



Air Resources Board



Linda S. Adams
Acting Secretary for
Environmental Protection

Mary D. Nichols, Chairman
9480 Telstar Avenue, Suite 4
El Monte, California 91731 www.arb.ca.gov

Edmund G. Brown Jr.
Governor

June 16, 2011

Reference No.: 11-661-835

Ms. Ellen Garvey
Claire Advanced Emission Controls
14775 Wicks Boulevard
San Leandro, California 94577

Dear Ms. Garvey:

Using the *Verification Procedure, Warranty, and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines* ("Procedure," Title 13, California Code of Regulations (CCR), Sections 2700-2711), Air Resources Board (ARB) staff reviewed your application for conditional verification of the Phoenix™ system for use with off-road diesel engines. 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 plus device (greater than or equal to an 85 percent reduction and meets the 2009 nitrogen dioxide emissions limit) (Title 13, CCR, Sections 2702 (f) and 2708). The Executive Officer also finds that the Phoenix™ system satisfactorily completed 33 percent of the durability demonstration period. Accordingly, the Executive Officer determines that the system merits conditional verification and, subject to the terms and conditions specified below, classifies Claire's Phoenix™ system as a Level 3 plus system for off-road vehicles and portable equipment using engines from the engine families listed in Attachment 1. In addition, the Phoenix™ system is conditionally verified for use with 2001 model year Cummins 5.9 liter on-road certified diesel engines in the engine family 1CEXH0359BAV, but only when used to power off-road vehicles or equipment.

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

- Claire has completed all requirements as specified in the letter 10-661-540 prior to the May 24, 2011, deadline stated therein. The Phoenix™ system will therefore remain conditionally verified until ARB staff completes its review of the application.
- Conditional verification is equivalent to verification for the purposes of satisfying the requirements of in-use emission control regulations.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: <http://www.arb.ca.gov>.

California Environmental Protection Agency

- Only one filter may be installed per engine.
- The engine must not be in an auxiliary power unit for on-road trucks, transport refrigeration unit, gantry crane, stationary application, marine vessel, or locomotive.
- The engine must be originally manufactured from model year 1996 through 2010 and have an engine family name listed in Attachment 1.
- The engine displacement must be between 3.4 and 12 liters, inclusive.
- The engine must be in its original certified configuration.
- The engine must have a PM certification level of at most 0.20 grams per brake horsepower-hour (g/bhp-hr), and greater than 0.01 g/bhp-hr.
- The engine must have a maximum power output rating of at least 100 horsepower and at most 450 horsepower.
- The engine must not be certified as having exhaust gas recirculation.
- The engine must not be certified with a pre-existing oxidation catalyst from the original equipment manufacturer (OEM) unless following conditions are met:
 - The OEM diesel oxidation catalyst is left in place and not removed.
 - The Phoenix™ is installed downstream of the diesel oxidation catalyst.
 - The backpressure sensor is installed upstream of the diesel oxidation catalyst.
- The engine must not be certified with a pre-existing OEM diesel particulate filter (DPF).
- The engine must be certified for off-road applications unless it belongs to the on-road family 1CEXH0359BAV and is used to power off-road vehicles and equipment.
- 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 (ppm) by weight.
- The Phoenix™ 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 Phoenix™ system must not be used with any other systems or engine modifications without ARB and manufacturer approval.
- The Phoenix™ 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 DPF component of the system may be swapped among other systems with the same diesel emission control strategy family name if authorized by Cleaire. DPF swapping must be performed in accordance with Section 2706, Title 13, CCR, and the policy document found here: <http://www.arb.ca.gov/diesel/verdev/swap/swap.htm>
- The system may be re-designated in its entirety to other vehicles or equipment within a common ownership fleet if authorized by Cleaire. A system re-designation must be performed in accordance with Section 2706, Title 13, CCR, and the policy document found here: <http://www.arb.ca.gov/diesel/verdev/swap/swap.htm>
- The other terms and conditions specified below.

It is also ordered and resolved that installation of the Phoenix™ system, manufactured by Cleaire Advanced Emissions Controls of 14775 Wicks Boulevard, San Leandro, California 94577, 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 vehicles using engines listed in Attachment 1.

This exemption is only valid provided the engines meet the aforementioned conditions.

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 catalyzed exhaust flow conditioner, one inlet cone and diesel fuel burner assembly, 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 Attachment 2. Schematics of the approved product and engine labels are shown in Attachment 3.

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.

This conditional verification letter 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.

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

No changes are permitted to the device. ARB must be notified, in writing, of any changes to any part of the Phoenix™ system. Any changes to the device must be evaluated and approved in writing by ARB. Failure to do so invalidates this conditional verification.

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, invalidate this conditional verification.

Marketing of Phoenix™ using identification other than that shown in this conditional verification letter or for an application other than that listed in this conditional verification letter is prohibited unless prior written approval is obtained from ARB.

Identification must include both device and engine labels consistent with the requirements of Title 13, CCR, Section 2706 and Attachment 3 of this conditional

verification letter. Changes or modifications to the label or label placement are prohibited without prior written approval from ARB.

This conditional verification does 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 conditional verification letter must be provided to the ultimate purchaser at the time of sale.

As specified in the Procedure, ARB assigns each diesel emission control strategy a family name. The designated family name for the conditional verification as outlined above is:

CA/CLE/2009/PM3+/N00/OF/DPF01.

As stated in the Procedure, Cleaire 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.

This conditional verification is valid provided that the diesel fuel used in conjunction with the device complies with Title 13, CCR, Sections 2281 and 2282, and if biodiesel is used, the biodiesel blend must 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 ppm sulfur content; and
- 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 conditional verification.

Proper engine maintenance is critical for the proper functioning of the diesel emission control strategy. The owner and/or operator of the vehicle on which the diesel emission control strategy is installed is strongly advised to adhere to all good engine maintenance

Ms. Ellen Garvey
June 16, 2011
Page 6

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.

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

Systems conditionally verified in this letter must conform to all applicable California emissions regulations.

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

This conditional verification does not release Cleaire from complying with all other applicable regulations.

Violation of any of the above conditions is grounds for revocation of this conditional verification.

This conditional verification letter hereby supersedes the conditional verification letters 10-661-726 (dated January 18, 2011), 10-661-541 (dated May 24, 2010), 09-661-361 (dated January 10, 2010), and 09-661-078 (dated April 20, 2009).

Thank you for participating in ARB's diesel emission control strategy verification program. If you have any questions or comments, please contact Ms. Shawn Daley, Manager, at (626) 575-6972 or by email at sdaley@arb.ca.gov.

Sincerely,



Robert H. Cross, Chief
Mobile Source Control Division

Attachment 1: ARB-Approved Engine Families for the Cleaire Phoenix System
Attachment 2: Parts List for the Cleaire Phoenix System
Attachment 3: Label for the Cleaire Phoenix System

cc: Ms. Shawn Daley, Manager
Heavy-Duty Diesel In-Use Strategies Branch