STATE OF CALIFORNIA
AIR RESOURCES BOARD

Proposed Amendments to the	**)**	**Board Hearing Date:**
Commercial Harbor Craft Regulation;	**)**	**November 19, 2021**
Initial Statement of Reason	**)**	**Agenda Item: 21-12-6**

COMMENTS OF THE TRUCK AND ENGINE MANUFACTURERS ASSOCIATION

November 12, 2021

Timothy A. French
Truck & Engine Manufacturers Association
333 West Wacker Drive, Suite 810
Chicago, IL 60606

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The Truck and Engine Manufacturers Association (EMA) appreciates the opportunity to submit these comments on CARB's proposed amendments to the regulations applicable to commercial harbor craft (CHCs) operating in California waters. EMA is the trade association that represents the world's leading manufacturers of internal combustion engines, including the diesel-fueled marine engines used to power commercial harbor craft. Consequently, EMA has a direct and significant interest in the proposed amendments at issue.

1. Introduction and Background

As an initial matter, our understanding of the proposed amendments to the CHC regulations is summarized below.

- Pursuant to the proposed amendments, CARB is planning to adopt new unique emissions performance standards for marine engines used in CHCs operated in California waters. Engines below 600kW will need to meet Tier 3 or 4 standards (if applicable), and also will need to include diesel particulate filter (DPFs) add-ons. For engines above 600kW, they will need to meet Tier 4 standards, and also will need to be equipped with DPFs.
- The proposed NO_x requirements are equivalent to the existing Tier 3 or Tier 4 marine engine standards. The proposed PM standards are approximately equivalent to a level that is 85 percent lower than the Tier 4 PM standards.
- The specific proposed PM performance standards for CHC engines range from 0.005 to 0.010 (g/bhp-hr) for Category 1 engines, depending on the particular engine-power subcategory.
- CARB is proposing the following pathways for meeting the unique Tier 3/4 plus DPF performance standards:
    - Repowering or rebuilding engines to meet Tier 3 or Tier 4 marine diesel engine standards, plus installing a CARB-verified Level 3 (85% reduction) DPF;
    - Installing Tier 3 or Tier 4 EPA-certified engines and adding a DPF from the OEM; or
    - Demonstrating, presumably through in-use testing, that the reconfigured marine CHC engines otherwise meet the revised performance standards.
- As noted, the mandated DPFs must be Level 3-verified and capable of reducing diesel PM by 85 percent or more.

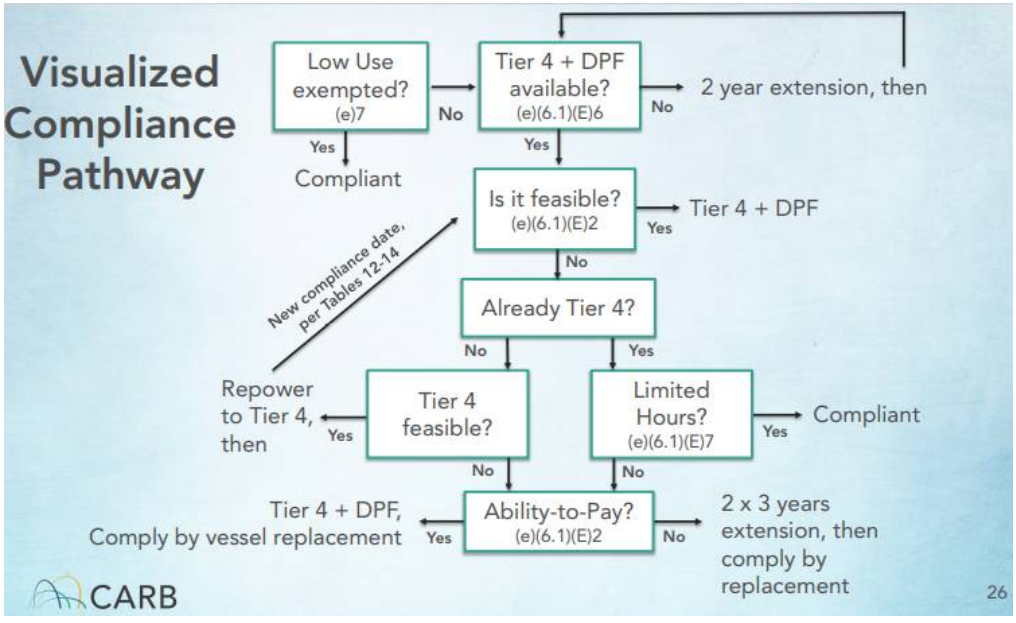
- The draft regulatory language includes a new Method C2 for retrofitting a CHC engine with a DPF to meet the proposed performance standards.
- The proposed implementation period for the revised marine engine performance standards ranges from 2023 to 2032, with opportunities for additional extensions of the compliance deadlines based on product availability.
- CARB has provided the following table (see Table III-8, ISOR, p. III-16) explaining the major compliance requirements of the proposed regulatory revisions.

Table III-8. Major Compliance Requirements of Existing and Proposed Amendments

Current Regulation		Proposed Amendments (Implementation Dates) – December 31st of compliance year									
2021 & Earlier	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
IN-USE VESSEL REQUIREMENTS											
Tier 2 or 3 (Tugs, Ferries, Excursion, Crew & Supply, Barge, Dredge)		**Any Pre-Tier 1 and 1 → Tier 4*** (generally Workboats, Research, Pilot, Tank Barges, and CPFV)									
		≤ MY 1993	MY 1994-2001	MY 2002-2006							
			Tier 2, 3, 4 → Tier 4*+DPF** Ferries (Except Short Run), Pilot***, All Tugs								
			MY 2007-2009	MY 2010-2012	MY 2013-2015	MY 2016-2019	MY 2020-2021	MY 2022+			
					Tier 2, 3, 4 → Tier 4*+DPF** Research, CPFV, Excursion						
					MY 2007-2010	MY 2011-2012	MY 2013-2014	MY 2015-2017	MY 2018+		
							Tier 2, 3, 4 → Tier 4*+DPF** Dredges, Barges, Crew & Supply, Workboats				
							MY 2007-2009	MY 2010-2013	MY 2014-2017	MY 2018+	
									Any Pre-Tier 1 and 1 → Tier 2 or Cleaner *Commercial Fishing*		
									≤ MY 1987	MY 1988-1997	MY 1998+
Other VESSEL REQUIREMENTS											
Tier 2, 3, or 4 All New Vessels Tier 3 + BACT New Ferries Carrying 75+ Passengers			New Excursion: Zero-Emission Capable (e.g., Plug-in Hybrid) 30% or more of power must be derived from a zero-emission tailpipe source								
				New and In-Use Short-Run Ferries: Zero-Emission							

*All engines ≥600 kW would be required to be certified to Tier 4. For engines <600 kW, a Tier 4 certified engine would be required if certified by U.S. EPA or CARB and available by the compliance date.
**Retrofit DPF requirements would apply to all Tier 3 and Tier 4 engines.
***Pilot vessels at Tier 2, 3, or 4 with MY 2007-2009 would not need to comply until December 31, 2025

- CARB also previously provided the following flow chart to explain the implementation of the proposed revised CHC emission-performance standards:



2. Remaining Issues Regarding the Proposed Amendments

EMA members acknowledge that additional emission reductions from CHCs can and should be achieved to help address NAAQS-attainment, climate change, and environmental justice issues in California. However, there are a number of issues that call into question whether the proposed CHC amendments are feasible and cost-effective means to advance CARB's goals.

- As an initial matter, it is unclear whether CARB has the authority to regulate marine vessels as opposed to marine engines used in vessels. CARB needs to clarify the extent of its regulatory authority, and the critical role that the United States Coast Guard (USCG) will play in implementing the proposed regulatory amendments.
- With respect to existing CHC vessels, CARB claims that there are a number of pathways to compliance, but, in actuality, most of those pathways appear to lead to a mandate to "comply by vessel replacement." That result seems largely preordained, since Tier 4 repowers and/or DPF retrofits likely are not feasible for many in-use CHC vessels, given space constraints, safety issues (including those relating to DPF regenerations and surface temperatures), and product availability concerns. In addition, no CARB-verified Level 3 DPFs that are suitable for use with commercial marine engines are currently available. CARB staff have estimated that only 15% of the covered CHC vessels will need to be replaced under the proposed amendments, but that percentage figure seems unreasonably and unrealistically low.
- New Tier 3-plus and Tier 4-plus marine engines and aftertreatment systems are not available and likely will remain unavailable for installation in existing CHC vessels. Similarly, as noted, the necessary supply of Level 3 DPFs does not exist. Even if products were available, it is unclear whether the USCG would approve the modification of CHC vessels with such significant retrofits, given the likely impacts on vessel weight, displacement, balance, safety, hull integrity and sea-worthiness.
- During prior meetings with CARB and USCG representatives, the Coast Guard representatives raised a number of key points that CARB staff have not addressed adequately. More specifically, USCG personnel noted that they will need to review the design specifications for any modifications that vessel owners propose to make to the exhaust systems of their in-use vessels to comply with the revised CHC regulations. In that regard, USCG personnel will need to assess and approve any exhaust-system redesign features that impact surface temperatures, air handling, auxiliary loads, heat-rejection systems, safety, fire protection, vessel balance and stability, as well as vessel weight and displacement, especially if any machinery spaces or bulkheads are relocated, or if other structural changes are involved. To the extent that fiberglass-hull vessels are involved, additional concerns will come into play. The necessary USCG approvals will need to be made on a case-by-case bases, and any approved redesigns, once completed, will need to be verified by local USCG inspection officers. CARB's proposed regulatory amendments will need to (but as yet do not) account fully for the Coast Guard's critical role, which, in essence, will make the retrofitting of in-use vessels that much more difficult and expensive.
- In light of the foregoing, CARB should be more transparent regarding the fact that its revised CHC regulations are likely to lead, as a practical matter, to a requirement for the replacement of the majority of the covered in-use CHCs (not just 15%) with new CHC

vessels powered by unique Tier 4-plus systems within the next 10 years. The actual costs of that actual regulatory mandate will be massive.

- Input from U.S. EPA staff has revealed other significant relevant issues that CARB staff have not fully accounted for. The bottom line conclusion from EPA's input and comments is that CARB's CHC regulations will need to specify that any DPF add-ons must be installed downstream of any SCR system (i.e., "after the box"). Otherwise, those add-ons could result in a number of issues that might cause violations of EPA's regulations, including those pertaining to tampering, defeat devices, emissions warranties, delegated assembly, IRAFs, and durability issues.

- CARB also should further delineate the very significant economic impacts that its proposed rulemaking will have on CHC vessel owners and operators. In particular, CARB should clarify the scale and sources of incentive funding that will be necessary to implement the proposed new vessel-replacement mandates in a cost-effective manner. Without very significant incentive funding, the proposed amendments will not be implementable.

- CARB also needs to evaluate and explain more fully the risks of whether the proposed regulations will result in a lack of compliant marine engines available in California for CHC vessels, since the proposed revisions to the CHC regulations would force OEMs to manufacture unique marine engines and aftertreatment systems solely for the California CHC market. That market is simply not large enough to justify or sustain a separate and unique marine engine product line.

- CARB's underlying inventory analysis appears to use deterioration factors associated with older outdated marine engine technologies. In that regard, it is the case that NOx emissions tend to decrease as current marine engines age, not increase. In addition, it also appears that CARB's analysis fails to account for the reduced emissions rates that result after engine rebuilds. To fix these problems, CARB should use the applicable deterioration factors from EPA's certification database, and then CARB should make the necessary corresponding adjustments to its inventory analysis and cost-benefit calculations.

- With respect to CARB's cost-benefit calculations, it appears that CARB is improperly applying a twenty-times (20x) multiplier to the estimated reductions of $PM_{2.5}$ (See SRIA, p. 163.) That 20x multiplier, however, was developed for assessing how to allocate Carl Moyer incentive funds, not for assessing the monetized health benefits of a proposed CARB regulation as a component of an actual regulatory cost-benefit analysis. Thus, through the improper application of an arbitrary 20x multiplier to the estimated reductions of $PM_{2.5}$, CARB has vastly and unreasonably overstated the putative benefits, and has similarly vastly understated the costs of the proposed CHC regulations. More specifically, if the 20x factor is backed out of CARB's cost-benefit analysis (as it should be), the cost-per-ton of the proposed rulemaking would increase from $28,878/ton to $577,560/ton. To address this fundamental flaw in the rulemaking record, CARB will need to redo the cost-benefit analysis for the proposed CHC amendments without using the 20x multiplier, and instead using CARB's established quantitative risk assessment procedures (which should be based on the most relevant and current epidemiology studies and relative risk factors) for monetizing the benefits of potential avoided health effects due to marginal reductions in emissions.

- Without addressing all of the foregoing issues, CARB cannot demonstrate that its proposed revisions to the CHC regulations are viable and cost-effective.

3. EMA's Potential Alternative Proposal

- European Stage 5 marine engine requirements, which took effect in 2020, include DPF-forcing particle number (PN) standards. Those Stage 5 marine engines could be deployed in the U.S market to help achieve a portion of CARB's CHC-related objectives. However, there are several issues that would need to be addressed, including how to coordinate U.S. EPA certification of EU Stage 5 engines.
- Instead of adopting unique standards for California-deployed CHC marine engines that OEMs will not be able to build given the low sales volume of CHC marine engines in California, CARB should encourage the use of Tier 4 engines, and should work with EPA to streamline the certification of EU Stage 5 marine engine configurations for use in the U.S. by treating those engines, in effect, as non-credit-generating engines with Family Emissions Limits (FELs) below the Tier 4 standard. The streamlined EPA certification process would need to apply a PM certification metric (assessed in gravametric terms of g/bhp-hr, and not in terms of PN) consistent with US regulations. The streamlined EPA certification also would need to cover deterioration factor (DF) issues as well. (Note: there is a 1.5 MW power limit for the EU Stage 5 standards.) Importantly, this recommended approach would utilize the certification procedures and requirements under the existing Tier 4 regulation, and so would obviate the need for unique CARB standards and retrofit requirements. CARB's incentive programs could apply to engines with EU and US certifications below the Tier 4 FELs.
- EPA certification requires some form of marine engine durability demonstration. Typically, a DF is used, which requires thousands of durability test hours in an engine laboratory.
- Under various test engine exemptions, some marine engine manufacturers have accrued significant in-use durability hours from engines installed in vessels. Perhaps those sources of durability data (or assigned DFs) could be used in the US EPA streamlined certification of Stage 5 engines under the current Tier 4 certification protocols.
- US EPA and CARB also should consider promoting the availability of remanufacturing kits for marine engines as additional means to lower emissions from in-use vessels. Further, ARB could work with EPA to upgrade the existing US EPA marine engine remanufacturing requirements to include requirements to meet Tier 3 or Tier 4 emission levels. While that may not be a near-term priority for EPA, it is an issue that warrants additional consideration.
- As noted, CARB will need to identify and implement the necessary incentive programs to cover the significant costs of what could amount to a CHC vessel-replacement program, or to subsidize the installation of Tier 4 or EU Stage 5 engine configurations (certified by US EPA to emission levels below Tier 4 standards) in existing vessels where it is practical. Without those necessary incentive programs and funds, this rulemaking will not be viable.

4. EPA's Authorization is Required

- As a final matter, and, as noted in EMA's earlier comments, an EPA preemption waiver will be required for all aspects of CARB's proposed CHC amendments as drafted, since CARB is, in essence, proposing to adopt new "Tier 5" standards and other requirements for new and non-new marine engines in California. See CAA Section 209(e). In that regard, CARB will need to assess whether the contemplated rulemaking schedule will allow sufficient time for EPA's review (which includes a notice and comment process) of the multiple preemption issues, including cost and safety considerations, implicated by the CHC proposal. CARB may need to adjust its rulemaking schedule accordingly, since CARB will be barred from attempting to enforce any of the proposed amendments until after CARB receives a preemption waiver and enforcement authorization from EPA.

5. Conclusion

EMA remains willing to work with CARB on a path forward that builds off and aligns with existing regulations, while allowing for improvements to accommodate lower emissions solutions in California. That said, EMA believes that the current proposal may, in fact, reduce product choices in the California marine market, which may yield counter-productive results for air quality.

Respectfully Submitted,

TRUCK AND ENGINE
MANUFACTURERS ASSOCIATION