Air Quality Appendix B-3
for Combined
Baja California Power and
Sempra Energy Resources

Appendix B-3: Combined Air Quality Modeling Analysis

I. Technical Description of Combined Facilities

To determine the combined impacts of the TDM facility and the two LRPC export units, air dispersion modeling was conducted utilizing the U.S. Environmental Protection Agency's Industrial Source Complex Short-Term 3 (ISCST3) model (Version 00101). The ISCST3 model is a steady state, multiple-source, Gaussian dispersion model, as described earlier. Detailed descriptions of the components of the Termoeléctrica de Mexicali (TDM) and La Rosita Power Complex (LRPC) power plants are contained in previous sections of this Appendix.

The TDM and the LRPC power plants have emission levels that are well below the Mexican standards (*Norma Oficial Mexicana – 085*) of 139 ppm. In addition, these emission levels are below the latest guidelines for new power plants published by the World Bank in July 1998, which sets the limit at 155 ppm. Both the TDM and LRPC generation facilities will run exclusively on natural gas.

II. Air Dispersion Modeling Methodology

This combined air quality impact assessment incorporated U.S. EPA guidelines for dispersion modeling.

Air quality impact assessments typically utilize the following information and data:

A. Definition of existing concentrations of specific pollutants in the area of interest;
B. Predicted emissions from the projects/sources;
C. Physical project characteristics;
D. Physical characteristics of surrounding terrain;
E. Dispersion modeling to estimate the increase in ambient concentration of the specified pollutants resulting from the project emissions

Each of these steps has been performed for the TDM and the LRPC export units combined.

II.1 Definition of Existing Concentrations of Specific Pollutants

Background ambient air quality concentration levels are available from monitoring stations operated by the U.S./Mexico Border Information Center on Air Pollution, a center run under the auspices of the U.S. EPA. Mexicali data for 1997-1998 were used to determine background ambient air quality, along with data obtained from the U.S. EPA. Table B-3.1 shows the background ambient air quality levels.

TABLE B-3.1
Imperial County Maximum Background Levels
(micrograms per cubic meter)[1]
*All maximum concentrations occurred at Calexico Ethel Street monitoring site.

Averaging Period	NO_2*	CO*	PM_{10}*
1-Hour	483.2 (1998)	36480 (1995)	----
8-Hour	----	26140 (1995)	----
24-Hour	----	----	568 (1998)
Annual	29.7 (1995)	----	109.8 (1996)

1 Based on Cal-EPA/Air Resources Board *California Ambient Air Quality Data 1980-1998* CD-ROM, December 1999. Values shown represent the maximum values for several air stations located in Calexico, El Centro, Niland and Westmoreland during the 1992-1998 monitoring period. Original values in parts per million were adjusted using *AP-42, Appendix A* factors.

II.2 Estimation of Emissions

The estimated project emissions were calculated based on data from the combustion turbine and heat recovery steam generator vendors.

II.3 Dispersion Modeling

The ISCST3 model includes many options to address unique modeling requirements. Some of these options are discussed below, and the options chosen for analyses performed for this proposed project are identified.

ISCST3 incorporates simple terrain algorithms for estimating impacts at receptors where ground-level elevations are equal to or less than the heights of the emission sources (stacks). To estimate impacts at receptors with ground-level elevations that exceed the final plume height centerline, the ISCST3 model incorporates complex terrain algorithms from the COMPLEX-I model. In default mode, the model follows U.S. EPA's guidance for calculation of impacts in intermediate terrain, that is, where ground-level elevations are located between the emissions release height and the final plume height centerline. For intermediate terrain receptors, the ISCST3 model calculates concentrations using both simple terrain algorithms and complex terrain algorithms. The model then compares the predicted concentrations at each receptor, on an hourly basis, and the highest concentration per receptor is output from the model. The results presented were derived from using all three terrain algorithms.

The technical options selected for the ISCST3 modeling are listed below. These are referred to as the regulatory default options in the ISCST3 User' Guide. These are the options that U.S.-based regulatory agencies typically require be used when conducting air dispersion modeling. The input options for ISCST3 are as follows:

- Final plume rise
- Buoyancy-induced dispersion
- Stack tip downwash
- Rural dispersion coefficients
- Calm processing routine
- Default wind profile exponents (rural)
- Default vertical temperature gradients
- Anemometer height = 10 meters.

II.3.1 Meteorology

Several meteorological data sets were evaluated for this analysis. The meteorological data set deemed most representative of the Mexicali-Calexico region was five years (1990-1994) of hourly surface meteorological data collected at Imperial, California, with Holzworth seasonal average mixing height data (California Air Resources Board [CARB], 2001a; Holzworth, 1972). The Imperial meteorological data set is from the National Weather Service through the CARB archives.

II.3.2 Receptor Grids

A Cartesian receptor grid was used in the modeling analysis. The receptors extend to a distance of approximately 8½ miles (12 km) from the proposed turbine sources. Beginning at the facilities and moving outward, receptors were placed at 250 meter, 500 meter, and 1,000 meter increments.

A refined receptor grid with 50-meter grid spacing was placed at the border in an area where elevated concentrations may be predicted. Placing a grid with 125-meter spacing around these points provides further refinement to help determine maximum concentrations along the border.

III. Results and Conclusion

The Mexican Government and U.S. EPA have developed ambient air quality standards for several pollutants (referred to in the U.S. by EPA as "Criteria Pollutants"). These include standards for nitrogen dioxide, carbon monoxide and particulate matter equal to or less than 10 microns in aerodynamic diameter (PM_{10}). If measured or predicted concentrations of criteria pollutants are below the ambient air quality standard, no health effects are expected, since ambient air quality standards are set at levels intended to be protective of health and the environment.

The combined increased pollutant concentrations resulting from air emissions from the TDM and the LRPC export facilities (four turbines in all) are shown in Table CAQMA.2 (in micrograms per cubic meter). Annual averages represent the maximum predicted value for any year. Based on the model results, the predicted increase in concentration levels as a result of the generation facilities' emissions would not, when added to existing background levels, exceed any of the ambient air quality standards established by either the Mexican Government or the U.S. EPA for their respective jurisdictions.

The regulatory jurisdiction of the U.S. EPA does not pertain to air pollutant emissions in Mexico; nevertheless, a useful benchmark in U.S. EPA air permitting regulations and permitting guidance can be drawn upon to help assess the significance of these predicted increases from Mexican sources at the U.S. border and points north. In the context of permitting a major source or major modification in the U.S., U.S. EPA has established significance levels (henceforth SLs) for the criteria pollutants NO_2, SO_2, CO, and PM_{10} below which a major source or modification in the U.S. will not be considered to cause or contribute to a violation of a National Ambient Air Quality Standard (NAAQS) at any locality that does not meet NAAQS *(40 CFR 51.165).* In addition, U.S. EPA permitting guidance describes the impact area required air quality analysis to be a geographical area that exceeds these SLs. Where air dispersion modeling is performed, the U.S. EPA does not require a full impact analysis when emissions of a pollutant from a proposed source or modification would not increase ambient concentrations by more than these prescribed SLs. Thus SLs may be generally regarded as thresholds of impact below which impact is not viewed to be significant. Table B-3.2 shows applicable U.S. EPA SLs and the predicted concentration increases at U.S. receptors.

Table B-3.2. U.S. EPA Significance Levels (SLs)
and Power Generation Facilities Project Dispersion Modeling Results
(micrograms per cubic meter)

Pollutant	Averaging Period	Significance Level (SL)	Concentration Increase at U.S. Receptors
Nitrogen dioxide	1-hour	N/A	7.04 $\mu g/m^3$
Nitrogen dioxide	Annual	1.0 $\mu g/m^3$	0.33 $\mu g/m^3$
Carbon monoxide	1-hour	2,000 $\mu g/m^3$	29.7 $\mu g/m^3$
Carbon monoxide	8-hour	500 $\mu g/m^3$	16.7 $\mu g/m^3$
Particulate matter	24-hour	5.0 $\mu g/m^3$	3.0 $\mu g/m^3$
Particulate matter	Annual	1.0 $\mu g/m^3$	0.20 $\mu g/m^3$

Based on these results, the pollutant levels at the US/Mexico border would still be well below U.S. EPA's SL thresholds. The nitrogen dioxide concentration in the U.S. from the four turbines will be 0.33 $\mu g/m^3$; the SL for nitrogen dioxide is 1.0 $\mu g/m^3$. The one-hour increase in carbon monoxide concentration levels in the U.S. will be 29.7 $\mu g/m^3$; the SL is 2,000 $\mu g/m^3$. For particulate matter, the 24-hour increase will be 2.58 $\mu g/m^3$; the SL is 5.0 $\mu g/m^3$. The annual average increase of particulate matter will be 0.41 $\mu g/m^3$ compared to a SL of 1.0 $\mu g/m^3$. Thus, none of the increased concentration levels will exceed the U.S. EPA's SLs.