR thinks "cornerstone" goes too far. The bulk of	Changed to "technology ~~cornerstone of global~~	Closed.	N/A	N/A

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			mitigation is expected to come from other measures and technologies. But it is fair to say that CCS enables for mitigation and removal, and that is as ESSENTIAL technology in the suite/portfolio for climate stabilization.	~~climate strategy~~ that is essential for achieving climate commitments…"			
7	3	1, page 15	DAC is referred to as using chemical processes to extract CO_2 from ambient air. Is the exclusion of non-chemical DAC relying on physical sorbents, etc. intentional?	Changed to "uses chemical and physical processes to extract CO_2…"	Closed.	N/A	N/A
8	1	1p 14	It would be useful context to present not just estimates of global storage capacity, but also of amounts of CO_2 that are projected to be needed to be stored under different climate stabilization scenarios (e.g. by IPCC).	The following sentence regarding IPCC estimates of the need to capture specific amounts of CO_2 was/is present on page 15: "The IPCC projects that 350–1,200 $GTCO_2$ must be captured and geologically stored this century to	Closed.	N/A	N/A

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				achieve the 1.5 °C target (IPCC, 2023) and the Global CCS Institute states that CCS is an essential component in all global modeled pathways that limit warming to 1.5 °C (Global CCS Institute, 2024a & 2024b)."			
9	1	2, p19, last bullet	Excluding eligibility thus is appropriate.	Thank you for this support.	Closed.	N/A	N/A
10	3	2, page 19	Text of footnote 8 is repeated in the paragraph.	The footnote was deleted.	Closed.	N/A	N/A
11	3	2, Table 1, pages 19-20	The standard is unclear whether geologic storage reservoirs includes basaltic or unmineable coal formations or other unconventional storage reservoirs that include in-situ mineralization. Earlier in section 1 storage reservoirs are described as those with “porous rocks”	A bullet was added to the end of section 2 stating that "Storage in basaltic or coal formations" is not eligible under the Methodology.	Closed.	N/A	N/A

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			and the definitions focus on “saline reservoirs.” If unconventional storage is not covered by the standard this should be more clear.				
12	1	2, p20	It would be important here to add an exclusion on the grounds of not being able to reliably monitor and verify the storage of CO_2. There are some geologic media into which CO2 could be injected, but monitoring its subsequent fate would be problematic.	Thank you for this suggestion. The authors agree that, at present, monitoring and verification of CO_2 storage in basaltic and coal formations is challenging and have excluded these as eligible storage reservoirs. The authors chose not to include blanket exclusions about the inability to reliably monitor and verify CO_2 storage since monitoring and verification are already requirements and so the absence of these does not need to be named.	Closed.	N/A	N/A

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13	1	3.1, p21	Allowing double-dipping into other incentives is appropriate, since the magnitude of those is often insufficient to spur development of certain project types. However, for low-hanging fruit cases where the economics clearly pan out, should this stacking be allowed, or should there be a necessity test?	The CCS Methodology (and most ACR methodologies for the industrial sectors) primarily employs a regulatory surplus test and performance standards to demonstrate additionality. The performance standards consider both existing and planned projects and demonstrate that government incentives have not been sufficient to spur CCS project development. Further, most developers require a reliable long term revenue stream to secure investment that the tax code or similar incentives do not provide.	Closed.	N/A	N/A
14	3	3.1	Typo in statute in the last line of the first paragraph	Corrected.	Closed.	N/A	N/A

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15	1	3.2.1, p22-23	PR agrees with the exceedingly uncommon nature of DAC+GS. Is a methodology revision envisioned if this is no longer the case in the future, or should some limit/subset be described now?	Per the ACR Standard, ACR reviews all non-AFOLU methodology performance standards at least once every five years to ensure that they remain valid indicators of additionality. As technologies and market conditions evolve, ACR re-evaluates penetration rates to ensure that a performance standard still represents a meaningful threshold beyond business-as-usual activities. If a previously eligible activity becomes common practice, ACR will update the methodology's eligible activities or inactivate a methodology, as appropriate.	Closed.	N/A	N/A
16	1	3.2.2 Table 2	PR does not see corn ethanol production listed here.	Corn ethanol production falls within the category of "Ethyl Alcohol (Ethanol)	Closed.	N/A	N/A

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				Manufacturing," which is listed in Table 2.			
17	1	3.2.2	PR urges caution with natural gas processing: even though it is uncommon, it is not because of the complexity and cost of CCS - it is likely because the CO_2 content of the produced gas is usually too low to warrant the expense. In case where the CO_2 content is so high that it would have to be stripped anyway in order to make the gas production itself economic and the gas marketable, PR would argue that the production of high-CO_2 gas should not be incentivized. At the extreme end, with the produced gas being predominantly CO_2, this looks like the production	The Methodology was updated to address this concern (see section 2 Eligibility Conditions, item V). This addition will ensure that the Methodology does not incentivize the production of natural gas from new, potentially higher CO_2-content gas that would otherwise not have been produced.	"Historical production" should be defined as in the past and ongoing to the time of the application/present day, not in the past that has now stopped.	The methodology states that "CO_2 captured from natural gas processing facilities that are CO_2 sources *must be processing gas from oil and gas reservoir(s)* with (a) historical (i.e., pre-2021) production…" (emphasis added). The phrase "must be processing gas" makes clear that production from the oil or gas reservoir is still occurring in the present, relative to the project activities.	Closed.

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			and re-injection of geologic CO_2.				
18	3	3.2.3	What is the threshold for the practice-based standard. Table 4 indicates that 9% would qualify for a practice based additionality but that 27% would not.	ACR does not have a single threshold above which an activity is considered common practice under a practice-based performance standard because of the diversity of technologies, market structures, and geographic areas that may be represented within each methodology. In other words, ACR applies a contextual, evidence-based evaluation of market penetration and practice prevalence for each methodology with a performance standard rather than a uniform quantitative threshold. This principle is further	Thank you for the clarification. Guidance on how to define the "practice activity" could help. For example, is the practice activity "lawful disposal of produced water" – which is mandated, or disposal through underground injection (which is one way to comply with the standard). To accurately capture the project activity for purpose of the regulatory and practice based additionality standards, the evaluator should consider both the purpose of the project activity as well as the method (but credits should only be issued for project activities that are uncommon using the	We agree that crediting only occurs for emission reductions and removals that are demonstrated to be additional. A performance standard is separate and distinct from the demonstration of regulatory additionality – and both must be met. A practice-based performance standard evaluates the adoption rates of relevant practices (i.e., activities that may be eligible under a methodology) and informs the eligibility criteria to ensure that projects exceed common practice. The practices being assessed in CCS Methodology v2.0's	Closed.

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				explained in the ACR Standard section 4.A.2.	practice-based standard, to the extent that they result in more carbon removal as compared to other industry-standard practices.	practice-based performance standards are as follows: 1. Direct air capture with storage in a geologic storage reservoir; 2. Non-EOR CCS (i.e., capture from any of the eligible CO_2 sources and storage in a saline reservoir or depleted oil or gas reservoir); 3. Capture from an eligible CO_2 source using biogenic fuel or feedstock with storage via CO_2-EOR; and 4. Capture from an eligible CO_2 source using biogenic fuel or feedstock with storage via CO_2-EOR.	
19	1	3.2.4	Whether corn ethanol production should be considered an industrial	ACR agrees that the use of corn ethanol as a CO_2 source fuel or feedstock	Closed.	N/A	N/A

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			source or a CDR source is debatable. The overall lifecycle emissions of the process are typically higher to label the process a net removal.	should not be presumed to be a CO_2 removal. All biomass used to produce CO_2 in CCS projects must meet the definition of "sustainable biomass." Appendix D was updated to include a requirement for all biomass to obtain certification under the Roundtable on Sustainable Biomaterials (RSB) Standard for Advanced Fuels. This RSB standard ensures that biofuels are from biogenic end-of-life products and production residues. The standard defines end-of-life products as "a specific type of feedstock generated at the end of the life of products that were not primarily produced or intended for the production of biofuel or biomaterial" and			

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				production residues as "secondary products derived from agricultural, forestry, food or industrial production and processing chains, among others."			
20	3	3.2	Missing cross-reference in last line of 3rd paragraph.	This sentence has been updated to reference sections 3.2.1 through section 3.2.4.	Closed.	N/A	N/A
21	3	3.3, Table 1	The additionality determination for gas separation facilities should also consider financial implementation where the oil and gas producer is an affiliate of the owner of the capture equipment/credit generator. It should be clear that the commodity production activities and extraction are profitable without receipt of any tax credit or voluntary carbon credit incentives. This is	Please see the responses to comment 13 and comment 17. As with the production of other fuels used in the project (e.g., natural gas used to power CO_2 capture equipment), the methodology doesn't account for the emissions associated with the production/mining of fuels and inputs because those emissions would have	The inclusion of part V in the eligibility considerations sufficiently addresses my concerns. One suggested revision would be to clarify that this financial viability test should be applied to capture from natural gas separation facilities for both natural gas and oil production. The same consideration should apply to other primary production activities such	Section 2, part V. states that the natural gas being processed can be from "oil and gas reservoir(s)." This means that the processed natural gas can be produced from either an oil or gas reservoir. Production and/or processing of brine-based critical minerals are not eligible CO_2 sources; therefore, it is not appropriate to add the	Closed.

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			necessary to prevent drilling that otherwise would not occur but for the incentives. As PR does not have a copy of the full ACR standard PR cannot assess how this is evaluated, but believes this would be considered within the project boundary as described in section 4. 4.2 also does not consider emissions from upstream production activities related to the gas stream processed at separation facilities and captured for storage. Is this because the storage excludes consideration of emissions from production of the fuels used in combustion/separation processes that would lead to anthropogenic capture? PR finds this particularly challenging for natural gas	occurred in the absence of the project.	as production of brine based critical minerals, where dissolved CO2 in the brines could be captured and reinjected.	suggested language to the methodology.	

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			separation facilities where the CO_2 is technology geologic CO_2 that is being produced with other natural gasses.				
22	1	Figure 3, p32	The boundary seems appropriate, as does the inclusion of the post-injection period and associated oil/HC emissions.	Thank you for this support.	Closed.	N/A	N/A
23	3	4.2.3	How is plume stabilization determined. Where there are multiple injection projects in a connected basin, injections by other operators could impact plume stabilization.	Plume stabilization is considered to be achieved when monitoring and modeling data demonstrate that no migration of CO_2 has occurred beyond the defined vertical or lateral boundaries of the confining zone(s) and modeled scenarios indicate that the injected CO_2 will remain contained within the approved	This explanation is helpful and thorough. PR could not locate the requirement to account for interactions with proximal injection activities within the text of the standard. This may fit best in 7.3.2.	Assessment of plume stabilization is based on the physical conditions of the plume at the time of assessment, not with any potential future interaction with other injection projects. Potential future interaction is addressed in Section 9 of the Methodology: “Prior to first credit issuance, the Project Proponent shall execute with ACR a Reversal Risk	Closed.

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				geologic storage reservoir over the long term. This is stated in section 7.3.12 of the Methodology. Each MRV Plan must define the Area of Review (AoR) and the criteria for determining plume stabilization. The Project Proponent is responsible for demonstrating, in accordance with the approved MRV Plan, that the CO_2 plume has stabilized and that the site meets the conditions necessary to confirm long-term containment. In cases where multiple injection projects operate within a connected basin, the Project Proponent must account for any potential interactions or pressure influences from adjacent injection activities that		Mitigation Contract that applies to any activity occurring on the surface or in the subsurface and prohibits any activity that may result in the release of the stored CO_2 to the atmosphere (i.e., a reversal), including as a collateral effect of future hydrocarbon, mineral, or water resources development, unless measures are taken in advance to compensate for the reversal.”	

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				could affect plume stabilization. Such interactions shall be evaluated and incorporated into the MRV Plan through appropriate monitoring, modeling, and mitigation measures to ensure plume stabilization is achieved.			
24	1	Table 5, p33	Although combustion will be a common source of "source emissions", the plant may use another process, e.g. pyrolysis or gasification. So a more general term could be used here, e.g. "energy-related emissions".	The noted examples were added to the footnote. Use of an additional term such as "energy-related emissions" would have required extensive changes to equations in which a combustion term is included, which could be confusing. The clarification in the footnotes makes it clear that the these energy producing processes are allowed under the Methodology.	Closed.	N/A	N/A

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25	1	Table 5, p33	Although a full lifecycle assessment of input fuels is likely outside the scope of a methodology that seeks to incentivize additional CCS, in some cases PR believes there should be a filter for cases whose resultant lifecycle emissions significantly increase as a result of CCS. For example, if a coal-fired power plant installs CCS, despite of any upstream emissions from the mining of coal, the installation of CCS results in a net improvement over the baseline and over common practice. However, in the example of a power plant that switches from coal to combusting biomass with significant land-use related and transportation emissions with CCS, the	The requirements in Appendix D regarding the use of sustainable biomass are intended to prevent the use of any biomass feedstock that could result in an increase in GHG emissions. These requirements also serve as an environmental and social safeguard to ensure that biomass sourcing and use do not cause adverse impacts such as deforestation, land-use change, or degradation of ecosystem services. See also the response to comment 19 regarding the update to include a requirement for all biomass to obtain certification under the Roundtable on Sustainable Biomaterials Standard for Advanced Fuels.	Closed.	N/A	N/A

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			net GHG improvement is debatable. Perhaps this is safeguarded through the definition of sustainable biomass in Appendix D, in this case?				
26	1	Table 5, p35	Fugitive transport emissions would apply to tanks/containers carried by rail/truck/vessel as well, not just pipelines.	Table 5 was updated to remove reference to "(pipeline transport only)" with respect to vented and fugitive CO_2 transport emissions because these emissions are accounted in Equation 19.	Closed.	N/A	N/A
27	1	4.3.1, p38	It looks like the EOR pathway sunsets in 2029? If so, PR does consider this to be appropriate.	Upon further consideration, the 2029 deadline for CO_2-EOR project Start Dates was removed because it was considered to be arbitrary, and the Crediting Period changed to one non-renewable 12-year Crediting Period, consistent with the	Closed.	N/A	N/A

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				crediting period for storage in saline reservoirs.			
28	1	4.3.1, p38	As defined, the start date would not include construction emissions, since it begins with the first injection?	That's correct that the Start Date is always after the construction period emissions. Per the ACR Standard, the State Date establishes the date that the project started to reduce GHG emissions against the baseline, not the date on which emissions start being accounted for. The Methodology is clear through equations (e.g., Equation 6) what project emissions must be accounted for, including construction emissions.	Closed.	N/A	N/A
29	1	4.3.2, p39	These are policy choices that ACR should make - PR does not feel qualified to comment on this point, but	Thank you for this feedback.	Closed.	N/A	N/A

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			notes the similarities with magnitudes in, e.g., 45Q.				
30	1	4.3.4, p39	If PR is understanding this correctly, the 5y post-injection period deviates significantly with common practice and regulation. The EPA under Class VI required 50y as default, unless a shorter period is approved. CARB in California has a hard 100y period, but with decreased obligations once plume stabilization is established. At this point in CCS project development, and given the dearth of projects that have successfully navigated this period, PR would suggest a larger minimum period that can be shortened if evidence is conducive as opposed to a short default that can be	The Methodology's post-injection period varies from other methodologies/protocols in that the end of the post-injection monitoring period is not dependent on a specific timeline, but instead on the condition of plume stability being met. This approach is more rigorous than approaches that are only specific to timeline because it ensures that the condition which is most indicative of emissions reduction and removal permanence is achieved. After the conclusion of the Crediting Period, other risk mitigation measures and compensation procedures (contained in a legally	Closed.	N/A	N/A

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			lengthened if evidence suggests there is reason.	binding ACR CCS Project Reversal Risk Mitigation Contract) still apply to the injected CO_2 to ensure the integrity of the carbon credits issued during the Crediting Period.			
31	3	4.3.4	There is a fragment mid-paragraph: This time after the end of the Crediting post-injection monitoring period	Sentence is updated to "After the cessation of CO_2 injection, the GHG Project enters the post-injection monitoring period, the results of which must demonstrate whether stabilization of the CO_2 plume can be assured (discussed in section 7.3.12)."	Closed.	N/A	N/A
32	1	4.4, p39	The language about the US government's past findings may need to be qualified given the current Administration in the U.S.	The authors have amended the wording slightly and the source is cited and a reference (including date) provided, which should be sufficient to demonstrate	Closed.	N/A	N/A

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				which administration published the information.			
33	1	4.4, last para, p40	PR thinks this is exactly the right approach regarding oil: require an examination of the carbon footprint of the produced oil compared to the default/baseline, which will be a mix of oils with varying carbon intensity in a global market.	Thank you for the support of the approach. The authors want to clarify that the Methodology actually captures the emissions of the produced oil in the project scenario rather than the baseline. This approach ensures a conservative accounting framework.	Closed.	N/A	N/A
34	1	p40	Rogue "." before "but".	Sentence fragment following ". but" is moved to the following sentence: "However, since CO_2-EOR enables the production of fossil fuels that will contribute to emissions, and because the projects must demonstrate a net benefit to the atmosphere, the methodology requires	Closed.	N/A	N/A

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				that the downstream emissions from..."			
35	1	5.1.1, p41	" […] producing the same quantity of electricity without CO2 capture." Does this factor in the energy penalty for CCS? Capture systems will have different efficiencies, and it would be appropriate to incentivize those that are more efficient than those that are not. So if a 300MW plant is derated to, e.g., 280MW because of CCS installation, would the calculation for the baseline be for reduction from a 280MW net output?	That is a correct interpretation. For projects utilizing the project-based baseline approach under section 6.1.2 (CO_2 Source Emissions with Project-Based Baseline Approach), the adjustment factor adjusts the mass of the captured CO_2 from the CO_2 source (e.g., electricity generation facility) to reflect what the CO_2 emissions to the atmosphere from that same CO_2 source would have been without the addition of capture equipment to the CO_2 source. For instance, if the installation of CO_2 capture equipment on an electricity generating facility caused the	Closed.	N/A	N/A

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				electricity output to increase by 25%, also increasing associated CO_2 emissions by 25%, the adjustment factor applied to the captured CO_2 would be 0.80 to reflect that CO_2 emissions from the electricity generation facility pre-capture equipment installation were 0.80 of what they were after installation of capture equipment.			
36	1	5.1.1, p41	See earlier comment on additionality for acid gas cleanup projects. If the gas is marketable the additional steps to complete the CCS cycle relate only to the transport and storage of CO2, not to its capture, which is typically the most costly step. So such projects may reap a windfall under the	Please see the response to comment 17.	Closed.	N/A	N/A

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			methodology. Some CCS projects will inherently have a capture-cost advantage over other, more expensive ones, and the methodology needs to award credits on an agnostic, per-ton basis. Corn ethanol is another low-cost of capture example, but at least there some CO2 may be removed, depending on fertilizer use and land-use change or absence thereof - no CO2 is brought up from the ground. On balance, PR would argue that natural gas processing should not be considered eligible under the methodology. Even though CO2 emissions would be avoided, its inclusion creates a perverse incentive to mine and re-inject geologic CO2 in a				

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			more direct way than the extraction of fossil fuels and their conversion to electricity or other fuels/products does. Natural gas cleanup also does not have a significant projected role in US or Canadian decarbonization pathways, and has managed to make economics work since the 1970s on the back of EOR only.				
37	1	6.1.1	The principle is sound.	Thank you for this support.	Closed.	N/A	N/A
38	2	Section 6.1.2, Equation 1	As written, AF leaves room for inconsistent interpretation. PR suggests tightening it: • Define AF clearly: “the fraction of measured CO_2 that would have been present without the capture system, at the same useful output.”	Equation 1 was split into four equations. Equation 1 includes the terms "Baseline Captured CO_2" and "Adjustment Factor" (AF), the former term which is measured or calculated for each CO_2 source and Reporting Period and the latter term which is	Closed.	N/A	N/A

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			Require $0 < AF \leq 1$. Use AF = 1 only when capture-related CO_2 is demonstrably absent from the measured stream. • Keep AF focused only on incremental capture-driven CO_2. Do not use it for curtailments, abnormal events, or permit exceedances—those belong in "Vol. excess CO_2." • Set AF per source stream and reporting period. If operations vary, calculate sub-period AFs and aggregate conservatively. • Add a short guidance note on "how to set AF" so developers and verifiers use the same method. Spell out the order of operations so AF is applied once and then compared	calculated once, unless fundamental changes to the function of the CO_2 source necessitate updating the value. Equation 2 describes how to use the lesser of the metered amount of CO_2 captured from all primary CO_2 sources (calculated using Equation 3) or all captured CO_2 injected underground (Equation 24) minus captured secondary CO_2 (Equation 4), all as measured in each Reporting Period. In both Equations 3 and 4, any excess CO_2 produced during periods of air permit non-compliance are subtracted from the total. This ensures that there is no incentive to operate the CO_2 source out of compliance with air			

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			to injected CO_2 (avoiding double scaling).	permits to (potentially) produce more CO_2. The (newly added) definition for "primary CO_2 source" is a "A CO_2 source that would have existed in the absence of the CCS project (e.g., electricity generating facility), the emissions of which exclude any separately quantifiable emissions (and/or captured CO_2) from secondary CO_2 sources and equipment. If CO_2 capture capabilities are added to a primary CO_2 source and the emissions and captured CO_2 of the associated capture equipment cannot be separately quantified from other primary CO_2 source emissions and captured CO_2, the increased emissions/captured CO_2			

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				are considered part of primary CO_2 source emissions." The (newly added) definition for "secondary CO_2 source" is "A CO_2 source of emissions and captured CO_2 that exists because of the CCS project and whose emissions and captured CO_2 can be quantified separately from primary CO_2 source emissions and captured CO_2." "Captured secondary CO_2" is newly defined as "CO_2 produced from a secondary CO_2 source. Some of this CO_2 can be emitted but at least some of the CO_2 must have been captured."			
39	2	Section 6.2.4,	Cement and asphalt emission factors look reasonable. Iron and steel	Thank you for those suggestions. Table 6 was updated to refer to Table	Closed.	N/A	N/A

#	REVIEWER	CITATION REFERENCE	REVIEWER COMMENT	AUTHOR RESPONSE	REVIEWER COMMENT (R2)	AUTHOR RESPONSE (R2)	REVIEWER COMMENT (R3)
		Table 6, p69	factors, however, vary widely (0.7–2.33 t/t depending on route and grid). Peer Reviewer recommends using product-specific EPDs where available. If not, apply route-specific defaults. For imports, use the producer's regional factor rather than a U.S./Canada average. Route-specific defaults refers to different steelmaking routes, mainly blast furnace–basic oxygen furnace (BF-BOF) and electric arc furnace (EAF), which have very different emission intensities. PR recommends using factors that reflect those distinct production pathways rather than a single average value. For references, route-specific and regional data	19 (Hierarchy of Emission Factors by Source Category) for steel emission factors. Table 19 was updated to require the use of World Steel Association LCA emission factors for specified steel construction materials (https://worldsteel.org/wider-sustainability/life-cycle-thinking/lca-eco-profiles-2022/), and to use the World Steel Association global emission factor (https://worldsteel.org/wp-content/uploads/Sustainability-Indicators-2025.pdf) for other steel construction materials. Conversations with several steel construction material suppliers revealed that information beyond the country of manufacture was almost never available on their products, so it			

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			can be found in several established sources: • World Steel Association (2021) life-cycle inventory data for BF-BOF vs. EAF routes • IEA Iron and Steel Technology Roadmap (2020) for regional emission ranges • EPA GHGRP Subpart Q (U.S.) and Canadian Steel Producers Association Sustainability Report (2022) for North American data • ecoinvent v3.9, GREET 2023, and WBCSD Global and Regional Steel LCI (2017) for regional and import factors. If EPDs are not available, then consider apply	would be highly unlikely that information about the production routes would be available. These suppliers also indicated that Environmental Product Declarations were almost never available.			

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			representative defaults such as: • BF-BOF: ~2.0 t CO_2 per t crude steel • EAF: ~0.7 t CO_2 per t crude steel (U.S. grid average)				
40	3	6.2.4	Omission of emissions related to construction activities for large equipment such as CO2 pipelines will result in overcounting of emissions reductions, if such infrastructure would not be constructed/ manufactured but-for the project. This is contrary to the principle of additionality. Where companies are using existing infrastructure not constructed for a CCUS project, these emissions would rightfully be	The authors have updated the methodology to include the emissions associated with the construction of CO_2 pipelines and associated compressor stations if those pipelines were constructed for the project (either in part or in whole). This means that emissions from pre-existing pipelines will not be considered within the GHG assessment boundary, but that the emissions from new pipelines will. Pipeline emissions must be	Closed.	N/A	N/A

#	REVIEWER	CITATION REFERENCE	REVIEWER COMMENT	AUTHOR RESPONSE	REVIEWER COMMENT (R2)	AUTHOR RESPONSE (R2)	REVIEWER COMMENT (R3)
			excluded. In many cases the pipelines are owned by affiliates of the storage company (or capture company). The emissions attributed to the project could be prorated based on the share of total volume transported and expected useful life of the pipeline. In PR's opinion, emissions from the construction or manufacture of CO_2 pipelines and other appurtenant equipment such as compression units should be included, whereas emissions related to the manufacture of heavy equipment not affixed to the property should be excluded. In contrast, construction related emissions for pipelines transporting oil from EOR projects should	amortized with other construction emissions (i.e., either during the first Reporting Period or proportionally across the entire first Crediting Period). For pipelines that will be used by multiple parties, the pipeline (and associated compressors) construction-related emissions will be adjusted by the maximum (i.e., conservative) percentage of CO_2 throughput expected from CCS project-related CO_2 relative to total CO_2 throughput. This addition is outlined in section 4.2 (GHG Assessment Boundary) and section 6.2.4 (Construction Emissions).			

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			not be included in 6.2.6 since that infrastructure instead would be part of the baseline emissions for the EOR project.				
41	1	6.2.7	The concept and equation here are activated once the CO_2 is emitted to the atmosphere. However, due to the convoluted nature of geologic settings and limitations in both monitoring and attribution, monitoring and estimation of atmospheric emissions are not straightforward and involve assumptions and approximation. So it would be both hard to assert with certainty that certain quantities have been emitted, and also to pin down their amounts with certainty. AS well-designed and -operated site should	Current provisions (derived from U.S. EPA's Class VI MRV requirements) in section 7.3 of the Methodology allow for (and require) reassessment of the boundaries of the storage volume. Given the complexity of subsurface reservoirs, it is reasonable that such reassessment can occur without needing to assume that CO_2 from the geologic storage reservoir has been released to the atmosphere. To address the potential for emissions to the atmosphere, however, subsection 6.2.7 (Geologic Storage Reservoir	Closed.	N/A	N/A

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			have zero escapes outside the storage complex. It would be both reasonable and prudent to require all CO2 to remain inside the storage complex and subtract credits if it does not, without having to assert or measure atmospheric emissions. A lighter, but more tenuous approach would be to assume that leaks from the storage complex are assumed to also be atmospheric emissions unless the operator shows otherwise. This can be the case in some projects, e.g. if there are multiple confining zones. But if the storage complex has been defined more broadly, this intra-complex migration would not be considered leakage. Migration outside the storage complex is a	Emissions) has been updated to clarify that, "[f]or the purposes of this Methodology, CO_2 shall be considered to have been emitted to the atmosphere if the CO_2 plume or the pressure front is observed (either directly or indirectly) at unmitigated pathways to the surface, including but not limited to unplugged or inappropriately plugged wells that penetrate the confining zone(s), or if CO_2 or the elevated pressure front is detected within a monitoring well."			

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			sure sign that the storage is not operating as expected. ACR needs to decide whether to draw the line there, or wrestle with the much harder task of tracing the leaked CO2 all the way to the atmosphere.				
42	1	6.2.7, 1st para	"Confining system" or "confining zone(s)" would be a better term than "confining zone". Often, there will be more than 1 confining layer, and this redundancy is required by some jurisdictions already.	The Methodology was updated to change to "confining zone(s)" throughout.	Closed.	N/A	N/A
43	1	6.3	How does Equation 34 work in the case of a new DAC project? Will baseline be zero and emissions negative, hence the double negative produces a positive removal term?	As noted in Equation 3, "For eligible DAC, BECCS, and BiCRS projects, [the total volume of gas (containing CO_2 and other compounds) produced and captured from primary CO_2 source **c**, which is used to calculate baseline	Closed.	N/A	N/A

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				emissions] shall be equal to the amount of CO_2 removed from the atmosphere." Project emissions are then subtracted from this value in Equation 37 to determine emission removals.			
44	1	6.4	PR agrees with the logic regarding leakage and oil production, but be aware that there are vocal advocates who disagree with this logic, and who consider the production of oil additional. To fortify the argument here, a closer look at carbon intensities of produced crudes would help. Some of these are really carbon intensive, but some less so. The mere injection of CO_2 does not guarantee that the overall intensity will be lower, if,	The authors understand that some entities believe that CO_2-EOR could result in emissions leakage and that no carbon crediting methodology should intersect with fossil fuel producing industries. The without-project scenario in the Methodology is that there is no oil production. This is much more conservative than assuming that the counterfactual would be conventional oil production without CO_2-	Closed.	N/A	N/A

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			e.g., it is combined with the production of a really heavy crude that requires a lot of energy/steam to produce.	EOR. The accounting for emissions associated with the production, transport, refining and processing, and end use of oil and associated hydrocarbons produced by CO_2-EOR negates any arguments that the Methodology incentivizes oil production and ensures a conservative approach to emissions accounting.			
45	1	6.5, penultimate para, p88	PR thinks it is a stretch to say that geologic storage reservoir emissions can be measured. PR thinks there can be some detective work to put bounds around them and obtain estimates for them, but it is not accurate to state that it can be measured, e.g. to the nearest ton.	The word "measurement" is changed to "calculation" in reference to reversals.	Closed.	N/A	N/A

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46	3	7.1	For clarity, the second bullet should be separated into two, with a new bullet beginning with the sentence “The project proponent shall provide justification for the use…”	An additional bullet was added where recommended, and the section of the original bullet beginning with "The VVB shall confirm…" was separated into yet another bullet.	Closed.	N/A	N/A
47	3	7.2	7.2 references the GHGRP and incorporates subpart RR requirements. Given the potential rescission of the GHGRP, the standard should reduce dependencies on EPA programs and allow use of the ISO standard.	ACR prefers, wherever possible, to tie requirements to and utilize references that are publicly available, like is the case with U.S. EPA's GHG Reporting Program Subpart RR. Using public, authoritative sources ensures transparency, accessibility, and verifiability. Even if U.S. EPA rescinds the GHG Reporting Program, the requirements of that regulation are publicly available. ACR does not	Closed.	N/A	N/A

#	REVIEWER	CITATION REFERENCE	REVIEWER COMMENT	AUTHOR RESPONSE	REVIEWER COMMENT (R2)	AUTHOR RESPONSE (R2)	REVIEWER COMMENT (R3)
				view ISO standards as inadequate, but ISO standards do not conform to this approach because they must be purchased and are often subject to copyright and licensing restrictions.			
48	3	7.3.2	The standard as written requires the project proponent to submit the same information as required by a class VI permit. This could be improved: Where a class VI permit has been granted by EPA or a state agency, submission of duplicate information should not be required and should be optional. Submission and review of information should be required for projects that are injecting into other well classes (Class I or Class II).	Section 7.3 of the methodology is effectively a restatement of the U.S. EPA Class VI MRV requirements rather than incorporating them by reference. This approach ensures that all applicable monitoring, measurement, and reporting elements are explicitly captured within the methodology for transparency and completeness. Project Proponents who already have a U.S. EPA-approved Class VI MRV Plan may submit that plan to the VVB	Closed.	N/A	N/A

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			In PR opinion the Class VI program is very robust and is designed to assure permanence, and therefore project proponents with a Class VI permit should not have to duplicate their efforts and undergo two separate technical reviews. However, for storage projects using other well classes under programs that are not expressly designed to assure permanence, PR's opinion is that in order to generate credits, the project proponent should have to demonstrate the same technical qualifications as would be required of a Class VI project. PR thinks the standard could do this either by stating technical requirements expressly as is done in the current	and ACR to demonstrate compliance with the corresponding MRV requirements under section 7.3.			

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			standard, or by incorporating by reference EPAs Class VI regs. There is some risk of incorporating EPA rules by reference given the current deregulatory agenda, however, so it may be preferable to leave the technical requirements and give project proponents the option to meet the requirements in 7.3.2 either by obtaining a class VI permit from the appropriate regulator or by submitting the required information. This diverges from the 45Q rules which only require that the taxpayer use the appropriate well class.				
49	1	7.3.3, p119	Recommend changing "relatively" to "sufficiently".	Changed "relatively" to "sufficiently".	Closed.	N/A	N/A

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50	1	7.3.6.1, p122	Even though it may be redundant, PR would recommend adding "including the post-injection […] period" after "life of the project".	Changed to "Project Term" since that is a defined term (see subsection 4.3.4).	Closed.	N/A	N/A
51	3	7.3.8.1	Why is this limited to state submerged waters?	Changed "state submerged waters" to "jurisdictional waters."	Closed.	N/A	N/A
52	1	7.3.12, p129	PR thinks the phrasing here is appropriate for a textbook case where all goes well, but does not leave enough room for unknown unknowns. In PR's view, we are not yet in a position to make such definitive statements about post-injection project performance without some qualifiers, and there have been numerous examples of projects and incidents that give cause for a more	The section has been updated to establish sound requirements that are applicable under a variety of scenarios and must be demonstrated rather than assumed. Please also see response to comment 30.	Closed.	N/A	N/A

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			conservative approach for now. PR thinks that a longer default period that can be shortened would be more credible than such a short one that may be lengthened.				
53	3	7.3.12	Most likely, post injection monitoring will extend much longer than 5 years for Class VI projects. State and federal law typically requires monitoring activities to extend for 30 years and a project proponent would not be able to plug monitoring wells before that time. Class II projects may be able to achieve site closure within 5 years since post injection MRV is not required by the UIC program (though some project proponents may have a longer period under	The authors agree that the post-injection monitoring period will likely extend beyond 5 years for many projects. The authors designed the post-injection monitoring period to be dependent on plume stability instead of a specific timeline, as plume stability is the best measure of emissions reduction and removal permanence. Please also see response to comment 30.	Closed.	N/A	N/A

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			the MRV plan if they are reporting under subpart RR and intend to claim 45Q credits).				
54	1	7.3, p117	The professional experience and qualifications requirement is a sound idea. Also, meeting or exceeding Class VI standards is a sound goal, since Class II by itself is inadequate in several ways: https://www.nrdc.org/sites/default/files/regulation-eor-carbon-dioxide-sequestration-report.pdf	Thank you for this support.	Closed.	N/A	N/A
55	1	7.4, p132	There is a difference between a public process that is genuine and one that attempts to check boxes without any real intent to engage or take public input on board. PR thinks that the	Section 7.4 was updated to better align with the *ACR Standard.* Stakeholder engagement, public notices, and public comment are addressed in the *ACR Standard,* Section 6.A (Project Development	Closed.	N/A	N/A

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			requirements for "stakeholder engagement, public notices, and comment periods" need to be fleshed out further here. Happy to offer additional thoughts here, if desired.	Process) and Chapter 8 (Environmental and Social Impacts).			
56	3	7.4.	How will “communities” and “stakeholders” be defined? Can public meetings and outreach required as part of the UIC permitting process be considered a public participation process?	These terms are defined in the *ACR Standard*, Chapter 8 (Environmental and Social Impacts).	Closed.	N/A	N/A
57	1	8.3	The phrase "may need" is used for obtaining pore space rights. Is it implied that this applies when the pore space is not wholly owned? If so, then this should be stated, and I think is the right setup.	The "Pore Space Ownership and Mineral Rights" (now section 8.2), "Site Access" (section 8.3), and "Permanence" (section 9) sections were largely rewritten, and the nuances among pore space access and ownership discussed. The most	Closed.	N/A	N/A

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				relevant sentence in the new text in section 8.2 now states "The Project Proponent must comply with all applicable legal requirements to secure necessary pore space ownership, occupancy, access and/or use and therefore may need to obtain perpetual storage rights to the subsurface pore space where CO_2 will be injected and stored, non-interference rights from mineral owners, and/or verifiable consent of surface owners."			
58	3	8.3	1. How do you define the area where CO_2 will be sequestered? Does this include a buffer zone around the plume, the full AOR, or just the area where	The area of review (AoR) is defined in the Methodology as "[t]he region in a CCS project where underground sources of drinking water [USDW] may be endangered by the injection activity. The area	Closed.	N/A	N/A

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			the free CO_2 plume will migrate.	of review is delineated using computational modeling that accounts for the physical and chemical properties of all phases of the injected carbon dioxide stream and displaced fluids, and is based on available site characterization, monitoring, and operational data." Detailed requirements regarding the AoR are found in section 7.3.5 (Area of Review and Corrective Action Plan) of the Methodology. The AoR includes all geologic, hydrologic, and engineered features that could influence the migration of injected CO_2 or displaced formation fluids and potentially affect USDWs. The AoR is			

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				delineated using computational modeling to predict the extent of both the pressure front and the CO_2 plume throughout the Project Term. The AoR encompasses several key components, including the geologic storage reservoir, confining zone(s), wells within the AoR that penetrate the injection or confining zone(s), USDWs), geologic features that could influence fluid flow or containment; and the corrective action area (i.e., the subset of the AoR where wells or other features require remediation to prevent fluid movement that could endanger USDWs). The AoR must also be reevaluated at least every five years or when			

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				operational or monitoring data indicate potential changes in the extent of the CO_2 or pressure plume. If the modeled or monitored data show an expansion beyond the existing AoR, the Project Proponent must update both the AoR and the corresponding Corrective Action Plan.			
59	3	8.3	2. The clearly growing consensus is that pore space is owned by the surface owner. However, the surface owner cannot preclude the mineral owner from drilling through the storage formation. To assure non-interference, in split estates, the project proponent would need to acquire assurances from the mineral owner that it	The authors agree with the need to assure permanence and a large portion of section 8.2 (Pore Space Ownership and Mineral Rights) has been updated. Given the variation of rules governing pore space across jurisdictions, a portion of the text discusses potential obligations and best practices, however, all Project Proponents will be	Paragraph 1 of Section 8.2 should be revised for clarity. REVISE: “In some jurisdictions, surface owners own the pore space; in other jurisdictions, surface rights holders have no clear property right to use pore space for the permanent injection of fluids into deep	ACR has edited the language taking your suggestions into account. Some suggested text was omitted from the first sentence identified as this statement is intended to be informational and provide context. The requirement to assess ownership rights is handled later in the section.	Closed.

#	REVIEWER	CITATION REFERENCE	REVIEWER COMMENT	AUTHOR RESPONSE	REVIEWER COMMENT (R2)	AUTHOR RESPONSE (R2)	REVIEWER COMMENT (R3)
			would not drill through the storage formation, or that if it drilled through the formation it would adopt practices to prevent containment losses. One challenge is that this drilling may occur decades after the end of the project or site closure. To assure permanence, it is necessary to have a perpetual easement or other such covenant from the mineral owner.	required to obtain and provide a "legal opinion from an attorney licensed in the relevant jurisdiction that (1) lists all relevant property owners and/or rights holders and the Project Proponent's agreements with each relative to the pore space; (2) describes the status and development of the law surrounding pore space rights the relevant jurisdiction(s), (3) determines these agreements to be adequate relative to the interests of ensuring the permanent storage of injected and stored CO_2, and (4) determines that the Project Proponent has the legal authority to enter into and comply with the terms of the Reversal Risk Mitigation Contract or	geological formations" to read: "In some jurisdictions, courts and legislatures have clarified that the owner of the surface property also has the right to use the pore space for permanent geologic storage, though even in these jurisdictions, project proponents should evaluate title to determine ownership. Many other jurisdictions have not determined pore space ownership for geologic storage." This sentence is unclear and may be missing some language: "In fee estates, Project Proponents are encouraged to secure in split estates and perpetual rights of non-conveyance."	Covenants are not discussed in the methodology but, as a condition within the Reversal Risk Mitigation Contract, a legally binding agreement between ACR and the Project Proponent that prohibits any activity that may result in the release of the stored CO_2 to the atmosphere (i.e., a reversal), including as a collateral effect of future hydrocarbon, mineral, or water resources development, unless measures are taken in advance to compensate for the reversal.	

#	REVIEWER	CITATION REFERENCE	REVIEWER COMMENT	AUTHOR RESPONSE	REVIEWER COMMENT (R2)	AUTHOR RESPONSE (R2)	REVIEWER COMMENT (R3)
				alternative risk mitigation assurance mechanism acceptable to ACR." Project Proponents are also required to assess whether additional agreements are required when there are "change[s] in ownership of property or rights... or whenever conditions indicate that the Area of Review and Corrective Action Plan (Subsection 7.3.5) should be updated...." Additionally, section 9 (Permanence) was simplified to clarify that Project Proponents must enter into a CCS Project Risk Reversal Mitigation Contract with ACR and contribute credits to the Reserve Account (or an alternative risk mitigation mechanism approved by	The section should be clear that a Project Proponent should secure restrictive covenants from all owners prohibiting future withdrawal or production of injected CO_2, which should be recorded as a covenant running with the land. This is needed because otherwise, at the termination of any land access agreements, legal title to the injected CO_2 could transfer to the landowner, who could authorize its production or extraction. This should apply in both split estates and fee estates. "In split estates" and "in cases where mineral rights are severed from surface rights" refer to the same thing.		

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				ACR). The Risk Reversal Mitigation Contract "applies to any activity occurring on the surface or in the subsurface and prohibits any activity that may result in the release of the stored CO_2 to the atmosphere (i.e., a reversal), including as a collateral effect of future hydrocarbon, mineral, or water resources development, unless measures are taken in advance to compensate for the reversal."	Non-interference rights should be secured for split estate projects and fee projects – and covenants (as described above) should be perpetual and recorded.		
60	3	8.3	3. For class II wells, the standard correctly states that the mineral owner can inject under an oil and gas lease without effecting a trespass. However, the mineral owner or lessee cannot assure permanent sequestration with a	Please see the response to comment 59. Additionally, the authors removed any references to case law because it was not necessary to the discussion and because different	Closed, other than comment 59.	N/A	N/A

#	REVIEWER	CITATION REFERENCE	REVIEWER COMMENT	AUTHOR RESPONSE	REVIEWER COMMENT (R2)	AUTHOR RESPONSE (R2)	REVIEWER COMMENT (R3)
			mineral lease alone. While the standard correctly states that at the end of injection the owner is not required to withdraw the CO_2, that does not mean it has a permanent storage right. First, when the lease ends, the injected substances would become subject to recapture and therefore could be withdrawn. Second, storage is different than disposal and storage rights are only included in the mineral estate to the extent that they are necessary for ongoing oil and gas production operations. To have a permanent right store the gas beyond the period of mineral production, the Class II project proponent would need to acquire that right from the surface	cases would apply in different jurisdictions.			

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			owner. The mineral owner's rights to inject are also limited to the extent that doing so increases mineral recovery, which could preclude maximizing storage volumes. A case in Texas this year, Meyers-Woodward, LLC v. Underground Services Markham, found that pore space is definitively "not a mineral." That case, however, like those in most other states, were interpreting specific conveyances. Accordingly, this cannot be considered a "rule" and a court could find otherwise if the language in the granting instrument implied that the parties had a contrary intent. This is true also in states with legislative declarations, which also				

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			state that they apply only if there are not instruments to the contrary.				
61	3	8.3	4. PR strongly recommends that the standard require: a) in split estates, the project proponent (whether Class II or Class VI) must obtain perpetual storage rights from the surface owner and must obtain non-interference rights from the mineral owner. b) for fee interests (where minerals could later be developed or severed), the project proponent should be required to have the perpetual right to store CO_2 in the storage formation and a covenant preventing future mineral operations in or through the storage formation.	Please see the response to comment 59.	Closed, except with respect to additional comments in 59.	N/A	N/A

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62	3	8.3	5. There is repeated text in 8.4 with the sentence beginning “In the case of CO_2-EOR…”	Deleted the second instance of that sentence.	Closed.	N/A	N/A
63	3	9	“Pore space ownership laws may vary by jurisdiction. Project Proponents are responsible for demonstrating that they are compliant with all local rules and regulations related to liability and pore space.” – The goal of this paragraph is not clear as it covers financial responsibility, safety plans, and pore space ownership. Many rules and regulations (Class VI) do not mandate that a project proponent obtain pore space, however, that does not insulate operators from civil liability for trespass	Given the fact that the second paragraph in section 9 (previously titled "Permanence, Reversal Risk Mitigation & Compensation") contains too many topics which were already in or better placed in other Methodology sections, all information in the noted paragraph was either moved or deleted. Requirements for financial responsibility are now addressed in section 7.1 (Data Collection and Parameters to Be Monitored) and section 7.3 (Monitoring, Reporting, and Verification (MRV)	Closed.	N/A	N/A

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			nor does it assure permanence. "Migration of CO_2 plumes might qualify as trespass or nuisance under State law. The oil industry has addressed this liability during EOR, and the issue of trespass has been addressed in a Texas case (Railroad Commission of Texas v. Manziel, 1962), which held that injection associated with a state-authorized secondary recovery project would not cause trespass even though fluids move across property lines. In other jurisdictions, this issue would be dependent on individual State regulations and statutes." PR readies the Manziel opinion as very specific and limited because it	Plan). The last two sentences in the paragraph were deleted because similar information is already covered in section 8.2 (now titled "Pore Space Ownership and Mineral Rights"). All references to case law were removed because they were not necessary to the discussion and because different cases would apply in different jurisdictions. Regarding plume migration, the authors agree that it is a permanence risk and say the Methodology contains the following in section 6.2.7 "[f]or the purposes of this Methodology, CO_2 shall be considered to have been emitted to the atmosphere if the CO_2 plume or the pressure front			

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			specifically relies on the fact that a regulatory agency responsible for adjudication of property rights between mineral owners made a determination that the spacing was necessary to protect correlative rights and prevent waste. The Manziel precedent might apply where a state has authority to create geologic sequestration units to transboundary migrations within those units, but is unlikely to apply to migration without a storage unit. A UIC program, in contrast, is not designed to adjudicate property rights. Therefore I think indirect migration of CO_2 might be more akin to the 2011 case of FLP Farming LTd v. Envtl Processing Services, where	is observed (either directly or indirectly) at unmitigated pathways to the surface, including but not limited to unplugged or inappropriately plugged wells that penetrate the confining zone(s), or if CO_2 or the elevated pressure front is detected within a monitoring well." Please also see the response to comment 59 as well as the updated section 8.2 (Pore Space Ownership and Mineral Rights) and section 9 (Permanence).			

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			the Texas Supreme Court found that a UIC permit did not authorize trespass. Those owners were unsuccessful at proving their claim but only because they could not demonstrate migration of the plume. The text as written reads Manziel too broadly. Beyond this, PR believes the standard should carefully consider the impacts of migration outside the project boundaries as a threat to permanence. If the CO2 migrates outside the project boundaries it will no longer be subject to institutional controls. Even if an owner takes no actions to bring a trespass claim, it could take actions that would result in				

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			releases of CO_2 to the atmosphere. Without a risk mitigation covenant, the owner of the property into which the CO_2 migrates could authorize other injections, withdrawals, or permit drilling through the storage reservoir.				
64	2	Section 9. Permanence, Revisal Risk Mitigation & Compensation	Projects should contribute 10% of credited reductions/removals to a Reserve Account. A reduction of up to five percentage points (minimum 5%) may be allowed if independent verification confirms: • Subsurface characterization and modeling demonstrate secure containment under conservative scenarios.	Thank you for the recommendations. The authors will consider them as a separate ACR CCS Project Reversal Risk Mitigation Contract and Reserve Account contribution document is developed.	Closed. While the specific 10%/5% structure proposed in the comment was not adopted, the protocol instead references a separate ACR reserve-account contribution tool to determine project-specific buffer percentages.	N/A	N/A

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			• Well integrity and legacy-well risks in the AoR are remediated. • Monitoring and response systems can detect and bound a reversal promptly. • Operating limits and pressure-management procedures are enforced. • Financial assurance instruments are sufficient to compensate any reversal. Reductions apply only during periods with verified evidence and must be revoked if conditions change.				
65	1	9.1, 2nd para, p137	A release meaning migration outside a geologic boundary, or an atmospheric emission?	The phrase "release occurs" is changed to "CO_2 is emitted to the atmosphere" in two places	Closed.	N/A	N/A

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				in that paragraph to align with the phrasing in Subsection 6.2.7 (Geologic Storage Reservoir Emissions). However, migration is treated similarly. Please see response to comment 63.			
66	1	9.2, 2nd para, p139	A release meaning migration outside a geologic boundary, or an atmospheric emission?	The phrase "release of CO_2" is changed to "CO_2 is emitted to the atmosphere" to align with the phrasing in Subsection 6.2.7 (Geologic Storage Reservoir Emissions).	Closed.	N/A	N/A
67	3	9.3	The standard as drafted only requires risk mitigation covenants from pore space/surface owners. In split estates, a risk mitigation covenant should also be obtained from mineral owners related to mineral development within or	Please see the response to comment 57 and comment 59.	Closed, except as to items in comment 59.	N/A	N/A

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			under the storage formation.				
68	2	Appendix B. Well-to-wheel (WTW) accounting for EOR – Note: Text referring to the accounting for “other hydrocarbons” or “hydrocarbons associated with the produced oil” is currently a placeholder for when WTW data	Upstream (extraction): Use OPGEE, fed with official data. • U.S.: EPA datasets. • Canada: Environment and Climate Change Canada’s National Inventory Report + provincial data. Refining, transport, fuel use: Use Argonne GREET (current release). Associated hydrocarbons: Meter volumes of produced gas and NGLs, then apply GREET factors for the relevant country/region. CO_2 stored through EOR: Calculate net storage using ISO 27916 (the same method EPA references).	Thank you for the feedback and recommendations. The authors reviewed all of the suggested data sources for post-production-to-end-use GHG emissions associated with produced oil and associated hydrocarbons and now reference Argonne National Laboratory's 2025 R&D GREET model for use in calculating the post-production emissions for associated gas (in both the U.S. and Canada) as well as for the post-production emissions for oil produced in Canada. The authors chose keep the use of Appendix B for oil produced in the U.S. since it is likely easier for Project	Closed.	N/A	N/A

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		are updated	Report storage and fuel emissions separately. Documentation: List models and versions used, key inputs/ assumptions, data sources, treatment of co-products and associated hydrocarbons, and allocation choices.	Proponents to use and just as rigorous as R&D GREET.			
69	1	Appendix D, Forest Biomass	PR is not sufficiently familiar with all the FSC, SFI, RSB etc standards. The exclusion of purpose-grown whole trees for electricity generation is sound. Do these standards collectively ensure that forest biomass is a byproduct of sustainable forest management (e.g. thinning/trimming for the purposes of wildfire prevention/severity mitigation), or do they also include purpose-managed	Appendix D was updated to add a specific RSB certification (the Standard for Advanced Fuels) for all biomass. For forestry materials, Forest Stewardship Council (FSC) Forest Management and chain of custody certifications ensure that requirements I through V are met and RSB certification ensures that requirement VI is met. The RSB fuels certification for agricultural materials	Closed.	N/A	N/A

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			commercial forest lands? For the former, ensuring that biomass is genuinely waste/byproduct would be paramount. For the latter, ensuring that additional land conversion isn't occurring as a result of using the grown biomass for carbon should be the objective.	ensures that requirements I. through VI. are met. Please see the responses to comment 19 and comment 25.			
70	1	Appendix D, Biomass from agriculture	For biomass from agriculture, the primary safeguard should be to ensure that no additional land with other sustainability value (e.g. forest with ecological and climate value) is converted to agriculture due to increased demand for a carbon crop. I am not familiar whether the RSB certification achieves this. Genuine agriculture wastes	RSB certification provides adequate assurance, as it prohibits conversion of forestland to agricultural land under Principle 7, Conservation, stating "Conversion of land or use of new areas for operations shall not occur…" as part of Criteria 7a., which states, "Conservation values of local, regional or global importance within the potential or existing area of operation shall be	Closed.	N/A	N/A

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			could be used effectively to sequester/remove carbon.	maintained or enhanced." Please see the responses to comment 19 and comment 25.			
71	2	Other General Comments	System Boundaries • Align with IPCC and LCFS CCS: cover all sources, sinks, and reservoirs (capture, transport, storage, leakage).	California's Low Carbon Fuel Standard (LCFS) compares the lifecycle GHG emissions of certain, lower-carbon-intensity transportation fuels to the lifecycle emissions of conventional transportation fuels. As such, it is explicitly designed to include the upstream emissions associated with transportation fuels, including in the LCFS CCS protocol. In comparison, ACR's methodologies primarily address onsite and purchased/ utilized-on-site energy emissions in alignment with carbon crediting standards.	Closed.	N/A	N/A

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				Because CCS projects can involve major construction and deconstruction with significant associated emissions, significant construction and deconstruction emissions are included within the project boundary. These sources of project emissions are clearly outlined in section 6.2.4 (Construction Emissions) and 6.2.5 (Post-Injection Period Monitoring, Decommissioning & Closure Emissions) of the Methodology, especially including Equation 29 (Project Emissions from Construction Materials). Equation 29 was also updated to clarify the production of construction materials for which project emissions are calculated is limited to those materials			

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				listed in Tables 6 and 19 (i.e., cement, asphalt mixture, and steel products).			
72	2	Other General Comments	Pipeline Operations and Transport Emissions • Current equations include fugitive pipeline emissions but omit operational emissions (compressors, pumps, electricity). • Provide default emission factors (DOE/EPA data, e.g., kWh per mile-year with grid factors).	Pipeline operational emissions are included in Equation 13 (Project Emissions Associated with CO_2 Pipelines Used Only by the CCS Project) and in Equation 14 (Project Emissions Associated with CO_2 Pipelines used by Multiple Parties) as the term "EF Pipeline Operation." Emission factors must be consistent with the requirements listed in Appendix E (Emission Factor Guidance).	Closed.	N/A	N/A
73	2	Other General Comments	Site Characterization • Requirements are lighter than EPA Class VI and LCFS CCS.	Section 7.3 (Monitoring, Reporting, and Verification (MRV) Plan) is almost verbatim what is required	Closed.	N/A	N/A

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			• Require: geologic/fault maps, AoR model outputs, baseline groundwater chemistry, rock stress/strength data, consistent with U.S. EPA Class VI well requirements. • Aligning with Class VI will raise credibility and simplify interoperability.	for U.S. EPA UIC Class VI MRV plans. For those items that you list, please see section 7.3.2 (Required Site-Specific and Plan Information), section 7.3.3 (Injection Zone Requirements), section 7.3.4 (Geologic Storage Reservoir Siting Criteria), and section 7.3.5 (Area of Review and Corrective Action Plan).			
74	2	Other General Comments	Permanence and Risk Buffering • Adopt LCFS standards (≥100 years, invalidation rules, buffer contributions). • Require periodic risk rating updates and buffer adjustments (LCFS Appendix G model).	Thank you for the recommendations regarding the buffer pool (Reserve Account) and associated risk assessment. The authors will consider them as the ACR CCS Project Reversal Risk Mitigation Contract and ACR CCS Reserve Account Contribution Tool	The response indicates that permanence and reserve account provisions will be addressed in separate ACR CCS program documents. Given the central importance of long-term storage integrity for CCS-based carbon credits, the methodology should at minimum clearly reference the governing permanence framework and describe	While the ACR CCS Project Reversal Risk Mitigation Contract and the ACR CCS Reserve Account Contribution Tool are being developed as separate program documents, the Methodology itself establishes the core permanence requirements	Closed.

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				(separate documents) are developed.	how reversal risk is managed (e.g., buffer pool contributions, invalidation rules, or financial assurance requirements). Without such linkage, reviewers cannot fully evaluate the permanence safeguards associated with credited storage. Clarifying this relationship would strengthen confidence in the protocol.	and risk-management framework. Specifically, Section 9 (Permanence) of the Methodology defines permanence requirements and the framework for mitigating risks and compensating for reversals.	
75	2	Other General Comments	Consistency and Application • Several definitions and equations (for example, EF_Pipeline Operation) are introduced without units or clear guidance. It is not always clear whether EF should be expressed as kg CO_2e per tonne of CO_2	Two instances of equation terms lacking units were identified; units were added to those terms. Units can be found in parentheses at the end of the first sentence where each term is described. In some equations, examples of units that are allowed to be utilized for the term are outlined. In these cases where exact units are not	Closed.	N/A	N/A

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			transported per km, or per mile per year. This ambiguity creates room for inconsistent application across projects. • The draft should include worked examples to illustrate the application of key equations. Currently, equations are presented only in abstract form, which makes them difficult to apply consistently. For instance, an example could walk through a 100-mile pipeline transporting 2 $MtCO_2$ per year, specifying compressor electricity demand in kWh per mile, applying grid emission factors in gCO_2/kWh, and calculating the	specified, the rules outlined in Appendix E (Emission Factor Guidance) and rules for emission factor choices in Table 19 (Hierarchy of Emission Factors by Source Category) are important. Among other requirements, Appendix E states that emission factors "shall be appropriately applied to the emission source," "shall utilize the appropriate basis of measurement" and "[t]he Project Proponent shall record units, data source of emission factor, publication year, and all conversion steps." The authors agree that providing example equations would be helpful and may do so on the ACR			

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			resulting operational emissions in tonnes of CO_2 per year. Providing such examples would make application and verification much more straightforward.	webpage instead of the Methodology.			
76	2	Appendix D. Sustainable biomass requirements as it relates to BiCRS and BECCS	The appendix is on the right track (no-conversion/no-harm rules, U.S./Canada sourcing, certification options). To make outcomes more consistent: • Require a short waste-hierarchy note to confirm feedstock is a true residual, not displacing higher-value uses. • Ask for origin and legal status documentation (U.S./Canada, non-hazardous).	FSC and RSB certifications require country of origin to be identified and RSB Principle 8 ensures that, "Operations shall implement practices to maintain or enhance soil's physical, chemical and biological conditions." The RSB certification also clearly define what is considered "waste" and what types of waste are allowed under the standard that will require that the waste meet the same requirements as	Closed.	N/A	N/A

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			• Require a short soil-protection memo if residues are removed, tied to local guidance. • As supply scales, include a land-use change risk screen and tighten controls if risk rises. • For traceability, accept FSC/SFI/PEFC/RSB chain-of-custody only when mass-balance or physically segregated (not book-and-claim alone at project entry). Require a plant-gate mass balance of receipts vs. use. • Verification should be risk-based and efficient: sample largest suppliers annually, spot-check origin/CoC paperwork, and review soil and waste memos.	would be met using a waste hierarchy note. Additionally, FSC prohibits forest conversion and RSB prohibits forest and agricultural conversion. In the United States, mass balance or physical segregation is not common practice and it would be excessively onerous to require this. Within the confines of FSC and RSB certification, ACR is comfortable with book-and-claim approaches. All carbon projects listed with ACR are required to undergo validation and verification (risk-based approach). Auditing of FSC and RSB certifications is outside the scope of ACR's authority.			