PROJECT NUMBER:
03215

PROJECT TITLE:
Diesel Bus Retrofits to Reduce Particulate Exposure

PRINCIPAL INVESTIGATOR:
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PROJECT OBJECTIVE:
This project will determine the reductions in occupant exposure to harmful components of diesel exhaust, which can be expected to result from retrofitting Birmingham City school buses with diesel oxidation catalysts.

PROJECT ABSTRACT:
According to the U.S. Environmental Protection Agency’s (EPA’s) 2002 Health Assessment Document for Diesel Engine Exhaust, long-term inhalation exposure to diesel engine exhaust is likely to pose a lung cancer hazard to humans, as well as damage the lung in other ways. Short-term exposures can cause irritation and inflammatory symptoms of a transient nature, and exacerbate existing allergies and asthma symptoms. Recent reports suggest that diesel school bus exhaust, in particular, may pose a special threat to children’s health.

Regulations are in place requiring engine makers to reduce harmful emissions by 95 percent beginning in 2007. But even as clean buses become available, financially strapped school districts across the nation have few incentives to phase out the older buses. A cost-effective alternative may be retrofitting older buses with available technologies that can make diesel exhausts cleaner. This project will allow UTCA investigators to monitor occupant exposure reductions associated with such bus retrofits. Results from this project will provide management information for decisions related to retrofitting additional buses with diesel oxidation catalysts, and will address information deficits identified by EPA at the national level.

The Alabama Department of Environmental Management (ADEM) and the Jefferson County Department of Health (JCDH) have funds available from EPA to retrofit Birmingham City School buses with diesel oxidation catalysts. However, neither funding nor equipment is available to monitor the reductions in emissions or occupant exposure resulting from these retrofits. This UTCA project will provide the occupant exposure monitoring and oxidation catalyst efficiency data these agencies need, as recommendations are made to other school system transit authorities in the state and region.
PROJECT TASK DESCRIPTIONS:
Task 1: Experimental design and sampling protocols
Task 2: Routine monitoring
Task 3: Data analysis and final report
Task 4: Information transfer

MILESTONES AND DATES:
Task 1: Jan 1 – Mar 31, 2003
Task 2: Mar 1 – Nov 1
Task 3: Nov 1 – Dec 31
Task 4: Nov 1 – Dec 31

TOTAL BUDGET:
Twelve month project: UTCA funds $48,330; total budget $96,660.

STUDENT INVOLVEMENT:
Nine months of graduate student time is budgeted in this project. An addition 12 months of graduate student time will be committed to this project as part of UAB’s in-kind match. Additionally, during the summer term, the particulate will periodically be made available to students participating in undergraduate minority engineering research programs at UAB.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
A concurrent UTCA project (03105, PM 2.5 Emissions from Roadways in Birmingham) is being conducted by Drs. Williamson (UA) and Jones (UAB). It will make use of particulate samplers, and other equipment will be shared between the two projects. Programs, already in place encourage the involvement of students from under-represented groups in research activities. The project investigators will have opportunities to work with these students on transportation mini-projects related to particulate emissions from vehicular traffic in urban areas.

TECHNOLOGY TRANSFER ACTIVITIES:
It is anticipated that project investigators will present the results of this project at state and national conferences. Information gained from this project will be of immediate interest to the ADEM and JCDPH. Representatives from these organizations will also disseminate project results through meetings and community guidance documents related to air pollution prevention compliance and transportation infrastructure. The graduate students working on this project will present project results at the Alabama Academy of Science student research day, the UAB student research day, and the Alabama Water Resources Association student research session.

POTENTIAL BENEFITS OF THE PROJECT:
Results from this project will provide information on which to base management decisions related to retrofitting buses with diesel oxidation catalysts. This information will be of interest within the state and nationally.

TRB KEYWORDS:
bus, diesel, air quality, oxidation catalysts