



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460

OFFICE OF
AIR AND RADIATION

JUN 28 2013

Susan Hayman
Foss Maritime Company
1177 Fairview Ave. North
Seattle, WA 98109

Dear Ms. Hayman:

The U.S. Environmental Protection Agency (EPA) has reviewed your request for verification of the Foss Maritime Company and Aspin Kemp & Associates (Foss/AKA) XeroPoint Hybrid Tugboat Retrofit System (XeroPoint). XeroPoint is an alternative drive system for use on certain marine vessels. XeroPoint includes a new generator set, modifications to the vessel propulsion system, an energy management system and other components described below. Based on our evaluation of the verification application, test plan, testing report, 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 XeroPoint system replaces one of the boat's auxiliary engines and generator sets with a suitably sized new larger generator set and new larger horsepower engine that must comply with current model year EPA emission standards. The XeroPoint hybrid system includes the main hybrid switchboard, DCDC converter cabinet, junction boxes, wheelhouse hybrid control, hybrid E-stop panels, clutches, energy management system, 24V DC uninterruptible power supply and optional batteries. The XeroPoint system uses Programmable Logic Controllers (PLCs) that are custom programmed to manage and control engine and motor speeds based on throttle demand and the selected mode of operation. The PLC will also control ancillary systems such as environmental (fans, heaters, water cooling), battery monitoring, clutch operation, system monitoring and data logging. The optional batteries are expected to yield minimal emission reduction benefits except in cases where the vessel has access to on-shore power.

The technology is approved for use on the following applications provided all of the operating criteria are met:

Technology	Engine Model/Application	Fuel, Max Sulfur (ppm)	Reductions (%)				
			PM	NO _x	HC	CO	CO ₂
Foss / AKA XeroPoint Hybrid Tugboat Retrofit System	Harbor tugboat vessels with auxiliary generator engines with rated horsepower range between 100 and 750 hp and main propulsion engines up to 5,000 hp each	15	25%	30%	15%	35%	30%

In the application described above, XeroPoint demonstrated a 30% fuel savings.

The emission reductions are based on Foss's testing and duty cycles. Individual emission reductions will vary based on engine selection, duty cycle and battery selection. Incorporating newer Tier 3 or Tier 4 auxiliary engines will yield greater emission reductions.

The following criteria must be met in order for appropriately retrofitted vessels to achieve the aforementioned emission reductions:

1. Prior to installation, Foss/AKA must determine final sizing and any energy storage system configuration to satisfy application-specific requirements.
2. With the main propulsion engines off, vessel speed is dependent on the XeroPoint system sizing.
3. Fuel savings and emission benefits are dependent on reduced operation of the main propulsion engines and operation with the XeroPoint system in transit, idle and stopped modes.
4. With the installation of a new generator set Foss/AKA must incorporate a new engine that complies with current model year EPA emission standards.
5. The servicing dealer must follow specific installation instructions approved by Foss/AKA and validate the necessary components to ensure the proper fuel delivery, power, torque and speed, per federal, state or local regulations. The dealer must submit a validation form to Foss/AKA to receive a label for the XeroPoint system.
6. Operating conditions and maintenance requirements of engines and engine components are to be conducted according to manufacturer specifications and are unchanged by the use of the XeroPoint system.
7. The XeroPoint system is designed to be installed on commercial vessels with trained and properly credentialed crew. As such the crews need to have the capability required for operating the system and conducting routine maintenance. Additionally, Foss/AKA will provide system training as part of the installation. For major repair work, an electrical technician with training and experience on the system is required.
8. Foss/AKA and the vessel owner must evaluate battery technology options for the specific vessel. EPA is not specifying a battery technology, rather it is the responsibility of Foss/AKA and the vessel owner to select a technology based on the individual preference and performance requirements.
9. Batteries are not required for the operation of a XeroPoint system. However, for systems with optional batteries the XeroPoint system must include a battery monitoring system to warn operators of any necessary actions to ensure the proper operation of the batteries.
10. For systems with optional batteries the owner's manual must include maintenance procedures which must include battery safety precautions and the disposition of the batteries.
11. Batteries and shore-power capability are optional, and could potentially help further reduce emissions and fuel consumption in applications with increased vessel idle time.
12. The engine must be operated on ultra-low sulfur diesel fuel (ULSD) of 15 ppm or less.

If the Foss / AKA XeroPoint Hybrid Tugboat Retrofit System is modified such that good engineering judgment would indicate that the performance could be affected, you must notify us immediately. This verification does not automatically confer to modified devices or devices that are similar to this original verification.

Information on the Foss / AKA XeroPoint Hybrid Tugboat Retrofit System's emissions performance and applicable engines will be posted on the EPA's Verified Technology List website at: <http://www.epa.gov/cleandiesel/verification/verif-list.htm>. As you know, Foss/AKA 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 Arman Tanman, of my staff, at (202)343-9326.

Sincerely,

A handwritten signature in black ink that reads "Jim Blubaugh". The signature is written in a cursive style with a large initial "J".

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