



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460

OFFICE OF
AIR AND RADIATION

JUN 26 2013

Gregory D. Hoenert
Caterpillar Inc.
P.O. Box 600
Mossville, IL 61552-0600

Dear Mr. Hoenert:

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 #6. The Caterpillar 3500 Marine Engine EUG Kit #6 is an upgrade for certain Tier 1 certified Caterpillar engines; with this upgrade typically performed at the time of engine rebuild, engines achieve Tier 2 emission levels. Caterpillar's 3500 Series Marine Engine EUG Kit #6 includes a new turbocharger, fuel pump, injectors, electronic controls, cylinder packs, jacket water after-cooler and other components. Based on our evaluation of the verification application, the test data, and additional information provided, EPA hereby verifies that this technology reduces emissions to the Tier 2 level.

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 _x	HC	CO
Marine Engine Emissions Upgrade Group Kit #6 (Tier 1 to Tier 2)	Caterpillar 3508, 3512, and 3516 (large cam bore) diesel engines for non-road, marine applications, model year 1994 – 2006, Tier 1 engine and rated at 1200, 1600, or 1800 rpm (varies by model)	15	Tier 2 Level (marine)			

This technology is approved for Caterpillar 3500 Series Tier 1 marine variable speed propulsion engines with rated power greater than 600 horsepower originally manufactured between 1994 and 2006 model years and rated at 1200, 1600 or 1800 rpm for the kits listed in Attachment A. Please note that this verification is based on the ISO 8178 E3 general marine duty cycle only. The following criteria must be met in order for appropriately retrofitted engines to achieve the aforementioned emission reductions:

1. 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.

2. The original Caterpillar 3500 Marine Engine must be a certified Tier 1 engine and the electronic control module (ECM) must be replaced or updated as part of the upgrade. The primary critical new components are turbocharger, fuel pump/governor, nozzles, cylinder packs, jacket water after-cooler, and other installation parts as necessary.
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.

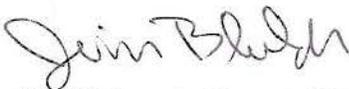
Caterpillar has indicated there is an approximately 1 percent fuel economy penalty with the use of this technology. If Caterpillar's 3500 Series Marine Engine EUG Kit #6 is modified such that good engineering judgment would indicate that the performance could be affected, you must notify us immediately.

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 #6 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: <http://www.epa.gov/otaq/marine.htm>.

Information on the Caterpillar 3500 Marine EUG Kit #6 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

Enclosure

Attachment A: List of Applicable EUG Kits

Kit Type	Sales Model	Type of Upgrade	Original Engine Arrangement	Rated Speed	EUG Kit		
Kit #6	3508	Tier 1 to Tier 2	232-2467	1200	350-2171	20R-0865	
			173-6943		350-2172	20R-0866	
			232-2468	1600	350-2173	20R-0867	
			173-6944		350-2174	20R-0868	
			232-2474		350-2175	20R-0869	
	3512		232-2506	1200	350-2176	20R-0870	
			232-2513		350-2177	20R-0871	
			180-9193		350-2178	20R-0872	
			174-3192		350-2179	20R-0873	
			232-2514	1600	350-2182	20R-0874	
			180-9196		350-2183	20R-0875	
			232-2507		350-2184	20R-0876	
			174-3193		350-2185	20R-0877	
			232-2508	1800	350-2186	20R-0878	
			236-2459		350-2187	20R-0879	
			174-3194		350-2188	20R-0880	
			3516	232-2517	1200	357-1798	20R-0885
				173-6960	1600	357-1799	20R-0886
				232-2505		357-1800	20R-0887
				243-5675		357-1801	20R-0888
	239-7323			1800	357-1802	20R-0889	
	232-2523			1200	350-2190	20R-0881	
	173-6954				350-2191	20R-0882	
	232-2522			1600	350-2193	20R-0883	
	173-1806				350-2194	20R-0884	
	232-2525				357-1803	20R-0890	
	173-6957		357-1804		20R-0891		
	234-2795		357-1805		20R-0892		
	239-7319		1800	357-1806	20R-0893		
				350-2180	20R-1732		