



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Washington, DC 20460

OFFICE OF  
AIR AND RADIATION

APR 19 2012

Brian J. Hockridge  
Caterpillar Inc.  
P.O. Box 600  
Mossville, IL 61552-0600

Dear Mr. Hockridge:

The U.S. Environmental Protection Agency (EPA) has reviewed your request for verification of the Caterpillar Inc. (Caterpillar) 3500 Series Marine Engine Emissions Upgrade Group (EUG) Kit #3. The Caterpillar 3500 Marine Engine EUG Kit #3 is an upgrade from a mechanical unit injection (MUI) engine to meet Tier 2 emissions levels. Based on our evaluation of the verification application, the test data, and additional information provided, EPA hereby verifies that this technology reduces emissions of certain criteria pollutants by the percentages described in the table below.

The technology is approved for use on the following engines and/or equipment provided all of the operating criteria are met as described below:

Technology	Engine Model/Application	Fuel, Max Sulfur (ppm)	Reductions (%)				
			PM	NO <sub>x</sub>	HC	CO	CO <sub>2</sub>
Marine Emissions Upgrade Group Kit #3 (MUI to Tier 2)	Caterpillar 3508, 3512, and 3516 (large cam bore) diesel engines for non-road, marine applications, model year 1994 – 2006	15	Tier 2 Level				3 <sup>1</sup>

This technology is approved for Caterpillar 3500 Series MUI marine variable speed propulsion engines with rated power greater than 600 horsepower originally manufactured between 1994 and 2006 model years. Please note that the level of reduction is based on the ISO 8178 E3 general marine duty cycle. The following criteria must be met in order for appropriately retrofitted engines to achieve the aforementioned emission reductions:

1. The Caterpillar 3500 Marine Engine EUG Kit #3 includes components necessary to upgrade Caterpillar model 3508, 3512, and 3516 diesel engines with model years 1994 through 2006 from MUI to Tier 2 emission levels. The primary critical components are the electronic control module, cylinder packs, oil cooler, turbocharger, fuel injectors, and after-coolers if applicable.

<sup>1</sup> The CO<sub>2</sub> level of reduction is based on a laboratory E3 general marine engine test cycle; the level of reduction may vary under different conditions.

2. The servicing dealer must follow specific installation instructions approved by Caterpillar and validate that the upgraded engine has the necessary components installed and has been tested to ensure the proper fuel delivery, power, torque and speed. The dealer must submit a validation form to Caterpillar in order to receive a label for the upgraded engine.
3. The engine must be operated on ultra-low sulfur diesel fuel (ULSD) of 15 ppm or less.
4. This verification is for engines used in vessels with variable speed propulsion systems and is not applicable for engines used in recreational or constant speed propulsion applications.

If Caterpillar's 3500 Series Marine Engine EUG Kit #3 is modified such that good engineering judgment would indicate that the performance could be affected, you must notify us immediately.

Vessel owners who use this kit must be made aware of EPA's 2008 Locomotive and Marine Engine Regulations which cover existing marine diesel engines that are upgraded, remanufactured, or rebuilt. This mandated measure, referred to as EPA's Marine Remanufacture Program, requires a vessel owner to use an EPA certified remanufacture system at the time of engine upgrade, of a specific marine engine, if available. Caterpillar is obligated to inform vessel owners if any certified remanufacture system is available for their engine. If not, and the above criteria listed is met, then the verified 3500 Marine Engine EUG Kit #3 can be applied. If a certified remanufacture system exists, then this verified technology does not qualify for EPA grant funding, and the owner must use a certified system in accordance with applicable regulations. More information about EPA's Marine Remanufacture Program can be found on: [www.epa.gov/otaq/regs/nonroad/marine/ci/420f09003.htm](http://www.epa.gov/otaq/regs/nonroad/marine/ci/420f09003.htm).

Information on the Caterpillar 3500 Marine EUG Kit #3, percent reduction, and applicable engines will be posted on the EPA's Verified Technology List website at: <http://www.epa.gov/cleandiesel/verification/verif-list.htm>. Caterpillar will be responsible for completing the required in-use testing program and for submitting all in-use testing data to EPA as outlined in EPA's in-use test methods.

Thank you for participating in EPA's Technology Assessment Center Verification Program. If you have any questions or comments, please contact Britney J. McCoy, of my staff, at (202) 343-9218.

Sincerely,



Jim Blubaugh, Deputy Director  
Transportation and Climate Division  
Office of Transportation and Air Quality