CONTROL MEASURE FOR OCEAN-GOING VESSELS AT BERTH

Innovative Concept Application

- Applicant -

Clean Air Engineering - Maritime (CAEM)

- Prepared By -

CAEM

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1 Applicant Background

Clean Air Engineering Maritime (CAEM) is a service company that provides Alternative Control Strategies to customers that choose to comply with the California Air Resources Board (CARB) Control Measure for Ocean-Going Vessels At Berth by means other than Shore Power. CAEM began the development of technologies and systems in 2010 and put into commercial service the first CARB approved capture and control system in 2015. That system has been providing capture and control services to container vessels on a commercial basis since 2015 and continues to provide those services to several vessels each week at a rate in excess of 120 hours per week. These services have been provided without a reportable safety incident, no issues with the US Coast Guard, or data quality or reporting complaints from CARB.

CAEM currently operates its barge-based capture and control system in the Ports of LA and Long Beach. Long term CAEM intends to provide capture and control services to all California ports that are impacted by the rule and to provide services to all vessel types stipulated in the rule. Additionally, with the approval of this application CAEM will have the ability to control emissions that are currently unregulated by CARB or any other regulatory authority in either the United States or internationally.

As part of the Control Measure, provisions have been made in Section 19130.17 for the identification and control of unregulated emissions as a means of compliance. This application requests the issuance of an Executive Order that would enable CAEM to control unregulated emissions, on behalf of its customers, as one of several strategies offered for compliance.

CAEM is not obligating itself or any of its current or future customers to control the emissions sources described under this Application. For many of the strategies proposed, the current CARB approved, and commercially operating technology developed and deployed by CAEM must be configured in another manner to comply with both the additional pollutant requirements and vessel types stipulated in the Control Measure amendments. These new systems may require greater exhaust flow capacity, greater capture boom reach, simultaneous emission source connections, and vessel specific safety protocols just to name a few.

1.1 Primary Applicant Contact

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1.2 Operational Description

The purpose of this application is to develop a system by which unregulated pollutant sources can be used to aid in compliance with the Control Measure. The intent of this system is to allow for better utilization of a capture and control fleet, which will produce the intended emissions reduction of the Control Measure while minimizing the cost to achieve those reductions on a dollars per ton of toxic pollutant treated basis. There will be instances for which the capture and control service fleet will not be adequate to service the number of vessels which are at berth simultaneously. There are two solutions to this problem as described below.

1. Build additional capture and control systems.
2. Have emission reduction credits available from unregulated sources that were generated with the capture and control fleet when not being utilized for compliance purposes.

Option 1 creates a larger fleet of poorly utilized systems significantly driving up the total cost of compliance.

Option 2 creates better utilization of a smaller fleet and reduces the cost of compliance. If a credit trading system is approved for use by a capture and control service provider, it will allow the optimization of a fleet across all ports in the state of California.

1.3 Operational Scope

This Innovative Concept application is intended to provide compliance flexibility to all vessel types. This flexibility will focus on the two distinct situations described below.

- Equipment Utilization – The innovative concept is designed to level the workload of a capture and control fleet, such that each system is utilized in excess of 5,000 hours per year. This level of utilization will produce emission reductions at a cost that is minimized due to fewer systems doing more work. The cost savings are realized through better use of both capital and fixed operating costs. The three scenarios below allow a fleet to be optimized in terms of utilization.
    - Scenario 1 - During low berth occupancy by vessels requiring capture and control service, the systems can treat unregulated sources identified in Section 2.
    - Scenario 2 - During typical occupancy the capture and control fleet is fully utilized serving regulated vessels.
    - Scenario 3 - During high berth occupancy by Vessels requiring capture and control services, credits generated during scenario 1 are utilized to service vessels for which an actual capture and control system is not available.

  The pre compliance emissions described in Section 2 will allow for a supply of credits to be built during 2023 and 2024 in LA/Long Beach and 2023 through 2026 in the northern ports that will allow optimization of the fleet size during the first several years of compliance. This supply will

prevent the investment in systems that are not well utilized. Unregulated sources described in Section 2 will allow for leveling of the fleet workload and maximum system utilization over the life of the Control Measure.

- Compliance for Unusual Circumstances – There may be situations that arise which are not covered by a TIE or VIE and cannot be accommodated with a capture and control system. In this case compliance could only be achieved through the remediation fund process, or if this IC application is approved, then compliance could also be achieved using accumulated credits.

The table below describes the locations and annual emissions estimates for which the approval of this IC application will provide as required in Sections 93130.17 (b)(1)(B) and (C) of the Final Rule.

						Emission Reductions		
	Number of Vessel Calls	Duration	Expected Power	Expected Reductions	Vessel Type	NOx	PM 2.5	ROG
	calls/yr	hr/call	kW/call	%		lb/yr	lb/yr	lb/yr
San Diego	15	24	600	90	Bulk Carrier	5,914	73	223
Los Angeles	40	36	800	90	Container Ship At-Anchor	31,543	389	1,189
Long Beach	20	36	800	90	Container Ship At-Anchor	15,772	194	594
Hueneme	10	24	600	90	Bulk Carrier	3,943	49	149
Benicia	10	24	600	90	Bulk Carrier	3,943	49	149
Richmond	10	36	800	90	Container Ship At-Anchor	7,886	97	297
Chevron Long Wharf	10	36	800	90	Container Ship At-Anchor	7,886	97	297
Oakland	20	36	800	90	Container Ship At-Anchor	15,772	194	594

2 Potential Unregulated Sources

The following sources have been identified as unregulated using the guidelines in Section 93130.17 of the At-Berth regulation. The unregulated sources described below are an attempt to identify all possible sources that could be available on January 1, 2023 when Section 93118.3 of Title 17 and Section 2299.3 of Title 13 of the California Code of Regulations are superseded by Sections 93130 through 93130.22.

It is anticipated that as compliance methods evolve over the years after 2023 that other sources and strategies for controlling unregulated emissions may be identified. CAEM would like to establish, as part of this application, a process by which those yet to be identified sources can be amended to the original Executive Order (EO) that is generated in response to this application. The initial proposal would be for CAEM to submit a "Proposal for Amendment" to the executive officer which would include and address the items listed in Section 19130.17(b)(1). Upon receipt CARB would process the request as described in Section 93130.17(b)(2), (3), (4), and (5). If the amendment is approved, the executive officer would amend the original EO to include an addendum authorizing the additional source or method which would include all required instructions.

2.1 Pre-Compliance Emissions (Tankers – Southern California)

Emissions captured and controlled from the auxiliary engines and/or boilers of tankers in the Ports of LA and Long Beach between January 2023 and January 2025. The tankers would be serviced by a CARB approved capture and control system while At-Berth. The vessels serviced would be those calling into Terminals in the Ports of LA and Long Beach which are capable of servicing both tankers and barges. Two different versions of capture and control systems would be used, a standard capacity version that can collect emissions at a maximum auxiliary engine equivalency of 2,800 kW or a high-capacity version that can collect emissions at a maximum auxiliary engine equivalency of 7,000 kW.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission reduction credit Management Company on the form referenced in Section 4.2. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the vessel location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(11).

2.2 Pre-Compliance Emissions (Tankers – All Ports other than Long Beach and Los Angeles)

Emissions captured and controlled from the auxiliary engines and/or boilers of tankers in all California ports other than Long Beach and Los Angeles between January 2023 and January 2027. The tankers

would be serviced by a CARB approved capture and control system while At-Berth. Two different versions of capture and control systems would be used, a standard capacity version that can collect emissions at a maximum auxiliary engine equivalency of 2,800 kW or a high-capacity version that can collect emissions at a maximum auxiliary engine equivalency of 7,000 kW.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission reduction credit Management Company on the form referenced in Section 4.2. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the vessel location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(11).

2.3 Pre-Compliance Emissions (RoRo – All California Ports)

Emissions captured and controlled from the auxiliary engines of RoRo vessels in all California ports between January 2023 and January 2025. The RoRo vessels would be serviced by a CARB approved capture and control system while At-Berth. The potential RoRo vessels serviced would be those calling into any berth located within any California port. The capture and control system used would be capable of collecting emissions at a maximum auxiliary engine equivalency of 2,800 kW.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission reduction credit Management Company on the form referenced in Section 4.2. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(11).

2.4 Unregulated Emissions (Bulk Liquid Barges – All California Ports)

Emissions captured and controlled from the auxiliary engines on liquid bulk barges that are used to offload cargo and provide power for other miscellaneous equipment on the barge. The barges would be serviced by a CARB approved capture and control system in all California ports while At-Berth. The barges serviced would be those calling into any terminal capable of servicing the vessel type. The capture and control system used would be capable of collecting emissions at a maximum auxiliary engine equivalency of 2,800 kW.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission reduction credit Management

Company on the form referenced in Section 4.2. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the barge location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(11).

2.5 Bulk and General Cargo Vessels

Emissions captured and controlled from the auxiliary engines on bulk and general cargo vessels which are exempted from the At-Berth regulation as stipulated in Section 93130.8(b). Vessels would not be included for which other rules or requirements stipulate control of the emissions as outlined in Section 93130.17(a)(3). These vessels would be serviced by a CARB approved barge-based or dock-based capture and control system while At-Berth. The vessels serviced would be those calling into any berth located in Southern California. The capture and control system used would be capable of collecting emissions at a maximum auxiliary engine equivalency of 2,800 kW.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission reduction credit Management Company on the form referenced in Section 4.2. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the barge location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(10).

2.6 Container Ships At-Anchor (capture and control)

Emissions captured and controlled from the auxiliary engines on container vessels which are at anchor in the Southern California port area. Vessels at anchor are not covered by the rule as only vessels at berth are identified in Section 93130.1. Vessels would not be included for which other rules or requirements stipulate control of the emissions as outlined in Section 93130.17(a)(3). These vessels would be serviced by a CARB approved barge-based system while at anchor. The capture and control system used would be capable of collecting emissions at a maximum auxiliary engine equivalency of 2,800 kW.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission Reduction Credit Management Company on the form referenced in Section 4.2. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the barge location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(10).

2.7 Minimizing Emissions Control Connect and Disconnect Times

Emissions associated with a capture and control system connecting and disconnecting at times reduced from those stipulated Section 93130.7(e)(3)(A) and (B). The "Reduced Connection Time" will be determined by subtracting the time between Ready to Work and Successful Connection from the two-hour stipulated limit. The definition of Successful Connection is defined by the items listed below.

1. Capture hood(s) are physically in place on the stack(s) and the system is indicating capture efficiency equal to or in excess of the requirements of the Executive Order that covers the capture and control system being used.
2. Outlet emission levels for PM, NOx, and ROG are at or below the requirements of the Executive Order that covers the capture and control system being used.
3. The on-board Manager of the capture and control system being used declares the system is Ready for Operations according the operations manual of the system.

The total mass emissions associated with the Reduced Connection Time will be determined by subtracting the total measured inlet mass emissions from the total measured outlet mass emissions over the period of the Reduced Connection Time.

The "Reduced Disconnect Time" will be determined by subtracting the time between Pilot on Board and Successful Disconnect from the one-hour stipulated limit. The definition of Successful Disconnect is defined by the items listed below.

1. Capture hood(s) have been physically removed from the stack(s) and the capture booms are stowed for transport.
2. The treatment system has been purged and shutdown.
3. The on-board Manager of the capture and control system being used declares the system is Ready for Transport according the operations manual of the system.

The total mass emissions associated with the Reduced Disconnect Time will be determined by subtracting the total measured inlet mass emissions from the total measured outlet mass emissions over the period of the Reduced Disconnect Time.

These calculations will be performed as part of the standard vessel call report generated for regulated pollutants as discussed in Section 4.1 of this application.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission Reduction Credit Management Company on the form referenced in Section 4.1. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the barge location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(10).

2.8 Capture and Control Performance Exceeds the Requirements of the Control Measure

Emissions associated with the capture and control system exceeding the performance requirements stipulated in Sections 93130.17(5)(d)(1) and (2). The actual measured mass emissions would be calculated based on the total measured emissions at the outlet of the capture and control system over the duration of the vessel call. Emissions will be measured continuously for PM, NOx, and ROG along with volumetric flow rate and temperature, and then the mass emissions will be calculated in total kg for the vessel call. The vessel call would begin two hours after ready to work [Section 93130.2(b)(63)] and would complete at one hour before pilot on board [Section 93130.2(b)(58)] as defined in Section 93130.7(e)(3)(A) and (B).

The unregulated emissions will be the difference between the maximum allowable emission and the actual measured mass emissions. The maximum allowable mass emissions for the vessel call will be calculated for the auxiliary engine(s) and boiler(s) individually based on fuel consumption records from the vessel according to the method outlined in Section 93130.17(d)(1)(B). The maximum allowable emissions for both auxiliary engines and boilers will be subtracted from the actual measured mass emissions to determine the unregulated emissions for PM, NOx, and ROG and will be reported in total pounds for each pollutant.

These calculations will be performed as part of the standard vessel call report generated for regulated pollutants as discussed in Section 4.1 of this application.

The operations of the capture and control system would follow the guidelines stipulated in the Executive Order for that specific system and would be reported to the Emission Reduction Credit Management Company on the form referenced in Section 4.1. Emissions captured would be used as emission reduction credits for compliance with the At-Berth regulation for any vessel type including container, RoRo, tanker, or Cruise that are At-Berth within three nautical miles of the barge location from which the emission reduction credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 93130.17(a)(10).

3 Emission Measurements and Estimates

The emission reductions achieved for all unregulated sources listed in Section 2 of this application will be monitored on a continuous basis. These continuous measurements will be on the inlet and outlet of the capture and control system being used and will include individual measurements for PM, NOx, and ROG. The operations of these measurement systems will be operated according to the requirements of the Executive Order issued for the capture and control system being used.

3.1 Captured and Controlled Unregulated Emission Measurements

Any emissions associated with a capture and control system will be directly measured and the results of those measurements will be included in the Captured and Controlled Unregulated Emissions report discussed in Section 4.2 of this application.

3.2 Vessels Utilizing Emission Reduction Credits – Emission Estimates

All emission estimates utilized for the purpose of applying collected unregulated emissions will be performed utilizing the Vessels Utilizing Emission Reduction Credits Report discussed in Section 4.3 of this application and shown in Appendix b.

4 Vessel Call Reports

The reports described below will be used to manage the collection of unregulated emissions and the distribution of those emissions to regulated vessels. One of these reports would be generated for each vessel call, or in some cases portion of a vessel call, that require compliance as defined in Section 93130.3(a).

4.1 Captured and Controlled Regulated Emissions – Vessel Call Report

A report will be developed for each vessel call, or portion of a vessel call, which will require the use of a CARB approved capture and control system for compliance. This report will incorporate data from the vessel, the terminal, a capture and control system, and will utilize factors that are defined in Section 93130.17(d)(1)(B) of the rule. The data to be collected, source of the data, calculations, and outputs of those calculations are shown in Appendix A of this application.

4.2 Captured and Controlled Unregulated Emissions – Vessel Call Report

A report will be developed for each vessel call, or portion of a vessel call, which will utilize a CARB approved capture and control system collect emissions from unregulated sources. This report will incorporate data from the vessel, the terminal, and a capture and control system. The final output of this report will be in pounds of each pollutant treated. This report will look very similar to the report shown in Appendix A.

4.3 Vessels Utilizing Emission Reduction Credits – Vessel Call Report

A report will be developed for each vessel call, or portion of a vessel call, which will require the application of emission reduction credits for compliance. This report will incorporate data from the vessel, the terminal, and will utilize NOx emission factors associated with the specific engine Tier of the

vessel. Emission factors for PM and ROG will be those specified in Section 93130.17(d)(1)(B) of the Control Measure. If the engine Tier cannot be determined through credible documentation (such as a Q88), then the default emission factor defined in Section 93130.17(d)(1)(B) of the Control Measure will be used. It is expected that the final report data and format will be provided as part of the Executive Order.

The data to be collected, source of the data, calculations, and outputs of those calculations are shown in Appendix B of this application.

5 Executive Order Timing

The purpose of this Innovative Concept is to develop emission reduction credits through controlling emissions from ocean going vessels that are not regulated under The Control Measure for Ocean-Going Vessels at Berth set forth in Sections 93130 through 93130.22, title 17, California Code of Regulations. These emission reduction credits will be used to provide compliance during instances when the number of vessels requiring capture and control services exceeds the number of available capture and control systems.

It is assumed that changes in current regulations and the development of new regulations will change the types and quantities of unregulated sources. The renewal application will reflect those changes.

5.1 Initial Duration

The initial duration requested is for the maximum of 5 years as stipulated in Section 93130.17(a)(7).

5.2 Renewals

It is anticipated that renewals will be requested as specified in Section 93130.17(a)(7). The renewal duration will be for the maximum allowed, 5 years, and the new application will update Section 2 of this application based on the development of new regulations or the identification of yet to be identified unregulated sources.

6 Agreements, Government Approvals, and Environmental Review

This section addresses the items listed in Section 93130.17(b)(1)(E), (G), and (H).

6.1 Memorandum of Understanding

Memoranda of Understanding (MOUs) do not currently exist due to the early stage of development of the technology and programmatic components that are required for the implementation of the innovative concept plan. As technology is developed and proven the MOUs will be executed as needed with the appropriate counterparty. Counterparties may include both terminal operators and vessel owners and a

copy of each MOU will be provided to CARB as a requirement of the Executive Order issued in approval of this application.

6.2 Government Approvals

The requirement in this section is acknowledged and understood and no government approvals are required other than the one issued by CARB in response to this application.

6.3 Environmental Review

The requirement in this section is acknowledged and understood and no environmental reviews are required as part of this application.

7 Demonstrated Eligibility

As part of the application process the 17 criteria listed in Section 93130.17(a) have been evaluated and compliance verified. Each of the items in that section are listed below with comments as appropriate.

7.1 Section 93130.17(a)(1)

This Innovative Concept application is intended to provide compliance flexibility to all vessel types. This flexibility will focus on the two distinct situations described below.

- Equipment Utilization – The innovative concept is designed to level the work load of a capture and control fleet, such that each system is utilized in excess of 5,000 hrs per year. This level of utilization will produce emission reductions at a cost that is minimized due to fewer systems doing more work. The cost savings are realized through better use of both capital and fixed operating costs. The three scenarios below allow a fleet to be optimized in terms of utilization.
    - Scenario 1 - During low berth occupancy by vessels requiring capture and control service, the systems can treat unregulated sources identified in Section 2.
    - Scenario 2 - During typical occupancy the capture and control fleet is fully utilized serving regulated vessels.
    - Scenario 3 - During high berth occupancy by Vessels requiring capture and control services, credits generated during scenario 1 are utilized to service vessels for which an actual capture and control system is not available.

  The pre compliance emissions described in Section 2 will allow for a supply of credits to be built during 2023 and 2024 in LA/Long Beach and 2023 through 2026 in the northern ports that will allow optimization of the fleet size during the first several years of compliance. This supply will prevent the over investment in systems that are not well utilized. Unregulated sources described

in Section 2 will allow for leveling of the fleet workload and maximum system utilization over the life of the Control Measure.

- Compliance for Unusual Circumstances – There may be situations that arise which are not covered by a TIE or VIE and cannot be accommodated with a capture and control system. In this case compliance could only be achieved through the remediation fund process, or if this IC application is approved, then compliance could also be achieved through the use of accumulated credits.

This application was submitted on Tuesday November 30, 2021.

7.2 Section 93130.17(a)(2)

The emission reductions achieved through this Innovative Concept will be realized using a CARB approved capture and control system. The proposed methods of controlling unregulated emissions comply with the GHG requirements of the Control Measure. Equivalent or greater emission reductions will be realized than those achieved by the control measure as described below.

1. The approval of this IC application which will allow for simultaneous vessel calls although capture and control hardware might not be available. This will result in a reduction of time at which vessels are at anchor and will eliminate the associated emissions.
2. The approval of this IC application will allow better utilization of a smaller fleet of capture and control systems which will decrease activities associated with both provisioning and maintenance which will eliminate auto and truck emissions associated with those activities.
3. The approval of this IC application will promote the use of capture and control technologies on vessels while at anchor and that experienced gained will allow CARB to regulate At-Anchor emissions sooner than if that experience was not absent.
4. The approval of this IC application should result in a reduction of the use of vessel incident events (VIE), terminal incident events (TIE), and the remediation fund. Utilization of these mechanisms allows direct emissions, a reduction in the utilization of these mechanisms will result in actual emission reductions.

7.3 Section 93130.17(a)(3)

All proposed emission reductions proposed in this Innovative Concept application are either pre compliance or in excess of any regulation as stipulated in this section.

7.4 Section 93130.17(a)(4)

All emission reductions proposed in this Innovative Concept application comply with this requirement and are noted in the descriptions contained in Section 2 of this application.

7.5 Section 93130.17(a)(5)

All emission reductions proposed in this Innovative Concept application comply with this requirement. The intent of this IC application is to allow for a greater number of simultaneous vessel calls to be realized with a smaller fleet of capture and control systems. This outcome will not create an increase in emissions at other ports as discussed below.

1. The outcome will not cause a greater number of vessel calls at other ports in California, since the outcome would apply equally to all ports.
2. The outcome would not cause vessels to remain longer At-Berth at other ports in California which would result in an increase of overall emissions.
3. The outcome would not cause vessels to remain longer At-Anchor at other ports in California which would result in an increase of overall emissions.
4. The outcome would not cause an increase in auto or truck traffic in other ports in California which would result in an increase of overall emissions.
5. The outcome would not cause an increase in tug boat activity in other ports in California which would result in an increase of overall emissions.
6. The outcome would not cause a decrease in industrial process efficiency in other ports in California which would result in an increase of overall emissions.
7. The outcome would not cause an increase in rail traffic in other ports in California which would result in an increase of overall emissions.
8. The outcome would not cause an increase in pilot boat activity in other ports in California which would result in an increase of overall emissions.
9. The outcome would not cause an increase in Coast Guard vessel activity in other ports in California which would result in an increase of overall emissions.
10. The outcome would not cause an increase in support vessel (fueling, provisioning, maintenance, inspections) activity in other ports in California which would result in an increase of overall emissions.

7.6 Section 93130.17(a)(6)

All emission reductions proposed in this Innovative Concept application comply with this requirement as they are real, quantifiable, verifiable, and enforceable. Calculations and data reporting that support this requirement are described in Sections 3, 4, and 9 of this application.

The approval of this IC application will allow the capture and control technologies to be used on unregulated sources (container ships at anchor and bulk carriers) and will encourage the optimization of operations to achieve greater levels of emission reductions and streamline procedures for vessel connection and disconnect. This optimization process will eventually create a business-as-usual environment in which CARB can elect to tighten requirements or regulate more source.

- Real – This IC application requires the actual physical collection and treatment (capture and control) of vessel emissions within the ports of California utilizing CARB certified barge-based capture and control technologies.
- Quantifiable – The CARB approved barge-based capture and control systems will be supplied by CAEM and will utilize continuous emission monitors that quantify captured emissions (inlet measurements) and treated emissions (outlet measurements) for all regulated pollutants (PM, NOx, ROG, and ammonia slip). All emissions will be quantified in terms of absolute pounds of individual pollutant captured and controlled.
- Verifiable – Emissions will be verified by the regular submission of appropriate documents to CAFRB for review and approval. These records will be the same as those required by the executive Orders issued for operations of the specific capture and control system being utilized for the event.
- Enforceable – enforcement will occur through the guideline of the EO and the EO issued for the capture and control systems.

7.7 Section 93130.17(a)(7)

All emission reductions proposed in this Innovative Concept application comply with this requirement and a compliance period of 5 years has been requested in this application with the intent to renew the application as described in this section.

7.8 Section 93130.17(a)(8)

The requirement in this section is acknowledged and understood.

7.9 Section 93130.17(a)(9)

CAEM consents and agrees to this requirement. This IC Application, if granted, will not be used to generate additional credits for Vessel Incident Events (VIEs), Terminal Incident Events (TIEs), or the remediation fund. The emission collected under this IC application will be used in place of a vessel incident events (VIE), terminal incident events (TIE), or the remediation fund. This requirement will be a condition of any service agreement between CAEM and the end user of its systems which are approved under this IC application.

These mechanisms, which allow emissions to be released, will be used less if emission credits can be purchased by the terminal or vessel. The use rate of these mechanisms being reduced will result in a port wide reduction of emissions as discussed in Section 7.2 of this application.

The EO issued for this IC application should stipulate that the emissions credits generated can be used in place of a vessel incident events (VIE), terminal incident events (TIE), or the remediation fund, but these mechanisms can't be used in place of emissions collected under the emissions credit program. In other

words, one of these mechanisms can't be utilized to create a "virtual" emission credit. Only actual emissions captured and controlled can generate credits as discussed in Section 7.6 of this application.

7.10 Section 93130.17(a)(10)

CAEM consents and agrees to this requirement. The emission credits generated as part of this IC application will be generated on an hourly basis and quantified based on the specific pollutant (PM, NOx, or ROG) treated in terms of total pounds per hour. When entered into the Emission Reduction Credit Database (ERCD) as described in Section 9 of this application, the credits will be assigned an expiration date, which will be expressly delineated in the service agreement between CAEM and the end-user, as described below.

1. Pursuant to Section 93130.17(a)(10), if the credits are achieved after the compliance date, 365 days from the date achieved. then the expiration date will be in the year in which the credits are achieved or the following year.
2. Pursuant to Section 93130.17(a)(11), If the credits are in advance of the compliance date then the expiration date will be calculated and assigned by adding 60 months to the date on which the credit was achieved. However, early reductions are only applicable for the initial compliance period, and will expire when the initial compliance period ends

7.11 Section 93130.17(a)(11)

CAEM consents and agrees to this requirement as confirmed in Section 7.10 above. Additionally, conversations with our potential customers have indicated that they would put systems into service before the compliance date in order to build an emissions bank that would be used to offset emissions during simultaneous vessel calls. CAEM consents and agrees that early reductions achieved through an innovative concept that occurs before a vessel or terminal's first compliance period can be used towards compliance for up to five (5) years. However, early reductions are only achievable for the initial compliance period and will not be capable of accrual upon the effective date of the compliance period. These conditions will be incorporated into any service agreement between CAEM and an end-user. The ports at which pre compliance emissions would be treated, with the approval of this IC application, are listed below.

1. Port of San Diego
2. Port of LA
3. Port of Long Beach
4. Port of Richmond
5. Chevron Long Wharf
6. Port of Benicia

7.12 Section 93130.17(a)(12)

CAEM agrees and confirms that the innovative concept is not funded with a public incentive program.

7.13 Section 93130.17(a)(13)

CAEM consents and agrees to comply with the requirement of Section 93130.17(a)(13). Calculations, data reporting, and procedures that support this requirement are described in Sections 3, 4, 9, and 10 of this application.

The unregulated sources of emissions that CARB approves under this IC application will be documented as part of a routine capture and control service call, and any allowed emission credits will be entered into the Emission Reduction Credit Database (ERCD). If a customer, under contract with CAEM, requests use of emission credits then a Emission Credit vessel call report will be initiated as described in Section 4.3 of this application. An example of this report is shown in Appendix B of this application.

7.14 Section 93130.17(a)(14)

CAEM agrees and consents to compliance with the requirements of this section. CAEM will ensure compliance with this section by delineating in the service agreement between CAEM and the respective vessel operators or terminal operators their respective agreement to compliance with Section 93130.17(a)(14), including the emission limits in Sections 93130.7 and 93130.9 of this Control Measure prior to such approval.

7.15 Section 93130.17(a)(15)

The requirement in this section is acknowledged and understood. The basic timeline for the implementation of the IC requested in this application is listed below.

1.	Approval of the application by CARB	March 2023
2.	Development of the final emission credit vessel call report	June 2023
3.	Development of the final capture and control report with emission credit features	June 2023
4.	Selection and contracting of the emission credit management company	June 2023
5.	Development of the Emission Reduction Credit Database (ERCD)	Sept 2023
6.	Final approval of Items 2 through 5 by CARB as a stipulation of the IC EO	Oct 2023
7.	Commencement of pre compliance operations with the approved systems	Nov 2023

7.16 Section 93130.17(a)(16)

The requirement in this section is acknowledged and understood.

8 Emission Reduction Credits Trading

The purpose of this application is to develop a system by which unregulated pollutant sources can be used to aid in compliance with the Control Measure. The intent of this system is to allow for better utilization of a capture and control fleet, which will produce the intended emissions reduction of the Control

Measure while minimizing the cost to achieve those reductions on a dollars per ton of toxic pollutant treated basis. There will be instances for which the capture and control service fleet will not be adequate to service the number of vessels which are at berth simultaneously. There are two solutions to this problem as described below.

1. Build additional capture and control systems.
2. Have emission reduction credits available from unregulated sources that were generated with the capture and control fleet when not being utilized for compliance purposes.

Option 1 creates a larger fleet of poorly utilized systems significantly driving up the total cost of compliance.

Option 2 creates better utilization of a smaller fleet and reduces the cost of compliance. If a credit trading system is approved for use by a capture and control service provider, it will allow the optimization of a fleet across all ports in the state of California.

It is proposed that all emission trading be accomplished in the units of actual pounds of either PM, NOx, or ROG.

8.1 Trading within the Applicants Fleet

The simplest transaction will be within the applicant's fleet and is the intended normal transaction. The fleet would be comprised of systems that are sold as capital equipment or provided under contract to a terminal or vessel owner. This transaction generates emission reduction credits for compliance when the number of vessels at berth exceeds both the number of systems in the capture and control fleet and the availability of Terminal Incident Events (TIEs) or Vessel Incident Events (VIEs). These emission reduction credits can also be used due to a vessel design feature that is incompatible with the capture and control system such as a stack configuration that cannot be accommodated by the capture hood. Other events could include unplanned break down of the capture and control system or weather conditions that prevent the use of the capture and control system.

8.2 Trading to Other Fleets

The primary circumstance under which this scenario would occur when emission reduction credits are shared amongst two organizations (the applicant and a vessel owner for example). This would occur in the case of generating emission reduction credits using a capture and control system on a container vessel as described in Section 2.6 of this application. In this case, the owner of the capture and control system would need to incentivize the owner of the container vessel to allow the collection of unregulated emissions from the vessel. One incentive would be to provide some percentage of the captured and controlled emissions to the container vessel owner. This would occur through a trade of emission reduction credits to the owner of the container vessel.

8.3 Selling and Buying Emission Reduction Credits

Due to typical fluctuations in vessel traffic and the unpredictable forces that control the level and type of traffic to a port, the applicant may have created an excess of emission reduction credits that go beyond the needs of their customers. In this case the applicant may choose to sell those emission reduction credits to another terminal or vessel owner to offset a lack of available capture and control services.

Emission tracking is the process by which regulated and unregulated emissions are balanced to provide compliance. The emission tracking process can be compared to the process of managing a bank account, in that generating emission reduction credits (adding to the account) and utilizing emission reduction credits (depleting the account) are independent from the activities that generate or require the emission reduction credits. The emission reduction credits will be generated and documented as described in previous sections of the application, and all final values will be reported on one of the three reports described in Section 4. These reports will either quantify available emissions to be deposited in the account or quantify emission reduction credits that need to be withdrawn from the account. The entire emission tracking process will be managed in absolute pounds of PM, NOx, and ROG.

9 Emission Reduction Credits Trading

Separate accounting for each pollutant will be set up. The specific pollutant emission reduction credits will then be deposited to those accounts from information provided in the vessel call reports defined in Section 4, “Captured and Controlled Regulated Emissions” and “Captured and Controlled Unregulated Emissions”. Withdrawal from a particular pollutant account would be based on the calculated values in the vessel call report, “Vessels Utilizing Emission reduction credits”.

9.1 Data Management Methods

Each of the vessel call reports described in Section 4 will be identified with a unique serial number and each of those reports will be generated by the applicant under various contracts with both terminal operators and vessel owners. An Emission Reduction Credit Database (ERCD) will be developed to manage the data from each vessel call report and will also contain trading accounts for PM, NOx, and ROG. The data which populates the emission reduction credit accounts will be transferred from the vessel call reports which are governed by the Executive Orders for the capture and control systems or, in the case of the “Vessels Utilizing Emission Reduction Credits” report, the Executive Order issued in approval of this application will validate the content. The ERDC will be developed and presented to the Executive Officer for approval prior to it being utilized. The review and approval process would be stipulated in the Executive Order.

9.2 Data Entry

Data entry to the ERDC will be accomplished by reading the vessel call reports electronically and the accuracy of that electronic transfer will be validated as described in Section 11 of this application. The

data entry process will only be initiated by individuals that have been trained in the process and will follow the guidelines established in a written procedure that describes the process. That procedure will be developed by the same entity that will develop the Emission Reduction Credit Database software.

9.3 Data Access

The ERDC will be password protected and its contents will be audited as described in Section 11 of this application. The individuals with access will be controlled by the Emission Reduction Credit System administrator as described below in Section 10 and the passwords will be changed and managed by methods considered to be best practices within the data management profession. CAEM will not have access to the ERDC with the intention to create a system that cannot be influenced by the capture and control service provider. CAEM will generate and transmit the reports described in Section 4 to the Emission Reduction Credit System administrator and will collect fees from the terminal or vessel owner to compensate the administrator.

9.4 Data Storage and Backup

Data storage and backup will be accomplished by methods considered to be best practices within the data storage and backup industry.

9.5 Data Reporting to CARB

Data reporting to CARB will occur on an annual basis consistent with the requirements of the Control Measure, Section 93130.17(d), unless a different reporting frequency is specified in the Executive Order issued as approval of this application. The entirety of the Emission Reduction Credit Database and summaries of the data contained in the database will be provided electronically.

10 Emission Reduction Credit - Administration

The Emission Reduction Credit System will be administered by designated individual(s) associated with another business entity (independent third party) that is contracted by CAEM for the task of managing and operating the Emission Reduction Credit System. This entity will also be responsible for developing the EDRC described in Section 9 of this application. CAEM has had preliminary discussions with consulting companies that have experience with environmental permitting and compliance reporting, as well as familiarity with the Control Measure. These companies have agreed in principle to develop the EDRC and to operate and administer the Emission Reduction Credit System. Upon approval of this application CAEM will select and put under contract one of these companies and will notify CARB once that resource has been put in place.

10.1 Designated Individual Roles and Responsibilities

The designated individuals will be responsible for the timely entry of data to the ERDC, auditing the accuracy of data entry, reporting to CARB, and overall distribution of the emission reduction credits either internally to the applicant or to external parties that want the emission reduction credits for compliance with the Control Measure. The administrator of the system should have qualifications that are consistent with the Best Practices for database development, data entry, data storage and backup, and data reporting in the data management profession.

11 Program Auditing and Quality Control

As in other emission reduction programs across industries it is expected that the CARB-issued Executive Order would contain the requirements for program auditing and quality control for the various unregulated emission capture scenarios. Since early capture and control of vessel emissions prior to the Rule compliance date is being recommended, an independent review of the program prior to the January 1, 2023 regulatory implementation date would provide assurances that all the proper processes are in place for a longer-term emission reduction credit program. This review would at a minimum cover the actual emissions reduction services and reporting, data flow to the third-party Emission Trading Management Company, data entry and data backup, calculation verification for the “unverified” emissions and reporting back to CARB.

APPENDIX A

Captured and Controlled Regulated Emissions – Vessel Call Report

Data Report - Vessel Call Utilizing Emission Credits

Report Serial Number 00001

	Units		Source Primary	Secondary	Comments
Port Data					
Port		POLB	Terminal Scheduling	Agent ?	
Terminal		Long Beach	Terminal Scheduling	Agent ?	
Berth		86A	Terminal Scheduling	Agent ?	
Terminal Contact Data					
Phone Number - Duty Operator			Terminal Guide	Vessel	
Terminal Person in Charge (TPIC)			?	Vessel	
TPIC - Telephone			?	Vessel	
TPIC - Email			?	Vessel	
Vessel Contact Data					
Phone Number		+870773408701	Q-88	Terminal	
Email		eagle.kinarut@eaglestar.com.my	Q-88	Terminal	
Vessel Data					
Registered Owner		AET Inc Limited	Q-88	Vessel	
Vessel Name		Eagle Kinarut	Q-88	Vessel	
Vessel IMO Number		9422201	Q-88	Vessel	
Vessel Type		Oil Tanker	Q-88	Vessel	
IMO NOx Tier					
Vessel Commercial Operator Contact Information					
Name		AET Inc Limited	Q-88	Vessel	
Address 1		1900 West Loop South	Q-88	Vessel	
Address 2		Suite 920	Q-88	Vessel	
City		Houston	Q-88	Vessel	
State/Province		TX	Q-88	Vessel	
Postal Code		77027	Q-88	Vessel	
Country		US	Q-88	Vessel	
Telephone		1-832-615-2000	Q-88	Vessel	
Email		aet-ops@aet-tankers.com	Q-88	Vessel	
Date and Time Data - Vessel					
Finished with Engines (FWE)	Date & Time	8/28/21 14:00	Terminal	Vessel	
Ready to Work (RTW)	Date & Time	8/28/21 16:27	Terminal	Vessel	
Begin Cargo Transfer (BCT)	Date & Time	8/28/21 20:00	Terminal	Vessel	
Cargo Transfer Complete (CTC)	Date & Time	8/30/21 13:30	Terminal	Vessel	
Pilot On Board (POB)	Date & Time	8/30/21 15:10	Terminal	Vessel	
Departure	Date & Time	8/30/21 16:00	Terminal	Vessel	
Total Time, At-Berth	hrs	50.0	Calculation		
Total Time, RTW to POB	hrs	46.7	Calculation		
Total Time, FWE to BCT	hrs	6.0	Calculation		
Total Time, BCT to CTC	hrs	41.5	Calculation		
Connection Allowance after RTW	hrs	2.0	Calculation		
Disconnection Allowance prior to POB	hrs	1.0	Calculation		
Total CAECS Required Hours - Aux	hrs	43.7	Calculation		
Total CAECS Required Hours - Boiler	hrs	41.5	Calculation		

Data Report - Vessel Call Utilizing Emission Credits

Report Serial Number 00001

	Units		Source Primary	Secondary	Comments
Fuel Data					
Type Used (Auxillary & Boilers)		Diesel	Vessel	Terminal	
Sulfur Content	%	0.1	Vessel	Terminal	
Bunker ROB (finished with engines) FWE	m3	250.0	Vessel	Terminal	
Bunker ROB (begin cargo transfer) BCT	m3	249.0	Vessel	Terminal	check with Capt Bedre to see if this is available
Bunker ROB (transfer complete) CTC	m3	230.0	Vessel	Terminal	check with Capt Bedre to see if this is available
Bunker ROB (departure)	m3	229.0	Vessel	Terminal	
Fuel Density	kg/m3	850.8	MPLX		Technical Reference and to be agreed upon by CARB in the EO
Fuel to Energy Ratio - Auxillary Engines	kg fuel/kW	0.27	CARB		Stipulated by CARB, Section 17(f)(1)(B)
Fuel to Energy Ratio - Boilers	kg fuel/kW	0.27	MPLX		This value needs to be developed and agreed to by CARB
Fuel Usage Rate (Aux) FWI to BCT	kg/hr	141.8	Calculation		Assumes all fuel is being used by aux engines only, in reality there is some boiler load
Fuel Usage Rate (Aux + Boilers) BCT to CTC	kg/hr	389.5	Calculation		Represents fuel used by the aux engines and boilers during cargo transfer
Fuel Usage Rate (Boilers) BCT to CTC	kg/hr	247.7	Calculation		Assumes the aux engine usage is continuous during transfer and all remaining fuel is associated with cargo transfer
Avergae Power (Aux) FWE to BCT	kWh	525.2	Calculation		Fuel usage converted to kWh for aux engines
Avergae Power (Boiler) BCT to CTC	kWh	917.5	Calculation		Fuel usage converted to kWh for boilers associated with transfer
Total Power Aux Power - CAECS	kW	22,959	Calculation		
Total Power Boiler Power - CAECS	kW	38,076	Calculation		
Machinery Configuration					
Auxillary Engine, count		3	Q-88	Vessel	Section 10.5 of the Q-88
Auxillary Engine, capacity	kW	680	Q-88	Vessel	Section 10.5 of the Q-88
Boiler, count		2	Q-88	Vessel	Section 10.5 of the Q-88
Boiler, capacity	MT/hr	22	Q-88	Vessel	Section 10.5 of the Q-88
Cargo Pump, count		3	Q-88	Vessel	Section 8.3 of the Q-88
Cargo Pump, type		Centrifugal	Q-88	Vessel	Section 8.3 of the Q-88
Cargo Pump, capacity	m3/hr	3000	Q-88	Vessel	Section 8.3 of the Q-88
IGS Supply		Flue Gas			Section 8.3 of the Q-88
Operations Data					
Anticipated Load At-Berth, Aux 1	kW	0	Vessel		This is just an estimate from the vessel and will help with system setup
Anticipated Load At-Berth, Aux 1	kW	400	Vessel		This is just an estimate from the vessel and will help with system setup
Anticipated Load At-Berth, Aux 1	kW	0	Vessel		This is just an estimate from the vessel and will help with system setup
Anticipated Load At-Berth, Boiler 1	ton steam/hr	6	Vessel		This is just an estimate from the vessel and will help with system setup
Anticipated Load At-Berth, Boiler 1	ton steam/hr	0	Vessel		This is just an estimate from the vessel and will help with system setup
Emission Factors					
PM, auxillary engines	g/kWh	0.14	EO	Regulation	Net reduction required based on values in Section 17.5(d)(1)
NOx, auxillary engines	g/kWh	11.0	EO	Regulation	Net reduction required based on values in Section 17.5(d)(1)
ROG, auxillary engines	g/kWh	0.42	EO	Regulation	Net reduction required based on values in Section 17.5(d)(1)
PM, boilers	g/kWh	0.14	EO	Regulation	Net reduction required based on values in Section 17.5(d)(2)
NOx, boilers	g/kWh	1.6	EO	Regulation	Net reduction required based on values in Section 17.5(d)(2)
ROG, boilers	g/kWh	0.09	EO	Regulation	Net reduction required based on values in Section 17.5(d)(2)
PM, auxillary engines	g	3,214	Calculation		
NOx, auxillary engines	g	252,553	Calculation		
ROG, auxillary engines	g	9,643	Calculation		
PM, boilers	g	5,331	Calculation		
NOx, boilers	g	60,921	Calculation		
ROG, boilers	g	3,427	Calculation		
Emissions Requiring IC Credits					
PM	lb	19	Calculation		
NOx	lb	691	Calculation		
ROG	lb	29	Calculation		

APPENDIX B

Vessels Utilizing Emission Reduction Credits – Vessel Call Report

Event Summary Sample Report

Event Serial Number:

Vessel Information	
Carrier:	
Vessel Name:	
Vessel IMO Number:	
IMO NOx Tier:	
Vessel Type:	

Terminal Information	
Terminal Name:	
Port:	
Berth Number:	
Vessel Contact Info:	
Name:	
Phone #:	
Email:	
Terminal Contact Info:	
Name:	
Phone #:	
Email:	

CAECS Information						
CAECS Contact Info:						
Name:						
Phone #:						
Email:		HH:MM:SS		HH:MM:SS		HH:MM:SS
Event:	Start		End		Duration	
Capture Time:	Start		End		Duration	
Emission Control Time:	Start		End		Duration	

Process Flows	Units	P&ID #	Ave	Min	Max
Inlet	scfm				
Outlet	scfm				
System Temperatures					
Ship Stack	F				
Process Inlet	F				
Filters A	F				
Filters B	F				
Filters C	F				
Box A Outlet	F				
Box B Outlet	F				
Box C Outlet	F				
Process Outlet	F				
System Pressures					
Ship Stack Pressure	"H_2O				
UCF-144-A D.P.	"H_2O				
UCF-144-B D.P.	"H_2O				
UCF-144-C D.P.	"H_2O				
System Air Pressure	psi				
DSI Feed					
DSI Injection Rate	lb/hr				
DSI Blower Pressure	psi				
DSI Blower Temperature	F				
Main Fan					
Fan Speed	Hz				
Fan Current	Amps				
Other					
Burner Set Point	%				
Ammonia					
NH3	ppmv				
H2O	%v				
Ammonia Flow Rate	slpm				
NOx					
Inlet NOx	ppmv				
Outlet NOx	ppmv				
Inlet O2	%v				
Outlet O2	%v				
PM					
PM, Inlet	mg/m^3				
PM, Outlet	mg/m^3				
ROG					
ROG, Inlet	ppmv				
ROG, Outlet	ppmv				
System Performance					
Capture Efficiency	%				
NOx Efficiency	%				
PM Efficiency	%				
ROG Efficiency	%				
Average Vessel Emissions During CAECS					
NOx	g/kW/hr				
PM 2.5	g/kW/hr				
ROG	g/kW/hr				

APPENDIX C

3.13.24-CARB IC Public Comment Letter Reply (Emission Reduction and Map Included)

March 13, 2024

Via Electronic Mail
Angela.csondes@arb.ca.gov

Angela Csondes
California Air Resources Board
Air Resources Supervisor I
Marine Strategies Section
Transportation and Toxics Division

RE: Clean Air Engineering – Maritime, Inc. Innovative Concept Application

Dear Ms. Csondes:

This letter will serve to respond to the February 12, 2024, letter from the California Air Resources Board (CARB) requesting further information regarding the Innovative Concept application submitted by Clean Air Engineering – Maritime, Inc. (CAEM) on December 1, 2021. Please consider this letter as an addendum to the August 19, 2022, Revised Innovative Concept application submitted by CAEM and as a supplement to the additional information requests recently provided to us by CARB.

CARB REQUEST NO. 1:

Address the concern of Pacific Environment that the use of a CARB Approved Emission Control Strategy (CAECS) will delay the implementation of ". . . shorepower [which] is the most efficient way to reduce emissions from ships at berth."

CAEM RESPONSE TO REQUEST NO.1:

The concern of Pacific Environment was predicated on a factual scenario over two years ago when CAEM initially filed its IC application. Since the filing of the CAEM IC application, any company regulated by the At-Berth Regulation has had two years to investigate the feasibility of shorepower for their respective operations. Compliance in Southern California is now only ten months away. Whether the IC application is approved or not has no bearing on the decision a regulated party would have had to make months, if not years, ago to proceed through the necessary permitting, bid, and construction process to be able to utilize shorepower as a compliance method.

Additionally, the opinion, unsupported by any factual support, that "shorepower is the most efficient way to reduce emissions from ships at berth", ignores several factors.

First, "efficiency" would have to account for location of the berth, available space for shorepower infrastructure, and MOTEMS compliance which could render shorepower impracticable to implement. Second, efficiency would also have to account for safety analysis including the cargo of the vessel with regards to highly flammable materials in close proximity to electrical equipment. Third, efficiency would also have to account for the availability of renewable energy and "clean" electricity. The State of California currently experiences frequent "brown outs" during peak electrical usage. Additionally, California imports roughly 30% of its electrical energy supply, 32% of which is coal fired or unspecified. (www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-generation). Since California does not utilize only renewable sources of electricity, the prosed IC technology is

carbon neutral, and is CARB compliant as shorepower equivalent, the shorepower is not the most efficient way to reduce emissions. The IC technology is also more cost efficient when compared to the total infrastructure and operating cost of shorepower.

CARB REQUEST NO. 2 (Item 2&20):

Emission Reduction Estimates and Calculations.

CAEM RESPONSE TO REQUEST NO. 2 (Item 2&20):

						Emission Reductions		
	Number of Vessel Calls	Duration	Expected Power	Expected Reductions	Vessel Type	NOx	PM 2.5	ROG
	calls/yr	hr/call	kW/call	%		lb/yr	lb/yr	lb/yr
San Diego	15	24	600	90	Bulk Carrier	5,914	73	223
San Diego	20	12	900	90	Ro-Ro (Pre-Regulation)	5,914	73	223
Los Angeles	40	36	800	90	Container Ship At-Anchor	31,543	389	1,189
Los Angeles	20	48	1200	90	Tanker (Pre-Regulation)	31,543	389	1,189
Los Angeles	20	12	900	90	Ro-Ro (Pre-Regulation)	5,914	73	223
Los Angeles	15	24	600	90	Bulk Carrier	5,914	73	223
Los Angeles	20	36	800	90	Liquid Bulk Barges	15,771	194	594
Long Beach	20	36	800	90	Container Ship At-Anchor	15,771	194	594

Long Beach	20	48	1200	90	Tanker (Pre-Regulation)	31,543	389	1189
Long Beach	20	12	900	90	Ro-Ro (Pre-Regulation)	5,914	73	223
Long Beach	15	24	600	90	Bulk Carrier	5,914	73	223
Long Beach	20	36	800	90	Liquid Bulk Barges	15,771	194	594
Hueneme	10	24	600	90	Bulk Carrier	3,943	49	149
Benicia	10	24	600	90	Bulk Carrier	3,943	49	149
Richmond	10	36	800	90	Container Ship At-Anchor	7,886	97	297
Chevron Long Wharf	10	36	800	90	Container Ship At-Anchor	7,886	97	297
Chevron Long Wharf	40	48	1200	90	Tanker (Pre-Regulation)	63,086	777	2377
Oakland	20	36	800	90	Container Ship At-Anchor	15,771	194	594

Vessel and berthing information will be tracked utilizing CAEM's IC Spreadsheet. This data set will include connection/disconnection times, generator output (kW), and boiler fuel usage (if applicable). The NOx, PM, and ROG emissions will be recorded in pounds per vessel call. The IC Spreadsheet will also track a customer's use of their credits and the expiration of accumulated credits. CAEM will provide CARB with the spreadsheet on a bi-monthly basis for their review. The CAEM IC Spreadsheet is included as Attachment A.

CARB REQUEST NO. 3 (Item 3):

IC Request Can't Be Business as Usual or Otherwise Required

CAEM RESPONSE TO REQUEST NO. 3 (Item 3):

The emission reduction rates using the proposed control technology are early and in excess of those required by Section 93130.5(d). There are no other state, federal, or international rules or regulations requiring the capture and treatment of vessel stack emissions in California ports.

CARB REQUEST NO. 4 (Item 7&22):

Timeframe and Extension Requests for Concepts.

CAEM RESPONSE TO REQUEST NO. 4 (Item 7&22):

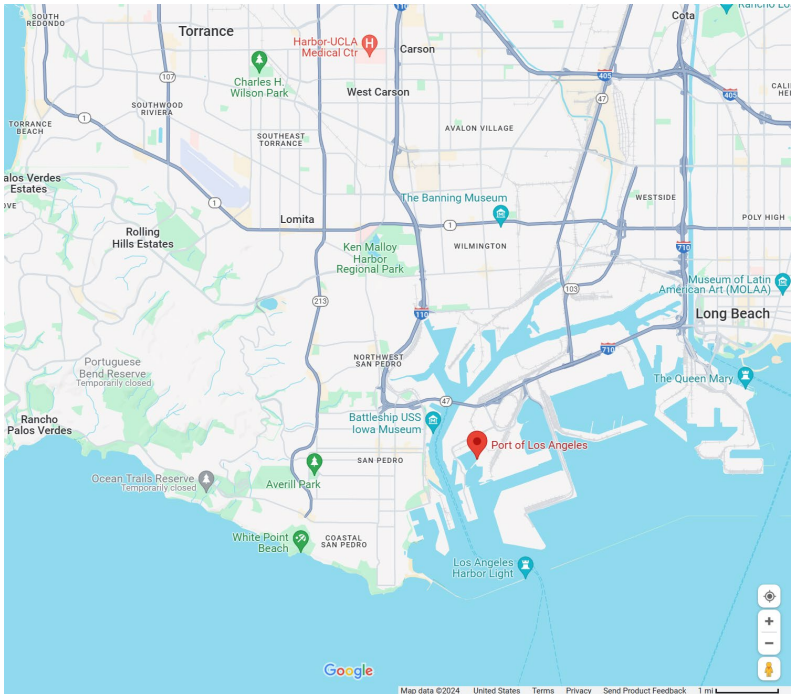
Maximum extension allowable will be sought for each sub concept.

CARB REQUEST NO. 5 (Item 18(b)):

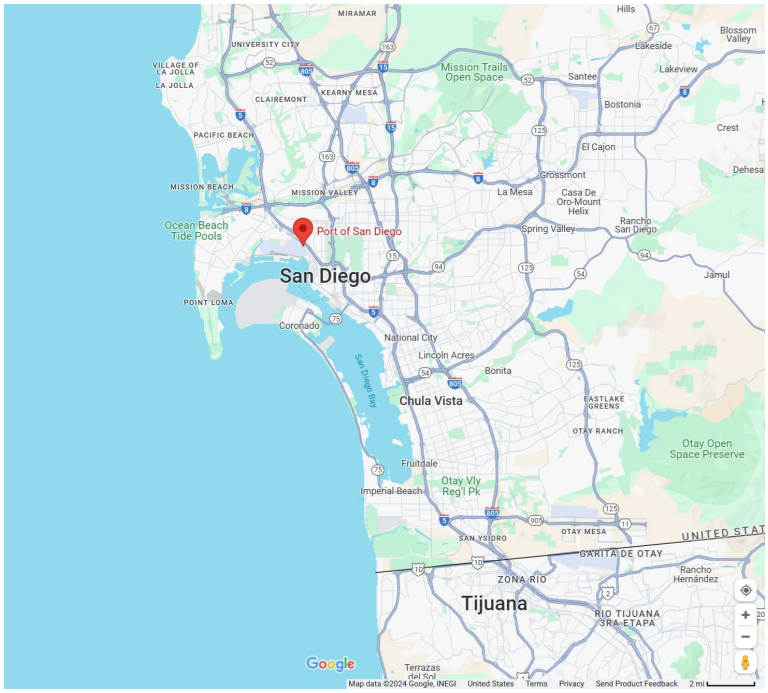
Project Site Map and Location Map

CAEM RESPONSE TO REQUEST NO. 5 (Item 18(b)):

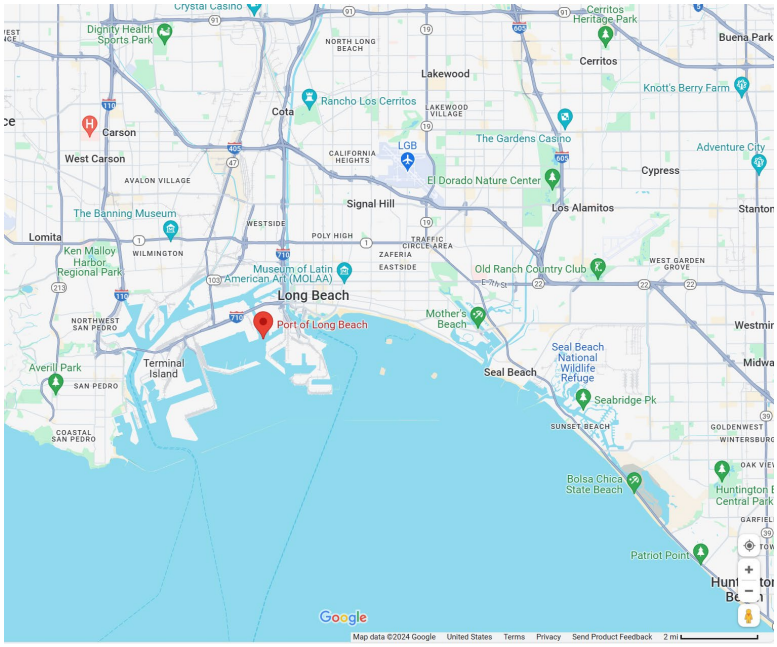
Port of Los Angeles



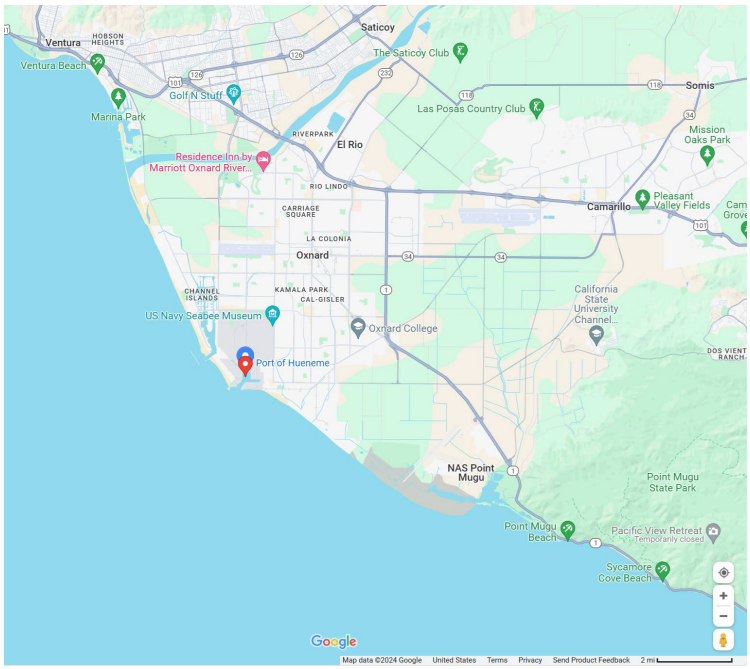
Port of San Diego



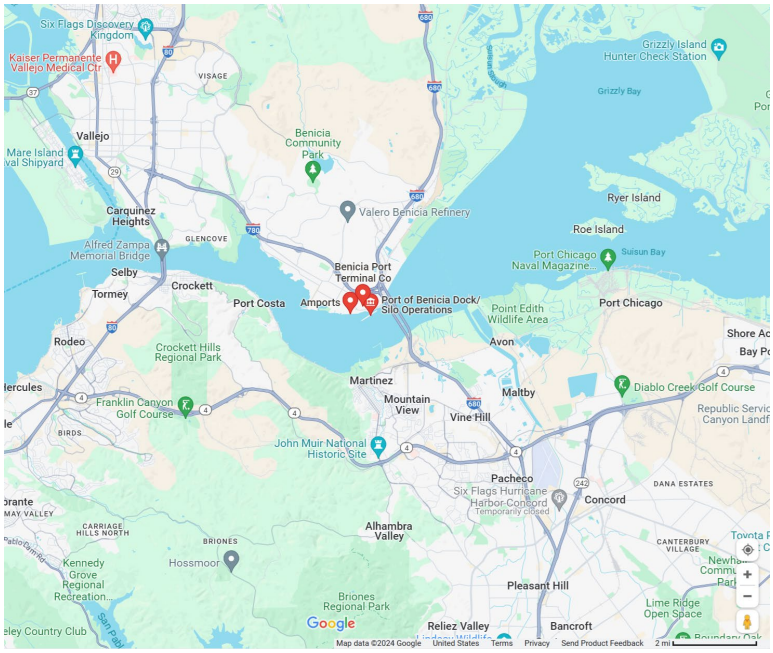
Port of Long Beach



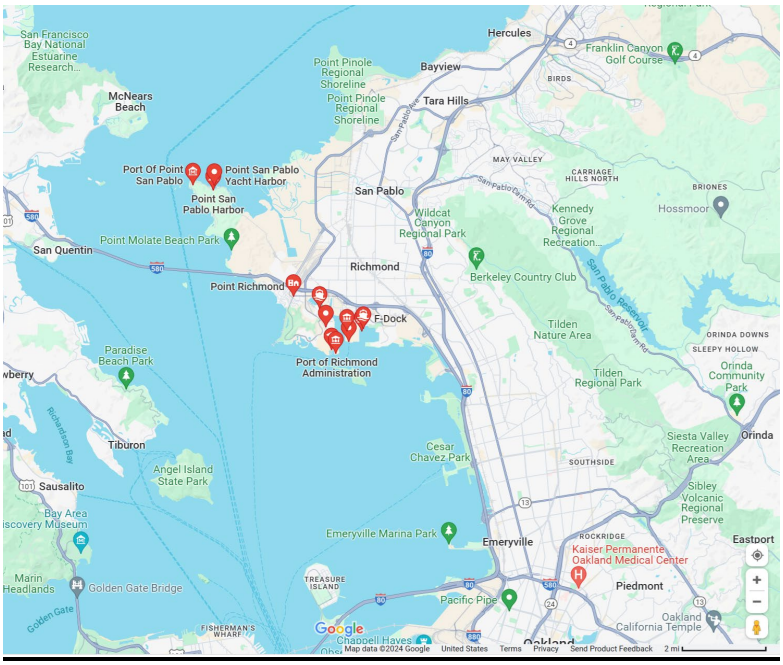
Port of Hueneme



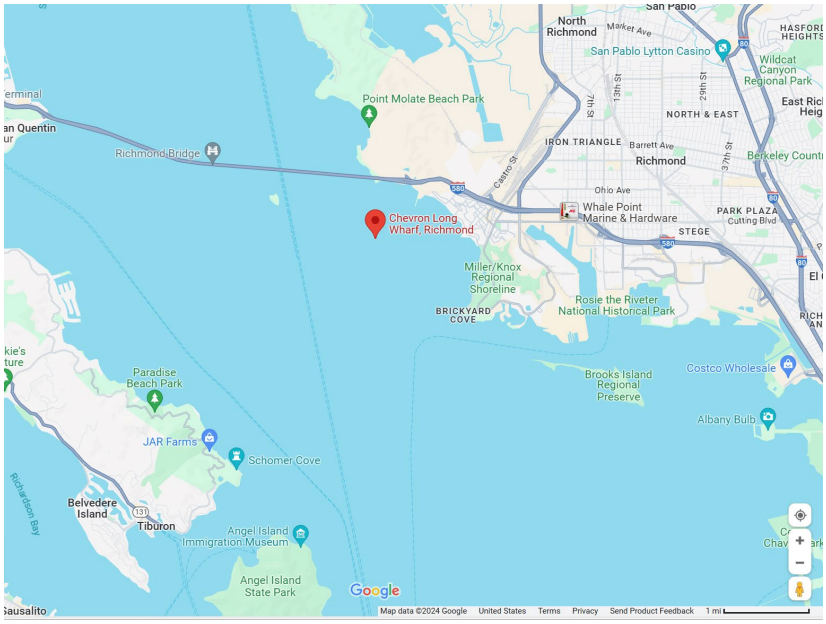
Port of Benicia



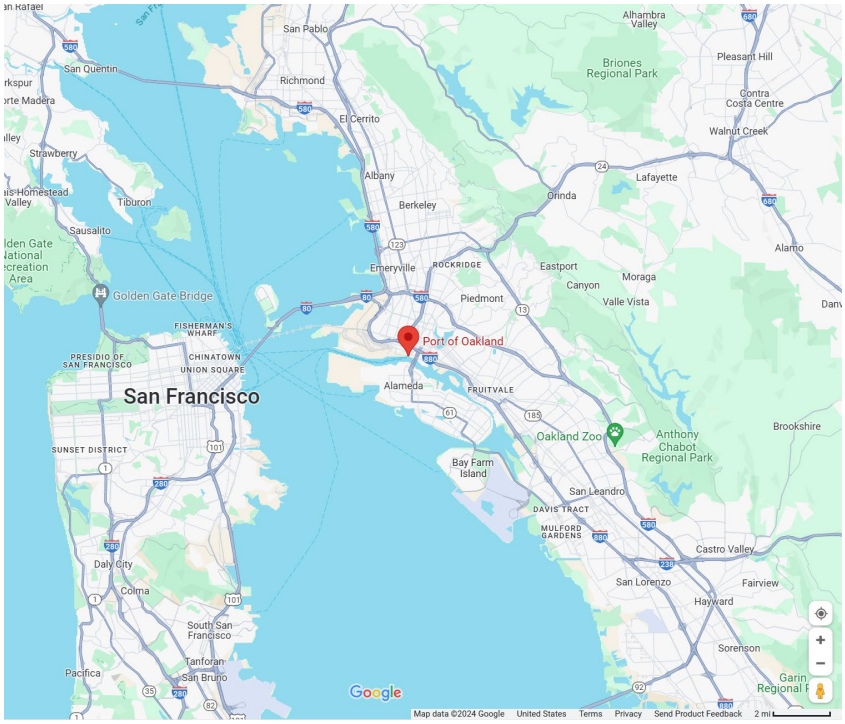
Port of Richmond



Chevron Long Wharf



Port of Oakland



CARB REQUEST NO. 6 (Item 21)

MOU or Similar Agreements.

CAEM RESPONSE TO REQUEST NO. 6 (Item 21)

The applicant is not a party to any MOUs or similar agreements that are necessary to execute the sub-concepts.

T[redacted]

N[redacted]

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Cleaner Air.... One Ship at a Time

APPENDIX D

6.4.24-CARB Letter Reply (Updated Maps)

June 4, 2024

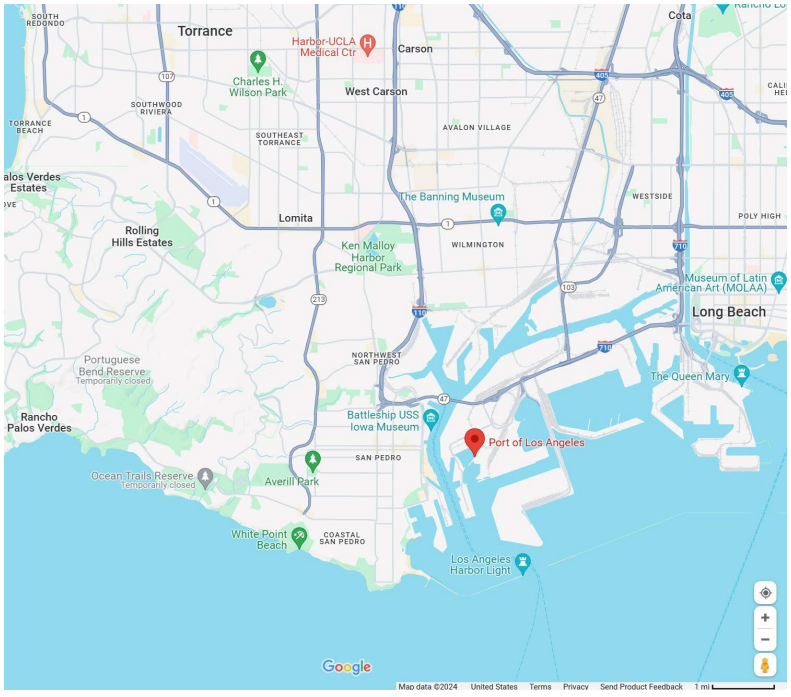
CARB REQUEST NO. 5 (Item 18(b)):

Project Site Map and Location Map

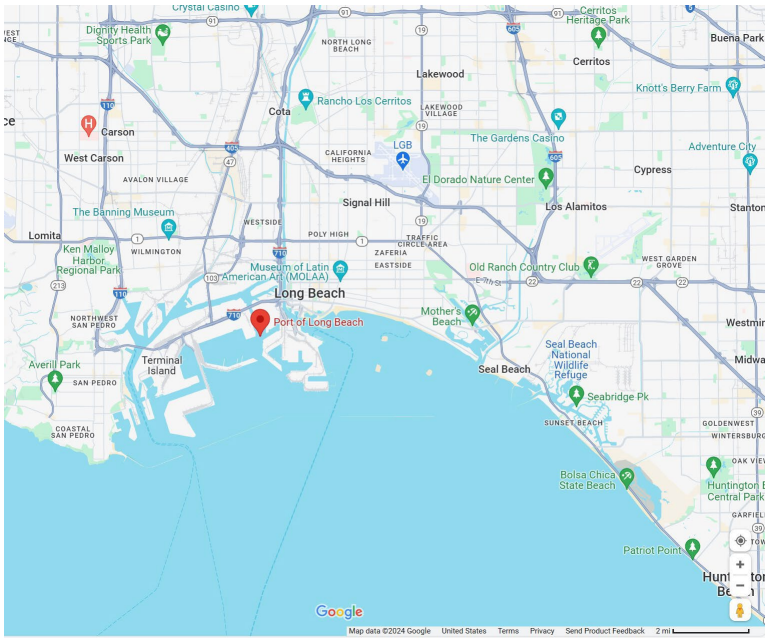
CAEM RESPONSE TO REQUEST NO. 5 (Item 18(b)):

Pre-Compliance Emissions (Tankers – Southern California)

- Port of Los Angeles

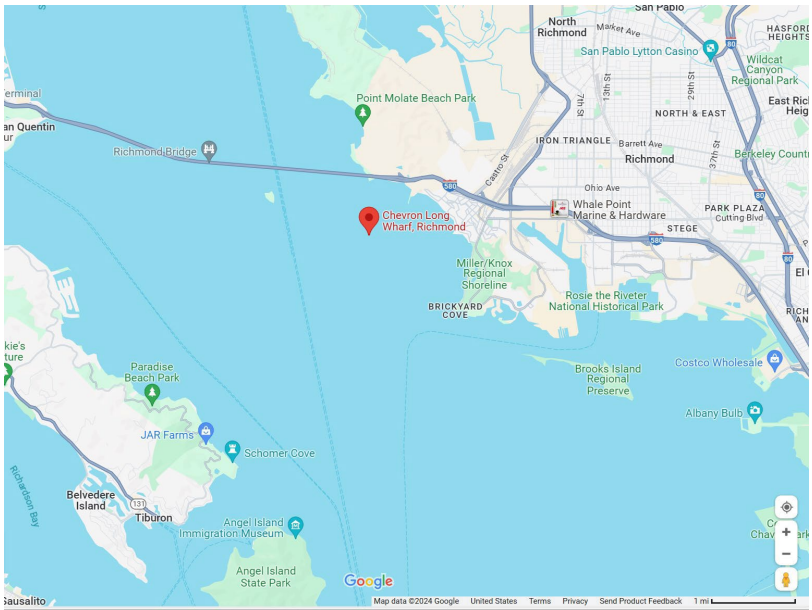


- Port of Long Beach



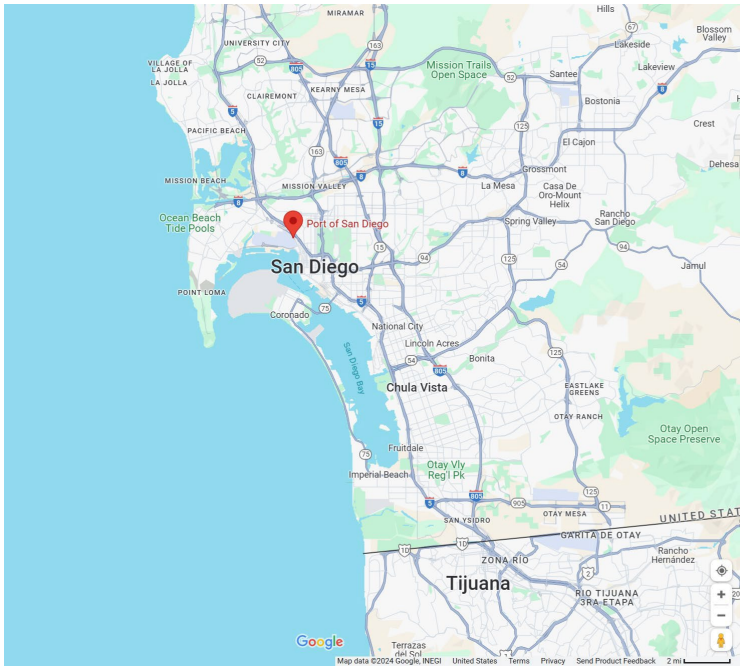
Pre-Compliance Emissions (Tankers – All Ports other than Long Beach and Los Angeles)

- Chevron Long Wharf

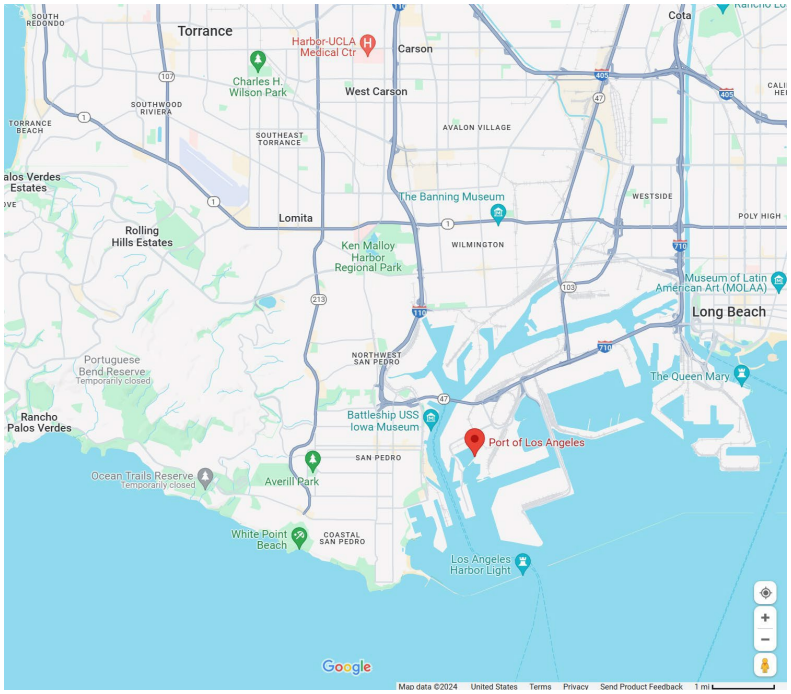


Pre-Compliance Emissions (RoRo – All California Ports)

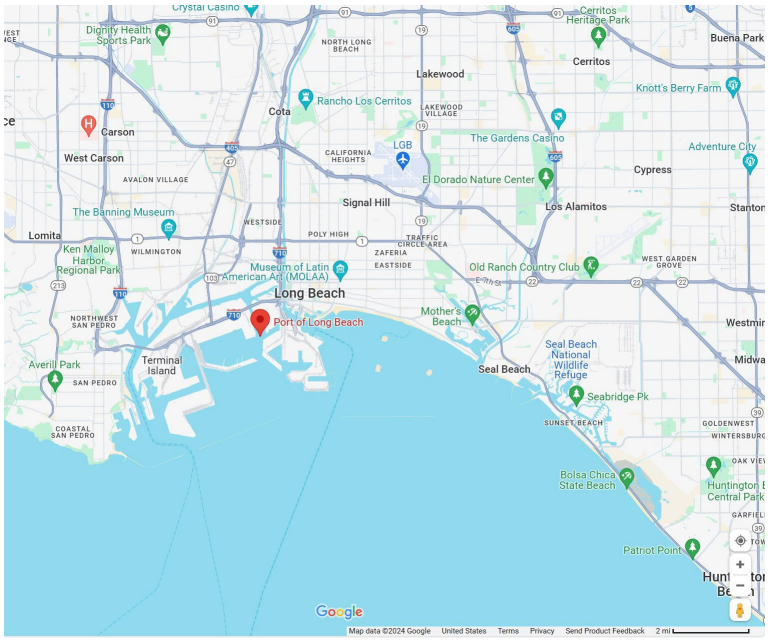
- Port of San Diego



- Port of Los Angeles

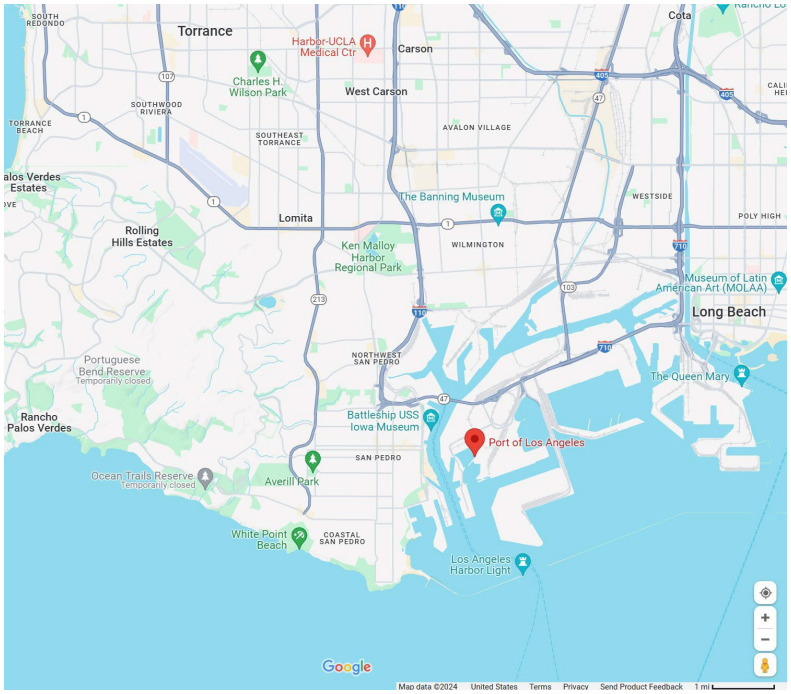


- Port of Long Beach

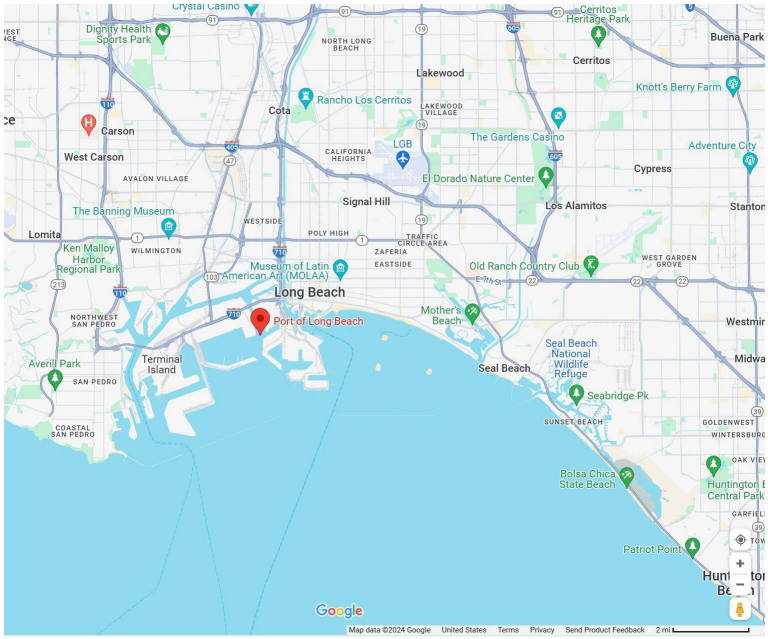


Unregulated Emissions (Bulk Liquid Barges – All California)

- Port of Los Angeles

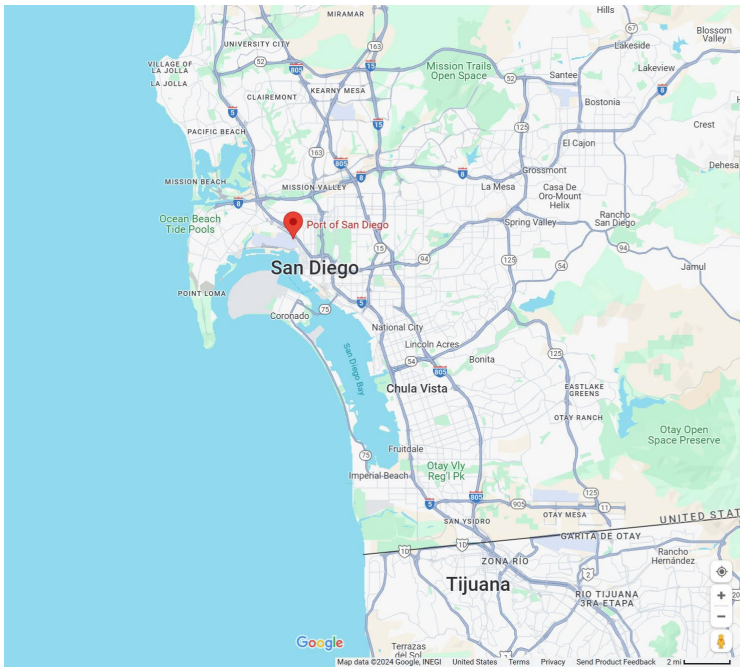


- Port of Long Beach

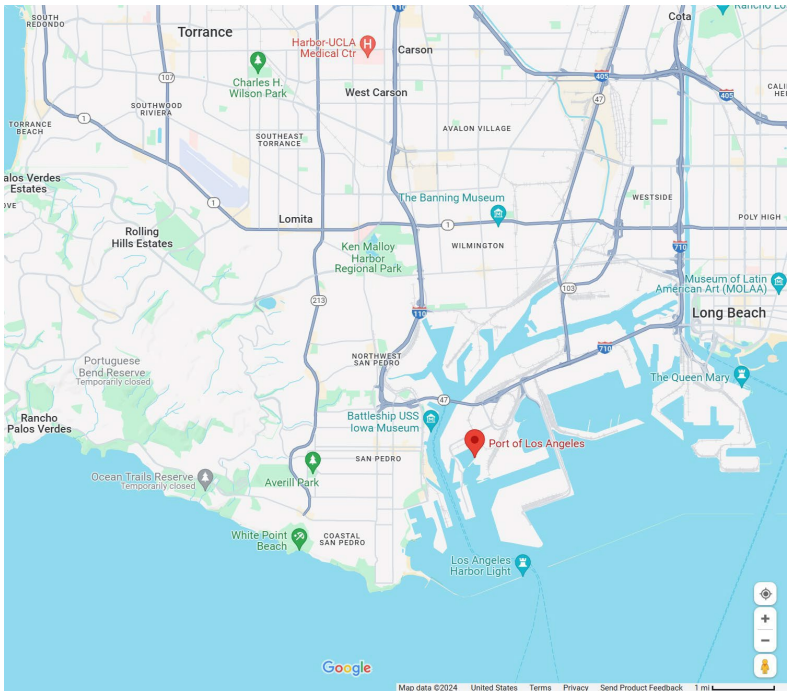


Bulk and General Cargo Vessels

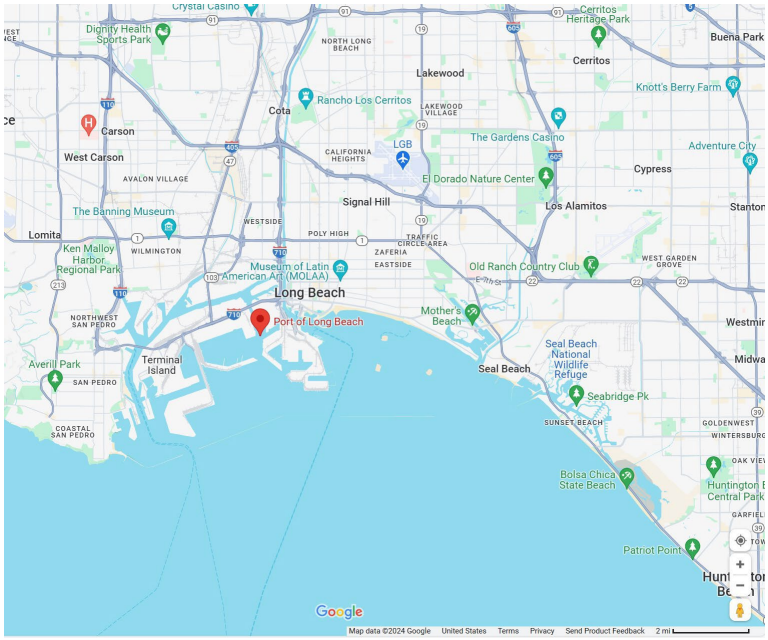
- Port of San Diego



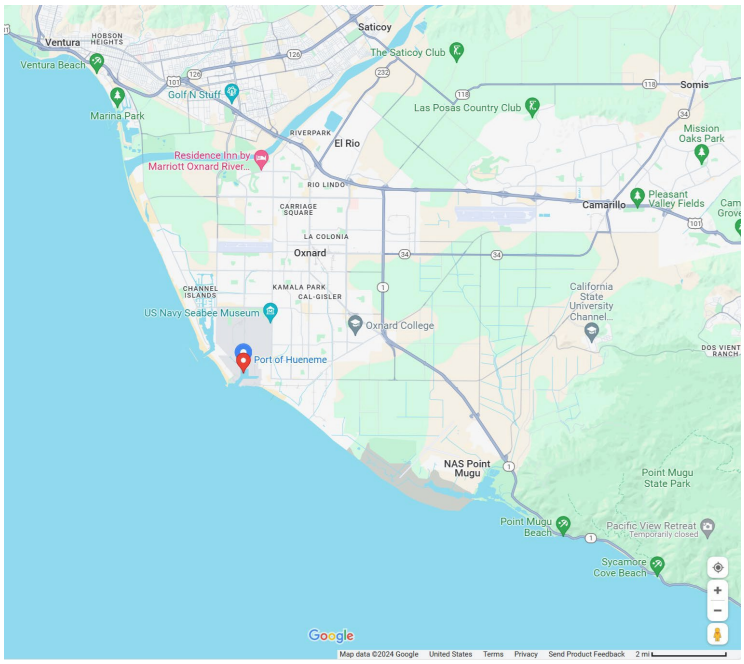
- Port of Los Angeles



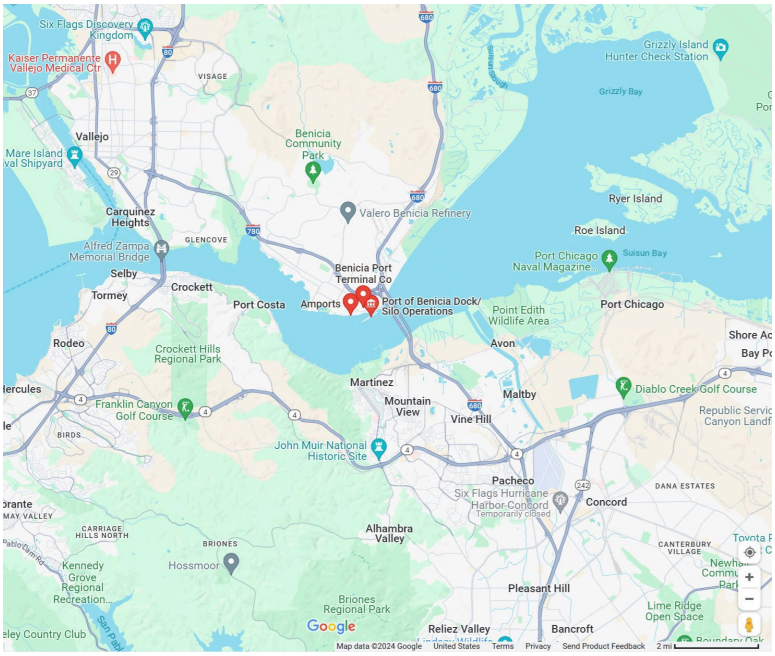
- Port of Long Beach



- Port of Hueneme

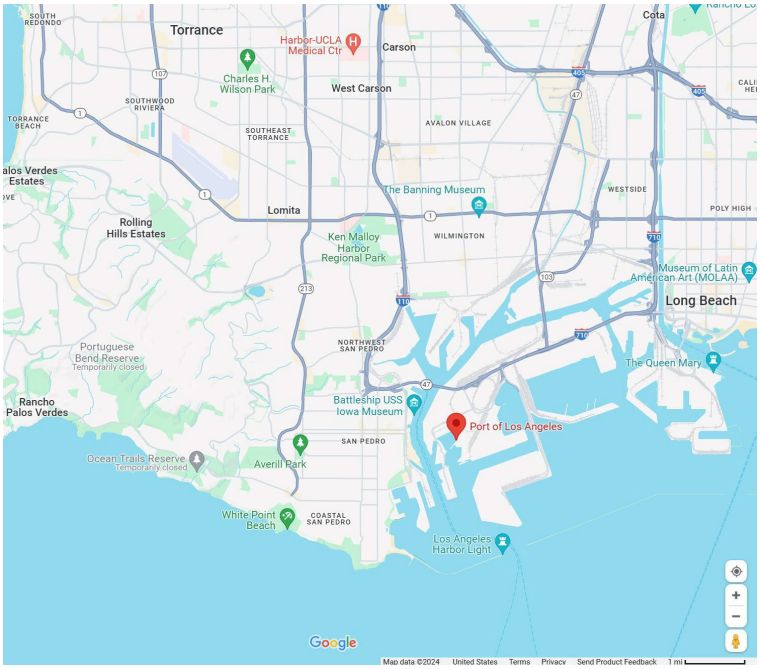


- Port of Benicia

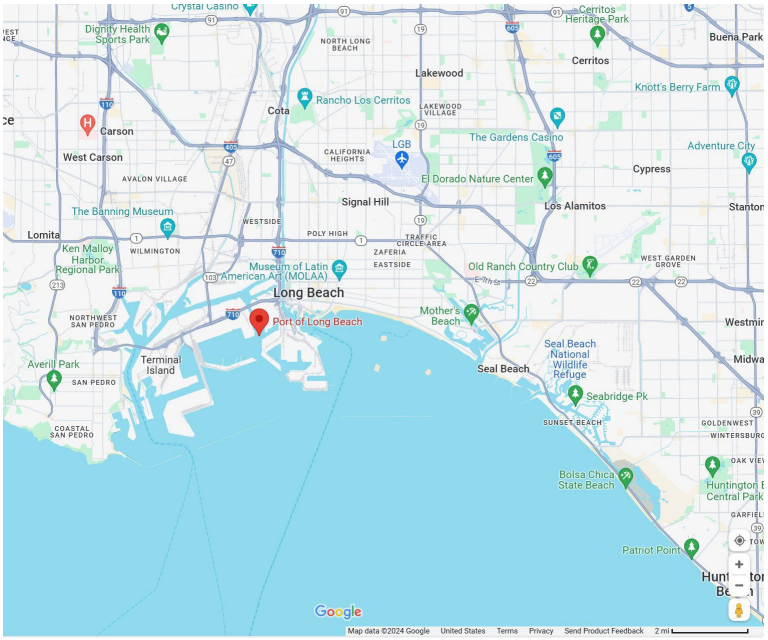


Container Ships At-Anchor

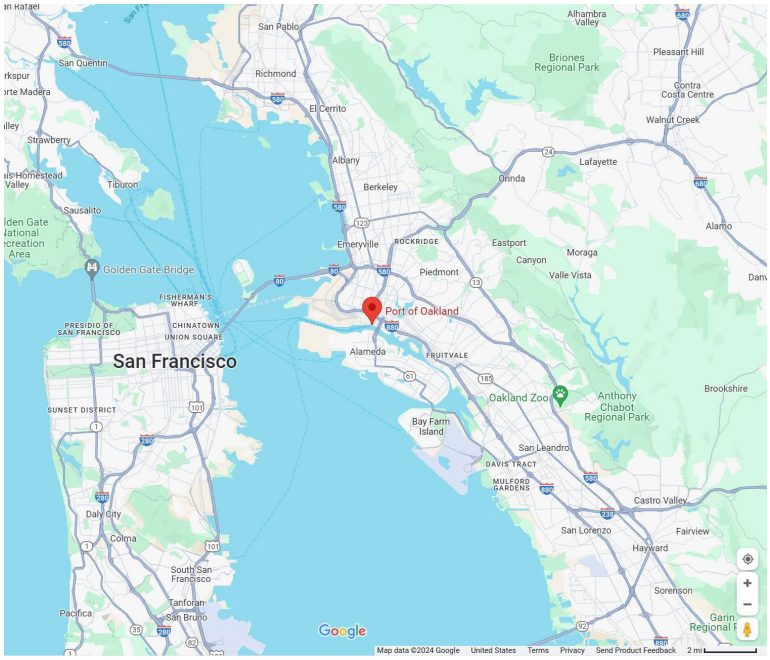
- Port of Los Angeles



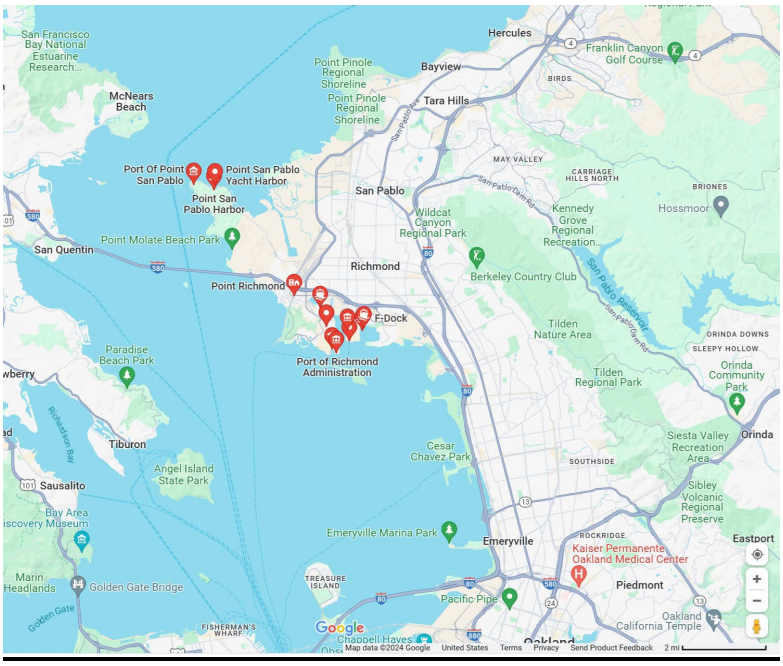
- Port of Long Beach



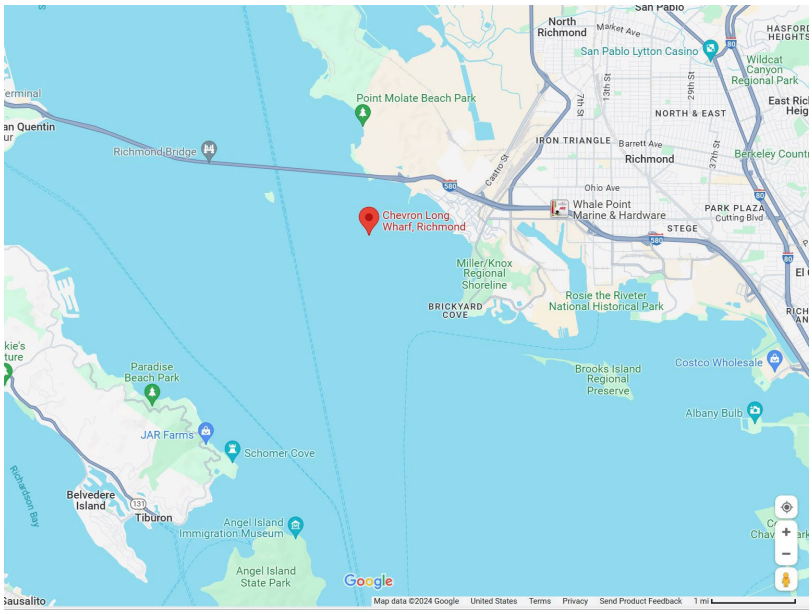
- Port of Oakland



- Port of Richmond



- Chevron Long Wharf



APPENDIX E

Questions Regarding CAEM IC's 100224 -10142024

Additional Questions Regarding CAEM's Innovative Concepts (10/2/2024)

1. CARB previously asked CAEM whether they had conducted a feasibility study of capture and control or engaged with owners/operators for bulk liquid barges. Is there any update or more information regarding this concept? No, we have not discussed this with specific owners/operators but plan to engage as IC application progresses.
    a. Previously, we pointed out that bulk liquid barges are subject to CARB's CHC regulation, they must be equipped with a Tier II or newer engine and a CARB approved SCR. Does CAEM believe that a CAECS would still be able to control 90% of the emissions from these harbor craft? Yes, 90% emissions will be able to be controlled.
    b. Will CAEM capture from both the engine and boiler emissions of bulk liquid barges or just the boiler? We would capture based off the stacks running both engine and boilers are able to be treated.
    c. Do the boilers on bulk liquid barges have the same emission rates as those on OGVs? We do not have this data.
2. Similarly to the question above, has CAEM engaged with any stakeholders regarding capture and control while at-anchor? No, we have not discussed this with specific owners/operators but plan to engage as IC application progresses.
    a. When vessels operate at-anchor how many sources need to be controlled (i.e. 1 aux engine or 2)? We would capture based off the stacks running both engine and boilers are able to be treated.
    b. Does CAEM have any concerns regarding maintaining proper connection and capture efficiency while at-anchor? No, we do not. Would the CAECS need to tie to the vessel? Yes, the METS barges would need to tie off in at-anchor treatment.
    c. What would be the maximum distance for operating on vessels at anchor? Would this be within the 3 nautical miles of the port or marine terminals? Yes, the maximum distance would fall under the 3 nautical miles of the port and marine terminals.