

**COMPARISON OF EXHAUST EMISSIONS, INCLUDING TOXIC AIR CONTAMINANTS,
FROM SCHOOL BUSES IN COMPRESSED NATURAL GAS, LOW-EMITTING DIESEL, AND
CONVENTIONAL DIESEL ENGINE CONFIGURATIONS**

Warren J. Slodowske, Bill Trestrail, Angelita L. Cook, and William B. Bunn

International Truck and Engine Corporation

Charles A. Lapin

Lapin and Associates

Kenneth J. Wright and Charles R. Clark

ConocoPhillips

ABSTRACT

In the United States, most school buses are powered by diesel engines. Some have advocated replacing diesel school buses with natural gas school buses, but little research has been conducted to understand the emissions from school bus engines. This work provides a detailed characterization of exhaust emissions from school buses using a diesel engine meeting 1998 emission standards, a low-emitting diesel engine with an advanced engine calibration and a catalyzed particulate filter, and a natural gas engine without catalyst. All three bus configurations were tested over the same cycle, test weight, and road load settings. In addition, the quantitative results from this study were used to calculate cancer potency weighted emissions.

Twenty-one of the 41 “toxic air contaminants” (TAC’s) listed by the California Air Resources Board as being present in diesel exhaust were not found in the exhaust of any of the three bus configurations, even though special sampling provisions were utilized to detect low levels of TAC’s. Although there were no significant differences between the low-emitting diesel and the natural gas bus configurations for 14 TAC’s, the low-emitting diesel bus configuration had significantly lower emission levels than the natural gas bus configuration for aldehydes, ketones, and benzene. Overall, the results demonstrate that low-emitting diesel technology had the lowest level of both EPA-regulated emissions and TAC’s.