September 24, 2024

Michael Walker, CEO
STAX Engineering, Inc.
65 Pine Avenue, Suite 943
Long Beach, California 90802
m.walker@staxengineering.com

Dear Michael Walker:

California Air Resources Board (CARB) staff have reviewed the "Addendum to February 28, 2023 Test Plan" submitted June 21, 2024, and request for Executive Order (EO) approval for the STAXbox 2-1 capture and control system for auxiliary marine diesel engines on auto carriers/roll-on roll-off (ro-ro) vessels.

The purpose of the "Addendum to February 28, 2023 Test Plan" was to verify and attest that STAXbox 2-1 is a duplicate of STAXbox 1-1, the system formerly named STAXbox.A-1 which was approved under EO G-24-054. Since STAXbox 2-1 is a duplicate of the already approved STAXbox 1-1, STAXbox 2-1 is eligible for EO approval and can be added to an approved equipment list.

For duplicate systems (once they are confirmed as duplicates) that are identical to one that CARB previously approved through an EO, the CARB Approved Emission Control Strategy (CAECS) operator may request that the duplicate system be added to an approved equipment list attached to the previously issued EO. Once an updated EO is issued, the duplicate system may operate as a CAECS to comply with the 2020 At Berth Regulation. Each duplicate system will be required to complete in-use compliance testing, confirming the performance of the duplicate equipment per section 93130.5(j) of the 2020 At Berth Regulation, and must submit test data to CARB within six months of operation or 30 vessel visits, whichever comes first. If the CAECS operator fails to submit test results for the new system within the specified timeframe, or if the new system fails to perform equivalently to the original approved system, the Executive Officer may revoke its approval of the duplicate system and remove it from the EO.

The following in-use compliance tests must be conducted on duplicate equipment within 6 months or 30 vessel visits, whichever comes first after the duplicate equipment is approved and added to the EO.

1. Third-party source testing for all pollutants listed in section 93130.5 (g) at one load point following the requirements and test methods listed in section 93130.5(g) with Relative Accuracy Test Audit (RATA) testing.
2. Third-party capture efficiency testing at one load point per vessel on two separate vessels with different reach to and/or positioning of the exhaust stack.
3. Durability testing on a minimum of 5 vessels and a minimum of 200 hours.

CARB staff's review of STAX's "Addendum to February 28, 2023 Test Plan" was based on the requirements in the 2020 At Berth Regulation and STAX's Test Plan for ro-ro vessels, submitted on February 28, 2023.

We are pleased to inform you that we have approved STAXbox 2-1 to be a duplicate of STAXbox 1-1 and are issuing the enclosed EO G-24-054-001. Executive Order G-24-054 is hereby superseded and is of no further force and effect.

As requested in the "Addendum to February 28, 2023 Test Plan", STAX can apply container vessel test results toward the in-use compliance testing requirement for ro-ro duplicate equipment. Container vessels may be used to complete the third-party source testing and up to 150 hours of durability testing; the remaining in-use compliance testing requirements (third-party capture efficiency testing on two separate vessels, and durability testing for a minimum of 50 hours) must be completed with ro-ro vessels.

STAX must conduct the above in-use compliance testing on the duplicate equipment (STAXbox 2-1) within 6 months (by March 24, 2025) or 30 vessel visits, whichever comes first.

Executive Order G-24-054-001 identifies the monitoring, reporting, and recordkeeping requirements for the STAXbox systems (STAXbox 1-1 and STAXbox 2-1) and stipulates the approved operating conditions for the use of the STAXbox systems, which are identified in the table below.

Parameter	**Value**
Ocean-going vessel engine type	One auxiliary engine
Ocean-going vessel type	Ro-ro 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))
Selective catalytic reduction inlet operating temperature range in degrees Fahrenheit (ºF)	600 – 720ºF
Ocean-going vessel engine maximum continuous rating (MCR) in kilowatts (kW)	3,500 kW
Ocean-going vessel allowable operating range (kW)	266 kW to 890 kW
Allowable exhaust flow rate in standard cubic feet per minute (scfm)	3,642 to 6,330 scfm of engine exhaust
Maximum engine exhaust temperature requirements	1,000ºF
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

Parameter	Value
GRID Neutral Target – CA CO2e state output emission rate from eGRID2021 in pounds per megawatt hour (lb/MWh)	457.5lb/MWh
Maximum CAECS auxiliary generator operating load (kW)	320 kW
CAECS auxiliary generator renewable diesel carbon intensity limit in grams of carbon dioxide equivalent per megajoule of fuel (g CO2e/MJ)	19.16g CO2e/MJ fuel
Maximum ammonia slip emissions in parts per million by volume, dry basis (ppmdv)	5 ppmdv averaged over 60 minutes

Executive Order G-24-054-001 identifies the approved STAXbox systems and the vessel and engine types for which the STAXbox systems are approved to control in the approved equipment list (Attachment 1 of EO G-24-054-001) and identified below.

Approved Equipment List

Barge	STAXbox	Ocean-going Vessel Type	Ocean-going Vessel Engine Type	Capture Hood Type	In-Use Compliance Testing
Xcraft-1	STAXbox 1-1	Ro-ro vessel	One auxiliary engine	Flex duct	Original STAXbox system approved, and not a duplicate. No Requirement.
Xcraft-2	STAXbox 2-1	Ro-ro vessel	One auxiliary engine	Flex duct	Test data must be submitted to CARB within 30 vessel visits or by March 24, 2025, whichever comes first.

STAXbox 2-1 has been granted EO G-24-054-001 under the 2020 At Berth Regulation, California Code of Regulations, title 17, section 93130.5(e)(3) and the approved equipment (STAXbox 1-1 and STAXbox 2-1) may operate under the terms specified in the EO as a CAECS for five years from the date when STAXbox1-1 was approved (March 21, 2024) before needing to apply for an extension, as specified in section 93130.5(i)(1).

For future duplicate system(s) to be added as approved equipment on an Executive Order, STAX will again need to submit information confirming that there are no modifications to design or operation for future system(s) as compared to the existing approved equipment. When requesting approval for future duplicate system(s), please submit the following information in writing to assist CARB in verifying that there are no modifications (as described in section 93130.5(i)(2)):

- ID number for this new piece of equipment
- Brief description of the control strategy's operation, confirm no changes
- Brief description of the monitoring and notification system, confirm no changes
- List of all components (provide spec sheets as applicable), confirm no changes
- Confirm no changes requested to any portion of the Executive Order approval
- Refer to previously approved test plan, agree to abide by test procedures (to be used for in-use compliance testing, as applicable) and maintenance procedures
    - Option to include test plan as an attachment, or submit a truncated version applicable to this new request

Per section 93130.19, this information may be submitted via email to shorepower@arb.ca.gov, and shall include an attestation that the information is true, accurate, and complete, signed under penalty of perjury.

If you have any questions, please contact Angela Csondes, Manager, Marine Strategies Section, at *angela.csondes@arb.ca.gov*.

Sincerely,

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

Attachment: EO G-24-054-001

cc: Angela Csondes, Section Manager, Marine Strategies Section