The American Waterways Operators

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Charles P. Costanzo
General Counsel & Vice President – Pacific Region

April 30, 2020

Mr. David C. Quiros
Manager, Freight Technology Section
Transportation and Toxics Division
1001 "I" Street
Sacramento, CA 95814

Re: Proposed Concepts for Commercial Harbor Craft in California

Dear Mr. Quiros:

On behalf of The American Waterways Operators (AWO), thank you for the opportunity to respond to the California Air Resources Board (CARB) proposed concepts for further reducing pollution from Commercial Harbor Craft (CHC). AWO is the national trade association for the tugboat, towboat, and barge industry. AWO's more than 300 member companies own and operate towing vessels on the U.S. inland and intracoastal waterways; the Atlantic, Pacific and Gulf coasts; and the Great Lakes. The tugboat, towboat and barge industry provides family-wage jobs and ladders of career opportunity for more than 50,000 Americans, including 38,000 positions as mariners who safely, securely and efficiently move more than 760 million tons of cargo critical to the U.S. economy. The industry supports more than 300,000 jobs nationwide.

CARB's harbor craft regulations are particularly significant given the importance of waterborne commerce to the State of California. California ranks third among the states in waterborne commerce by tonnage and fourth in economic impact, with more than $12.2 billion annually in economic activity driven by the domestic maritime transportation industry. In California, the domestic maritime industry supports over 51,000 jobs and $3.6 billion annually in worker income. Seven AWO member companies are headquartered in California, and many more operate tugboats, tank barges, and deck barges on California waters. The industry enables the movement of tens of millions of tons of freight on California waterways, ensuring the state's essential role in global trade and significantly decreasing congestion on the state's highways and railroads while producing fewer air pollutants.

AWO members have a long history of collaboration with CARB on air quality initiatives and we are deeply committed to ongoing efforts to reduce air emissions and the carbon footprint of our operations. AWO is very concerned that CARB has not provided enough time for the regulated community to collaborate, engage on, and understand the complex and long-term implications and effects of the proposed concepts on the towing industry serving California. CARB has requested industry input throughout this process and has repeatedly highlighted the importance of strong industry-regulator dialogue for rule development. Now, with a global pandemic affecting livelihoods and schedules and in the face of repeated urgent requests from industry to delay the comment deadline on the proposed concepts, CARB has moved inexorably forward with a minimal extension on a critical review period for a major rulemaking proposal. In short, the 30-day extension is inadequate given the present circumstances surrounding industry's limited ability to respond and at odds with CARB's professed interest in regulator-industry dialogue. AWO values regulatory processes that allow for robust industry-agency dialogue, the safe and environmentally responsible operation of towing vessels, consideration of compliance costs and benefits, and protection of U.S. port competitiveness. CARB's process around these proposed concepts has neglected these important precepts.

CARB's Incentive-based Programs Have Proven Effective

The proposed concepts represent a significant change in policy direction from incentive-driven emission control programs to prescriptive and mandatory emission control programs. Harbor craft operators in California have long participated in mutually successful, incentive-based air quality programs through CARB and various Air Quality Management Districts, taken advantage of grant and finance plans to upgrade and improve engines, and achieved meaningful results for California air quality. Earlier iterations of progressively higher voluntary standards have led to successful technology innovations, well-managed industry costs, and substantive air quality improvements. The proposed concepts are a disappointing and dramatic departure from what has been a very successful regulator-industry partnership.

Several AWO member companies have worked extensively with CARB on incentive-based emission reduction strategies and have taken advantage of state funding programs to undertake substantial measures to reduce engine emissions. For example:

1. An operator of tugs and barges in both the Southern California and Bay Area markets took advantage of the Carl Moyer program, EPA DERA grants and Tiger grants partnering with Port Authorities. These funds, in conjunction with even more company capital was used to rebuild or repower over 20 engines upgrading from Tier 0 to Tier 1 or Tier 2. The funds were also used to convert a conventionally powered diesel tug to hybrid propulsion and construct a new hybrid propulsion tug. After spending tens of millions of dollars, the company has already had to replace many of these vessels due the current CHC rules, and will have to replace or modify all the vessels within 8 years,

including the brand new Tier 4 tug just delivered from the shipyard this year, if these concepts are adopted;

2. Another Bay Area towing vessel operator has more than a 20-year history of successful collaboration with the State of California, using Carl Moyer grants to replace over 40 engines. However, the proposed concepts would require this operator to replace or modify many of these engines for which the grant reporting period is still running; and,

3. Another national towing vessel operator collaborated with CARB, SCAQMD, and the BAAQMD to obtain Carl Moyer grants to repower and re-tier several vessels with kits to Tier 2 in 2011/2012 and is now in the process of upgrading many of these same vessels to Tier 3.

These examples demonstrate that the towing industry has been aggressively reducing air emissions both through collaboration with California regulators and on its own. This positive record of collaboration was achieved by developing a clear and shared understanding of our common goals. The proposed concepts, if enacted, threaten the collaboration built over many years and risk creating an adversarial and counterproductive situation driven by engineering feasibility concerns, prohibitive costs, and likely legal challenges. This is particularly disappointing since the concepts themselves and the implementation timeline are not justified by accurate data.

CARB Overstates CHC Air Emissions

AWO believes that CARB has relied on inaccurate information to justify the proposed regulatory concepts. Specifically, AWO sees no justification for upwardly scaling the CHC vessel population from the February 2019 reported figure of 1,928 vessels to align with U.S. Coast Guard data showing 3,698 vessels. This artificial inflation of California's vessel population is due to a flawed interpretation of Coast Guard data leading to an overstatement of air emissions from towing vessels in California.

The entire premise of the proposed concepts is that CHC are "the third-highest contributor to near-source cancer risk [at the Ports of Los Angeles and Long Beach] in 2016 and will contribute an even larger proportion in 2023 once emissions from ocean-going vessels and locomotives are further reduced." The proposed concepts and the attendant compliance schedules are derived from this flawed starting assumption. AWO strongly requests that: 1) CARB revise its vessel population count; 2) Revise the concepts and schedules to accurately reflect the lower cancer risk; and, 3) Revise the emission profile from CHC operation.

While our examination of the data was hampered by time and resource constraints due to our industry's response to the COVID-19 pandemic, CARB's unwillingness to extend the comment period, and a lack of transparency on how CARB used the Coast Guard dataset, we can safely conclude that there is no rationale for CARB's conclusion that our industry is

underreporting in any significant way. We find the following flaws in CARB's use of the dataset and the conclusions drawn from the data:

1. CARB is confusing "Hailing Port" with area of operation;

2. CARB is counting vessels that do not operate in California as "non-reporting" vessels;

3. CARB is counting vessels that are either not properly documented to operate or are no longer in commercial service because of their age or other regulatory requirements; and,

4. CARB failed to use readily available sources of vessel information to validate their assumptions.

All CHC vessels must maintain and provide extensive operational records pursuant to 17 California Code of Regulations (CCR) § 93118.5. But CARB is asserting that nearly half of the harbor craft in California do not comply with reporting requirements – i.e. 1,928 CHC operators report their operations to CARB while Coast Guard data reflects an additional 1,770 vessels with hailing ports from California. CARB's incorrect starting assumption is that "hailing port" is synonymous with operating area and that 1,770 vessels are not only not reporting but are operating with hours that are equivalent to the industry average per vessel. A vessel is not required to set their hailing port as the area they operate and is more often reflective of the owner's offices or corporate domicile.

As an example, one AWO member company reports seeing 60 vessels associated with its operation in the Coast Guard dataset, of which only 18 operate in California or regularly call on California ports. The remaining 42 vessels are either:

1. Operating in Alaska and have not been to California in possibly decades;

2. Operating in the Gulf of Mexico and, while they have the potential to call California, do not currently call California;

3. Operating only in Washington State;

4. Laid up (in Washington State) or sold; or,

5. Double counted in the Coast Guard data (two vessels are listed twice).

Towing vessels reporting to CARB have hailing ports in many states. This lack of rigor suggests that CARB is inflating the number of purported CHC vessels to demonstrate a greater risk to the airshed and to help justify the proposed concepts.

CARB's use of the Coast Guard dataset is also flawed because many vessels included in the dataset are not legally allowed to operate under current regulations. At least 37 of the tank barges in the list were built before 1983 – most likely with single hulls and legally prohibited from carrying oil in U.S. waters. These vessels likely do not operate in California or anywhere else. Other vessels in the dataset lack Certificates of Documentation (COD) and therefore cannot legally operate in U.S. waters. All told, from the data that AWO members had extraordinarily little time to review, at least 69 out of 217 towing vessels included in the Coast Guard's data have either expired CODs or work outside California. CARB concedes that 41 of the towing vessels included in its data have expired CODs but then appears to keep all 41 towing vessels in the dataset.

CARB has acknowledged its reliance on the Coast Guard data, but it is clear that CARB has not addressed any of these anomalies. Not including barges and tank vessels, CARB refers to 244 total towing sector vessels within California (13 ATBs, 73 ship assist/escort tugs, and 158 near-shore/ocean-going vessels). AWO sought to resolve this inconsistency by obtaining towing vessel population data from the Marine Exchange of Southern California and the San Francisco Marine Exchange, data clearinghouses for vessel activity throughout the state. This data included details on all tug escorts, assists, tank barge escort transit logs, and an AIS search for active towing vessels in San Francisco Bay, Los Angeles/Long Beach, San Diego, and Port Hueneme. This data showed that in the most recent two-year period a total of 142 vessels, classified as towing vessels by the Coast Guard, were active in CARB regulated waters. This includes 13 ATB units that call on these ports and more than 10 tug-barge units that called fewer than 10 times in the two years, likely leaving them well below the 300/80-hour low-operation reporting threshold. In addition to reexamining its vessel inventory, CARB should also disclose its exact methodology for determining its vessel inventory and explain its decision to augment that inventory with misinterpreted Coast Guard data.

CARB's Arbitrary and Capricious Application of Rules

CARB's mistaken reliance on inapplicable Coast Guard data to arrive at the 3,698 regulated vessel count is further compounded by its decision to refrain from applying portions of the proposed concepts to commercial fishing vessels and other vessels. Approximately 1570 vessels (40%) included in CARB's data set are listed as commercial fishing vessels, which are excluded from current and future in-use regulations. Therefore, CARB reasons that the remaining community of regulated CHC – 60% of the vessels included in the data set – must bear 100% of the regulatory burden of proposed emissions reductions. This selective application of the rules is unfair. Further, it necessitates a careful review of the policy decision to exempt 40% of the regulated vessel population from CARB's proposed concepts.

CARB's rationale for excluding fishing vessels from the so-called "in-use" concepts is based on "the small profit margins in the industry, demonstrated lack of feasibility for Tier 4 repowers and retrofits, competition with out of State and global markets, and tendency to conduct the majority of their operations far from the coast." These are identical prevailing

conditions for a significant portion of regulated vessels in the towing industry. Indeed, many, if not all, of the conditions that led CARB to exempt commercial fishing vessels and other ocean-going vessels from these proposed concepts are also true of a significant number of towing vessels.

ATBs Are Ocean-Going Vessels

Purpose built ocean-going tugs and their corresponding tank barges, which are rigidly connected as one unit (referred to as "ATBs"), commonly operate in interstate commerce in competition with U.S.- and foreign-flagged self-propelled tank vessels. While ocean-going tankers are entirely excluded from the proposed concepts, ATBs calling on the same petroleum terminals, carrying the same cargo, and conducting the same operations as self-propelled tank vessels would be regulated differently under CARB's proposed concepts. Due to the markets of operation, coupled with the fact that ATBs routinely spend the majority of their time outside of California in interstate and foreign commerce, CARB should consider ATBs as ocean-going vessels and, therefore, exclude ATBs from the proposed harbor craft rule.

CARB's Proposed Concepts May Violate the Federal Clean Air Act

Several of CARB's proposed concepts could, if enacted without express authorization from the U.S. Environmental Protection Agency (EPA), violate the federal Clean Air Act as they are "standards and other requirements relating to the control of emissions."[1] Although the federal Clean Air Act expressly preempts state regulation of emissions from many types of engines, it allows California to seek authorization from the EPA to adopt standards for certain nonroad engines and vehicles including harbor craft. Federal law limits the standards available to California without express authorization from EPA to "in-use standards." CARB characterizes certain elements of its proposed CHC concepts as "in-use" standards – which federal courts have determined apply to "use, operation, or movement" of regulated non-road vehicles. Examples of in-use standards include limitations on idling times, carpool lanes, and other use restrictions that control emissions. Despite this characterization, CARB's proposed concepts include clear emission performance standards that necessitate authorization from EPA.

CARB's proposed Concept 2 – which it characterizes as "More Stringent In-Use Requirements" – describes two clear emission performance standards, followed by an in-use standard as an alternate means of compliance: 1) the modification of a federally-compliant engine with specific filter equipment to meet an elevated California emission performance standard; 2) the use of "pre-approved" Alternate Complying Technology to meet an elevated California emission performance standard[2]; and 3) the imposition of low-use operational requirements. Both Options 1 and 2 outlined in Concept 2 are emission performance standards that specifically require specialized equipment above and beyond existing federal requirements to be installed aboard the vessel. CARB in its Proposed Concepts expressly acknowledges the establishment of an emission performance standard: "For vessels that choose to meet the

[1] Clean Air Act §209(e)(2)
[2] CARB provides no information on the pre-approval process for Alternate Complying Technologies.

performance standard with diesel engine repowers and retrofits, CARB is proposing the use of the cleanest available marine certified engines combined with verified retrofit DPFs." The proposed concept is not an "in-use" rule because it would regulate emissions and engines, not the fuel used. "Supplying a presumed mode of compliance does not alter the nature of the general requirement limiting emissions. Indeed, the Marine Vessels Rules do not impose an in-use fuel requirement because no particular fuel is required to be used at all."[3] Notwithstanding the questionable feasibility of retrofitting marine engines with DPFs, proposed Concept 2 cannot be construed as an "in-use requirement" and would necessitate authorization from EPA.

CARB's proposed Concept 3 – requiring new vessels to be designed with specific engine equipment meeting standards that are separate from those established by the federal EPA – is preempted by Clean Air Act §209(e)(1), which prohibits states from establishing requirements relating to the control of emissions from new non-road engines without authorization from EPA. The 2004 case of *EMA v. South Coast Air Quality Mgmt. District* is instructive. The U.S. Supreme Court took a broad view of what constitutes a "standard" under §209 of the Clean Air Act to include not just standards that manufacturers must meet, but also standards that consumers/purchasers are required to meet: "This interpretation is consistent with the use of 'standard' throughout Title II of the CAA (which governs emissions from moving sources) to denote requirements such as numerical emission levels with which vehicles or engines must comply, e.g., 42 U.S.C. § 7521(a)(3)(B)(ii), *or emission-control technology with which they must be equipped*, e.g., § 7521(a)(6)."[4]

Finally, CARB's proposed Concept 16 – requiring annual opacity testing – is a clear emission performance standard as it establishes a test to determine – however subjectively – a certain amount of a given pollutant. Even if this proposed concept were made less subjective through detailed standards for testing or made more applicable to CHC by updating existing CARB opacity testing rules, establishment of this concept in regulation would nevertheless require EPA authorization. As articulated by the court in *EMA*, "The Marine Vessel Rules plainly fit within the SCAQMD definition of 'standards' as a requirement that a 'vehicle or engine must not emit more than a certain amount of a given pollutant." This is the very essence of what opacity testing would measure. And, citing *Goldstene*, "In the end, Clean Air Act §209(e)(2) preempts the Marine Vessel Rules and requires California to obtain EPA authorization prior to enforcement because the Rules are 'emissions standard' that require that engines 'not emit more than a certain amount of a given pollutant."

Specific Suggestions from AWO

Despite AWO's fundamental concerns with the basis, timing, application, and legality of the proposed concepts, we nonetheless want to share specific concerns with the individual concepts themselves and suggest ways they can be better applied to regulated community of towing vessels.

[3] *PMSA v. Goldstene,* 517 F.3d 1108 (Ninth Cir. 2008).
[4] *EMA v. South Coast Air Quality Mgmt. District,* 124 S. Ct. 1756 (2004) (emphasis added).

Compliance Timelines

CARB's proposed compliance deadlines for engine repowering and engine modifications are too short. Even relatively simple engine modifications must be evaluated based on the vessel's stability, maneuverability, available space, and watertight integrity. As engine manufacturers obtain Tier certification for more engines, vessel manufacturers need more time to properly evaluate the engine options for certain operations and make changes to vessel designs to account for the new engine parameters and specifications.

AWO suggests the following improvements to the timeline:

1. Before enforcing new Tier 4 requirements, the agency should allow sufficient time (e.g. 1 year) for the industry to test the Tier 4 engines for towing applications.

2. Extend the proposed implementation dates to account for industry investments made to comply with existing regulations. Any currently compliant engine should be able to operate without modification for at least 20 years from its initial service date.

3. If an operator can prove that a required upgrade is not feasible and that such an upgrade would present a financial hardship to meet the compliance date, CARB should grant a reasonable extension.

4. Operators of multi-vessel fleets should be allowed to defer compliance in one-year increments indefinitely to avoid two vessel re-power projects in the same calendar year.

5. Vessel operators should be allowed to defer compliance until a vessel's next regulatory dry-docking in order to mitigate against shipyard congestion and cost.

6. New-build designs are often completed years in advance of vessel construction. The proposed concept could compel vessel operators to make costly and disruptive changes to engine plans during the design period. To avoid this situation, AWO recommends that CARB extend the new-build phase-in date to a minimum of five years after the effective date of the rule.

AWO appreciates CARB's consideration to allow compliance deadline extensions based on feasibility. However, because of the way CARB groups engine model years into single compliance years, compliance extensions are not likely to provide significant relief for operators with fleets that operate more than one "sister" vessel with engines from the same model year.

Technological Feasibility

The proposed concepts will not be feasible for certain towing vessels and will require operators to remove those vessels from California service. In some cases, relatively new and fully

compliant vessels would be barred from operation in California simply because the operators failed to anticipate the enactment of California's special Tier 4 requirements. This is particularly true of the proposed concept requiring Tier 4 engines with a Diesel Particulate Filter (DPF). Currently, there is little to no marine application of DPF, considerable size and engine space restrictions exist, and back pressure created by DPF on an engine exhaust system is intolerable for the safe operation of existing and known future engines. Many vessels currently have no manufacturer approved DPF available for engines, so industry cannot determine feasibility of DPF on marine vessels. CARB is proposing to require technology that is untested, unproven, and simply unavailable.

AWO suggests the following measures to address feasibility issues with DPF:

1. Delay the implementation date for any DPF rules by a minimum of five years after a compliant Tier 4 with DPF engine can be approved by the appropriate regulatory authority and is reasonably available; and

2. Vessels unable to install a Tier 4 engine and a DPF due to infeasibility will be considered in compliance if the vessel operates a Tier 3 engine with a DPF or a Tier 4 without a DPF.

CMA Tier 4 Feasibility Report Shortcomings

AWO retained Jensen Maritime Consultants ("Jensen") to provide an independent engineering review of Cal Maritime's "Evaluation of the Feasibility and Costs of Installing Tier 4 Engines and Retrofit Exhaust Aftertreatment on In-Use Commercial Harbor Craft." CARB relied on the Cal Maritime study to determine the feasibility of Tier 4 retrofits and to help justify the implementation and compliance schedule for the proposed concepts. The Cal Maritime study looked at four retrofit scenarios for an individual harbor tug to arrive at its conclusions while the Jensen review drew conclusions from a similar project performed for Crowley Maritime.

Jensen's review finds that the technical challenges of repowering a vessel with EPA Tier 4 engines could be significant and cost prohibitive for some ship assist and escort tugs. This is particularly true in the case where the engine room does not allow for overhead selective catalytic reduction (SCR) placement. Jensen's review identifies technical considerations for vessel repowers that were not included in the Cal Maritime study and suggests that the Cal Maritime study may have underestimated retrofit costs by nearly 37%. The Jensen review is attached hereto as Appendix 1.

It should also be noted that both the vessel in the Cal Maritime study and the vessel in the Jensen project are relatively large towing vessels with ample machinery space. Many other vessels performing similar functions do not afford the same space. Therefore, the Cal Maritime study, on which CARB relied for feasibility, is not representative of the feasibility for most towing vessels. For many comparable vessels in this category, not only is the cost of Tier 4 repower and DPF retrofit severely underestimated in the Cal Maritime study, but

general feasibility is questionable. AWO suggests that the proposed concept will necessitate more vessel replacements than CARB realizes.

Shore Power for At-Berth Vessels

CARB's proposal to require shore power for vessels at berth depends on the development of shoreside infrastructure beyond the control of vessel operators. Terminal and lay-berth facilities should equitably bear the burden of any proposals requiring specific shoreside infrastructure development. Many towing vessel companies use shore power at their home dock berths to limit generator use and to decrease idling time for main engines, but vessel operators without long-term leases and control over infrastructure may find it impossible to comply with this proposal.

The proposal also impacts customer berths, where the terminals may have to provide increased infrastructure. AWO is concerned that facilities may decide not to offer short-term lay-berths if they cannot comply with CARB's proposed infrastructure requirements. Limited berth space could force towing vessels to idle in harbor between jobs or burn more fuel to return to an electrified home dock. In this situation, the regulation would be responsible for increasing, not decreasing, air pollution.

Towing vessel operators struggle to find suitable mooring locations in California ports. While harbor craft moorage is essential to the port economy, most port operators would prefer to devote infrastructure resources to activities that generate higher revenue. The proposed concepts might reduce lay-berth availability if facility operators fail to provide to shore power to enable compliance with CARB's proposed shore power concept.

AWO also recommends the following actions to improve the shore power proposals:

1. The duration of the idle period should be extended from 15 minutes to 30 minutes.

2. CARB should explore incentive-based programs to encourage facilities to provide shore power infrastructure to regulated harbor craft.

Opacity Testing Requirements are Inappropriately Designed

Notwithstanding the above-referenced legal concerns, the opacity testing proposal is too subjective. Certain types of towing vessels have a highly variable duty cycle and their engines must be tuned to provide the power, maneuverability, and braking necessary to safely operate. CARB's proposed concept suggests testing during the transitional phase of a vessel's fuel map (i.e. accelerating or decelerating the engine), and not at steady state (i.e. at constant RPM under a consistent load), where the engines operate most efficiently. Tuning the engine to minimize smoke during the transitional phase could compromise engine integrity when the operator needs to ensure safe operation and maximum responsiveness.

To ensure the engines are tested in the manner that they are certified by the EPA, we offer the following recommendations:

1. Opacity testing of marine equipment should be done at steady state, either prior to or post acceleration/deceleration.

2. Testing should not be annual. Testing should be based on known risk factors such as equipment age and operational history. Opacity testing should occur once in the first years of vessel operation to set a baseline and then at reasonable periods thereafter (e.g. every 5 years).

3. Opacity testing should not be required for vessels qualifying under low-use operating requirements.

4. Consider allowing operators to perform annual engine opacity tests on their own equipment and adopt an oversight method to certify and spot-check results.

5. Towing vessel engines have different operational characteristics than other vessels addressed under similar CARB regulations. Also, different types of towing vessels operate differently from each other. CARB should consider the range of CHC engine types and duty cycles and modify the proposed concepts to meet specific operating conditions.

6. Opacity tests will be more difficult to perform on constant RPM engines such as generators and will provide fewer significant examples of standard operating condition for these engines. Opacity testing, as CARB proposes, may not be appropriate for constant RPM engines.

Compliance Costs are Unreasonable

The proposed concepts would create unreasonably high compliance costs and create waste by forcing operators to replace or retire relatively new, clean, and operable engines and vessels. In the towing vessel community's experience under the previous rule, transitioning a towing vessel from a Tier 0 or Tier 1 to a Tier 2 engine often required significant rebuilds or repowers. Because vessels often outlive the useful life of engines, compliance deadlines under the previous regulation could be effectively aligned with scheduled vessel rebuilds or repowers that would have taken place regardless of regulatory deadlines.

Under the proposed rule, too many towing vessels would not be allowed to outlive the useful life of their engines due to physical space constraints and installation restrictions for required equipment. In those cases, compliance with the proposed rule would require that vessels be retired or replaced when they would have otherwise had significantly greater operational lifespans. For some operators that perform work outside of California, vessel relocation is an option. For many California-only operators, however, the rule presents a significantly higher

financial burden by forcing them to replace vessels and engines long before it would make economic sense.

Under the proposed rule, CARB would render useless many towing vessels into which operators have already made significant air quality investments. Many of these recent investments were made with the understanding that CARB's current and forthcoming commercial harbor craft rules would allow vessels a far greater portion of their useful lives than the proposed rule currently allows. Tug and barge owners have, in good faith, designed and built vessels in compliance with international, federal, state, and local laws and regulations. CARB should not enact unnecessarily aggressive regulations that prevent vessel owners from recouping the cost of their significant investments.

Additionally, AWO is concerned that the proposed concepts frame the emissions by unit per engine or per vessel. The proposals fail to take into consideration emissions by unit per work performed. Given the added size and weight of Tier 4 compliant equipment, all other things being equal, vessels are likely to have reduced operating capacity. This lower capacity would create a need for additional vessels, operating in the same location and time period, in order to perform the same amount of work. Once again, the regulation could actually increase fuel use and air pollution.

The proposed rule would also cause an unprecedented short-term increase in demand for shipyard availability and equipment, much of which is not available in the market. The towing vessel community is concerned that California shipyards could not accommodate the waves of retrofits necessary to comply with the proposed concepts.

AWO disagrees with CARB's intent to assess the financial hardship of complying with a regulation based on a company's financial health. The effect of such a methodology would be to prop up companies that are struggling financially by allowing them to avoid regulation and gain an economic advantage over companies that are financially sound. Regulators should not be in the position of altering the competitive posture of companies, but rather strive to create an equitable regulatory regime. Financial hardship should be measured by the impact on an asset's ability to compete. For many operators, losing a single vessel has significant economic impact, either through lost revenue or through the cost of sourcing a temporary replacement tug. Also CARB should give special consideration when a vessel's design or configuration renders the required modification so expensive as to make the vessel unprofitable. CARB's projected compliance costs do not reflect the entire financial impact of the proposed concepts and AWO recommends that CARB more fully account for these costs.

To address cost concerns for towing vessels, AWO recommends the following:

1. Modification estimates, as verified by a to-be-determined third party or agency, which exceed a given cost/value ratio should be granted a compliance extension.

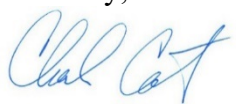
2. A vessel's initial in-service date should be the baseline to determine implementation dates for that engine, instead of engine model year, since engine year does not reflect

how long the engine has been operated or how long the owner has had to recoup the cost of investment.

CARB should also minimize the cost of the proposed rule's administration, including reducing the frequency of reporting and opacity testing. Any administration fees should be capped and based on fleet size and number of engines. AWO recommends $100 per year per engine, up to $400 per vessel, with a cap of $2,000 per company fleet.

AWO members are focused at this extraordinary time of global pandemic on keeping crews safe, protecting the environment, and facilitating essential California trade. We appreciate this opportunity to comment but strongly believe that more time to review this complex and costly proposal is needed. AWO urges CARB to further extend the comment period and stands ready to collaborate and dialogue with the agency. We would be pleased to answer any questions or provide further information.

Sincerely,



Charles. P. Costanzo
General Counsel & Vice President – Pacific Region

Appendix A
Jensen Naval Architects and Marine Engineers: Engineering Review Summary - Cal Maritime Tier 4 Feasibility Study

REVISIONS			
REV	DESCRIPTION	DATE	APPVD

PROJECT

Engineering Review - Cal Maritime Tier 4 Feasibility Study

CLIENT

The American Waterways Operators

TITLE

Engineering Review Summary

JENSEN
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203062-230-0	0

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Introduction

The American Waterways Operators (AWO) retained Jensen Maritime Consultants (Jensen) to provide an independent engineering review of Cal Maritime's "Evaluation of the Feasibility and Costs of Installing Tier 4 Engines and Retrofit Exhaust Aftertreatment on In-Use Commercial Harbor Craft", dated 30 September 2019, which was prepared for the California Air Resources Board (CARB) (Reference 1).

Reference 1 evaluated the feasibility of repowering thirteen different representative vessels with Environmental Protection Agency (EPA) Tier 4 marine engines. This engineering review focused on evaluating the technical feasibility and capital cost information for ship assist tugs only; particularly for the EPA Tier 4 main engine repower option. Specifically, the review focused on five areas impacted by repowering:

- Arrangement
- Mechanical
- Structure
- Electrical
- Weight/Stability
- Capital Cost

Operating costs and vessel replacement costs were not evaluated in this review.

In order to facilitate the review, Jensen's recent experience repowering ship assist and escort tugs with EPA Tier 4 engines was used.

Discussion

Cal Maritime Feasibility Study

Reference 1 evaluated the feasibility of four retrofit scenarios for a ship assist and escort tug. The study determined that retrofitting diesel particulate filters (DPF) and selective catalytic reduction (SCR) equipment to existing main engines was not feasible given the scope and constraints of the study. The study determined that repowering with EPA Tier 4 main engines was feasible with "minimal vessel modification".

In the repower option, the study used a representative ship assist and escort tug with the following attributes:

- LOA: 100'-0"
- Beam: 40'-0"
- Max Draft: 19'-6"
- Quantity of Main Engines: 2
- Total Installed Main Engine Power: 6,850 hp

The study identified the following impacts to accommodate the new engines in the representative vessel:

Arrangement

- The SCRs were located forward of the main engines in the engine room overhead.
- The study notes that there wasn't space available for a 2,000 gallon diesel exhaust fluid (DEF) tank in the engine room. The study does not identify a location for the DEF tank, but suggests there is a possible location in the Z-Drive room.

Structure

- No specific structural modifications were identified.

Mechanical

- The study assumes that new silencers will be needed for the main engines along with an overhaul of the exhaust system.
- Rerouting other mechanical systems in the engine room in way of the SCRs may be required.
- The study briefly mentions compressed air modifications.
- Engine room ventilation duct work rerouting to accommodate SCRs.

Electrical

- No significant impact to the electrical system was identified, but the study notes that minor integration of dosing equipment is required.

Weight/Stability

- The estimated weight additions are as follows:
  - New engines: 2 long tons (LT)
  - Additional equipment and structure: 13 LT
- The study notes that additional weight and stability calculations are required upon finalizing the DEF tank size and location.
- An increased vertical center of gravity (VCG) is possible due to the location of the SCRs and a possible weight reduction in the new main engines.

Capital Cost

- The average total capital cost for the repower is estimated to be $2,812,000.

Crowley Ship Assist and Escort Tug Case Study

In order to evaluate the information provided on the technical feasibility and capital cost for repowering a ship assist tug with EPA Tier 4 engines in Reference 1, it is useful to compare it against a project that is underway with the Crowley Maritime Corporation (Crowley). Crowley is currently underway with a project to repower an existing Tier 0 ship assist and escort tug with EPA Tier 4 engines. At this point the engineering is nearly complete and the project is scheduled for implementation in 2020. This project provides an excellent basis for comparison because the particulars of the tug are nearly identical to the representative tug used in Reference 1. The particulars of the Crowley tug are shown below:

- LOA: 100'-0"
- Beam: 40'-0"
- Depth: 22'-1"
- Quantity of Main Engines: 2
- Total Installed Main Engine Power: 6,800 hp

In reviewing the engineering package for the Crowley repower project, the following areas have been identified as requiring modification:

<u>Arrangement</u>

- The tug is fortunate to have the available space in the overhead of the engine room so the SCRs were located above the main engines as shown in Figure 1.

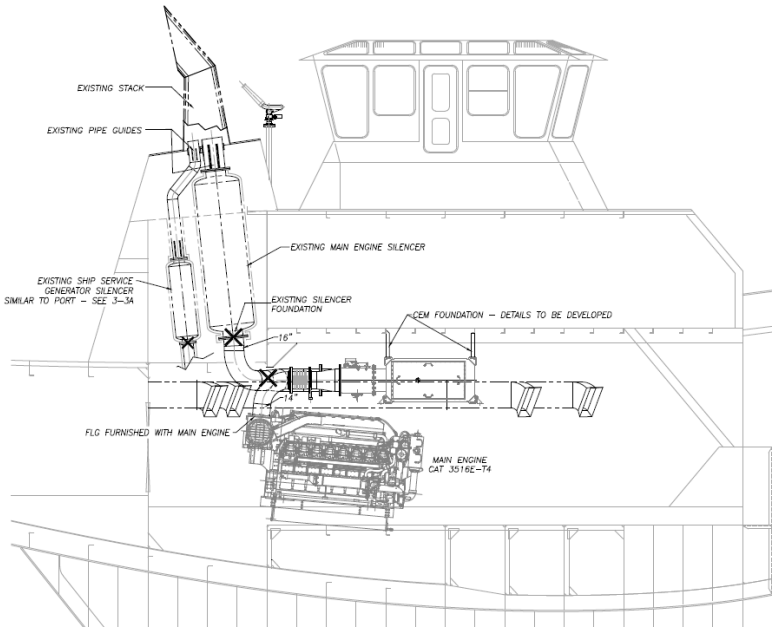

Figure 1: Crowley Tug SCR Arrangement

Structure

- The new Tier 4 engines have the same footprint and mounting configuration as the existing engines so modifications are not required to the engine foundation.
- The following equipment foundations are required:
  - Two (2) new DEF dosing units.
  - Two (2) new main engine exhaust aftertreatment CAT clean emissions modules (CEMs). Note that these are the SCRs.
  - One (1) new harbor generator silencer.
- Subdividing two existing ballast tanks to partially convert to DEF storage.
- Compartment and tank testing for DEF tanks

Mechanical

- Minor fuel oil modifications are required for the new engines and generators.
- New keel coolers for main engines and generators to replace existing raw water cooling system.
- Propulsion shaft bearing replacement and alignment.
- New exhaust piping between the main engines and silencers. The existing silencers will be retained as a cost saving measure. Possibility of installing new, slightly smaller silencers exist, but at additional cost for new equipment.
- Modifications to exhaust system piping for the generators.
- New DEF system including stainless steel transfer piping and DEF tank fill and vent piping. DEF tank insulation and heating.
- New compressed air piping, valves, and fitting for the dosing units.

Electrical

- Two new 129 kW generators to upgrade from Tier 0 engines to Tier 3 engines.
- Additional 2 kW electrical load for the dosing cabinets.
- New alarm and monitoring system for the main engines.
- Miscellaneous electrical requirements for power, control, and monitoring of dosing equipment and tank level indication.

Weight/Stability

- The new engines are the same weight as the existing engines.
- The estimated lightship increase from the repower is 4 LT.
- The vertical VCG is estimated to increase by .07 ft.

Capital Cost

- The total capital cost project budget range is 3.7M to 4.5M.

Conclusion

When comparing the results of Reference 1 with the Crowley project, as well as other EPA Tier 4 ship assist and escort tug designs in the Jensen Maritime portfolio, this engineering review finds that it is technically feasible for the representative tug to be repowered with EPA Tier 4 engines and associated aftertreatment equipment. There are multiple options for commercially available engines in the 3,500 hp range from which operators can evaluate and choose from. It is important to note that the technical challenges of repowering with EPA Tier 4 engines could be significant and cost prohibitive for some ship assist and escort tugs. This is particularly true in the case where the engine room overhead does not allow for SCR placement.

The scope of Reference 1 may not have allowed for detailed analysis of all aspects of a repower project. However, this review identified some technical considerations for repowering the representative tug that were not included in Reference 1, but should be discussed. The additional technical considerations are as follows:

Arrangement

As described above, the engine room of a ship assist and escort tug may not allow for the installation of SCRs in the overheard. In these cases, the SCRs may need to be located in the stacks which requires more extensive structural modifications and typically has an impact on the engine room ventilation fan arrangement. This can also create challenges in accessing the SCR for routine maintenance. Figure 2 shows an example of an SCR located in the stack. Note that this was excerpted from a new design.

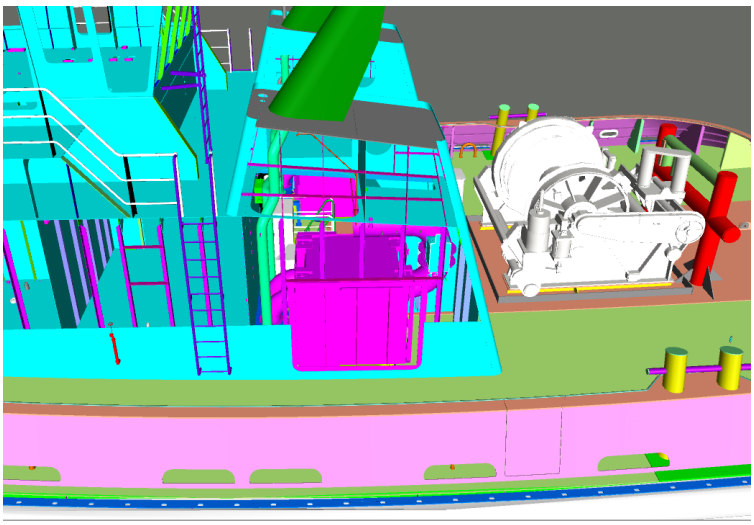

Figure 2: Example of SCR Located in the Stack

DEF Tank and Transfer System

Reference 1 assumes the use of an independent poly/rotomold DEF tank. Jensen has designed several new EPA Tier 4 ship assist tugs, as well an EPA Tier 4 repower project. Each of these projects have used independent stainless steel tanks with the exception of the repower project, which used integral steel tanks with a coating system. The volume of the DEF tank in Reference 1 is indicated as 2,000 gallons, which is smaller than the Jensen projects described above. For

example, new ship assist and escort designs using the 100 ft tug platform have a DEF capacity of approximately 5,800 gallons. Additionally, the Crowley repower project will have a DEF capacity of approximately 6,000 gallons. Since the amount of DEF carried aboard is dependent on the operators bunkering schedule, it is worth noting that some operators will need a DEF capacity greater than 2,000 gallons, which will create additional material and labor costs.

The study doesn't clearly state that DEF should not be kept in the engine room. DEF must be kept in a particular temperature range if reasonable shelf life is to be maintained, this typically precludes DEF storage in engine rooms or similar hot spaces without adequate measures to insulate the DEF tank. Ship owners will need to plan for alternate storage arrangements. The study correctly identifies the Z-Drive room as a viable location for the DEF tank(s). It is important to note that the American Bureau of Shipping's Guide for Exhaust Emission Abatement requires a minimum of six air changes per hour in areas where DEF tanks are located. Z-Drive rooms have ventilation systems sized to limit temperature rise in the space and typically meet the minimum air change requirement. However, if the tanks are located in the Z-Drive room consideration should be given to heating and insulating the DEF tanks if operation in cold climates is intended.

Main Engine Foundation Modifications

Reference 1 notes the repower option requires a different engine make and model. This will likely require some amount of engine foundation modifications; possibly including replacing the rider plates and modifying the foundation height to match the existing shaft line.

Auxiliary Equipment Foundations

Reference 1 doesn't explicitly identify the need for foundations for the engine aftertreatment equipment such as the dosing units and independent DEF tank.

Engine Room Ventilation

Reference 1 doesn't address the amount of engine room ventilation. The SCRs have significant ambient heat rejection which is particularly important when they're installed in the overhead of the engine room. Depending on the make and model of engine, the heat rejection from the SCRs can be 65% of the main engine or greater. This typically requires larger engine room ventilation supply fans; although in the Crowley example, engine room supply fans were not upgraded.

Propulsion Shafting and Z-Drives

Reference 1 does not include modifications to the propulsion shafting, Z-Drives, and propellers which assumes that the EPA Tier 4 replacement engines are approximately the same horsepower and RPM as the existing engines.

Capital Cost

The average total capital cost in Reference 1 is $2,812,000 for equipment and installation costs. The total capital cost budget for the Crowley reference project is $3,700,000 to $4,500,000. The Crowley project includes items that are not included in Reference 1, some of which are necessary for the repower and some of which are included as a matter of convenience. In order to have a more accurate comparison of capital costs, work items in the Crowley estimate not absolutely necessary to the repower were removed from the estimate. The work items, removed for this

comparison, are the new generators and associated exhaust systems and the new keel coolers. Removing these items lowers the Crowley capital cost budget to $3,300,000 to $4,100,000. Table 1 below summarizes the project capital costs.

Table 1: Capital Cost Comparison

	Cal Maritime Study	Crowley Reference Project
Low Estimated Capital Cost	$2,612,000	$3,300,000
High Estimated Capital Cost	$3,012,000	$4,100,000

As a general point of comparison, a previous study developed by Jensen (Reference 2) estimated that the cost to install a DEF system of approximately 4,500 gallons was $375,000 for labor and materials. This estimate assumed an independent stainless steel DEF tank at a west coast shipyard.

It's important to note that it was not the intent of this study is to cover every technical consideration or cost impact associated with repowering a ship assist and escort tug. Further study is required if additional factors are to be considered or more detail is required.

References

1) Cal Maritime "Evaluation of the Feasibility and Costs of Installing Tier 4 Engines and Retrofit Exhaust Aftertreatment on In-Use Commercial Harbor Craft" Prepared for CARB, 30 September 2019.
2) 193062-230-0_0, Tier 4 Engine Installation Study, Jensen Maritime Consultants, 2020.