



An ORNL State Partnerships Program Success Story

ORNL and UT Turn Section of I-40 Into Environmental Lab

Without even slowing down, the 25,000 big rigs rumbling through Knoxville daily will help researchers from ORNL and the University of Tennessee (UT) understand real-world vehicle emissions and their effects on the environment.

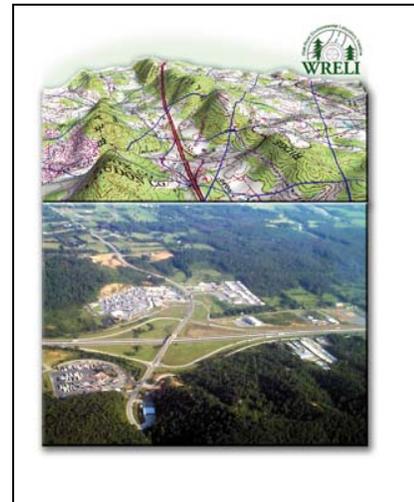
Instrumentation being installed near the Watt Road and Interstate 40 interchange west of Knoxville will create a world-class field laboratory devoted to analyzing emissions data from on-road heavy vehicles. Two meteorological towers are operational already, and equipment will be installed to measure nitrogen oxide (NO_x) and particulate matter (PM) emissions as trucks pass.

Researchers envision using stepped FM-AM LIDAR (light detection and ranging) to measure PM and ultraviolet absorption to measure NO_x emissions. Both of these techniques are currently under development at ORNL.

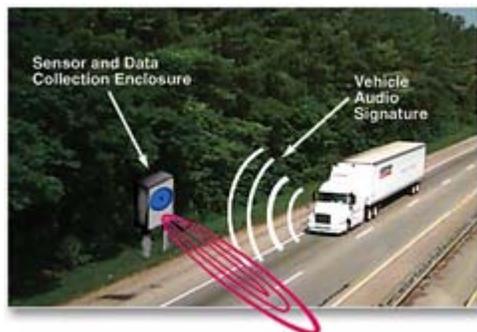
“We’d like to determine, for example, whether the stricter emission regulations for trucks are achieving actual benefits to the environment,” said Ralph McGill of ORNL. “In the immediate future, though, we’re hoping to learn more about truck emissions during different operating conditions, all remotely so we won’t interfere with traffic flow.”

Large trucks contribute about 40% of NO_x and 60% of PM from mobile sources. Emissions vary according to a truck’s load, speed, and acceleration, yet few studies exist that quantify differences in emissions among modes of operation.

The field lab will extend 2.5 miles eastward along the valley from the Watt Road/I-40 interchange to a weigh station at the top of a ridge. This stretch of road is one of the most heavily traveled in the country because it is where three interstate highways converge for 20 miles.



Top: Topographical map of the area around the I-40/Watt Road interchange. Bottom: Aerial view of the interchange showing the trucking-related facilities.



Roadside panels will use sound signature analysis to determine operating conditions of passing trucks.