Public Comment from Friends of the Earth U.S. and Biofuelwatch

July 11, 2025

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Submitted via regulations.org.

Docket ID: EPA-HQ-OW-2025-0198

Re: Comments and Request for Public Hearing on **MPRSA research permit application, Carboniferous, Inc. Research Project (Orca Basin, Gulf of America)**

Friends of the Earth U.S. (FOE) and Biofuelwatch submit these comments and formally request a public hearing in response to Public Notice of proposed MPRSA research permit No. EPA-HQ-MPRSA-2025-001 (Docket ID EPA-HQ-OW-2025-0198). We write to oppose the proposed issuance of a research permit under the Marine Protection, Research, and Sanctuaries Act (MPRSA) to Carboniferous, a for-profit company seeking to conduct a field experiment dumping terrestrial biomass into the Orca Basin of the Gulf of Mexico.

The public hearing is being requested by FOE. Our specific objections to the permit issuance and the issues we propose to be raised during the hearing are enumerated and detailed below. For those same reasons, the Environmental Protection Agency (EPA) should deny the permit application.

Friends of the Earth U.S. is a 501(c)(3) non-profit, membership-based organization with a headquarters office located in Washington, D.C and a regional office in Oakland, California. FOE currently has over 5.8 million activists and over 226,000 members, located across all 50 states and the District of Columbia. FOE's primary mission is to defend the environment and champion a more healthy and just world by collectively ensuring environmental and social justice, human dignity, and respect for human rights and peoples' rights.

Carboniferous is seeking a permit to conduct "biomass sinking," which is one proposed strategy for marine carbon dioxide removal (mCDR), designed to offset human-induced CO2 emissions and limit the effects of climate change. If conducted at climate-relevant scales[1] biomass sinking would require dumping more biomass than the annual production of the entire global corn industry (1.1 gigatons in 2023) onto ocean floors. The field trial described in the application would involve processing over twenty tonnes of sugarcane byproducts (drying and compacting

[1] To be considered "climate-relevant," a CDR technique generally has to be scalable to one gigaton of CO2 removals per year or more, which represents just under 3% of current human CO2 emissions per year. For example, demonstrating scalability to one gigaton of carbon sequestration was the criteria used by the recent XPrize Carbon Removal competition.

the product), and assembling them into twenty separate one-tonne packages using burlap sacks and rope cargo netting. These “biomass packages” would then be tethered to steel anchors and attached to “sampler system” frames, before being lowered to the ocean floor in the Orca Basin for study. The Orca Basin is a unique hypersaline (high salt), anoxic (no oxygen) seafloor depression in the Gulf of Mexico that was discovered only in the 1970s. Although it is difficult to access and its role in the region’s biogeochemistry is poorly understood, the Basin hosts uniquely adapted microbial ecosystems and is thought to play a critical role in metal and nutrient cycling in the Gulf of Mexico.[2] The biomass packages and attached anchors would be left on the ocean floor permanently, while the sampler system frames would be retrieved in batches after 6 months, 8 months, 12 months, and 14 months for analysis.

After careful review of the permit application, the Environmental Protection Agency (EPA) fact sheet, and the governing statutes and regulations, it is abundantly clear that the proposal fails to meet the legal, scientific, and ethical standards required for MPRSA research permits and the permit application should be denied.

In addition, the recent extension of MPRSA research permits to encompass marine carbon dioxide removal field experiments in general constitutes a substantive change in policy, which Congress has neither legislated nor authorized. In such circumstances, the Administrative Procedure Act (APA) mandates the EPA to engage in formal notice-and-comment rulemaking and to submit the rule change to Congress under the Congressional Review Act (CRA) before issuing any such research permits. Moreover, any actions taken on permit applications, and related decisions, must refrain from being “arbitrary, capricious, or an abuse of discretion.” Indeed, the APA provides that courts “shall . . . hold unlawful and set aside agency action” that is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law,” 5 U.S.C. § 706(2)(A), that is “without observance of procedure required by law,” *Id.* § 706(2)(D) or that is taken “in excess of statutory jurisdiction, authority, or limitations, or short of statutory right.” *Id.* § 706(2)(C).

Below, we outline the reasons why the EPA must deny Carboniferous’s research permit application, and why it must first engage the public in formal rulemaking before undertaking any extension of the MPRSA’s research permitting provisions to marine carbon dioxide removal activities. This letter also serves to remind the EPA of its statutory duties (1) to conduct environmental review of this permit, and any action on related projects pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq*.; and (2) to conduct proper consultations as to whether this particular permit, and similar projects, might affect species listed under the Endangered Species Act (ESA) 16 U.S.C. § 1531, *et seq*.[3] Finally, we use this

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[2] See for example Nigro et al, “Microbial ecology and biogeochemistry of hypersaline sediments in Orca Basin,” *PLoS ONE* vol. 15, iss. 4, 2020; Stüeken et al, “Deep-Marine Brine Seeps Stimulate Microbial Nitrogen Cycling: Implications for the Formation of Sediment-Hosted Ore Deposits,” *JGR Biogeosciences* vol. 129, iss. 7, 2024; and Cappellen et al, “Biogeochemical Cycles of Manganese and Iron at the Oxic−Anoxic Transition of a Stratified Marine Basin (Orca Basin, Gulf of Mexico),” *Environmental Science & Technology* vol. 32, iss. 19, 1998.

[3] There are likely additional federal laws that apply to this permit, and similar decisions. We urge the EPA to ensure proper fulfillment of the Marine Mammal Protection Act, 16 U.S.C. § 1361, et seq., the Migratory

comment letter to formally request a public hearing on the proposed permit, to address the following objections and issues:

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1. The proposal would test a carbon dioxide removal strategy that contradicts the foundational intent of the MPRSA

Biomass sinking as a CDR strategy is a dead-end that would be impermissible under U.S. law, and indeed is directly opposed to the principles of the specific law under which this permit has been proposed.

The Marine Protection, Research, and Sanctuaries Act was enacted to prevent the ocean from becoming a routine repository for waste products. It establishes a legal framework in which ocean dumping is considered only as a last resort, after it is demonstrated that land-based alternatives are not feasible or would pose greater environmental risks. This intent is embedded in both statute and regulation. Section 102(a) of the MPRSA (33 U.S.C. § 1412(a)) prohibits dumping of any material unless it is shown to be necessary and not unreasonably harmful to the marine environment. EPA regulations 40 C.F.R. § 227.16 reinforce this by requiring that dumping be denied if there are practicable land-based alternatives that are environmentally preferable.

The very concept of biomass sinking for carbon removal would undermine this unequivocal prohibition by positioning the ocean as a primary or preferred sink for agricultural waste that could (and should) be managed on land. This approach inverts the hierarchy of environmental responsibility established by the MPRSA. Rather than preserving the marine environment as a last resort for waste disposal in very limited, specific situations, biomass sinking would repurpose the ocean into an industrial carbon storage site without demonstrating that other, less risky and more reversible land-based solutions have been exhausted. Such a strategy would fundamentally violate the Act, which prioritizes the protection of marine ecosystems from precisely this type of systemic, cumulative waste loading.

2. The EPA's criteria for "scientific merit" are not consistent and overly narrow

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Bird Treaty Act, 16 U.S.C. § 703, et seq., the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 et seq., the Outer Continental Shelf Lands Act, 43 U.S.C. § 1331 et seq., the Coastal Zone Management Act, 16 U.S.C. § 1451 et seq., the National Historic Preservation Act, 54 U.S.C. § 306101 et seq., and the River and Harbors Act, 33 U.S.C. § 401 et seq. Each of these laws raise serious concerns associated with mCDR projects, including possibly the one at issue here. The EPA must ensure that it has fulfilled all obligations pursuant to these and other applicable laws prior to issuing permits, amending policies, or undertaking any other activities related to mCDR activities.

The assessment framework that the EPA has articulated for evaluating the "scientific merit" of MPRSA research proposals is evolving and highly subjective, overly narrow, not in line with the enabling statute, nor with common practice at other U.S. agencies. In other words, EPA's actions are "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," in violation of the Administrative Procedure Act, and possibly other applicable federal laws.

The MPRSA statute does not mention research permits, but empowers the EPA to "establish and issue various categories of permits" for ocean dumping (33 U.S.C. § 1412(b)). The implementing regulations establish research permits, and state that they may be issued "when it is determined that the scientific merit of the proposed project outweighs the potential environmental or other damage that may result from the dumping" (40 CFR 220.3(e)), but the regulations do not define "scientific merit" in any detailed or prescriptive way. In the absence of such a definition, the EPA bears the responsibility to develop and apply a clear, rigorous, and policy-aligned interpretation.

However, the agency does not appear to have developed any formal criteria for assessing scientific merit. The criteria it does describe in permit application documents varies tremendously from one project to the next:

1) In the EPA's Fact Sheet on the Carboniferous research permit application, the agency mentions only two criteria for evaluating scientific merit: "The EPA assessment of "scientific merit" encompassed an evaluation of the scientific rigor in the applicant's design of the proposed research project as well as an assessment of the applicant's explanation of the scientific basis—its "need"—for conducting the research in the ocean rather than in a laboratory setting."[4]
2) In its Fact Sheet for the first (and only other) research permit issued for a marine CDR experiment - the "LOC-NESS" experiment in ocean alkalinity enhancement in 2024 - the EPA articulates a different, but also inadequate definition of scientific merit based on four criteria: "The EPA evaluated the scientific merit (the need) of the applicant's proposed activities for Phase 1 and Phase 2 [of the LOC-NESS experiment], including consideration of the scientific basis for the research; the rationale for the amounts of materials to be released and methods for the release; the rationale for the appropriateness of the proposed study area locations; and the justification for why land-based or other alternatives, such as further lab or mesocosm research, would not achieve the research needs."[5]
3) In 2019 the EPA issued an MPRSA research permit to the StarKist Samoa Company in order to examine the impacts of ocean disposal of fish processing liquid wastes from the StarKist tuna plant in American Samoa (which did not involve any marine CDR activities).[6] Neither the Starkist permit application, nor the EPA's Fact Sheet or any other

[4] U.S. Environmental Protection Agency, *Fact Sheet: Proposed MPRSA Research Permit No. EPA-HQ-MPRSA-2025-001 Carboniferous, Inc. Research Project*, page 4. Document ID EPA-HQ-OW-2025-0198-0003, June 2025.
[5] U.S. Environmental Protection Agency, *Fact Sheet: Tentative Permits EPA-HQ-MPRSA-2024-001 and EPA-HQ-MPRSA-2024-002*, page 24. Document ID EPA-HQ-OW-2023-0591-0006, May 30, 2024.
[6] U.S. Environmental Protection Agency, "Administrative Record related to Ocean Dumping Permit (OD 2020-01 RESEARCH) for Starkist Samoa Co., American Samoa."

documents related to the permit discuss “scientific merit” at all. StarKist does not appear to have made a case that their research was scientifically meritorious, and the EPA gives no indication that it evaluated the scientific merit of the project.

This lack of a uniform standard for assessing the scientific merit of proposed research projects, combined with uneven criteria from one permit application to the next, falls far short of the “arbitrary and capricious review” standard established under the APA. The APA states that any agency actions that are “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law” (with particular emphasis on “capricious”) are unlawful and shall be set aside by the courts (5 U.S.C. § 706(2)).

The modicum of criteria for scientific merit that the EPA does mention regarding the two marine CDR permits are also overly narrow. Any adequate assessment of scientific merit must account for the broader context in which research occurs - including its relevance, feasibility, potential impact, and implications. It must not be assessed solely in terms of internal consistency or methodological rigor. Research that explores actions or technologies that are infeasible, unlawful, or ethically unacceptable at scale cannot be considered scientifically meritorious for the purpose of a public interest statute like the MPRSA. A permitting framework that ignores this context risks enabling studies that lack societal value or that, as is the case in this Carboniferous proposal, run contrary to the very goals of the enabling statute and U.S. law.

Assessment frameworks for scientific merit are broader at other U.S. agencies, and also clearly articulated in formal documents. One of the two criteria used by the National Science Foundation for evaluating grant applications, for example, is an evaluation of their “broader impacts” - including their “potential to benefit society and contribute to the achievement of specific, desired societal outcomes.” The EPA’s criteria for scientific merit appear to lack any such assessment of impacts (both positive or negative). The National Institutes of Health’s Simplified Peer Review Framework, as another example, instructs reviewers to evaluate the “importance of the research,” including an assessment of the rationale for conducting the research and whether the research solves a critical problem or leads to a technical advance. Again, the EPA’s criteria appear to be neutral when it comes to the impacts or importance of proposed research, as well as the broader societal project the research attempts to advance.

3. The EPA’s extension of MPRSA permitting to marine CDR research violates the Administrative Procedure Act, the Congressional Review Act, and other federal laws

Starting in 2024 the EPA began publishing a series of webpages and later an Interim Information Sheet related to MPRSA permit applications specifically for the purpose of researching or deploying “marine carbon dioxide removal” (mCDR) strategies. While no comprehensive listing of MPRSA permits issued over the law’s 50+ years is available online, every single permit listed on the EPA’s website prior to 2024 relates to the disposal of waste

products, including dredged materials, marine mammal carcasses, decommissioned vessels, fish waste, spoiled food products, waste water, industrial waste, and sewage sludge.[7] EPA's recent actions expanding MPRSA permits to include mCDR activities has marked a major shift in policy, as mCDR is not conducted as last resort waste disposal, but as climate mitigation.

The APA establishes that federal agencies must engage in formal rulemaking when they adopt new policies or interpretations that have the force and effect of law. Specifically, 5 U.S.C. § 551(4) defines a "rule" as any agency statement that "implements, interprets, or prescribes law or policy." Exemptions from formal rulemaking are limited to "interpretative rules, general statements of policy, or rules of agency organization, procedure, or practice" (5 U.S.C. § 553(b)(A)).

The EPA's decision to issue MPRSA permits for mCDR activities - such as the Carboniferous biomass sinking project - constitutes a substantive change in policy. The EPA's implementing regulations for the MPRSA (40 C.F.R. § 220–229) contain no references to carbon sequestration, climate mitigation, or marine CDR. Prior to 2024, the agency had never interpreted the MPRSA to cover such projects. The introduction of this new class of ocean dumping activity unlawfully broadens the scope of the statute and EPA's implementing regulations, expanding it into the domain of climate policy, changing expectations for future applicants, and exposing environmental ecosystems and the coastal communities that rely upon them to a new class of risks from potential dumping activities.

By adopting this interpretation solely through fact sheets and website guidance - without engaging in formal notice-and-comment rulemaking - the EPA has violated the APA. The decision affects both the rights of permit applicants and the public, and it creates new expectations for how the agency will review and approve future MPRSA permit applications. This is precisely the type of substantive policy shift that requires public input and formal deliberation before taking action.

Moreover, also in violation of the APA, the EPA has taken action that unlawfully exceeds the statutory authority granted by Congress when it passed the MPRSA. As detailed above, the proposed permit for Carboniferous is unrelated to the purposes for which MPRSA was created, and thus, exceeds what Congress has authorized. Any action taken in furtherance of permitting these unauthorized activities would be ultra vires and unlawful, as they exceed the EPA's statutory authority. See 5 U.S.C.§ 706(2); see generally Loper Bright Ent. v. Raimondo, 603 U.S. 369 (2024).

It also bears noting that EPA has flouted its mandate under the Congressional Review Act (CRA), which requires that an even broader range of agency rules - including both substantive and interpretive rules - be submitted to Congress for review. This not only keeps Congress

[7] This includes all permits listed on the MPRSA Ocean Site Map, all dockets for permit applications found on regulations.org, and all permits listed on the EPA's pages for General Permits, Research Permits, Emergency Permits, Special Permits, and Permits for Fish Wastes and Dredged Material (accessed July 2, 2025).

informed of agency activity, but it also provides a pathway for Congress to fast-track procedures to potentially overturn the rule via legislation. However, a search of the Government Accountability Office (GAO) Database of Rules shows no rule submissions from the EPA concerning marine CDR under the MPRSA. EPA's rush to extend the MPRSA to mCDR activities did not comply with the CRA, exposing these permits to additional risk by depriving Congress of the right to review and respond to this new class of ocean dumping permits.

To avoid litigation over these clear violations of federal law, EPA should immediately deny the permit application at issue. It should also place a full-stop on all other permitting and related activities that involve mCDR so that it can assess and fully comply with all applicable federal laws and mandates.

4. The core experimental method - deployment of large biomass packages - is unnecessary and scientifically unjustified

Astonishingly, this proposal from Carboniferous does not include any biological or chemical sampling of the actual large biomass packages they propose to sink to the floor of the Orca Basin. Instead, the only biological analyses will be conducted on small "subsamples" of biomass suspended in nylon bags on nearby sampler frames. The larger packages are permanent, unrecoverable, and largely unmonitored. This means the project's most impactful and irreversible environmental intervention - dumping 20 tonnes of biomass to the ocean floor - will have almost no direct scientific yield.

Carboniferous proposes to conduct water sampling near the large biomass packages, which is also unlikely to yield meaningful data. Degradation of biomass under the hypersaline, anoxic conditions of the Orca Basin is expected to be extremely slow. As a result, the rate of chemical release into surrounding waters may be too low to generate a detectable signal amid the brine's naturally high background concentrations. This poor signal-to-noise ratio - combined with the use of intermittent, fixed-point water bottle sampling - makes it unlikely that the study will detect statistically significant environmental effects attributable to biomass degradation, especially over the limited monitoring period of 6 to 14 months. Without the use of in situ sensors or direct biomass measurements, this approach lacks the resolution necessary to assess the environmental and microbial processes the study seeks to explore.

Because the primary scientific analyses are focused on the nylon bag subsamples and not the large biomass packages, the experiment could be redesigned to rely solely on retrievable, monitored biomass samples, reducing the risk of permanent environmental disturbance. As currently designed, the use of unrecoverable large biomass packages serves no essential scientific function. Should EPA approve the permit as-proposed, it would be in violation of APA's prohibition on agency activity that is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law."

5. The project lacks scientific endpoints, success criteria, and testable hypotheses

Nowhere in the Carboniferous application are there clearly stated hypotheses to be tested - statements that could be confirmed or disproved based on the results of the experiment. Nor does the proposal define what success would look like, e.g.: How much biomass degradation would be acceptable? What thresholds would signify environmental harm? What measurements would demonstrate that long-term sequestration is feasible?

Instead, the proposal centers on descriptive observations of microbial communities and water chemistry near the biomass, without explaining how those observations will be interpreted to evaluate the carbon removal potential or environmental impact of biomass sinking as a CDR method. The design lacks any performance metrics or evaluation framework that would allow the EPA or the public to determine whether the experiment has achieved its aims. The measurements planned (e.g., water sampling near biomass, microbial sequencing of subsamples) are descriptive, not evaluative.

Without defined benchmarks or outcome criteria, the project cannot answer its central question: does biomass sinking in the Orca Basin safely and effectively sequester carbon over climate-relevant timeframes? Lacking a component as basic as testable hypotheses, the project design cannot possibly be considered “scientifically rigorous.”

6. The monitoring time frame is too short to evaluate long-term carbon sequestration

According to the permit application, one of the central objectives of the research is “to characterize the final form of the biomass that is expected to persist in the [Orca] basin ‘permanently’ – i.e., over 1,000-year timescales” (p. 40). Yet all sampling will occur within a 6-to-14-month window.

No meaningful claims about long-term carbon durability can be drawn from such a short timeframe. The growth of microbial communities, which play a major role in biomass decomposition, is often nonlinear and may accelerate significantly beyond the first year. Likewise, degradation processes in anoxic, hypersaline environments like the Orca Basin may be extremely slow at first, but could evolve unpredictably over multi-year to decadal timescales. Because of this researchers cannot assume that short-term degradation rates are representative of longer-term dynamics, but the application fails to state what their assumptions are in this regard, and lacks a hypothesis connecting their short-term data collection (6-14 months) with their primary research question (whether the carbon content of sunk biomass will be sequestered for millennial time scales).

The EPA should not issue permits for climate mitigation experiments whose measurement windows cannot possibly capture the phenomena they purport to study.

7. Spatial mismatch between baseline data collection and deployment sites may distort findings

In a separate field report not included in the application, Carboniferous reports collecting a range of baseline data from the Orca Basin over four research cruises conducted in 2023 and 2024.[8] However, these efforts do not appear to be spatially aligned with the 20 planned biomass deployment locations, and neither the application nor the field report confirm whether the brine, sediment, or microbial data were collected at or near the specific area where the biomass packages will be placed.

This spatial mismatch is a problem because the Orca Basin is a heterogeneous environment. Salinity, redox potential, microbial community structure, and other key parameters may vary across relatively small distances. Without co-located baseline data, any changes observed after biomass deployment cannot confidently be attributed to the experimental intervention rather than natural background variability between sites.

The EPA should require that all post-deployment measurements have corresponding baseline data collected from the same location, depth, and environmental context. Without this alignment, the study's findings may rest on spatial artifacts rather than actual environmental effects of biomass sinking.

8. There is no plan to directly measure carbon sequestration or climate benefit

Despite being a carbon removal experiment, the project includes no direct measurement of carbon flux, sequestration rate, or atmospheric drawdown potential. This undermines the experiment's credibility as climate science and renders any claims of mitigation potential speculative.

9. The proposal overlooks potential risks of methane release into overlying waters

The Orca Basin contains methane-rich brines and methane hydrates. The physical disturbance associated with deploying or recovering biomass and sampling equipment may disrupt these deposits, potentially releasing methane into the overlying water column. The application does not address this risk at all, nor does it propose any monitoring to detect such an event. The

[8] Dr. Morgan Reed Raven, *Ocean Carbon Retention under Anoxia (OCRA) Field Report, 2023 – 2024*, July 2024. Retrieved from the project's Github page on July 7, 2025.

applicants rely on 40-year-old data for eddy diffusion rates in the Basin, but those were measured without the potential disturbance of dropping 20 tonnes of biomass onto the seafloor (and potentially much more in the future if this technique was scaled up). Given that methane is a potent greenhouse gas, even small unmonitored or underestimated perturbations could invalidate any claimed net climate benefit and contradict the foundational premise of the research. The risk of more catastrophic releases must also be addressed.

10. The project is irretrievable and lacks any remediation or adaptive response plan

The large biomass packages will be unrecoverable. No containment strategy is proposed should environmental effects prove harmful or unexpected. This violates the precautionary principle and exposes a sensitive and poorly understood ecosystem to permanent disturbance with no fallback plan.

11. The proposal fails to address the risk of introducing foreign microbes into the Orca Basin

The Orca Basin is an extreme and ecologically isolated environment, characterized by hypersaline, anoxic conditions that support unique and fragile microbial communities. The introduction of terrestrial biomass—such as sugarcane bagasse—and the deployment of sampling equipment represent potential vectors for microbial contamination. Foreign bacteria from agricultural residues, human handling, or surface equipment could be inadvertently introduced into this deep-sea ecosystem.

The Carboniferous permit application does not describe any microbial contamination controls. There is no indication that the biomass will be sanitized, or that equipment will be sterilized. The EPA should require a microbial contamination mitigation plan that addresses ecological protection.

12. The proposal does not adequately preserve pressure, temperature, and redox conditions during sample retrieval, posing a risk to data integrity

Microbial communities in the Orca Basin will be uniquely adapted to conditions of high pressure, low temperature, hypersalinity, and anoxia. When samples are retrieved from these depths without specialized preservation protocols, the sudden changes in environmental conditions can kill pressure- or redox-sensitive microbes, stimulate atypical metabolic activity, or cause chemical transformations that distort the original sample composition.

Although the project's Standard Operating Procedures for sampling (in Appendix D of the application) include several sound practices, there is no indication that the applicant will use pressure-retaining samplers, anaerobic workflows, or temperature-stabilized transfer protocols for microbial or brine samples. Most microbial and chemical sampling appears to involve standard Niskin bottles, syringe transfers, and surface-level handling in atmospheric conditions. Sample containers are refrigerated or frozen post-collection, but no indication is given that they are stored at in situ temperatures. Established best practices in deep-sea microbiology call for the use of pressure-retaining samplers, cold-chain storage, and anaerobic transfer protocols. The Carboniferous permit application does not adequately address these risks.

These shortcomings are especially concerning for the project's baseline dataset, which is intended to characterize undisturbed environmental conditions. Without appropriate controls on pressure, redox, and temperature, baseline samples may not reflect true in situ states, undermining the ability to detect or attribute future changes caused by biomass deployment.

The EPA should not approve any permit until the applicant demonstrates that it can retrieve and process biological and chemical samples in a way that maintains critical in situ conditions. Without these measures, the scientific results may be compromised by sample handling rather than true environmental signals.

13. The project may compromise future scientific use of the Orca Basin

The Orca Basin is a rare and scientifically invaluable environment - one of the few known deep hypersaline anoxic basins (DHABs). It has been the focus of decades of research in microbial ecology, geochemistry, sedimentology, and astrobiology, and continues to serve as a natural laboratory for investigating life under extreme conditions. Orca Basin research has helped to inform the exploration of potential life on other planets, some of which exhibit similar extreme environmental conditions.[9] Its pristine and relatively undisturbed condition makes it especially valuable for baseline studies and future comparative work.

The Carboniferous experiment proposes to deposit twenty biomass packages (~1 metric ton each), along with large anchoring systems, into a concentrated area of the Orca Basin seafloor. These structures, along with any biomass degradation byproducts and altered microbial activity, may produce long-lasting changes to the biogeochemical, microbial, and physical properties of the surrounding sediments and water. Even if these impacts are limited, they could render the affected portion of the basin unsuitable for future studies that require undisturbed sediments or unaltered microbial community baselines.

[9] This was the basis for the Oceans Across Space and Time (OAST) initiative, funded by NASA's Astrobiology Program.

However, the permit application does not acknowledge this risk or propose any mitigation measures. It is misaligned with the precautionary principles embedded in the MPRSA, which states that the EPA will take into consideration when evaluating permit applications: “The effect on alternate uses of oceans, such as scientific study, fishing, and other living resource exploitation, and non-living resource exploitation” (33 U.S.C. § 1412). The EPA should not approve activities that compromise this unique and irreplaceable scientific asset, particularly without strong justification or restorative safeguards.

14. The project is subject to a significant conflict of interest and may inappropriately advance a pre-commercial enterprise

Carboniferous is a for-profit company whose long-term business model depends on demonstrating the viability of anoxic biomass sinking as a method of carbon dioxide removal. The company’s financial success is contingent on favorable research findings that support future commercial deployment and the potential sale of carbon credits. This creates a direct and substantial financial conflict of interest, as the sponsor stands to benefit from particular research outcomes. The Carboniferous permit application, however, does not disclose this conflict or include any discussion of conflict mitigation procedures, such as third-party validation, independent data analysis, or protocol pre-registration. Indeed, Carboniferous fails even to affirm that it will not sell carbon credits, or that it has not already sold carbon offtakes, for any biomass sunk during the proposed experiment.

On their website Carboniferous currently makes definitive claims that biomass sinking into anoxic basins will sequester carbon for over 1,000 years[10] - the research question they claim to be studying in this proposed experiment. This paints a picture of a pre-commercial pilot with a scientific veneer. Although the proposal is framed as research, its structure resembles more that of a pilot project for a carbon dioxide removal method, designed to test deployment technologies and produce positive results and not to study the impact of those activities on the receiving environment.

The MPRSA research permit framework is intended to support legitimate scientific inquiry - not to serve as a policy beachhead for commercial geoengineering techniques that run contrary to U.S. environmental policy.

15. The EPA must undertake additional processes to fulfill its mandatory duties under federal law, prior to reaching a decision on the proposed permit.

[10] “Plants release CO2 as they decompose in the fall and winter. By arresting that state of decomposition, Carboniferous's MACS approach — the preserving of agricultural plant stalks in anoxic basins — is removing C02 from the atmosphere for at least 1,000 years.” (https://www.carboniferous.co/ - accessed 7/1/2025)

As detailed above, the proposed permit poses environmental and socio-economic risks that necessitate a closer review prior to reaching a decision on the proposed permit, pursuant to myriad federal laws, including but not limited to the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq*.; the Endangered Species Act (ESA) 16 U.S.C. § 1531, *et seq*.; the Marine Mammal Protection Act, 16 U.S.C. § 1361, *et seq*., the Migratory Bird Treaty Act, 16 U.S.C. § 703, *et seq*., the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 *et seq*., the Outer Continental Shelf Lands Act, 43 U.S.C. § 1331 *et seq*., the Coastal Zone Management Act, 16 U.S.C. § 1451 *et seq*., the National Historic Preservation Act, 54 U.S.C. § 306101 *et seq*., and the River and Harbors Act, 33 U.S.C. § 401 *et seq*.

Of paramount importance is compliance with NEPA. NEPA review is necessary before the EPA reaches a decision on the proposed permit. NEPA is the "basic national charter" for protecting the environment, intended to minimize risk to human health and safety, assure beneficial uses of the environment without degradation, and balance resource uses with high standards of living. *See* 42 U.S.C. § 4331. NEPA ensures that the federal government looks before it leaps by requiring federal agencies, including the EPA, to follow specific procedures in evaluating the environmental and socio-economic consequences of proposals *prior* to taking certain actions. See 42 U.S.C. § 4332(C).

As detailed in these comments, the proposed permit poses negative ecological, physical, and biogeochemical impacts to the Orca Basin, a relatively inaccessible and poorly understood deep-sea region with high concentrations of methane and carbon, tenuously sheltered from overlying waters by a density gradient. This project would be the first of its kind, likely used to establish a precedent for future actions with significant effects. Because this precedent-setting permit represents a novel approach that uses new technology and marine use, EPA is mandated to complete a robust NEPA process prior to reaching a decision. Yet to our knowledge, EPA has failed to undertake any level of NEPA review to assess these risks in association with the proposed permit.

ESA consultation is also likely to be triggered by this permit decision. The ESA was enacted to conserve the ecosystems on which threatened and endangered species depend, and to conserve and recover those species so that they no longer require the protections of the ESA. 16 U.S.C. § 1531(b); 16 U.S.C. § 1532(3) (defining conservation as "the use of all methods and procedures which are necessary to bring any endangered…or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary"). Threatened and endangered species are to be "afforded the highest of priorities." *Tennessee Valley Authority v. Hill*, 47 U.S. 153, 174 (1978). Congress intended that endangered species be given priority even over "primary missions" of federal agencies. *Id.* at 185. To our knowledge, the EPA has not undertaken any mandatory ESA processes to assess the impacts that this marine geoengineering project could have on protected species and habitat - not only in the Orca Basin, but in nearby ocean areas that may be influenced or otherwise affected by changes to the ecology of the Basin.

Conclusion

The Orca Basin is not a test bed for speculative geoengineering proposals. It is an ecologically rare and scientifically precious site - home to microbial ecosystems that have evolved over millennia under some of the most extreme and isolated conditions on Earth. The Carboniferous experiment would introduce 20 tonnes of terrestrial waste, steel anchors, and chemical residues into this pristine environment with no plan to monitor long-term effects and no capacity to remove what has been dumped.

This proposal is not built to discover whether biomass sinking works as a carbon dioxide removal strategy. It lacks any testable hypotheses that would help us answer its fundamental research questions, its monitoring window is too short, its monitoring methods lack the resolution necessary to detect gradual biomass degradation, the project's proponent has a significant financial conflict of interest in producing positive results, and its greatest environmental impact - the permanent deposition of 20 tonnes of biomass onto the seafloor - will not even be sampled as part of the experimental design. This project bears a greater resemblance to a commercial pilot project, enabling a for-profit company to test its deployment technology and proof of concept for investors and customers. Moreover, the EPA would be in violation of multiple federal laws if it approved the permit application.

For these reasons, FOE is formally requesting a public hearing to address the specific objections and issues enumerated and detailed above. The EPA should deny this permit application. This is not simply a question of this one project, but one of larger liability as well. Starting in 2024, the EPA unlawfully expanded MPRSA permitting - exceeding its statutory authority under the MPRSA - to include marine CDR activities. This was also done without conducting requisite notice-and-comment procedures under the APA. The EPA should immediately pause consideration of all marine CDR permit applications and related activities in order to engage the public in formal rulemaking, scientific peer review, stakeholder consultation, and engagement with other agencies and Congress.

Thank you for your consideration,

Friends of the Earth U.S.

Biofuelwatch

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