OHVT STUDY OF COMPARATIVE TOXICITY OF ENGINE EMISSIONS: PART A, SOURCES, SAMPLE, AND PARTICIPANTS

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Results from the recently completed Northern Front Range Air Quality Study (NFRAQS) suggest that particle emissions from gasoline engines are a significant contributor to ambient concentrations of $PM_{2.5}$ (particles having aerodynamic diameter less than 2.5 μm). Vehicle testing performed as part of NFRAQS demonstrated that cold-temperature testing of light-duty vehicles resulted in higher PM emissions than those observed under standard test cycle temperatures (information available at the NFRAQS web site, http://www.nfraqs.colostate.edu).

There is currently little information pertaining to the comparative health effects of emissions from diesel and gasoline engines, with only limited work performed several years ago. A large amount of research has been conducted during the past 20 years regarding the potential health risks of diesel particles, but there has been little effort directed toward understanding the health risks of both particle and semivolatile organic compound (SVOC) emissions, including higher molecular weight organic compounds, found in spark- and compression-ignition engine exhaust. Moreover, there are no contemporary data available regarding the comparative toxicity of gasoline and diesel exhaust particle emissions from real-world vehicles using cellular assays and animal instillation tests.

This project has collected up to 4-gram samples of particle emissions ($PM_{2.5}$) from gasoline and diesel vehicles, along with associated gas-phase SVOC samples, for subsequent toxicity testing. The samples have been collected from Baltimore's Ft. McHenry Tunnel, and in dynamometer tests using the Unified Driving Cycle. The tunnel testing results provide insights regarding on-road vehicle emissions from a large fleet, while the dynamometer testing results are from individual vehicles or groups of new, in-use, and high emitter (smoking) vehicles. The information derived from this project will help place the comparative health risks from airborne emissions from diesel and gasoline engine technologies in perspective. Sample toxicity will be evaluated with a combination of *in vitro* (cell culture) and *in vivo* (animal) tests. The samples also will be subjected to a standard mutagenicity test (Ames) to develop an index of the relative cancer potentials of the vehicle emissions. Groups participating in the study include Southwest Research Institute, University of Dayton Research Institute, Desert Research Institute, Oak Ridge National Laboratory, National Institute for Occupational Safety and Health (NIOSH), and Lovelace Respiratory Research Institute.