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# CONTROL MEASURE FOR OCEAN-GOING VESSELS AT BERTH Innovative Concept Application for Equilon Enterprises LLC d/b/a Shell Oil Products US


Shell Mormon Island Terminal  
Wilmington, California

Issue Date: 12/1/21


**Prepared For:**

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**APPENDICES**

**APPENDIX A** Captured and Controlled Emissions – Sample Vessel Call Report

**APPENDIX B** Vessels Utilizing Credits –Sample Vessel Call Report

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## 1 Introduction

The purpose of this application is to develop a system by which reduction in alternative pollutant sources can be used to aid in compliance with the regulation. 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 regulation while minimizing the cost to achieve those reductions. 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 within Shell Mormon Island Terminal and the Port of Los Angeles and Long Beach.

Due to the deadline for the Innovative Concept Application, the options provided in this report are based on preliminary assessments. For many of the strategies proposed, the technology to accomplish the strategy is still under study and further development. Therefore, Shell is not obligating itself to control the emissions sources described under this proposal at this time. Concerns with the timeline of technology development and the ability to comply with the regulation are outlined in Shell's Terminal Plan.

## 2 Owner Background

Equilon Enterprises LLC, doing business as Shell Oil Products US ("Shell") is a subsidiary of Royal Dutch plc, providing a range of energy-related products and services across the United States. Royal Dutch Shell plc is a global group of energy and petrochemical companies that aims to meet the world's growing need for more and cleaner energy solutions in ways that are economically, environmentally and socially responsible, and whose purpose is to power progress together with more and cleaner energy solutions. As part of the Control Measure for Ocean-Going Vessels At Berth regulation, provisions are made for the identification and control of alternative sources emissions as a means of compliance. This application outlines one option for Shell to be able to control alternative sources emissions, among several strategies that could be employed for compliance.

### 2.1 Primary Owner Contact

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### 2.2 Owner Representative

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### 2.3 Operational Description

The existing Shell Mormon Island Terminal is in the Port of Los Angeles and occupies a land area of approximately nine acres and an over water area of approximately three acres. Figures 2.1 and 2.2 provide a map and aerial view of the terminal. The site currently consists of one

operational berth (B169), 11 hydrocarbon storage tanks of various sizes, parking, and several ancillary buildings. The site, which has been leased by Shell operated as a marine oil terminal since 1923.

The terminal is currently under construction to replace operating Berth 169 with a new jetty and topsides which will be known as Berth 168. Completion and commissioning of the remaining topside equipment, piping and utility systems is expected by late 2024, early 2025. Once operational Berth 169 will be demolished.

The new single berth will accommodate vessels with a capacity of up to 86,000 deadweight tons (dwt) with a draft of 40 feet. The marine terminal handles hydrocarbon products.

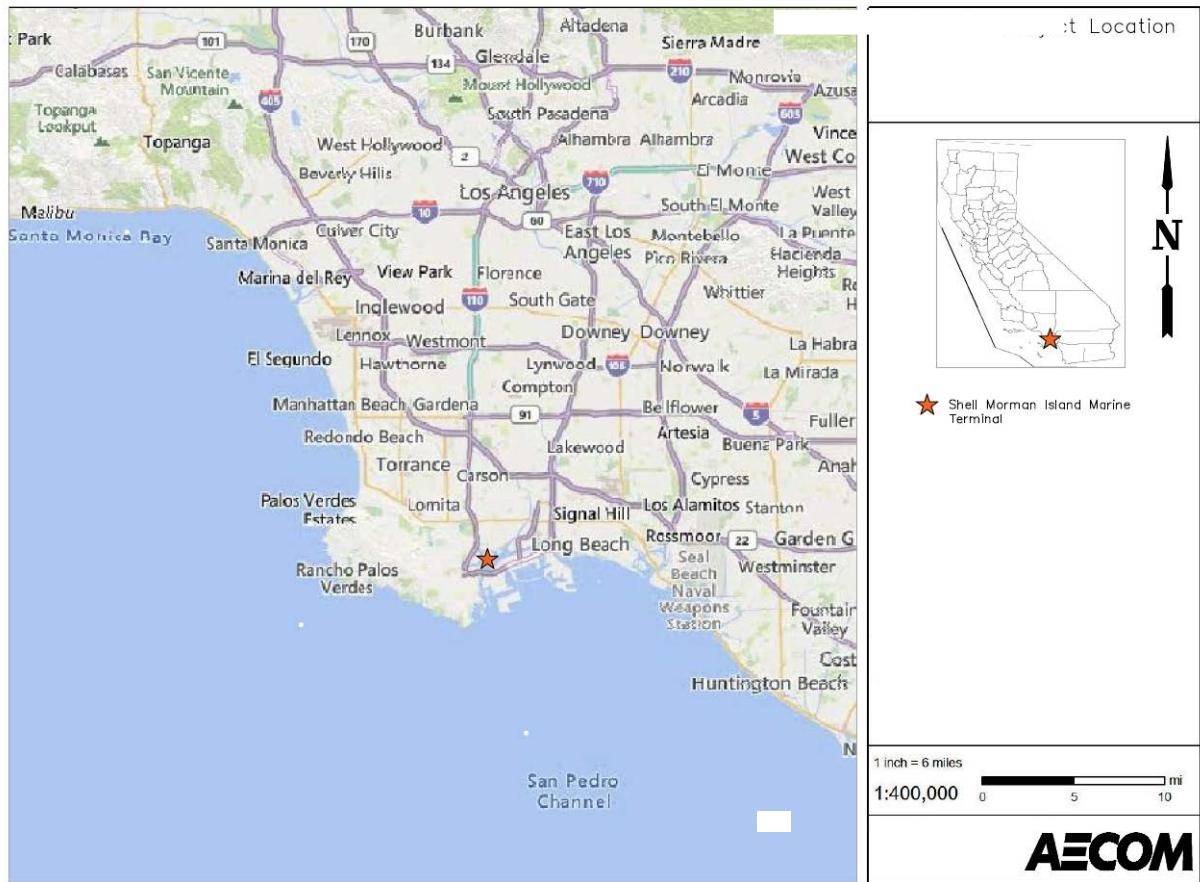


Figure 2.1

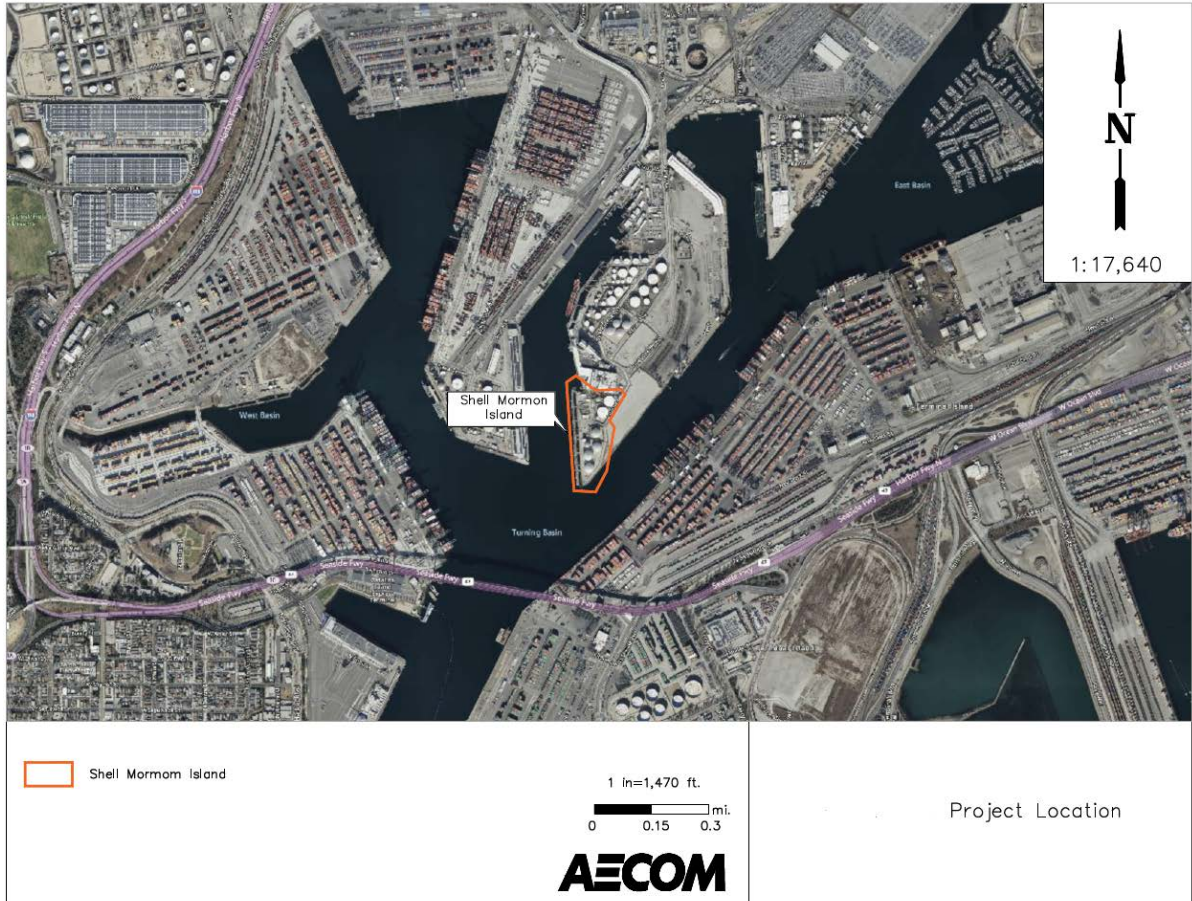




Figure 2.2

### 3 Potential Compliance Options for the Reduction of Emissions

The following sources have been identified as sources of emissions that can be captured and controlled according to the guidelines in Section 93130.17 of the At-Berth regulation.

The sources described below are listed to identify possible sources that could be available on January 1, 2023 when 93118.3 of Title 17 and 2299.3 of Title 13 of the California Code of Regulations are superseded by 93130 through 93130.22. It is anticipated that as compliance strategies develop after 2023 that other sources and strategies for controlling other equivalent emissions may be identified. Shell 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 that is generated in response to this application. The initial proposal would be for Shell 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, California Air Resources Board (“CARB”) would process the request as described in Section 93130.17 (b)(2), (3), (4), and (5). If the

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amendment is approved, the Executive Officer would amend the original Executive Order to include an addendum authorizing the additional source or method which would include all required instructions.

### 3.1 Pre-Compliance Emissions (Tankers – Shell Berth 168 and 169 Port of Los Angeles)

Emissions captured and controlled from the auxiliary engines and/or boilers of tankers in the Port of Los Angeles 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 Berth 169 and Berth 168 (when completed) which represent the berths used by Shell that service both tankers and barges.

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 Credit Management System on the form referenced in Section 5.2. Emissions captured would be used as 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 credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.



### 3.2 Pre-Compliance Emissions (Tankers – all other terminals Port of Los Angeles/Port of Long Beach)

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 any berth located in the Ports of Los Angeles and Long Beach.

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 Credit Management System on the form shown in Section 5.2. Emissions captured would be used as 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 credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.



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### 3.3 Pre-Compliance Emissions (RoRo – Port of Los Angeles/Port of Long Beach)

Emissions captured and controlled from the auxiliary engines of Roll-on/roll-off (“RoRo”) vessels in the Ports of Los Angeles and Long Beach between January 2023 and January 2025. The RoRo vessels would be serviced by a CARB approved barge-based capture and control system while At-Berth. The potential RoRo vessels serviced would be those calling into any berth located in a California port.

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 Credit Management system on the form shown in Section 5.2. Emissions captured would be used as 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 credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.

### 3.4 Bulk Liquid Barges

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 while At-Berth. The barges serviced would be those calling into any berth located in the Ports of Los Angeles and Long Beach including those at berth at Berths 168/169.



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 Credit Management System on the form shown in Section 5.2. Emissions captured would be used as 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 credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 17(a)(10).

This source is available today and all emissions treated are considered eligible as an alternative emission reduction opportunity.

### 3.5 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 stipulated control of the emissions as outlined in Section

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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 berths located in the Ports of Los Angeles and Long Beach.

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 Credit Management system on the form shown in Section 5.2. Emissions captured would be used as 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 credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.

### 3.6 Container Ships At-Anchor (Capture and Control)

Emissions captured and controlled from the auxiliary engines on container vessels which are at anchor in the Ports of Los Angeles and Long Beach. Vessels at anchor are not covered by the rule as only vessels at berth are stipulated 93130.1. Vessels would not be included for which other rules or requirements stipulated 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 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 Credit Management System on the form shown in Section 5.2. Emissions captured would be used as 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 credits were generated as stipulated in Section 93130.17(a)(4).

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.

### 3.7 Minimizing Capture and Control Connect and Disconnect Times

Emissions associated with the capture and control system connecting and disconnecting at times reduced from those stipulated Section 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.

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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 declares the system is “Ready for Operations” according to 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
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 to 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 shown in Section 4.1.

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.

### 3.8 Vessel Speed Reduction

Vessel speed reductions are an available source of non-regulated emissions. Reductions in speed from 12 knots to 8-10 knots within three nautical miles of the terminal may be possible. Emission reductions associated with vessel speed reductions can be calculated utilizing one of the following methods:

- A. U.S. Environmental Protection Agency. 2020. Ports Emissions Inventory Guidance: Methodologies for Estimating Port Related and Goods Movement Mobile Source Emissions. [Port Emissions Inventory Guidance: Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions \(EPA-420-B-20-046, September 2020\)](#) Appendix Table E-1. Accessed 3-5-2021.
- B. Delta Fuel usage from 12 knots to 8-10 knots vessel speed reduction  
These calculations will be performed as part of the standard vessel call report generated for regulated pollutants as shown in Section 5.1.

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This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.

### 3.9 Pre/Post-compliance Emissions Utilizing Shore Side Infrastructure to Reduce Tanker Vessel Discharge Emissions

Emission reductions associated with the use of shore side infrastructure capable of using grid power. Some terminals may have the capability of using shore side electric pumps to move liquid cargoes from the berth to the tankage located miles away from the dock. The use of these pumps allows for the vessel to operate cargo discharge at reduced loads thus lowering vessel emissions generated from fuel burned in either main engines, boilers or auxiliary engines. The vessel only needs to provide enough flow and pressure to move the liquid to the shore pumps.

For Shore Side pumping:

1. Flow is established by the vessel to the tank farm
2. Shoreside pumps are then started with the ship backing down on their engines that operate vessel pumping systems
3. Towards end of discharge when the volume from the vessel drops, the shoreside pumps are shut down and the vessel completes the last portion of cargo unload.

The emissions reduction credit would be calculated based on the required fuel usage for a vessel only discharge and the amount of fuel burned during the time the shore side pumps are operating.



For existing shoreside pumping systems that are in use today possible energy efficiency modifications may be made by installing more energy efficient pump and driver systems such as variable speed drives.

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.

### 3.10 Capture and Control Performance Exceeds the Requirements of the Rule

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 2(b)(63)] and would complete at one hour before pilot on board [Section 2(b)(58)] as defined in Section 7(e)(3)(A) and (B).

The alternative sources 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

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emissions for both auxiliary engines and boilers will be subtracted from the actual measured mass emissions to determine the alternative sources 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 shown in Section 4.1.

This source would fall under the compliance period requirements described in Section 17(a)(11) and are available today and considered eligible as an alternative emission reduction opportunity.

## 4 Emission Measurements and Estimates

The emission reductions achieved for all the alternative sources listed in Section 3 of this application, except for the sources described in Section 3.8, 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.

### 4.1 Captured and Controlled Alternative sources 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 Vessel Call report shown in Section 5.1 of this application.

### 4.2 Vessels Utilizing Credits – Emission Estimates



All emission estimates utilized for the purpose of applying collected alternative sources emissions will be performed utilizing the Vessels Utilizing Credits Report Section 5.2 of this application.

## 5 Vessel Call Reports

The reports described below will be used to manage the collection of alternative 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).

### 5.1 Captured and Controlled Emissions – Vessel Call Report

A sample report has been 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 or emission reduction credit development. This report will incorporate data from the vessel, the terminal, a capture and control

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system. The data to be collected, source of the data, calculations, and outputs of those calculations are shown in Appendix A of this application. It is expected that the final report data and format will be provided as part of the Executive Order.

## 5.2 Vessels Utilizing Credits – Vessel Call Report

A sample report has been developed for each vessel call, or portion of a vessel call, which will require the application of emission credits for compliance and is shown in Appendix B. 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.

## 6 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 and is defined in sections 93130 through 93130.22, title 17, California Code of Regulations. These 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 alternative sources. The renewal application will reflect those changes.

### 6.1 Initial Duration

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

### 6.2 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 the Section 2 based on the development of new regulations or the identification of yet to be identified alternative sources.

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## 7 Agreements, Government Approvals, and Environmental Review

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

### 7.1 Memorandum of Understanding

The potential alternative sources listed in Section 3 of this application will be serviced by capture and control equipment owned or chartered by Shell. In some cases, Shell will require consent from a fleet in order to connect to a vessel that is not chartered by Shell. This consent will be through a standardized document developed specifically for that purpose, and that consent form will be included as part of the documentation associated with the emissions captured and controlled.

### 7.2 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.

### 7.3 Environmental Review

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

## 8 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.

### 8.1 Section 93130.17(a)(1)

This Innovative Concept application is intended to provide a compliance pathway for primarily LA/LB Tankers and Other Tankers. However, the alternative sources emission reductions generated as part of this Innovative Concept could also be used as a method of compliance for all vessel types that are listed in this section. This application was submitted on Wednesday, December 1, 2021.

### 8.2 Section 93130.17(a)(2)

The emission reductions achieved through the Innovative Concept are realized primarily using a CARB approved CAECS or using means and methods that reduce the emissions from a regulated source by utilizing that source less or operating that source at a reduced load. The proposed methods of controlling alternative sources emissions comply with the GHG requirements of the regulation.

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**8.3 Section 93130.17(a)(3)**

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

**8.4 Section 93130.17(a)(4)**

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

**8.5 Section 93130.17(a)(5)**

All emission reductions proposed in this Innovative Concept comply with this requirement.

**8.6 Section 93130.17(a)(6)**

All emission reductions proposed in this Innovative Concept comply with this requirement as they are real, quantifiable, verifiable, and enforceable. Calculations and data reporting that support this requirement are described in Sections 4, 5, and 9 of this application.

**8.7 Section 93130.17(a)(7)**

All emission reductions proposed in this Innovative Concept 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.

**8.8 Section 93130.17(a)(8)**

The requirement in this section is acknowledged and understood.



**8.9 Section 93130.17(a)(9)**

The requirement in this section is acknowledged and understood.

**8.10 Section 93130.17(a)(10)**

The requirement in this section is acknowledged and understood.



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**8.11 Section 93130.17(a)(11)**

The requirement in this section is acknowledged and understood.

**8.12 Section 93130.17(a)(12)**

The requirement in this section is acknowledged and understood.

**8.13 Section 93130.17(a)(13)**

The requirement in this section is acknowledged and understood. Calculations, data reporting, and procedures that support this requirement are described in Sections 4, 5, 9, and 10 of this application.

**8.14 Section 93130.17(a)(14)**

The requirement in this section is acknowledged and understood.

**8.15 Section 93130.17(a)(15)**

The requirement in this section is acknowledged and understood.



**8.16 Section 93130.17(a)(16)**

The requirement in this section is acknowledged and understood.

**9 Emission Credit Transaction**

The purpose of this application is to develop a system by which alternative sources pollutant sources can be used to aid in compliance with the regulation. The intent of this system is to allow for better utilization of capture and control equipment, which will produce the intended emissions reduction of the regulation while minimizing the cost to achieve those reductions on dollars per ton of toxic pollutant treated basis. There will be instances for which the available capture and control equipment 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 credits available from alternative sources that were generated with the capture and control fleet when not being utilized for compliance purposes.

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Option 1 creates a larger pool of poorly utilized systems significantly driving up the total cost of compliance. Option 2 creates better utilization of a smaller equipment pool reducing the cost of compliance. Several transaction scenarios are required so that the value of the emissions can be optimized relative to the investments made to treat the emissions.

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

### 9.1 Utilization within the Owners Operations



The simplest transaction will be within the organization and is the intended normal transaction 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 an unplanned break down of the capture and control system or weather conditions that prevent the use of the capture and control system.

### 9.2 Transaction with Other Fleets

The primary circumstance under which this scenario would occur when emission reductions credits are shared amongst two organizations. 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 3.6 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 alternative sources 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 transaction of emission reduction credits to the owner of the container vessel.

### 9.3 Selling and Buying Emission Reduction Credits

Due to fluctuations in vessel traffic and the forces that might control the level of traffic to a port, the fleet owner may have created an excess of emission reduction credits beyond their need. In this case the fleet owner may choose to sell those emission reduction credits to another terminal or vessel owner to offset a lack of available capture and control services. The opposite situation might also occur when the capture and control fleet owner does not have enough emission reduction credits to accommodate a situation where capture and control services are not available and would need to buy them from others.

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## 10 Emission Reduction Credit Tracking

Emission tracking is the process by which regulated and alternative sources emissions are balanced to provide compliance. The emission tracking process can be compared to the process of managing a bank account, in that generating credits (adding to the account) and utilizing 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 two forms described in Section 5. Those forms either generate available emissions to be deposited in the account or they quantify the quantity of credits that need to be withdrawn from the account. The entire emission tracking process will be managed by absolute pounds of PM, NO<sub>x</sub>, and ROG.

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 5, "Captured and Controlled Emissions". Withdrawal from a particular pollutant account would be based on the calculated values in the vessel call report, "Vessels Utilizing Emission reduction credits".

### 10.1 Data Management Methods



Each of the vessel call reports described in Section 5 will be identified with a unique serial number. An Emission Reduction Credit System will be developed, specifically for this application, to manage the data from each vessel call report and will also contain transaction accounts for PM, NO<sub>x</sub>, and ROG. The data which populates the emission credit accounts will be transferred from the vessel call reports. An emission credit system will be developed and presented to the Executive Officer for approval prior to it being utilized, and this approval should be a condition of the Executive Order issued in approval of this application.

### 10.2 Data Entry

Data entry to an emissions credit system will be accomplished by reading the vessel call reports electronically. The accuracy of that electronic transfer will be validated as described in Section 11 and 12 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 establish in a written procedure that describes the process. That procedure will be developed by the same entity that will develop the Emission Reduction Credit system.

### 10.3 Data Access

Data reporting to CARB will occur on an annual basis which is consistent with the requirements of the regulation, Section 93130.17(d), unless a different reporting frequency is specified in the Executive Order

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issued as approval of this application. The entirety of the Emissions Reduction Credit system and summaries of the data contained in the system will be provided electronically.

## 11 Emission Reduction Credit - Administration


The Emissions Reduction Credit system will be administered by designated individual(s) within the Shell organization or individuals associated with another business entity that is contracted by Shell for the task of managing and operating the Emission Credit System.

### 11.1 Administrator Responsibilities


The designated person will be responsible for the timely entry of data to the Emissions Reduction Credit System, auditing of the accuracy of data entry, reporting to CARB, and overall distribution of the reduction credits either internally to Shell or to external parties that might want the credits for compliance with the regulation. 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

## 12 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 alternative sources emission capture scenarios. Since early capture and control of vessel emissions prior to the Rule compliance date is being recommended, an early 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 credit program. This review would at a minimum cover the actual emissions reduction services and reporting, data flow to the Shell or third party administrator, data entry and data backup, calculation verification for the “unverified” emissions and reporting back to CARB.

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APPENDIX A  
Captured and Controlled Emissions –  
Sample Vessel Call Report

**APPENDIX A  
EVENT SUMMARY SAMPLE REPORT**

Event Summary Sample Report						
Event Name: _____						
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 _____						
Event:		Start	End	HH:MM:SS		
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 <sub>2</sub> O	_____	_____	_____	_____	_____
UCF-144-A D.P.	"H <sub>2</sub> O	_____	_____	_____	_____	_____
UCF-144-B D.P.	"H <sub>2</sub> O	_____	_____	_____	_____	_____
UCF-144-C D.P.	"H <sub>2</sub> O	_____	_____	_____	_____	_____
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						
NH <sub>3</sub>	ppmv	_____	_____	_____	_____	_____
H <sub>2</sub> O	%v	_____	_____	_____	_____	_____
Ammonia Flow Rate	slpm	_____	_____	_____	_____	_____
NOx						
Inlet NOx	ppmv	_____	_____	_____	_____	_____
Outlet NOx	ppmv	_____	_____	_____	_____	_____
Inlet O <sub>2</sub>	%v	_____	_____	_____	_____	_____
Outlet O <sub>2</sub>	%v	_____	_____	_____	_____	_____
PM						
PM, Inlet	mg/m <sup>3</sup>	_____	_____	_____	_____	_____
PM, Outlet	mg/m <sup>3</sup>	_____	_____	_____	_____	_____
ROG						
ROG, Inlet	ppmv	_____	_____	_____	_____	_____
ROG, Outlet	ppmv	_____	_____	_____	_____	_____
System Performance						
Capture Efficiency	%	_____	_____	_____	_____	_____
NOx Efficiency	%	_____	_____	_____	_____	_____
PM Efficiency	%	_____	_____	_____	_____	_____
ROG Efficiency	%	_____	_____	_____	_____	_____
Vessel Emissions during CAECS						
NOx	g/kW/hr	_____	_____	_____	_____	_____
PM 2.5	g/kW/hr	_____	_____	_____	_____	_____
ROG	g/kW/hr	_____	_____	_____	_____	_____

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APPENDIX B  
Vessels Utilizing Credits –  
Sample Vessel Call Report



**APPENDIX B**

**Data Report - Vessel Call Utilizing Emission Credits**

	Units	Source		Comments
		Primary	Secondary	
<b>Port Data</b>				
Port	POLA	Terminal Scheduling	Agent	
Terminal	Shell Mormon Island	Terminal Scheduling	Agent	
Berth	86A	Terminal Scheduling	Agent	
<b>Terminal Contact Data</b>				
Phone Number - Duty Operator		Terminal Guide	Vessel	
Terminal Person in Charge (TPIC)		TBD	Vessel	
TPIC - Telephone		TBD	Vessel	
TPIC - Email		TBD	Vessel	
<b>Vessel Contact Data</b>				
Phone Number	+870773408701	Q-88	Terminal	
Email	eagle.kinarut@eaglestar.com.my	Q-88	Terminal	
<b>Vessel Data</b>				
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				
<b>Vessel Commercial Operator Contact Information</b>				
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	
<b>Date and Time Data - Vessel</b>				
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 1.3	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 6.3	Calculation		
<b>Fuel Data</b>				
Type Used (Auxiliary & Boilers)	Diesel	Vessel	Terminal	
Sulfur Content	% 0.15	Vessel	Terminal	
Bunker ROB (finished with engines) FWE	m3 280.0	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 - Auxiliary 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
Average Power (Aux) FWE to BCT	kWh 525.2	Calculation		Fuel usage converted to kWh for aux engines
Average 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		
<b>Machinery Configuration</b>				
Auxiliary Engine, count	3	Q-88	Vessel	Section 10.5 of the Q-88
Auxiliary 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
<b>Operations Data</b>				
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
<b>Emission Factors</b>				
PM, auxiliary engines	g/kWh 0.14	EO	Regulation	Net reduction required based on values in Section 17.5(d)(1)
NOx, auxiliary engines	g/kWh 11.0	EO	Regulation	Net reduction required based on values in Section 17.5(d)(1)
ROG, auxiliary 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, auxiliary engines	g 3,214	Calculation		
NOx, auxiliary engines	g 252,553	Calculation		
ROG, auxiliary engines	g 9,643	Calculation		
PM, boilers	g 5,331	Calculation		
NOx, boilers	g 60,921	Calculation		
ROG, boilers	g 3,427	Calculation		
<b>Emissions Requiring IC Credits</b>				
PM	lb 19	Calculation		
NOx	lb 691	Calculation		
ROG	lb 29	Calculation		

**Sample**