October 31, 2012

Eric Solorio, Project Manager
California Energy Commission
Docket No. 11-AFC-3
1516 9th St.
Sacramento, CA 95814

Cogentrix Quail Brush Generation Project - Docket Number 11-AFC-03: Revised NO2 Modeling Analysis

Docket Clerk:

Pursuant to the provisions of Title 20, California Code of Regulations, and on behalf of Quail Brush Genco, LLC, a wholly owned subsidiary of Cogentrix Energy, LLC, Tetra Tech hereby submits the *Revised NO2 Modeling Analysis.* The *Revised Air Quality NO2 Modeling Files* were docketed under separate cover today. The Quail Brush Generation Project is a 100 megawatt natural gas fired electric generation peaking facility to be located in the City of San Diego, California. The following issue area is addressed in this submittal:

- Air Quality

If you have any questions regarding this submittal, please contact Rick Neff at (704) 525-3800 or me at (303) 980-3653.

Sincerely,

Constance E. Farmer
Project Manager/Tetra Tech

cc: Lori Ziebart, Cogentrix
John Collins, Cogentrix
Rick Neff, Cogentrix
Proof of Service List

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE QUAIL BRUSH GENERATION PROJECT

DOCKET NO. 11-AFC-03
PROOF OF SERVICE
(Revised 10/29/2012)

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DECLARATION OF SERVICE

I, Constance Farmer, declare that on October 31, 2012, I served and filed copies of the attached Revised NO2 Modeling Analysis, dated October 31, 2012. This document is accompanied by the most recent Proof of Service list, located on the web page for this project at: http://www.energy.ca.gov/sitingcases/quailbrush/index.html.

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:

(*Check all that Apply*)

For service to all other parties:

_x_ Served electronically to all e-mail addresses on the Proof of Service list;

___ Served by delivering on this date, either personally, or for mailing with the U.S. Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses marked *"hard copy required" or where no e-mail address is provided.

AND

For filing with the Docket Unit at the Energy Commission:

_x_ by sending an electronic copy to the e-mail address below (preferred method); *OR*

___ by depositing an original and 12 paper copies in the mail with the U.S. Postal Service with first class postage thereon fully prepaid, as follows:

CALIFORNIA ENERGY COMMISSION – DOCKET UNIT
Attn: Docket No. 11-AFC-03
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.ca.gov

OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:

___ Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

California Energy Commission
Michael J. Levy, Chief Counsel
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I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Constance C. Farmer

MEMO

To: Gerry Bemis, CEC
Joseph Hughes, CEC
Wenjun Qian, CEC

From: Richard Booth, AEROWEST
Gregory Darvin, Atmospheric Dynamics, Inc.

Date: October 31, 2012

Re: Revised NO2 Modeling Analysis

Attached is the revised NO2 modeling and impact analysis for the Quail Brush Power Project using the updated and revised NO2/NOx ratio data as provided in our earlier memo dated October 9, 2012.

Please feel free to contact me at (530) 474-1893 if you or your staff has any questions regarding the revised analysis.

Richard B. Booth
AEROWEST

ADDENDUM TO THE QUAIL BRUSH POWER PROJECT NO2 MODELING ANALYSIS

October 31, 2012

INTRODUCTION

Additional AERMOD analyses were performed for short-term (1-hour) NO_2 impacts based on a revised NO2/NOx ratio of 18.5%. Annual NO_2 impacts previously modeled are not affected by the revised analyses since annual NO_2 impacts are calculated with the Ambient Ratio Method (ARM), which does not require any assumptions or inputs for in-stack NO_2/NOx ratios.

MODELING OPTIONS

In the previous analyses, a NO_2/NOx ratio of 1.15% was assumed for the Wartsila engines based on various data sources. For these revised analyses, 18.5% was selected as a conservative approximation for the NO_2/NOx ratio for the Wartsila engines during startup conditions and commissioning events based on these data. While a lower NO_2/NOx ratio was likely indicated for normal operations, the 18.5% ratio was also selected for normal operations for the QPBB project.

The worst case NO_2 facility configuration, eleven engines at 100% load for 70°F ambient temperatures (Case I), was modeled with AERMOD. Most modeling options and inputs were the same as the previous modeled, namely:

- Concurrently hourly NO_2 background data for 2003-2007 from the Kearny Mesa (Overland Ave) monitoring site provided by SDAPCD was used to assess compliance with the CAAQS based on the maximum impact for the entire five year meteorological period modeled;
- Seasonal NO_2 background data for 2008-2010 (third-highest seasonal value for each hour, with the NO_2 data first processed in accordance with the guidance contained in the CAPCOA Guidance Document "Modeling Compliance of The Federal 1-Hour NO_2 NAAQS" dated October 27, 2011) from the Kearny Mesa site were used to assess compliance with the NAAQS based on the 5-year average of the annual 8th highest daily 1-hour maxima; and
- NO_2/NOx ratios of 10% for the warm start and fuel heaters and 20% for the diesel fire-pump engine (the fire-pump was conservatively included in all modeling analyses for normal operations, including the NAAQS assessment, despite the fact that USEPA guidance allows intermittent sources like firepumps to be deleted from the modeling inventory).

JUSTIFICATION OF TIER 3 NO_2 SCREENING TECHNIQUE

For this revised analysis, the Plume Volume Molar Ratio Method (PVMRM) modeling option was selected rather than the Ozone Limiting Method (OLM). The USEPA considers both PVMRM and OLM to be acceptable as Tier 3 options and does not indicate any preference between these two options[1,2]. Both PVMRM and OLM simulate the same basic chemical mechanism of ozone for the formation of NO_2 from emissions of NO. The main distinction is the approach taken to estimate the NO and ozone concentrations to which the ozone titration mechanism is applied. Both Tier 3 options are "detailed screening methods" to be considered with the reviewing authority on a "case-by-case" basis. While USEPA is currently evaluating these options, particularly PVMRM, as a preferred refined technique for these types of analyses, they are both currently considered to be non-regulatory-default options. As such, their use as alternative modeling techniques should be justified in accordance with Section 3.2.2, paragraph (e) of Appendix W. This justification was included in the modeling protocol originally submitted and approved by the reviewing authorities for OLM and many of the justifications remain valid for PVMRM. However, for purposes of completeness, the justification is paraphrased here, as it applies to PVMRM, based on five selected criteria:

1. **The model has received a scientific peer review:**

As noted in the U.S. EPA's June 2010 guidance document, because AERMOD is the preferred model for dispersion for a wide range of applications, the alternative model demonstration for use of the OLM/PVMRM options within AERMOD focuses on the treatment of NOX chemistry within the model, and does not need to address basic dispersion algorithms within AERMOD. The chemistry for OLM and PVMRM has been peer-reviewed, as noted by the documents posted on the U.S. EPA's Support Center for Regulatory Air Modeling web site. The posted documents include *Sensitivity Analysis of PVMRM and OLM in AERMOD* (MACTEC, 2004) and *Evaluation of Bias in AERMOD-PVMRM* (MACTEC, 2005). Both documents indicate that the models appear to perform as expected. Additional analyses of the OLM and PVMRM options have been performed and are summarized in the 2011 USEPA Guidance memo.[2]

2. The model can be demonstrated to be applicable to the problem on a theoretical basis:

As noted in the document entitled "Sensitivity Analysis of PVMRM and OLM In AERMOD" prepared by Roger W. Brode "This report presents results of a sensitivity analysis of the PVMRM and OLM options for NO_x to NO_2 conversion in the AERMOD dispersion model. Several single source scenarios were examined as well as a multiple-source scenario. The average conversion ratios of NO_2/NO_x for the PVMRM option tend to be lower than for the OLM option and for the Tier 2 option or the Ambient Ratio Method which has default values of 0.75 and 0.80 for the annual and 1-hour averages. The sensitivity of the PVMRM and OLM options to emission rate, source parameters and modeling options appear to be reasonable and are as expected based on the formulations of the two methods. For a given NO_x emission rate and ambient ozone concentration, the NO_2/NO_x conversion ratio for PVMRM is primarily controlled by the volume of the plume, whereas the conversion ratio for OLM is primarily controlled by the ground-level NO_x concentration.

Overall the PVMRM option appears to provide a more realistic treatment of the conversion of NO_x to NO_2 as a function of distance downwind from the source than OLM or the other NO_2 screening options (Hanrahan, 1999a; Hanrahan, 1999b). No anomalous behavior of the PVMRM or OLM options was identified as a result of these sensitivity tests." Based on this report for both OLM/PVMRM appear to be applicable to the problem of NO_2 formation and as noted by the author provides a better estimation of the NO_2 impacts compared to other screening options (Tier 1 and 2).

3. The databases which are necessary to perform the analysis are available and adequate:

The data needed to conduct an AERMOD run with hourly seasonal background NO_2 data (for NAAQS analyses) or concurrent hourly background NO_2 data (for CAAQS analysis) are hourly meteorological data, hourly ozone data, and hourly NO_2 data. The hourly ozone and meteorological data exist for the same time period at the same Kearny Mesa Monitoring Station, operated by the SDAPCD. As noted above, concurrent NO_2 data were used for CAAQS analyses and three recent years (2008-2010) of hourly seasonal NO_2 data were processed based on USEPA and CAPCOA guidance for the NAAQS analyses. The APCD considers this monitoring station as representative of where reactive photochemistry will occur most extensively.

The site is an urban/commercial area and is bounded by State Route 52 to the north, Interstate 805 to the west, and Interstate 15 to the east. Adjacent communities include Serra Mesa, Clairemont, and Tierrasanta. The air quality in this location is representative of a large part of the metropolitan portion of San Diego due to the diurnal onshore and offshore flow, which mixes the pollutants throughout the metropolitan region.

This monitoring station is located next to major transportation corridors and population centers, so it is able to provide representative concentration data for a significantly large area. The APCD classifies the monitoring objective at this site as "Representative Concentration", which is defined to represent the air quality concentrations for a pollutant that is expected to be similar throughout a geographical area. They may not always indicate the highest concentrations in the

area, but review of Table 4 1-hour NO_2 data for Overland Ave indicates that many of the high concentrations for 1-hour NO_2 have been recorded at Overland Ave. Part of the reason for the relatively high NO_2 concentrations may be due to the location of the monitor with respect to State Route 52. Based on prevailing wind direction, the Overland Ave monitoring station appears to be directly impacted from State Route 52 mobile source emissions.

For this project, the use of the Overland Ave monitoring station satisfies the Environmental Protection Agency's new requirements for the placement of NO_2 monitors near major roadways in urban areas in order to determine the highest concentrations in an area covered by a monitoring network. The new Federal 1-hour NO_2 standard requires that monitoring networks be designed to measure the expected highest concentrations. Each of the SDAPCD monitoring stations has unique objectives that are associated with a spatial scale for each site. These spatial scales are defined in 40 CFR Part 58, Appendix D. Additionally, the desired spatial scale of a monitoring site must conform to established criteria for the distance from roadways, based on traffic volumes as defined in 40 CFR Part 58, Appendix E. The goal in siting monitoring stations is to match the spatial scale with the desired monitoring objective.

The new Federal 1-hour NO_2 standard is focused on short-term peak concentrations, which may occur near roadways. As summarized in the 2009 San Diego Air Monitoring Network Plan (June 2010) and based on the last four years of 1-hour NO_2 monitoring data, the Overland Ave monitoring objective appears to be population oriented (typical concentrations in areas of high population density in order to protect public health) and highest concentration (monitoring at locations expected to have the highest concentrations). Based on the major roadways that surround the monitoring station, the use of the Overland Ave NO_2 monitoring data appears to satisfy the revised EPA population and highest concentration oriented monitoring station requirements for the new 1-hour standard.

4. **Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates:**

   As noted in *Evaluation of Bias in AERMOD-PVMRM* (MACTEC, 2005), which was prepared by Roger W. Brode, PVMRM has been judged to provide unbiased estimates based on criteria that are comparable to, or more rigorous than, evaluations performed for other dispersion models.

5. **A protocol on methods and procedures to be followed has been established.**

   The methods and procedures (that were proposed in the original air quality modeling protocol, which was reviewed and approved by the reviewing authorities) have been followed for implementation as outlined here.

MODELING RESULTS

The revised 1-hour NO_2 impacts are compared below to the AAQS. Maximum impacts for both NAAQS/CAAQS and normal operations and startup conditions normally occurred on the 20-meter downwash receptor grid, so no refined receptor grids were necessary for most runs. However, the commissioning impacts calculated for comparison to the NAAQS required a refined 20-meter spaced receptor grid (reflected in the impacts below). As can be seen, the facility still complies with applicable state/California and Federal/ National NO_2 standards.

Comparison of NO2 Air Quality Impacts to Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total ($\mu g/m^3$)	Ambient Air Quality CAAQS/NAAQS	
					($\mu g/m^3$)	($\mu g/m^3$)
NORMAL QBPP OPERATIONS:						
NO_2	1-hour Federal	-	-	160	-	188
	1-hour State	-	-	243	339	-
STARTUP/SHUTDOWN QBPP CONDITIONS:						
NO_2	1-hour Federal	-	-	186	-	188
	1-hour State	-	-	336	339	-
COMMISSIONING:						
NO_2	1-hour Federal	-	-	184	-	188
	1-hour State	-	-	314	339	-

Notes: Background concentrations included by AERMOD for 1-hour NO_2 impacts.

[1]USEPA, 2010. *"Applicability of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard."* June 28, 2010 memorandum from Tyler Fox to Regional Air Division Directors.

[2]USEPA, 2011. *"Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard."* March 1, 2011 memorandum from Tyler Fox to Regional Air Division Directors.