

RETROFIT TECHNOLOGY



As part of the Maryland Dept. of the Environment School Bus Retrofit Technology Assistance Program, 230 buses from Montgomery and Prince George were retrofitted with diesel particulate filters (DPFs). The buses were pre-2007 Thomas Safe-T-Liner ER Pusher models powered by 7.2 L six-cylinder Caterpillar 3126 diesel engines rated 220 to 300 hp.

FIT FOR CLEANER AIR

Maryland school districts retrofit 230 buses through state's school bus retrofit technology assistance program

BY DAWN M. GESKE

The Montgomery and Prince George Counties of Maryland have retrofitted 230 school buses through the Maryland Dept. of the Environment (MDE) School Bus Retrofit Technology Assistance Program. The retrofits aim to reduce over 150 tons of CO, 47 tons of HC and six tons of PM within the first six months of operation.

"MDE developed the School Bus Retrofit Technology Assistance Program to provide a cleaner and healthier commute for students who ride buses every day," said Kendl P. Philbrick, MDE secretary. "Local air quality will benefit from this action as well."

The buses were retrofitted by K. Neal International, an Engine Control Systems (ECS) distributor in Hyattsville, Md. Each bus was equipped with a Level 3 diesel particulate filter (DPF) designed to reduce PM by 85% or more. The DPFs were supplied by ECS, Thornhill, Ontario, Canada. ECS uses Clean Diesel Technologies Inc.'s catalysts in its products. CDTI is a wholly owned subsidiary of ECS located in Ventura, Calif.

The Montgomery and Prince George Counties school buses that were retrofitted for the MDE project were pre-2007 Thomas Safe-T-Liner ER Pusher buses powered by 7.2 L six-cylinder Caterpillar 3126 diesel engines rated 220 to 300 hp. The engines were coupled with Allison automatic transmissions.

Each bus was retrofitted with an ECS Purifilter DPF that was installed at the rear of the bus under the engine in the same position as the original muffler. Using a silicon carbide wall-flow filter substrate and an advanced precious and base metal catalyst system, the ECS Purifilter is designed to reduce PM by 90% through passive regeneration using engine exhaust heat.

Since this was the first DPF installation for K. Neal, ECS provided training for technicians involved with the project. Training included three to four hours of classroom work and installations on several buses. Following training, K. Neal became an authorized technician for the ECS product line.

Installation of the DPFs needed to

be scheduled around the vehicles' normal operation to ensure the fleet was still able to transport students. Buses were retrofitted in groups of five, starting with the Montgomery County buses.

"K. Neal International provided mobile installations on a flexible schedule so that the fleet managers could keep as many buses in service as possible," said Darrell Trueman, ECS regional sales manager — Northeast. "This avoided the need to shuttle buses back and forth, added convenience and helped the fleet managers save time and money."

For the installation, K. Neal technicians mounted a data logger at the inlet of each of the vehicle's mufflers to monitor and record the exhaust gas temperature, time and date. Data was logged from each bus for three to five days. This information was sent to ECS for analysis to determine which DPF to install on each bus and what type of configuration was required.

The initial bus retrofits were completed in K. Neal's service bay, while the



Each bus was retrofitted with an Engine Control Systems (ECS) Purifier DPF that was installed at the rear of the bus where the original muffler was located. ECS uses its wholly owned subsidiary Clean Diesel Technologies Inc.'s catalysts in its after-treatment products.

remaining installations were performed at the Montgomery and Prince George Counties' bus maintenance facilities.

As part of the contract, an ECS CombiClean DPF cleaning machine was provided to the school districts. The cleaning process uses a gradual temperature increase along with a constant air supply during the DPF regeneration process to ensure damage doesn't occur to the catalytic

coating or substrate material. The cleaning process consists of a heat cycle, a vacuum cycle and a high-pressure blow cycle.

With the ECS CombiClean, the bus fleet managers can clean a DPF within two to six hours at their own maintenance facility without having to send filters out for cleaning elsewhere. This also saves on cost as, ECS said, external cleaning costs

anywhere from \$300 to \$500 per filter.

"During the project, we noticed that some of the buses required filter cleaning earlier than we anticipated and were right on the borderline of the required heat needed for the DPFs to regenerate and burn the soot into ash," said Laurence F. Richmond Jr., MDE's senior regulatory & compliance engineer, Emissions Control & Program Development. "Further investigation revealed that the engine duty cycle had changed since the initial exhaust temperatures were taken as a result of changes to assigned bus routes and due to different driving characteristics of the drivers."

To resolve the issue, K. Neal installed thermal blankets to retain the temperature in the heat range for the DPFs to regenerate. **dp**



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