1-HOUR NO_2 MODELING ASSESSMENT

For the:

Russell City Energy Center Amendment

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Russell City Energy Center –1-Hour NO_2 Air Quality Impact Assessment

This report describes the Russell City Energy Center (RCEC) air quality modeling results for the comparison to the new Federal 1-hour standard of 188 ug/m^3. Potential air quality impacts were evaluated based on air quality dispersion modeling, as described herein. With the exception of the binary data files, all input and output modeling files are contained on a CD-ROM disk provided with this report. The modeling analyses were performed using the techniques and methods approved by the Bay Area Air Quality Management District (BAAQMD) modeling staff and outlined in the September 2008 *AERMOD Modeling Assessment*.

DISPERSION MODELING

For modeling the potential impact of RCEC in terrain that is both below and above stack top (defined as simple terrain when the terrain is below stack top and complex terrain when it is above stack top), the USEPA guideline model AERMOD (version 09292) was used with hourly ozone limiting. The meteorological and receptor data sets were those used in the previous air quality modeling analysis, as outlined in the *AERMOD Modeling Assessment* (September 2008). The purpose of the revised AERMOD modeling analysis was to evaluate compliance with the new federal 1-hour NO_2 air quality standard. The EPA recommended Tier 1 approach was utilized where the maximum 1-hour NO_2 background was added to the modeled 98th percentile concentration

Ozone Limiting Method

The Ozone Limiting Method (OLM) was used with concurrent hourly 1-hour ozone concentrations to calculate the 1-hour NO_2 concentrations using the AERMOD OLM subroutine. The OLM involves an initial comparison of the estimated maximum NO_x concentration and the ambient ozone concentration to determine which is the limiting factor to NO_2 formation. If the ozone concentration is greater than the maximum NO_x concentration, total conversion is assumed. If the NO_x concentration is greater than the ozone concentration, the formation of NO_2 is limited by the ambient ozone concentration. In this case, the NO_2 concentration is set equal to the ozone concentration plus a correction factor that accounts for in-stack and near-stack thermal conversion. Ozone data from the San Leandro monitoring site for the same period as the meteorological data (2003-2007) were used for the OLM analyses. Missing ozone data for periods of 1 hour were interpolated from the San Leandro data before/after the missing period. Missing data for longer periods were replaced with data from Hayward monitoring site or, if both San Leandro and Hayward data were missing, from the Fremont monitoring site.

Background Air Quality

Each federal or state AAQS is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time which specifies the

period over which the concentration value is to be measured. Table 1 presents the current federal and state AAQS for NO_2.

TABLE 1
State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Nitrogen dioxide (NO_2)	Annual Average	0.03 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)
	1-hr	0.18 ppm (339 µg/m^3)	0.1 ppm (188 µg/m^3)

The nearest NO_2 air quality monitoring site to the proposed project site is the Fremont-Chapel Way station. BAAQMD has previously approved use of data from this monitoring station as appropriate for NAAQS compliance demonstration for RCEC. Ambient monitoring data for this site for the most recent three (3) year period, as provided by the BAAQMD is summarized in Table 2.

Table 2 Monitoring Data Summary (First High Monitored Values)

Pollutant	Site	Avg. Time	2007	2008	2009
NO_2, ppb	Fremont	1 Hr	58	62	58

Compliance with the federal 1-hour NO_2 standard was based on a Tier 1 appraoch where the first high background concentration was added to the modeled 98th percentile concentration determined by the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations. Accordingly, the data from the Fremont monitoring station were evaluated to identify the maximum 1-hour NO_2 background concentration of 62 ppb, which converted into micrograms per cubic meter (ug/m^3) produces a background concentration of 116.56 ug/m^3.

AERMOD Modeling Results

This section describes the results in magnitude and spatial extent of ground level concentrations, resulting from NO_x emissions from the RCEC project. The 98th percentile maximum 1-hour modeled concentrations were added to the maximum (first high) background concentrations to calculate a total impact.

Table 3 summarizes 98th percentile 1-hour modeled NO_2 concentration which demonstrates compliance with the new 1-hour federal NO_2 standard. The maximum modeled concentration occurred during routine operation of the turbines along with the weekly simultaneous 30 minute test of the fire pump.

TABLE 3
Maximum Modeled Criteria Pollutant Concentrations

Pollutant	Avg. Period	98th Percentile Concentration ($\mu g/m^3$)	Model Run-Start or Norm	Background ($\mu g/m^3$)	Total ($\mu g/m^3$)	Class II Significance Level ($\mu g/m^3$)	BAAQMD SILs ($\mu g/m^3$)	Ambient Air Quality CAAQS/NAAQS ($\mu g/m^3$)	($\mu g/m^3$)
NO_2	1-hour	62.33[a]	Start	116.56	178.89	7.5	19	339	188

[a] The project maximum 1-hour impact is due primarily to the testing of the emergency fire pump, which occurs over a 30 minute period. All 1-hour NO_2 modeled concentrations were calculated with ozone limiting.

Conclusion

The results of the revised AERMOD analysis of the RCEC project demonstrates that the proposed project will comply with new federal 1-hour ambient air quality standard for NO_2.