

**ISAF XV International Symposia on Alcohol Fuels  
San Diego, California  
September 26-28, 2005**

**THE EFFECTS OF ETHANOL AND VOLATILITY PARAMETERS ON EXHAUST  
EMISSIONS OF LIGHT-DUTY VEHICLES**

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As emissions standards have become more stringent, it is imperative that the vehicle and fuel are viewed as a system in meeting performance and emissions objectives. The commercialization of vehicles meeting CARB LEV I and LEV II emission standards raises new questions when gasoline formulations are changed to include ethanol. While past studies of the effects of changes to gasoline composition provide some insight into these issues, including many with ethanol, there are some contradictory results. As such, it is important to measure the effects of ethanol and fuel volatility changes to E200/T<sub>50</sub> and E300/T<sub>90</sub> for the most advanced vehicle technologies.

The objective of this study was to provide information that can be used to better predict the effects of gasoline volatility parameters and ethanol content on exhaust emissions from vehicles that can meet current and upcoming emissions standards. For this project, a total of 12 fuels with varying ethanol content (0 to 10%), mid-fill and back-end volatility, as measured by E200/T<sub>50</sub> and E300/T<sub>90</sub>, were tested. The test fleet was comprised of 12 in-use vehicles ranging from Low-Emission Vehicle (LEV) to Super-Ultra-Low-Emission Vehicle (SULEV) certification. The vehicles were equipped with catalysts/sensors aged to an equivalent of 100,000 miles. Vehicles were tested over the Federal Test Procedure (FTP) in at least duplicate on each of the test fuels. Testing included regulated emissions and modal engine-out and tailpipe emissions. For a subset of 4 fuels, non-methane organic gas speciation (NMOG) measurements were obtained for the purpose of measuring toxic emissions.