

THE CHANGING EMISSION PROFILES OF HEAVY-DUTY TRUCKS AND BUSES: THE EFFECT OF CATALYTIC DEVICES ON THE EMISSIONS OF ORGANIC COMPOUNDS FROM DIESEL AND CNG FUELED VEHICLES

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Technology validation programs conducted over the past five years have yielded increasingly detailed data on the chemical characteristics of particulate matter (PM) emitted from trucks and buses operated with and without various after-treatment devices and fueled with various types of diesels and compressed natural gas (CNG). In a multi-year study conducted in southern California (1999-2002), exhaust emissions were extensively characterized for a variety of chemical compounds and for long-term durability. In a special investigation a subset of the study vehicles were tested with ultra-low sulfur diesels ($S < 15\text{ppm}$), synthetic Fischer-Tropsche (F-T) diesel, and compressed natural gas (CNG). This select group of vehicles was tested with and without Diesel Particle Filters (DPFs) in order to obtain detailed emissions profiles for a range of compounds and conditions. This paper will focus on the results pertaining to the identification and quantification of key organic compounds such as carbonyls, polycyclic aromatic hydrocarbons (PAHs), and nitro-PAHs. It will present their relative abundance in the PM-10 particulate fraction as a function of the fuel used and the presence or absence of DPFs. The results will illustrate the impact of the fuel and hardware combinations on exhaust emissions and will demonstrate that under most conditions emissions profiles for diesel vehicles equipped with DPFs are the same or lower than those for similar vehicles fueled by CNG. Moreover, the paper will also demonstrate the correlation between the determinations of Elemental Carbon/Organic Carbon (EC/OC) with the observed PAHs in tailpipe emissions.