

Kevin Charles O'Leary

Thesis

Source Apportionment of Volatile Organic Compounds in Urban Micro-Environments

Abstract

Source apportionment of VOCs at three urban micro-environments was successfully accomplished using the U.S. EPA's Chemical Mass Balance Model CMB7. Three micro-environments were examined: underground garages, downtown urban roadways and residential homes with attached garages.

Underground garage source apportionment showed that tailpipe and evaporative emissions were significant contributors to total garage VOC loading. The results showed that the evaporative emissions were more significant in the interior of the garage in the morning. Tailpipe emissions were more significant at the entrance in the afternoon.

Urban roadway source apportionment showed that heavy and light duty tailpipe and evaporative emissions were significant. Minor contributions from liquefied petroleum gas, and graphic arts were also seen. Source apportionment showed differences over the three sampling locations and four sampling times (two nose-level and one elevated set back from the road).

Residential home results showed that vehicle emissions infiltrating from the garage are impacting the in-house air quality. During two separate tests, the vehicle was operated in two modes (cold start/hot soak). The impact of vehicle exhaust varied widely from house to house. The degree of infiltration of vehicle emissions from both the cold start and hot soak test showed reasonable agreement at each of the test homes.

Degree

M.Eng.

Completion

1999

Supervisor

Karman