Documentation of speed and vehicle miles traveled (VMT) estimates for Mojave Valley portion of San Bernardino County, including Interstates 15 and 40

While researching the data available to produce a motor vehicle emissions budget for the federal ozone nonattainment area portion of the Mojave Desert Air Quality Management District, ARB staff discovered that the travel activity data used in EMFAC2002 for the San Bernardino County portion of the Mojave Desert Air Basin does not include a significant portion of the ozone nonattainment area, including about 118 miles of interstate highway. The activity data provided by the Southern California Association of Governments is limited to regional statistical areas 32 and 33 (bordered in yellow on the map). This limitation results in underestimation of emissions when an EMFAC user requests emissions for San Bernardino County, Mojave Desert Air Basin.

To correct this problem, ARB staff developed VMT and speed estimates for the missing area, termed the "Mojave Valley," for calendar years 1990, 2000, 2002, 2005, 2007, 2010, 2020 and 2030. The activity is to be used in conjunction with activity for surrounding areas to produce a motor vehicle emissions inventory for the full ozone nonattainment area.

Methodology

SCAG data for this region covers only about two-thirds of the San Bernardino County portion of the ozone nonattainment area. The SCAG areas in this region are regional statistical areas (RSA) 32 and 33. According to SCAG, the post miles on Interstates 15 and 40 where they *leave* the SCAG modeling domain are post mile 89.142 and post mile 7.806, respectively. The post miles where these highways *leave* the nonattainment area were estimated by examining roadmaps for the area in relation to Caltrans data. For I-15, this was estimated to be at the junction of Highway 127 and I-15 in Baker (post mile 136.57). For I-40, this point was estimated to be at the intersection of I-40 with Kelbaker road (post mile 78.17). These two points on each highway define the segments that contain most of the missing travel.

The Caltrans traffic data website (http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/index.htm) contains historical count data for 1992 through 2002 for all vehicles. Staff downloaded data for the desired highways into an Excel spreadsheet. Count locations near the above post mile locations were used for VMT calculation. Staff calculated VMT by multiplying the highway segment length between the count locations by the recorded traffic volumes.

The Caltrans website includes separate count data for heavy-duty trucks for the period 1992 through 2001, except 1999 (1998 and 2000 counts were used to interpolate a 1999 estimate). Staff used these data to estimate heavy-duty truck VMT, then subtracted it from total VMT to estimate the VMT for light and medium-duty vehicles. Heavy-duty truck VMT has grown at a faster rate than light and medium-duty VMT, and this trend is carried forward.

Interpolation/Extrapolation

The Caltrans count program does not count every location every year. According to Caltrans staff, resource limits in Caltrans District 8 prevented counts from being completed for some locations in some years. For this reason, data for some years is repeated from subsequent years when no other data are available. (This can be readily seen in the "Raw VMT" section of the spreadsheet.) To smooth the trend for years 1992-2002, values for years in which the data were repeated from earlier years were linearly interpolated.

To extend the trend to 2030, staff first calculated the average annual VMT growth for each highway. Growth was calculated for all vehicle travel and heavy-duty travel independently. For all vehicle travel, average growth was calculated over the period 1992 to 2000 for I-15 and 1992 to 2002 for I-40. (No new data has been reported for I-15 since 2000.) For heavy-duty VMT on both highways, the period for average growth was 1992 through 2001. Staff added these figures for miles of average growth to each successive year out to 2030, for all vehicle travel and separately for heavy-duty travel. To estimate 1990 travel, the figures were *subtracted* from the 1992 estimates, again separately for heavy duty and all vehicle travel.

This "decaying growth rate" method was selected following discussion of several alternatives with SCAG modeling staff, because it uses the vigorous growth of recent years but results in a level of growth that does not compound over time. Staff judged that a compounding rate based on very high recent growth may not be sustainable over a 28-year period.

The preceding method accounts for travel on the two interstate highways only. Examination of maps shows that in the area east of Dagget on the western edge of the region between the two highways, there is a Marine Corps Supply Station, the Barstow airport, and about 80 square miles of suburban/semi-rural development. Further east there is no evidence of development. To account for travel on these local roads and the servicing of local facilities along the interstate highways, staff increased overall travel estimates for all years by 10 percent.

Speeds

For the purposes of emissions estimation using EMFAC, estimates of travel by speed group were made. Lacking empirical speed data for this sparsely populated area, staff judged that almost all traffic would be at free-flow highway speeds. For "peak" period travel (6 to 9 a.m. and 3 to 7 p.m.) staff assumed 85 percent of VMT for all classes travels at 65 mph, and 15 percent travels at 35 mph. For remaining hours, staff assumed 90 percent of VMT at 65 mph and 10 percent at 35 mph.

Results

Below is a summary of the VMT estimated through this assessment for the Mojave Valley area, along with SCAG's estimates for Victor Valley (RSAs 32 and 33).

VMT for San Bernardino County Portion of SE Desert Ozone Nonattainment Area (thousands)

Routes	Vehicle Category	1990	2000	2010	2030
Victor Valley (RSAs 32 and 33)	L./MDV	7,649	10,588	14,719	22,806
	HDV	618	763	1,037	1,609
Mojave Valley (I-15 and 40)	L./MDV	1,407	1,725	2,134	2,861
	HDV	447	1,052	1,551	2,655
	Total	10,121	14,128	19,441	29,931

The detailed spreadsheet with results can be found at:
http://www.arb.ca.gov/planning/sip/sedsip04/sedsip04.htm