**MEASUREMENT INTERFERENCE OF ON-BOARD NOX SENSORS DUE TO NH3 CROSS-SENSITIVITY FOR GASOLINE LIGHT-DUTY VEHICLES**

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Recent modeling demonstrates that current State programs for all emission sources will not provide enough reduction of oxides of nitrogen (NOX) emissions to meet NOX reduction goals in the South Coast Air Basin for the 2023 and 2031 target years.[[1]](#footnote-1) The California Air Resources Board (CARB) is investigating areas of potential real-world NOX reduction in gasoline light-duty vehicles (LDVs). These reductions may be identified in real-world driving where control of NOX on-road may vary from laboratory certification test cycles. On-road emission measurement is becoming an integral part of ensuring that light-duty vehicles are behaving as expected under real-world driving conditions. Portable and reliable measurement instruments are needed for accurate measurements under a wide range of environmental conditions and exhaust characteristics.

This study screened 10 newer-model gasoline LDVs using an onboard NOX sensor integrated into a mini-Portable Emissions Measurement System (mini-PEMS). Measurement data quickly revealed a limitation of the NOX sensor in that it overestimated the NOX concentrations, specifically for gasoline exhaust. Further investigation with dynamometer correlation testing and a bench study confirmed that the NOX sensor has a significant cross-sensitivity to ammonia (NH3). This can present an issue, as some gasoline LDVs were found to emit a proportionally significant amount of NH3 compared to NOX. Without the presence of NH3, particularly before catalyst light-off, the NOX sensor performed well as confirmed by the dynamometer analyzer bench. Concurrent measurements with a Fourier Transform Infrared (FTIR) analyzer during dynamometer testing with standardized cycles demonstrated that the NOX sensor of the mini-PEMS tracks NH3 concentrations very well from gasoline LDVs that emit a significant amount of NH3. Not all vehicles tested exhibited proportionally high amounts of NH3 compared to NOX.

These results identified a need for addressing the NH3 cross-sensitivity for NOX sensors in gasoline exhaust measurement applications to support continued improvements of on-road emissions testing equipment. Furthermore, NH3 emissions from gasoline LDVs is an area that needs further attention for the purpose of updating emissions inventory in California since NH3 can be a significant contributor to secondary particulate matter (PM).

1. California’s 2017 Climate Change Scoping Plan. https://www.arb.ca.gov/cc/scopingplan/scoping\_plan\_2017.pdf [↑](#footnote-ref-1)