

December 4, 2023

Mr. Randall Pasek  
STAX Engineering, Inc.  
95 Pine Avenue Suite 943  
Long Beach, California 90802  
[r.pasek@staxengineering.com](mailto:r.pasek@staxengineering.com)

Dear Mr. Pasek:

California Air Resources Board (CARB) staff has reviewed STAX Engineering, Inc.'s (STAX) Test Report and request for Executive Order (EO) for container vessels dated May 2, 2023, and supplemental information submitted on August 25, 2023, September 5, 2023, September 22, 2023, October 9, 2023, October 13, 2023, and October 23, 2023, for the STAXbox.A-1 barge-based capture and control system for auxiliary marine diesel engines. The purpose of the Test Report and Request for EO was to provide emission measurements and associated information to support the development of approved operating conditions for the STAXbox.A-1 for use as a CARB Approved Emissions Control Strategy (CAECS) by container vessels in accordance with CARB's Control Measure for Ocean-Going Vessels At Berth (2020 At Berth Regulation). CARB staff's review of STAX's Test Report for container vessels was based on the requirements in the 2020 At Berth Regulation, the guidelines provided in CARB's "Revised Performance and Testing Guidelines for Emissions Control Strategies on Ocean-Going Vessels" (Revised Guidelines) and STAX's Test Plan for container vessels which was submitted on February 28, 2023, and approved on April 10, 2023.

CARB staff also reviewed STAX's Test Report for roll-on/roll-off (ro-ro) vessels dated May 26, 2023, based on the requirements in the 2020 At Berth Regulation, the guidelines provided in CARB's Revised Guidelines, and STAX's Test Plan for ro-ro vessels which was submitted on February 28, 2023, and approved on April 10, 2023. As explained in CARB's approval letter for STAX's Test Plan for ro-ro vessels, Executive Order approval and approved operating conditions for ro-ro vessels will only be issued after successful completion of emissions testing on ro-ro vessels, and successful issuance and approval of the operating conditions of an Executive Order for container vessels. The ro-ro vessel Test Plan and Test Report are mentioned here to acknowledge that CARB has accepted STAX's request dated October 19, 2023, that emissions testing results from ro-ro vessels be applied to the container vessel application and to the approved operating conditions of the container Executive Order.

We are pleased to inform you that we have approved the results of the emissions measurements and are issuing the enclosed Executive Order G-23-294. Executive Order G-23-294 identifies the monitoring, reporting, and recordkeeping requirements for the STAXbox.A-1 and stipulates the approved operating conditions for the use of the STAXbox.A-1 which are identified in the table below.

**STAXbox.A-1 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 (0.1% sulfur marine gas oil (MGO) or marine diesel oil (MDO)), or R99/R100 renewable diesel fuels that meet the specifications of MGO/MDO
Selective catalytic reduction (SCR) inlet operating temperature range in degrees Fahrenheit (°F)	600-720°F
Ocean-going vessel engine maximum continuous rating (MCR) in kilowatts (kW)	3,500 kW
Ocean-going vessel allowable operating range (kW)	266 - 890 kW
Allowable exhaust flow rate in standard cubic feet per minute (scfm)	3,642-6,330 scfm of engine exhaust
Maximum engine exhaust temperature requirements	1,000°F
Static pressure	Differential pressure between -2 to -20 inches of water across the diesel particulate filter
Other parameters that affect performance	1-2 inches of water back pressure at the capture system inlet
GRID Neutral Target – CA CO <sub>2</sub> e state output emission rate from eGRID2021 in pounds per megawatt hour (lb/MWh)	480.5 lb/MWh
Maximum CAECS auxiliary generator operating load (kW)	382 kW
CAECS auxiliary generator renewable diesel carbon intensity limit in grams of carbon dioxide equivalent per megajoule of fuel (g CO <sub>2</sub> e/MJ)	29.49 g CO <sub>2</sub> e/MJ fuel
Maximum ammonia slip emissions in parts per million by volume, dry basis (ppmdv)	5 ppmdv averaged over 60 minutes

The STAXbox.A-1 has been granted Executive Order G-23-294 under the 2020 At Berth Regulation, California Code of Regulations, title 17, section 93130.5(e)(3) and may operate under the terms specified in the Executive Order for five years as a CAECS before needing to apply for an extension, as specified in section 93130.5(i)(1). Additional vessel source testing and an extension application would be necessary to extend the range of approved operating conditions or the inclusion of additional vessel types.

In closing, we appreciate the opportunity to work with STAX in its efforts to implement a barge-based capture and control system to treat container vessel auxiliary engine emissions while at berth. If you have any questions, please contact Angela Csondes, Manager, Marine Strategies Section at [angela.csondes@arb.ca.gov](mailto:angela.csondes@arb.ca.gov). In addition, please feel free to contact Nick Storelli, Air Resources Engineer, Marine Strategies Section at [nicholas.storelli@arb.ca.gov](mailto:nicholas.storelli@arb.ca.gov).

Sincerely,

A handwritten signature in blue ink, appearing to read "Bonnie Soriano".

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

Enclosure: Executive Order G-23-294

cc: Angela Csondes, Manager, Marine Strategies Section