

In-Use Emissions Report for Heavy-Duty Diesel Engine *Shows substantial margin to the most stringent EPA NO_x proposed regulation*

SAN DIEGO, April 19, 2022 - Achates Power has announced initial in-use NO_x measurements from the cleaner, heavy-duty diesel engine it developed in a project funded by the California Air Resources Board (CARB) and several partners. Achates Power previously announced the opposed-piston has entered fleet service with WALMART Corporation in a Peterbilt 579 tractor. It is the only diesel engine operating on the road capable of meeting CARB's 2027 regulation, which requires a 90% reduction in emissions of nitrogen oxide (NO_x) compared to current standards. In addition, the Environmental Protection Agency (EPA) recently released its proposed rule to lower NO_x emissions levels for commercial vehicles across the entire United States. Option 1 from EPA is similar in many respects to the CARB regulation.

Both CARB and EPA have introduced Low Load requirements, in-use NO_x measurement updates, and limits on permissible real-world emissions.

Before entering fleet service, the engine was extensively tested, and the ultra-low emissions and improved fuel efficiency were measured and confirmed at the Aramco Research Center-Detroit. The University of California, Riverside (UCR) provided the in-use emissions measurements, using a Portable Emissions Measurements System (PEMS).

"The PEMS measurements conducted by UC-Riverside for CALSTART on the Peterbilt 579 powered by the Achates Power 10.6L heavy-duty opposed-piston engine demonstrated NO_x emissions control far better than other diesel engines we have tested," said Kent Johnson, Principal Investigator, Emissions and Fuels Research, UCR. "This first round of measurements performed over 3 days in December 2021 in the California San Joaquin Valley with ambient temperatures in the mid-40s °F while the vehicle was in active fleet operation showed between a 99% and 50% margin to the most stringent EPA 2031+ in-use NO_x proposed Regulations, which is outstanding."

At low speeds, typical of driving in urban and other congested areas, today's heavy-duty vehicles by contrast can emit five times the today's higher certification limit. In-use testing is an important assessment of real-world emissions and emission control strategy practical robustness.

"Achates Power is pleased with this initial in-use assessment as it confirms that opposed-piston engines have inherent advantages in both low criteria emissions and low CO₂," said Dave Crompton, President, and CEO of Achates Power. "It is particularly noteworthy that we were able to achieve the extremely stringent in-use NO_x limits without any additional emissions control devices while reducing cost, complexity, and compliance risk. As our engineers refine the emissions control systems, we expect further increase in performance and emissions control."

CALSTART managed the demonstration project team, which consisted of Achates Power and the team of technology providers. South Coast Air Quality Management District, San Joaquin Valley Air Pollution Control District, and the Sacramento Metro Air Quality Management District provided additional support and funding for the project.

In addition to lower in-use NO_x, the demonstration program also shows that the opposed-piston provides a fuel economy improvement of more than 10% compared to reference trucks currently in service. Improving fuel economy both reduces the cost of operation and provides a commensurate reduction in CO₂ emissions.

The opposed-piston engine can use existing manufacturing facilities, processes, and materials to allow rapid time-to-market and deployment. It also uses existing components and supply chains. It is expected to cost less than current engines, even as it meets much more stringent environmental regulations and fuel efficiency. It does not require any additional emissions control devices and has a reduced part count compared to conventional engines. Building off these demonstrated achievements, Achatas Power is conducting further testing with a fully aged catalyst (the equivalent of 800,000 miles of operation) to demonstrate sustained ability to meet CARB and EPA Option 1 stringent standards.

About Achatas Power, Inc.

The Achatas Power Opposed-Piston Engine is engineered to meet future emissions and fuel economy standards more cost effectively than any other engine solution. Founded with the mission to build cleaner, more efficient engines, Achatas Power has an experienced staff of engineers and scientists working with leading engine manufacturers to bring the OP Engine to market. Achatas Power is backed by the Oil and Gas Climate Investments, Saudi Aramco Energy Ventures, and other investors. For more information visit www.achatespower.com. For more information about the in-use measurements see (hyperlink to technical paper).

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