

**State of California
AIR RESOURCES BOARD**

Executive Order G-23-293

CARB approval of the AERAS-1 system used to control emissions from container vessels for compliance with the Control Measure for Ocean-Going Vessels At Berth

**AERAS Technologies, LLC (AERAS)
AERAS-1 System (AERAS-1)**

WHEREAS on August 27, 2020, the California Air Resource Board (CARB) adopted the Control Measure for Ocean-Going Vessels (OGV) At Berth, California Code of Regulations, sections 93130 - 93130.22 (2020 At Berth Regulation), which establishes requirements for ocean-going vessels at berth in a California port to reduce oxides of nitrogen (NO_x), diesel particulate matter (PM), and reactive organic gases (ROG) emissions from auxiliary engines;

WHEREAS section 93130.5 of the 2020 At Berth Regulation establishes requirements for an emission control strategy to qualify as a CARB Approved Emission Control Strategy (CAECS) that can be used to reduce emissions from ocean-going vessel auxiliary engines and applicable tanker auxiliary boilers while at berth in a California port;

WHEREAS no emission control strategy may be used to comply with the requirements of the 2020 At Berth Regulation unless CARB approves it as a CAECS;

WHEREAS the 2020 At Berth Regulation requires that the emission control strategy, if applicable for auxiliary engines, achieves emission rates of less than 2.8 grams per kilowatt hour (g/kW-hr) for NO_x, 0.03 g/kW-hr for PM 2.5, and 0.1 g/kW-hr for ROG demonstrated through testing conducted under a CARB approved Test Plan as specified in section 93130.5(d) of the 2020 At Berth Regulation;

WHEREAS for strategies approved after 2020, greenhouse gas (GHG) emissions from the strategy must be grid-neutral using the grid emission rate for the year that the technology is granted an Executive Order, as specified under section 93130.5(d);

WHEREAS the 2020 At Berth Regulation requires that the emission control strategy, if applicable for tanker auxiliary boilers, achieves emission rates less than 0.4 g/kW-hr for NO_x, 0.03 g/kW-hr for PM 2.5, and 0.02 g/kW-hr for ROG demonstrated through testing conducted under a CARB approved Test Plan as specified in section 93130.5(d);

WHEREAS AERAS developed AERAS-1, a barge-based capture and control system to reduce emissions from the auxiliary engines on an ocean-going vessel while at berth;

WHEREAS AERAS submitted their final "AERAS-1 System Test Plan" on April 25, 2023, and CARB issued AERAS a Test Plan approval letter on June 27, 2023;

WHEREAS, AERAS-1 consists of the components and subcomponents specified in the Formal Equipment Description in "AERAS Technologies, LLC Test Report and Request for

Executive Order” (Test Report), including: a placement boom duct and an emission control system comprising of a particulate filter and Selective Catalytic Reduction (SCR) unit to reduce NOx, PM, and ROG;

WHEREAS AERAS submitted the Test Report for the AERAS-1, dated August 15, 2023;

WHEREAS CARB reviewed and evaluated the Test Report and request for Executive Order for the AERAS-1 based on the requirements specified in the 2020 At Berth Regulation;

WHEREAS CARB found the submitted documents indicate AERAS-1 achieves the emission reductions stated in the Test Report and required by the 2020 At Berth Regulation and has GHG emissions that are grid neutral for 2023, as required under section 93130.5(d);

WHEREAS the Executive Officer finds it is appropriate to issue this Executive Order that identifies the operating conditions, recordkeeping, and monitoring requirements for AERAS’ use of the AERAS-1 to allow its use as a CAECS for compliance with the 2020 At Berth Regulation;

WHEREAS this approval does not constitute an air pollution or land use permit nor does it relieve the responsibility of AERAS or the end user to comply with all Federal, State, and local laws, rules, and regulations;

WHEREAS AERAS is subject to the 2020 At Berth Regulation as a CAECS operator;

NOW, THEREFORE, IT IS ORDERED that the AERAS-1 is approved for use in demonstrating compliance with the 2020 At Berth Regulation as a CAECS, when used by AERAS as intended and in accordance with the following terms and conditions, and in accordance with all other applicable requirements in the 2020 At Berth Regulation.

APPROVED OPERATING CONDITIONS

| Parameter | Value |
|---|--|
| Ocean-going vessel engine type | One auxiliary engine |
| Ocean-going vessel type | Container vessel |
| Ocean-going vessel fuel composition limitation | Marine distillate fuel meeting 0.1% sulfur content limit marine gas oil (MGO), marine diesel oil (MDO), or R99/R100 renewable diesel fuels that meet the specifications of MGO/MDO |
| SCR inlet operating temperature range in degrees Fahrenheit (°F) | 400 - 600°F |
| Ocean-going vessel engine maximum continuous rating (MCR) in kilowatts (kW) | 2,195 kW |

| Parameter | Value |
|---|---|
| Ocean-going vessel allowable operating range (kW) | 420 kW to 1,100 kW |
| Allowable exhaust flow rate in standard cubic feet per minute (scfm) | 1,690 to 4,700 scfm of engine exhaust |
| Other parameters that affect performance | A vacuum of less than -0.2 inches of water column (WC) at the AERAS-1 inlet pressure transducer |
| GRID Neutral Target - CA CO ₂ e state output emission rate from eGRID2021 in pounds per megawatt hour (lb/MWh) | 480.5 lb/MWh |
| Average CAECS auxiliary engine operating load (kW) | 62.5 kW |
| AERAS-1 carbon intensity limit in grams of carbon dioxide equivalent per megajoule of fuel (g CO ₂ e/MJ) | 38 g CO ₂ e/MJ fuel |
| Maximum ammonia slip limit in parts per million by volume, dry basis (ppmdv) | 5 ppmdv, averaged over 60 minutes |

OPERATIONAL REQUIREMENTS

BE IT FURTHER ORDERED, AERAS will operate the AERAS-1 following the notification and operational requirements per sections 93130.12(b)(1) and 93130.12(b)(2):

1. At least seven calendar days before a vessel's arrival, the operator of the CAECS must coordinate in writing with the vessel operator and terminal operator for the use of the strategy and supply the vessel operator with information about the compatibility with the vessel and terminal of the CAECS.
2. During each visit, the operator of the CAECS shall:
 - a. Begin controlling emissions within two hours of vessel "Ready to Work";
 - b. Record inlet and outlet levels of emissions during the visit;
 - c. Continue controlling emissions until at least one hour before "Pilot on Board"; and
 - d. Ensure vessels are operating on CARB compliant distillate marine fuel.

MONITORING REQUIREMENTS

BE IT FURTHER ORDERED, for every 1000 hours of operation (and at a minimum annually), AERAS shall submit data to the Executive Officer from the continuous emission monitoring system (CEMS) for each visit the CAECS is operated to verify that the emission reduction

levels are maintained for each visit, and paying the applicable Certification Fees for the At Berth Regulation (Division 3, Chapter 16, Article 7, sections 2913 and 2914).

BE IT FURTHER ORDERED, the CEMS parameters submitted to the Executive Officer must follow the parameters and measurement methods listed in AERAS' Test Plan submitted on April 25, 2023.

BE IT FURTHER ORDERED, within 30 days of a vessel departure, for every visit where AERAS-1 is used as a CAECS, AERAS shall report to CARB visit information as required by section 93130.12(b)(3).

BE IT FURTHER ORDERED, within seven days of a vessel departure, AERAS shall report to their vessel operator customers the information necessary for vessel operators to submit their visit information to CARB as required by section 93130.7(e)(4), including the following:

- 1) Emissions control start date and time;
- 2) Emission control end date and time;
- 3) Details on any delays or interruptions while controlling emissions and the times that emission reductions were uncontrolled during the visit.

BE IT FURTHER ORDERED, when vessel operators submit visit information to CARB as required by section 93130.7(e)(4), the vessel operator must also report the following information per the compliance instructions for section 93130.7(e)(4)(Q):

- 1) Vessel's auxiliary generator load while at berth in kW. Data must be recorded at a minimum of once per hour.

BE IT FURTHER ORDERED, within seven days of a vessel departure, AERAS shall report to their terminal operator customers the information necessary for terminal operators to submit their visit information to CARB as required by section 93130.9(d)(5), including the following:

- 1) Emissions control start date and time;
- 2) Emission control end date and time;
- 3) Details on any delays or interruptions while controlling emissions and the times that emission reductions were uncontrolled during the visit.

BE IT FURTHER ORDERED, AERAS shall maintain the AERAS-1 in accordance with "Section 3.3 Maintenance" of AERAS's Test Report and Request for Executive Order.

BE IT FURTHER ORDERED, the Executive Officer may request that the AERAS-1 be tested annually using the test methods specified in the 2020 At Berth Regulation to demonstrate the overall percentage of the emission reduction being achieved, and the results of such testing shall be provided to the Executive Officer within 30 days of testing per section 93130.5(j) of the 2020 At Berth Regulation.

MALFUNCTION REPORTING AND RECORDKEEPING REQUIREMENTS

BE IT FURTHER ORDERED, AERAS shall report within 24 hours to CARB, by electronic means, any malfunction that is expected to create emissions in excess of any applicable emissions limitation for a period greater than one hour and shall retain for five years all records pertaining to the malfunction pursuant to section 93130.12.

BE IT FURTHER ORDERED, a delay or interruption in emissions control caused by a malfunction is eligible for remediation for the hours of uncontrolled emissions only when CARB is notified by AERAS according to the provisions of section 93130.12(c).

BE IT FURTHER ORDERED, AERAS shall submit a corrective action report within seven calendar days after a malfunction has been corrected as pursuant to section 93130.12(d).

BE IT FURTHER ORDERED, records made pursuant to section 93130.12 shall be kept for a minimum of five years and AERAS shall submit information to CARB according to section 93130.19.

BE IT FURTHER ORDERED, this approval is subject to the following conditions:

- AERAS must submit documentation, within 30 days upon request, to CARB showing AERAS-1 is being maintained and the maintenance schedule in "Section 3.3 Maintenance" of AERAS's Test Report and request for Executive Order is being adhered to.
- AERAS must keep records, including purchase receipts, for a minimum of five years, for diesel and propane fuel purchases demonstrating the fuel used on the AERAS-1 complies with the Approved Operating Conditions in this Executive Order.
- AERAS must communicate with the vessel operator and ensure the vessel is only operating one auxiliary engine while the AERAS-1 is controlling emissions.
- Delays or interruptions in emissions control caused by a malfunction, or when the operational requirements in section 93130.12(b)(2) are not met may result in enforcement actions and ultimately revocation of the EO unless the visits are made compliant through use of the Remediation Fund or with a Vessel Incident Event (VIE) or Terminal Incident Event (TIE).

DESIGN CHANGES AND EXTENSIONS

BE IT FURTHER ORDERED, no modifications to the AERAS-1 system which have any potential to affect emissions control effectiveness or operational performance are permitted to AERAS-1 design, or approved operating parameters set forth in AERAS' application, test plan, and this Executive Order and its appendices, unless CARB is notified in advance per section 93130.5(i)(2). Such modifications may include changes to any part of the AERAS-1 system including the exhaust capture apparatus, ductwork, control equipment, and deployment platform. The modifications must be approved in writing by the Executive Officer and any applicable Certification Fees for the At Berth Regulation (Division 3, Chapter 16, Article 7, sections 2913 and 2914) must be paid before the modifications may be used for compliance with the 2020 At Berth Regulation. The Executive Officer may revoke this

Executive Order if the AERAS-1 design or approved operating parameters are changed without prior notification and approval by the Executive Officer.

BE IT FURTHER ORDERED, this Executive Order shall have a duration of five years from the date it is executed unless it is revoked by CARB as set forth in section 93130.5(l). As specified in section 93130.5(i)(1), at least six months prior to the expiration of this Executive Order, AERAS may apply for an extension by submitting an extension application to the Executive Officer asserting that the strategy has not changed and is still effective, following the requirements specified in section 93130.5(d), as provided in section 93130.5(i)(1) of the 2020 At Berth Regulation, after paying any applicable Certification Fees for the At Berth Regulation (Division 3, Chapter 16, Article 7, sections 2913 and 2914).

BE IT FURTHER ORDERED, marketing of the AERAS-1 using any identification other than that shown in this Executive Order or marketing of the AERAS-1 for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from CARB.

BE IT FURTHER ORDERED, this Executive Order does not relieve AERAS from complying with all other applicable regulations.

BE IT FURTHER ORDERED, this Executive Order may be revoked if the Executive Officer determines that AERAS-1 does not comply with any of the requirements in this Executive Order.

Executed at Sacramento, California, this 4th day of December, 2023.



Bonnie Soriano, Branch Chief
Freight Activity Branch
Transportation and Toxics Division