State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER DE-13-004

The diesel emission control strategy described herein qualifies as a potential compliance option for the Air Resources Board's (ARB) in-use diesel fleet rules.

Pursuant to the authority vested in ARB by the *Health and Safety Code*, Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by *Health and Safety Code* Sections 39515 and 39516 and Executive Order G-02-003;

Relating to Exemptions under Section 38395 of the *Vehicle Code*, and Verification under Sections 2700 to 2711 of Title 13 of the *California Code of Regulations* (CCR)

ESW CleanTech, Incorporated (ESW CleanTech)
Phoenix Diesel Particulate Filter System (Phoenix)

ARB has reviewed ESW CleanTech's request for verification of the Phoenix system. Based on an evaluation of the data provided, and pursuant to the terms and conditions specified below, the Executive Officer of ARB hereby finds that the Phoenix system reduces emissions of diesel particulate matter (PM) consistent with a Level 3 device (greater than or equal to 85 percent reductions) (Title 13, CCR, Sections 2702 (f) and Section 2708) and is compliant with the 2009 nitrogen dioxide emissions limit. Accordingly, the Executive Officer determines that the system merits verification and, subject to the terms and conditions specified below, classifies the Phoenix system as a Level 3 Plus system for off-road equipment, which includes portable equipment, that use certain diesel engines. Engines for which the Phoenix system is verified, the verified parts list, the verified labels, swapping and re-designation information, and other product information can be found here:

http://www.arb.ca.gov/diesel/verdev/companies/esw/phoenix.htm.

The aforementioned verification is subject to the following terms and conditions:

- The engine must be used in off-road equipment.
- The application must not be a transport refrigeration unit, auxiliary power unit, rubber-tired gantry crane, marine vessel, or locomotive.
- The engine must be certified for off-road applications unless it belongs to the family 1CEXH0359BAV and is used to power off-road equipment.
- The engine must have a minimum displacement of 3.4 liters and maximum displacement of 12 liters.

- The engine must have a rated power of at least 100 horsepower but not more than 450 horsepower.

- Only one filter may be installed per engine.

- The engine must be in its original certified configuration.

- The engine must have a PM certification level of at most 0.2 grams per brake horsepower-hour (g/bhp-hr), and greater than 0.01 g/bhp-hr.

- The engine must not be certified as having exhaust gas recirculation (EGR).

- The engine must not have an internal EGR system.

- The engine must not have a pre-existing original equipment manufacturer (OEM) diesel oxidation catalyst (DOC) unless the following conditions are met:
  - The DOC is left in place and not removed.
  - The Phoenix system is installed downstream of the DOC.
  - The backpressure is measured upstream of the DOC.

- The engine must not be certified to have an OEM diesel particulate filter (DPF).

- The engine must have a four-stroke combustion cycle.

- The engine may be turbocharged or naturally aspirated.

- The engine may be mechanically or electronically controlled.

- The engine must be well maintained and not consume lubricating oil at a rate greater than that specified by the engine manufacturer.

- Lube oil, or other oil, must not be mixed with the fuel.

- The engine must be operated on fuel that has a sulfur content of no more than 15 parts per million by weight.

- The system must not be operated with fuel additives, as defined in Section 2701 of Title 13, of the CCR, unless explicitly verified for use with fuel additive(s).

- The system must not be used with any other systems or engine modifications without approval from ARB and the manufacturer.

- The system must be installed with a backpressure monitor to notify the operator when the backpressure limit is reached. The notification must occur and be clearly

visible to the operator while the vehicle or equipment is in use.

- The other terms and conditions specified below.

IT IS ALSO ORDERED AND RESOLVED: That installation of the Phoenix system, manufactured by ESW CleanTech Incorporated, 6755 Mira Mesa Boulevard, Suite 123-122, San Diego, California 92121, has been found not to reduce the effectiveness of the applicable vehicle pollution control system, and therefore the Phoenix system is exempt from the prohibitions in Sections 38390 and 38391 of the *Vehicle Code* for installation on off-road equipment. This exemption is only valid provided the engines meet the aforementioned conditions.

ARB reserves the right in the future to review this Executive Order and the exemption and verification provided herein to assure that the exempted and verified add-on or modified part continues to meet the standards and procedures of CCR, Title 13, Section 2222, et seq, and CCR, Title 13, Sections 2700 through 2711.

The Phoenix system consists of the following major system components, listed in order from exhaust inlet to outlet as they are arranged within the exhaust system of the vehicle: one inlet cone and burner assembly (includes one catalyzed exhaust flow conditioner), one silicon carbide wall-flow DPF, and one outlet cone. The Phoenix system also includes a backpressure monitor and warning system. The major components of the Phoenix system are identified in the parts list. The parts list and schematics of the approved product and engine labels are available on the website shown above.

The Phoenix system is comprised of a single silicon carbide wall-flow DPF designed to filter the exhaust from a single engine. Phoenix systems with multiple DPFs, including designs with two or more filter components canned together or multiple individually-canned filter components in parallel or in series (or any combination thereof), are not valid under this Executive Order. Channeling exhaust from a single engine through multiple Phoenix systems, deployed in parallel or in series or any combination thereof, is also not valid under this Executive Order.

No changes are permitted to the system. ARB must be notified, in writing, of any changes to any part of the Phoenix system. Any changes to the system must be evaluated and approved in writing by ARB. Failure to do so shall invalidate this Executive Order.

ESW CleanTech must provide each installer with the specific criteria used to determine the compatibility of the Phoenix system with a candidate engine pursuant to Section 2706(t), Title 13, CCR.

ESW CleanTech must ensure that the installation of the Phoenix system conforms to all applicable industrial safety requirements.

Prior to the sale of a Phoenix system, ESW CleanTech must provide each prospective owner/purchaser with a written estimate of the number of hours of vehicle operation that will typically elapse before regeneration is required. ESW CleanTech must also provide, in writing, the length of time of a typical regeneration event.

Changes made to the design or operating conditions of the Phoenix system, as exempted by ARB, which adversely affect the performance of the vehicle's pollution control system, shall invalidate this Executive Order.

This Executive Order is valid provided that installation instructions for the Phoenix system do not recommend tuning the vehicle to specifications different from those of the vehicle manufacturer.

Marketing of the Phoenix system using identification other than that shown in this Executive Order or for an application other than that listed in this Executive Order shall be prohibited unless prior written approval is obtained from ARB.

This Executive Order shall not apply to any Phoenix system advertised, offered for sale, sold with, or installed on a motor vehicle prior to or concurrent with transfer to an ultimate purchaser.

A copy of this Executive Order must be provided to the ultimate purchaser at the time of sale.

As specified in Section 2706(j) (Title 13, CCR) of the *Verification Procedure, Warranty, and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines* (Procedure), ARB assigns each diesel emission control strategy a family name. The designated family name for the verification as outlined above is:

CA/ECT/2009/PM3+/N00/OF/DPF01

The designated family name CA/ECT/2009/PM3+/N00/OF/DPF01 replaces the previous name CA/CLE/2009/PM3+/N00/OF/DPF01.

As stated in the Procedure, ESW CleanTech is responsible for recordkeeping requirements (Section 2702), honoring the required warranty (Section 2707), and conducting in-use compliance testing (Section 2709).

Proper engine maintenance is critical for the proper functioning of the diesel emission control strategy. The owner of the vehicle on which the diesel emission control strategy is installed is strongly advised to adhere to all good engine maintenance practices. Failure to document proper engine maintenance, including keeping records of the engine's oil consumption, may be grounds for denial of a warranty claim.

Use of system parts or replacement parts not authorized by ESW CleanTech may be grounds for denial of a warranty claim.

This Executive Order is valid provided that the diesel fuel used in conjunction with the system complies with Title 13, CCR, Sections 2281 and 2282, and if biodiesel is used, the biodiesel blend shall be 20 percent or less subject to the following conditions:

- The biodiesel portion of the blend complies with the American Society for Testing and Materials specification D6751 applicable for 15 parts per million sulfur content.

- The diesel fuel portion of the blend complies with Title 13, CCR, Sections 2281 and 2282.

Other alternative diesel fuels such as, but not limited to, ethanol diesel blends and water emulsified diesel fuel are excluded from this Executive Order.

The Phoenix system must not be located over any occupied space (e.g., driver or passenger compartments) or any other location deemed unacceptable by ESW CleanTech, and must not be installed in a way which would result in noncompliance with any applicable safety standards.

Systems verified under this Executive Order shall conform to all applicable California emissions regulations.

The terms and conditions of this Executive Order must be satisfied regardless of where the system is sold in order for the system to be considered verified.

Systems sold as verified, or which carry the ARB-approved label, must satisfy all the terms and conditions of this Executive Order.

This Executive Order does not release ESW CleanTech from complying with all other applicable regulations.

Violation of any of the above conditions shall be grounds for revocation of this Executive Order.

This Executive Order hereby supersedes the conditional verification letter with reference number 11-661-835 (dated June 16, 2011).

Executed at El Monte, California, and effective this 6th day of September 2013.

Annette Hebert, Chief
Mobile Source Control Division