EVALUATION OF A NO_x ADSORBER SYSTEM ON A LIGHT-DUTY DIESEL VEHICLE

R. Mital, J. Li, S. C. Huang, and R. C. Yu
Cummins, Inc.

and

John A. Anderson
Argonne National Laboratory

This paper presents the results of NO_x adsorber testing done under the FreedomCAR Program. A compact exhaust aftertreatment system (EAS) design was developed after various iterations of the catalyst formulation and system configuration. The EAS tested is dual leg and consists of sulfur trap, adsorber, and catalyzed soot filter (CSF). During regeneration, supplementary low-sulfur diesel fuel is injected upstream of the adsorber and CSF in the exhaust. The adsorber catalyst volume is 1.8 times the engine displacement. Steady-state and transient emission test results with and without the EAS are presented. Results of soot filter regeneration by injecting low-sulfur diesel fuel and slip of unregulated emissions, such as NH_3, are discussed. Effects of adsorber size and bypass strategy on NO_x conversion efficiency and fuel economy penalty are also presented in this paper. The results show that if the supplementary fuel injection is optimized, NH_3 slip is negligible. During the FTP cycle, injection of low-sulfur diesel fuel can create temperature exotherms high enough to regenerate a loaded CSF. It was observed that the adsorber size affects the NO_x conversion efficiency significantly, and the right catalyst size will need to be chosen based upon the application.