APPENDIX C

ADJUSTMENT OF THE REMI CONTROL FORECAST

The 2007 AQMP uses SCAG's forecasts on population, employment, and other economic variables for future emission projections (Health and Safety Code Section 40460). The REMI model is used in the AQMP to generate a baseline forecast from which the effects of a policy are evaluated. The REMI and SCAG forecasts use different data inputs and assumptions.

The REMI model uses employment data published by the Bureau of Economic Analysis (BEA) while SCAG uses data published by the Bureau of Labor Statistics (BLS). The major difference between these two data sources lies in military personnel and the self-employed. The BEA data include federal military jobs and a much higher estimate of the self-employed than the BLS data. The self-employed are embedded in the estimates of sectoral employment in the BEA but are listed separately from the sectoral employment in the BLS.

An audit of the District's socioeconomic analysis methods by Massachusetts Institute of Technology recommended further evaluation of the inconsistency between the REMI and SCAG forecasts (Polenske et al., 1992). The District and SCAG commissioned the Center for the Continuing Study of the California Economy (CCSCE, 1994) to determine the sources of inconsistency between these forecasts. The CCSCE recommended a three-step process to ensure consistency between REMI and SCAG forecasts:

- REMI and SCAG should use the same U.S. projections for population and employment;
- REMI and SCAG should use the same birth rates by age cohort; and
- REMI and SCAG models should use similar rates of growth for employment projections.

The 2006 release of the 70-sector REMI model was adjusted in 2006 in preparation for work on the 2007 AQMP. This version of the REMI model has the same U.S. population projections as the SCAG model. The U.S. employment growth is at one percent annually from 2002 until 2025 in both models. Therefore, no further adjustment to the REMI U.S. forecast is needed.

SCAG's birth rates for four race/ethnicity groups (White, Black, Hispanic, Other) and five-year age cohorts for each of the four counties were incorporated into the REMI model from 2002 to 2025. Birth rates for a particular county were used for its subregions.[1] Specifically, the percentage differences between SCAG and REMI's birth rates were calculated and applied to the model using the birth rate variable within the model. The resultant birth rates are within 0.5% of the target birth rates.

After the above adjustments the REMI and SCAG models continued to display different growth rates of employment. SCAG has employment projections at a higher aggregate industry level than REMI's. Therefore, for each five-year interval (beginning in 2002), employment by REMI industry by sub-region was calculated as a percentage of the total employment of the SCAG industry within that county where the subregions belong. Based on SCAG employment growth rates for each five-year interval, the corresponding REMI target growth rates were derived using the 2002 REMI employment data as a starting point. A trend function was developed to interpolate values for intervening years. The annual growth rates by industry by sub-region

[1] There are 11 subregions for Los Angeles County, four for Orange County, and two each for Riverside and San Bernardino Counties, respectively, in the REMI model.

were entered into REMI using the Employment Update function via a multiplicative adjustment to ensure that the adjusted forecasts reflect SCAG growth rates and are incorporated into the baseline.

Additionally, REMI adjusted the population growth trends using the International Migration variable, which affects the most likely source of discrepancies in demographic estimates within California. The population of each sub-region was calculated as a share of the corresponding county. Based on the 2002 population data within the REMI model and growth rates from SCAG, a county population growth pattern was created. As with the employment adjustment, the 5-year interval population growth targets were interpolated for interim years. The data was entered in a control forecast as changes to the population between 2002 and 2025.

Adjustments to the employment growth rates and population were carried out iteratively to ensure that the percentage change in employment and population for the periods of 2002-2015 and 2015-2025 was consistent between the two models at the county level.

Table C-1 shows the region-wide difference in population between 2000-2015 and 2015-2025 for the unadjusted and adjusted REMI and SCAG forecasts. Table C-2 compares the employment growth rates between the unadjusted and adjusted REMI and SCAG forecasts for the periods of 2002-2015 and 2015-2025. The difference of the employment growth rates of the two forecasts is less than one percentage point for the four-county region.

TABLE C-1

Unadjusted and Adjusted REMI versus SCAG Population Comparison (in percent growth)

	2000-2015			2015-2025		
	Unadjusted REMI	Adjusted REMI	SCAG	Unadjusted REMI	Adjusted REMI	SCAG
Los Angeles	10%	12.0%	12.4%	8%	6.4%	6.3%
Orange	15%	17.3%	17.5%	10%	5.7%	5.4%
Riverside	58%	51.3%	50.8%	21%	21.2%	20.6%
San Bernardino	33%	31.7%	31.7%	16%	15.2%	14.4%
4-County Total	18%	19%	19.5%	11%	9%	9%

TABLE C-2

Unadjusted and Adjusted REMI versus SCAG Employment Comparison (in percent growth)

	2002-2015			2015-2025		
	Unadjusted REMI	Adjusted REMI	SCAG	Unadjusted REMI	Adjusted REMI	SCAG
Los Angeles	17%	6.4%	6.5%	6%	3.8%	3.8%
Orange	18%	21.8%	21.8%	6%	6.0%	6.0%
Riverside	45%	61.6%	61.6%	15%	20.2%	20.2%
San Bernardino	33%	44.2%	44.3%	11%	16.5%	16.5%
4-County Total	21%	17%	17%	8%	7%	7%