Air Resources Board

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Linda S. Adams
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

April 20, 2009

Mr. Tom Swenson
Cleaire Advanced Emission Controls
14775 Wicks Boulevard
San Leandro, California 94577

Ref. No.: 09-661-078

Dear Mr. Swenson:

Using the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines* (Procedure), 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, ARB hereby finds that Phoenix™ 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 standard). ARB also finds that Phoenix™ satisfactorily completed 33 percent of the durability demonstration period. Accordingly, ARB determines that the system merits conditional verification and, subject to the terms and conditions specified below, classifies Cleaire's Phoenix™ as a Level 3 plus system for rubber-tired off-road vehicles using engines from the engine families listed in Attachment 1. In addition, the Phoenix™ is conditionally verified for use with 2001 model year Cummins 5.9 liter on-road certified diesel engines of 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:

- Phoenix™ is conditionally verified for a period not to exceed 1 year from the date of this letter. For the Phoenix™ to be considered for full verification, Cleaire must complete all remaining requirements as specified in the letter 08-661-077 within 1 year of the date of this letter.
- Conditional verification is equivalent to verification for the purposes of satisfying the requirements of in-use emission control regulations.
- Only one filter may be installed per engine.
- The engine must be originally manufactured from model year 1996 through 2009 and have an engine family name listed in Attachment 1.
- The engine may have a maximum displacement up to 12 liters.

- The engine must be in its original certified configuration.
- The engine must have a PM certification level of at most 0.20 grams per horsepower-hour (g/bhp-hr), and greater than 0.01 g/bhp-hr.
- The engine must not be certified as having exhaust gas recirculation.
- The engine must not have a pre-existing oxidation catalyst from the original equipment manufacturer.
- The engine must not have a pre-existing diesel particulate filter from the original equipment manufacturer.
- The engine must be certified for off-road application unless the on-road certified engine is used to power off-road vehicles and equipment.
- The engine must be four-stroke.
- The engine can be turbocharged or naturally aspirated.
- The engine can 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.
- Phoenix™ must not be operated with fuel additives, as defined in Section 2701 of Title 13, of the California Code of Regulations (CCR), unless explicitly verified for use with fuel additive(s).
- Phoenix™ must not be used with any other systems or engine modifications without ARB and manufacturer approval.
- 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 Phoenix™ 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.

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, section 2474, et seq and sections 2700 through 2710, of the CCR.

The Phoenix™ system consists of a catalyzed exhaust flow conditioner, a silicon carbide wall-flow diesel particulate filter, a diesel fueled burner assembly, an electronic controller, and control sensors. The diesel fueled burner assembly includes a glow plug, a fuel metering pump, a fuel solenoid, and an air blower. The sensors include an engine speed sensor, two exhaust temperature sensors, and an engine backpressure sensor. 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.

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/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 Phoenix™. Any changes to the device must be evaluated and approved by ARB. Failure to do so invalidates this conditional verification.

Changes made to the design or operating conditions of Phoenix™, as exempted by ARB, which adversely affect the performance of the vehicle's pollution control system, invalidates 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 the procedure (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™ advertised, offered for sale, sold with, or installed on a motor vehicle prior to or concurrent with transfer to an ultimate purchaser.

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).

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 (ASTM) 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.

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

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 (ref. no. 09-661-078) is effective as of this 20th day of April 2009.

This conditional verification ref. no. 09-661-078 hereby supersedes the conditional verification ref. no. 09-661-058 dated March 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
Attachment 2: Parts List for the Cleaire Phoenix
Attachment 3: Label for the Cleaire Phoenix

cc: Ms. Shawn Daley, Manager
Retrofit Assessment Section

bcc: Erik White, MSCD
Dean Bloudoff, MSCD