

# Latest School Bus Emissions Study Addresses Crankcase Emissions

SEATTLE — A study conducted by the University of Washington and the University of Basel in Switzerland has produced new results about the origin of school bus pollution. Preliminary research indicates a majority of school bus pollution comes from the crankcase and not the tailpipe, the latter being the subject of the majority of past research.

Lead researcher Dr. Lee-Jane Sally Liu tracked two buses during the past



**Dr. Lee-Jane Sally Liu monitored crankcase emissions from school buses in a recent University of Washington study.**

year and found that 80 percent of emissions originated in the crankcase. Liu is an associate professor in the Department of Environmental and Occupational Health Sciences at UW and a guest professor at the Institute of Social and Preventative Medicine at the University of Basel.

In response to the findings, reported local media, Seattle Public Schools will begin retrofitting crankcases later this year. The shift saves money as a tailpipe retrofit can reach \$5,000, while fixing a crankcase can be done for a few hundred dollars.

The UW study is unique due to the specific techniques used to measure particulate matter from different sources of self-pollution on the school buses, Liu said. Findings indicate that when the bus windows are open, more than half of the PM inside school buses comes from sources other than the bus. In contrast, when the windows are closed, she said, these sources account for only 19 to 46 per-

cent of the measures PM. The rest is from bus self-pollution.

"Our study was the first using two tracers to quantify two major sources on the bus and a lead-vehicle driven in front of the bus to identify other sources contributing to the on-bus exposure," Liu said. "Most of the bus self-pollution is from the crankcase emission, and very little is from tailpipe diesel exhaust."

While the Iowa Bus Emissions Education Program has not reviewed the UW study, the organization's primary focus is on safe student transportation, reads a statement from Terry Voy, director of school transportation services with the Iowa Association of School Boards, and BEEP partners. BEEP is the first program of its kind designed to help school bus fleets increase performance while cutting costs and emissions.

"If, however, the study's conclusions are accurate, the BEEP program partners, state agencies and associations will continue to work closely with Iowa school districts, the EPA and engine manufacturers to act, within our ability, to improve the school bus environment for our students," said the response.

The UW study was cosponsored by International Truck and Engine Corporation, which shared its method for labeling tailpipe emissions and together with Liu, developed another technique for labeling the engine crankcase emissions, said Dr. Thomas W. Hesterberg, International's product stewardship director.

While the research results did not directly impact International's development of emissions technology because new emissions reduction systems are already in place to meet the stringent 2007 EPA and California Air Resources Board emissions standards, he said, the UW findings did encourage the company to develop an engine retrofit that completely eliminates particle emissions from the crankcase of school buses already on the road. International will also fund another study with UW to

determine the impact of tailpipe and crankcase retrofits on reducing particle levels inside the buses.

"These new school buses will have completely enclosed crankcases, which will emit no particles, and the tailpipes will be fitted with particle filters that will have reduced particle emissions to near-zero levels," Hesterberg said.

Donaldson has offered its own Spiracle crankcase filtration system since 2003, which eliminates 100 percent of crankcase emissions in self-pollution studies conducted by the company and the Clean Air Task Force in 2003 and 2004. The UW study confirms similar findings as Donaldson-sponsored testing by the Clean Air Task Force in 2002, said engineering manager Tim Ricke. However, that study identified the tailpipe as an emissions source in need of equal attention.

"We always want to caution people that the tailpipe is something that needs to be addressed as well," Ricke said. "Ultimately, both sources should be controlled for best protection."

While Caterpillar had no official comment on the UW study, spokesperson Jason Phelps pointed to the company's C7 school bus engine that meets



the new 2007 EPA regulations by using closed crankcase ventilation and capturing 98 to 99 percent of the PM generated by diesel engines. The EPA regs, he said, take into account all emissions regardless of the source.

"This issue is being addressed as part of a larger plan to address EPA regulations," Phelps said. ❖