

Memorandum

To: Bryan Lange, Tech Services
Through: Jim Roller, Supervisor, AQAB
From: Connie J. Washburn
Date: 9/3/03
Subject: VOC Modeling for Salisbury Asphalt Plant

I have completed the mobile source modeling requested on January 25th to determine the impact of VOC concentrations from vehicle traffic traveling on US 70/601 near the asphalt plant in Salisbury, NC. This memo outlines the data and assumptions used in this analysis as well as the results of the Mobile5a and Caline4 modeling studies. The modeling results apply to the peak hour of traffic on the highway. Although an additional analysis for an “average hour” was requested, it was deemed unnecessary due to the very low concentrations of the peak hour analysis.

Traffic Assumptions

Tube type traffic counts were taken at the site during May 18th to May 28th and June 27th to July 17th of 2001. The highest daily traffic count during this period occurred on Friday, May 25th. This volume was 29,477 per day (24 hrs). No axle factors or seasonal adjustment factors were applied to these traffic counts.

The K factor used was 0.095. This is the percentage of the daily traffic assumed to occur during the peak hour. Therefore, 2800 vehicles pass the asphalt plant on US 70/601 during the peak hour.

The directional distribution applied to this traffic volume was 65%/35% with the 65% occurring in the lanes nearest the receptors for conservatism. This factor results in 1820 vph in the nearest lanes of traffic and 980 vph in the farthest lanes.

Modeling Assumptions and Results

The Mobile5a model was used to estimate VOC emissions from the cars traveling on US 70/601 adjacent to the asphalt plant. The vehicle mix was approximated from 1995 vehicle classification counts for Rowan County supplied by NCDOT. The assumptions were: 80% cars, 10% pickup trucks, 4% single unit trucks 5% tractor trailers, and 1% motorcycles. These percentages resulted in inputs to the model of 77% LDGV, 6% LDGT1, 3% LDGT2, 4% HDGV, 3% LDDV, 1% LDDT, 5% HDDV and 1% MC. The vehicles were assumed to be operating in default operating mode meaning 20.6% non-catalyst vehicles in cold-start mode, 27.3% vehicles in hot-start mode, and 20.6% catalyst-equipped vehicles in cold-start mode. Emissions were calculated for July of 2002 with a temperature of 86^o F and vehicle speeds of 45.0 mph and resulted in **1.455 gm/mi** for total VOC's.

The Caline4 model was used to calculate the concentrations of VOC's at three receptor sites. These receptors were placed 60' (18 m), 201' (60 m) and 411' (123 m) from the edge of the roadway and at a height of 6' (1.8 m). The roadway geometry was assumed to be a 5-lane section on flat and level terrain. The model was run in the worst-case wind angle mode. Additional inputs were wind speed of 1 m/s, temperature of 86^o F (30^o C), stability class of E and mixing height of 1000 m. Worst-case VOC concentration occurred at the nearest receptor to the roadway (60') with **0.2 ppm**. The other two receptors were not impacted by VOC emissions from the vehicles traveling on the roadway.