Appendix 5.1H
Modeling Protocol and Related Correspondence

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April 27, 2011

Matt Layton
Siting Division
California Energy Commission
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Subject: Modeling Protocol for BrightSource Energy's Proposed Hidden Hills Ranch Solar Electric Generating Station in Inyo County

Dear Matt:

Please find attached the air quality modeling protocol for BrightSource Energy's proposed Hidden Hills Ranch Solar Electric Generating Station solar thermal power plant project to be located in Inyo County. BrightSource will be applying to the California Energy Commission for certification and to the Great Basin Unified Air Pollution Control District for a Determination of Compliance. Attached for your review and concurrence is a description of the analytical approach that we propose to use to comply with the CEC's modeling requirements for the project. We intend to file an Application for Certification with the CEC in the summer of this year.

We would like to meet with you and your staff to discuss the air quality-related aspects of the project and will contact you next week to set up the meeting. We look forward to working with you. If you have any questions regarding this protocol or any other aspect of the proposed project, please do not hesitate to call Nancy Matthews or me. Thank you for your attention in this matter.

Sincerely,

Gabriel McAuliffe

for Gary Rubenstein
Senior Partner

Attachment

cc: Clay Jensen, BrightSource Energy, Inc.
Susan Strachan, Strachan Consulting
Chris Ellison, Ellison Schneider & Harris

Air Dispersion Modeling and Health Risk Assessment Protocol Hidden Hills Ranch Solar Electric Generating Station Inyo County, California

Submitted to:

Great Basin Unified Air Pollution Control District
California Energy Commission

prepared for:

BrightSource Energy, Inc.

April 2011

prepared by:

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Air Dispersion Modeling and Health Risk Assessment Protocol
Hidden Hills Ranch Solar Electric Generating Station
Inyo County, California

April 2011

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Air Dispersion Modeling and Health Risk Assessment Protocol
Hidden Hills Ranch Solar Electric Generating Station

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1. INTRODUCTION

BrightSource Energy (BSE) intends to submit an Application for Certification (AFC) to the California Energy Commission (CEC) and an Application for a Determination of Compliance to the Great Basin Unified Air Pollution Control District (District) for a new solar thermal power project in southeastern Inyo County.[1] The proposed project will consist of two solar concentrating thermal power plants, based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of the heliostat array. The project will have a total output of 500 MW (nominal net, at site design conditions). Air emitting sources at the plants will include large and small natural gas-fired auxiliary boilers, Diesel emergency generators, Diesel fire pump engines, air-cooled condensers, and partial dry cooling systems that include evaporative coolers.

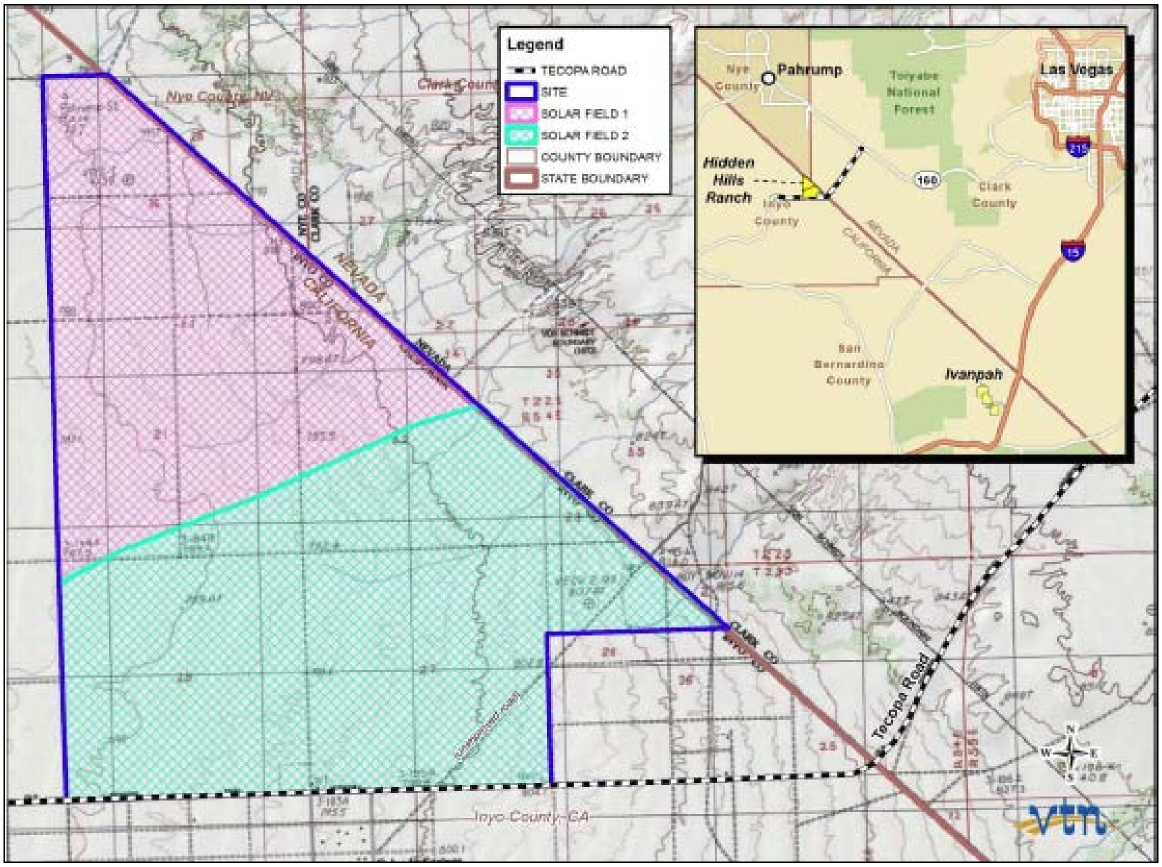
The location of the proposed project is shown in Figure 1.

Certification by the CEC will be required because the project will generate more than 50 MW of electric power. The project will be required to provide an assessment of impacts on air quality under District Rule 216 (New Source Review Requirements for Determining Impact on Air Quality) because emissions of nitrogen oxides (NOx) and particulate matter (PM_{10}) are each expected to exceed 15 pounds per hour or 150 pounds per day.

The project is not expected to be subject to federal PSD requirements (40 CFR 52.21) because potential emissions of each attainment pollutant will be below the 100 ton per year major source threshold that is applicable to facilities of this type.[2] Greenhouse gas (GHG) emissions will be limited to below the 100,000 ton per year major source threshold for GHG. PSD applicability will be addressed in the application documents. The applications that will be submitted to the District and the CEC (and, potentially, the USEPA) will include air quality impact analyses. Air dispersion modeling for these analyses will address criteria pollutants as required by District Rule 216; CEC requirements[3] for evaluation of project air quality and public health impacts; and, if necessary, applicable USEPA requirements for PSD permits. The purpose of this

[1] The proposed project is not expected to require a PSD permit. If a PSD permit is required, a separate modeling protocol will be prepared for submittal to the U.S. Environmental Protection Agency (USEPA).
[2] Because the project will include several large (>250 MMBtu/hr heat input) natural gas-fired auxiliary boilers, it will be subject to the 100 tpy major stationary source threshold in 40 CFR 52.21(b)(1)(i)(a).
[3] Summarized in CEC Data Adequacy Worksheets, revised March 28, 2007, and available at *http://www.energy.ca.gov/sitingcases/documents/index.html*.

Figure 1
Location of the Proposed Hidden Hills Ranch Solar Electric Generation Station



document is to present the procedures for meeting District and CEC air quality modeling requirements for the proposed project. If a PSD permit is required, a separate modeling protocol will be prepared that will address project-specific PSD modeling requirements.

This protocol describes the modeling procedures that will be used, which follow modeling guidance provided by the USEPA in its "*Guideline on Air Quality Models*" (USEPA 2005, including supplements), 40 CFR part 51, Appendix W, and the San Joaquin Valley Air Pollution Control District's *Guidance for Air Dispersion Modeling, Rev 2.0* (March 2011).[4]

Impacts from operation of the facility will be compared to the criteria shown in Table 1.

[4] While the project is not located in the San Joaquin Valley, the SJVAPCD has developed detailed guidance for implementing the 1-hour NO_2 national ambient air quality standard in non-PSD permits that is useful in laying out a tiered approach to modeling compliance with the 1-hour standard.

Table 1 **Air Quality Impact Analysis**					
Air Quality Criteria	**NO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO**	**SO_2**
PSD Significant Impact Levels [a]	√	√	√	√	√
Ambient Air Quality Standards (AAQS)	√	√	√	√	√
Impacts to Soils and Vegetation [b]	√	√	√	NA[c]	√

Notes:
a. Used as an objective standard to determine whether modeled air quality impacts are significant.
b. Used in assessing impacts to biological resources.
c. NA: Not applicable.

2. FACILITY DESCRIPTION AND SOURCE INFORMATION

The Hidden Hills Ranch Solar Electric Generation Station will be located on a privately owned 3,200-acre parcel north of Tecopa Road (Old Spanish Trail Highway) and west of the Nevada state line in Inyo County. Figure 2 shows the project site and its immediate surroundings. The nominal site elevation is 800 meters (2600 feet) above mean sea level.

The Project will include two 250-MW (nominal, net) solar concentrating thermal power plants, based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of the heliostat array. The two plants will be constructed on adjacent property (as shown in Figure 1) and will share natural gas supply, transmission infrastructure, and a common control area, so are considered a single stationary source under District Rule 209-A F.3.

In each plant, one Rankine-cycle reheat steam turbine receives steam from a solar boiler located at the top of the power tower adjacent to the turbine. The solar field and power generation equipment are started up each morning, and shut down in the evening. To optimize the power output of the plants and extend generating capability into the late after/early evening shoulder period when solar insolation alone is not sufficient to generate adequate steam for the steam turbine, each plant will utilize five 500-MMBtu natural gas-fired auxiliary boilers, to be operated up to five hours per day on summer weekdays. Annual heat input to the auxiliary boilers will be limited to be less than 15% of annual solar energy capture. The boilers will utilize advanced combustion design to limit emissions of nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC). Emissions of particulate matter with nominal aerodynamic diameter less than or equal to 10 and 2.5 microns (PM_{10} and $PM_{2.5}$), and sulfur oxides (SOx) will be kept to a minimum through the exclusive use of natural gas as the fuel.

In addition, each plant will have emergency standby Diesel fuel-fired internal combustion engines (to provide power to operate boiler feed and recirculation pumps if power is otherwise unavailable) and small natural gas-fired auxiliary boilers to assist with startup of the solar boilers. Finally, each plant will be equipped with a Diesel fuel-fired emergency firewater pump engine. Air-cooled condensers will be used for cooling and condensing process steam. Partial dry cooling systems will be used to cool auxiliary equipment, including generators, lube oil, and pumps. The wet surface air coolers that are part of the partial dry cooling systems will be used to provide auxiliary cooling only during the hottest hours of the year. For the purposes of the AQIA, all combustion particulate matter and particulate emissions from the wet surface air coolers will be treated as $PM_{2.5}$.

Figure 2
Aerial View of the Immediate Vicinity
Around the Proposed Hidden Hills Ranch SEGS

3. DISPERSION MODEL PROCEDURES

3.1 AERMOD Modeling

The following USEPA air dispersion models are proposed for use to quantify pollutant impacts on the surrounding environment based on the emission sources' operating parameters and their locations:

- American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) model, also known as AERMOD (Version 11059);

- Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME, Version 04274); and

- SCREEN3 (Version 96043).

The main air dispersion modeling will be conducted with the latest version (Version 11059) of AERMOD, EPA's preferred/recommended dispersion model for new source review and PSD air quality impact assessments. The air quality modeling analysis will follow the March 2009 USEPA AERMOD Implementation Guide, USEPA's "Guideline on Air Quality Models," and the SJVAPCD's "Guidance for Air Dispersion Modeling."[5] USEPA default options will be used.

AERMOD can account for building downwash effects on dispersing plumes. Stack locations and heights and building locations and dimensions will be input to BPIP-PRIME. The first part of BPIP-PRIME determines and reports on whether a stack is being subjected to wake effects from a structure or structures. The second part calculates direction-specific building dimensions for each structure, which are used by AERMOD to evaluate wake effects. The BPIP-PRIME output is formatted for use in AERMOD input files.

Simple, Complex, and Intermediate Terrain Impacts – The AERMOD air dispersion model to be used for simple, complex, and intermediate terrain is a steady-state, multiple-

[5] As discussed above, the project will not be located in the SJVAPCD. However, the SJVAPCD has developed detailed modeling guidance that incorporates procedures for implementing the 1-hour federal NO_2 standard for non-PSD projects and we are proposing to follow that guidance in the absence of other state or local guidance.

source, Gaussian dispersion model designed for use with stack emission sources situated in terrain where ground elevations can exceed the stack heights of the emission sources (i.e., complex terrain). The AERMOD model requires hourly meteorological data consisting of wind direction and speed (with reference height), temperature (with reference height), Monin-Obukhov length, surface roughness length, heights of the mechanically and convectively generated boundary layers, surface friction velocity, convective velocity scale, and vertical potential temperature gradient in the 500-meter layer above the planetary boundary layer. AERMOD is considered a steady-state model because it assumes that there is no variability in meteorological parameters over a one-hour time period.

Standard AERMOD control parameters will be used, including stack tip downwash, non-screening mode, non-flat terrain, and sequential meteorological data check. The stack-tip downwash algorithm will be used to adjust the effective stack height downward following the methods of Briggs[6] for cases where the stack exit velocity is less than 1.5 times the wind speed at stack top. The rural default option will be used by not invoking the URBANOPT option.[7] The use of the rural default in modeling for this project is consistent with the project's remote location.

Background ambient air quality data for the project area from the monitoring site most representative of the conditions that exist at the proposed project site will be used to represent regional background concentrations. Table 2 shows the monitoring stations we propose to use as they provide the most representative ambient air quality background data. The locations of these stations relative to the project site are shown in Figure 3.

Table 2
Representative Background Ambient Air Quality Monitoring Stations

Pollutant(s)	Monitoring Station	Distance to Project Site
Ozone, PM_{10}, $PM_{2.5}$	Jean, NV (Clark County)	34 miles
CO	Barstow, CA (San Bernardino County)	97 miles
NO_2, SO_2	Trona, CA (San Bernardino County)	82 miles
Lead	San Bernardino, CA (San Bernardino County)	150 miles

Although the PM_{10} monitoring site at Pahrump, NV, is closer to the project site than the Jean station, the Pahrump data are strongly impacted by local windblown dust, and therefore are not representative of regional background concentrations.

[6] Briggs, 1972 (see Section 5, References, for detail).
[7] The rural vs. urban option in AERMOD is primarily designed to set the fraction of incident heat flux that is transferred into the atmosphere. This fraction becomes important in urban areas having an appreciable "urban heat island" effect due to a large presence of land covered by concrete, asphalt, and buildings. This situation does not exist for the proposed project site.

> *Fast population growth in the '90s through mid-2006 created intensive development. Large parcels of land were cleared of vegetation, subdivided and prepared for housing construction. Dirt and gravel roads were constructed. Many of the planned housing developments never materialized and the lots are now disturbed, vacant areas.*
>
> *As a result of the disturbed, vacant land and the number of dirt and gravel roads, fugitive dust (particulate matter less than 10 microns, or PM) became a problem. The Pahrump valley is subject to high winds and these winds often create dust storms.*[8]

However, the project site is upwind of the Pahrump area under most meteorological conditions[9] and therefore would not be expected to be impacted by the dust storms that create high localized PM_{10} concentrations in Pahrump. Therefore, PM_{10} concentrations monitored at Jean are believed to better represent conditions in the project area.

The 3-year period 2008-2010 is the most recent 3-year period for which background ambient data are available. Modeled concentrations for the Project will be added to these representative background concentrations to determine compliance with the CAAQS and NAAQS (see Section 3.6).

If more detailed evaluation of impacts at receptors in terrain above stack-top height is required, the screening version of the USEPA guideline Complex Terrain Dispersion Model PLUS (CTDMPLUS), Complex Terrain Screening Model (CTSCREEN), would be used. The CTSCREEN model is discussed in more detail in Appendix A. However, because there is no terrain above stack-top height within 4 miles of the plant site, it is unlikely that this more refined analysis will be needed.

3.1.1 Ambient Ratio Method and Ozone Limiting Method

Annual NO_2 concentrations will be calculated using the Ambient Ratio Method (ARM), adopted in Supplement C to the Guideline on Air Quality Models (USEPA, 1995). The Guideline allows a nationwide default of 75% for the conversion of nitric oxide (NO) to NO_2 on an annual basis and the calculation of NO_2/NOx ratios.

If NO_2 concentrations need to be examined in more detail, the Ozone Limiting Method[10] (OLM), implemented through the "OLMGROUP ALL" option in AERMOD,[11] will be used. AERMOD OLM will be used to calculate the NO_2 concentration based on the OLM method and hourly ozone data. Contemporaneous hourly ozone data collected at the Jean monitoring station will be used in conjunction with OLM to calculate hourly NO_2 concentrations from modeled hourly NOx concentrations.

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8 NVBAQP (2010)
9 See wind roses in Appendix B.
10 Cole and Summerhays (1979).
11 USEPA (2011a).

The Ozone Limiting Method assumes that 10% of the NOx in the exhaust is converted to NO_2 during and immediately after combustion. The remaining percentage of the NOx emissions is assumed to be nitric oxide (NO). As the exhaust leaves the stack and mixes with the ambient air, the NO reacts with ambient ozone (O_3) to form NO_2 and molecular oxygen (O_2). The OLM assumes that at any given receptor location, the amount of NO that is converted to NO_2 by this oxidation reaction is proportional to the ambient O_3 concentration. If the O_3 concentration is less than the NO concentration, the amount of NO_2 formed by this reaction is limited. However, if the O_3 concentration is greater than or equal to the NO concentration, all of the NO is assumed to be converted to NO_2.

A detailed discussion of how OLM modeling results and monitored background NO_2 will be combined is provided in Section 3.6.1.2.

3.1.2 $PM_{2.5}$

$PM_{2.5}$ impacts will be modeled in accordance with EPA guidance.[12] A detailed discussion of how modeled $PM_{2.5}$ impacts will be evaluated is provided in Section 3.6.1.

3.2 Fumigation Modeling

The SCREEN3 model will be used to evaluate inversion breakup fumigation impacts for short-term averaging periods (24 hours or less), as appropriate. The methodology in USEPA 1992b (Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised) will be followed for these analyses. Combined impacts for all sources under fumigation conditions will be evaluated, based on USEPA modeling guidelines.

3.3 Health Risk Modeling

A health risk assessment (HRA) will be performed according to the Office of Environmental Health Hazard Analysis “Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments” (August 2003). For the CEC AFC, a complete HRA will be performed. The HRA modeling will be prepared using the California Air Resources Board’s (CARB’s) Hotspots Analysis and Reporting Program (HARP) computer program (Version 1.4d) and AERMOD with the CARB “onramp.”[13] HARP will be used to assess cancer risk as well as non-cancer chronic and acute health hazards. Because the TACs emitted by the project include polycyclic aromatic hydrocarbons (PAHs), the HRA will address not only the inhalation pathway, but also the following three pathways: dermal absorption, soil, and mother’s milk ingestion. Consistent with OEHHA guidance, because of the remote desert location of the proposed project, the produce and fish pathways will not be evaluated.

[12] EPA OAQPS (2010a)

[13] HARP has not yet been revised to utilize AERMOD, but CARB has developed “onramp” software that allows HARP to incorporate AERMOD output files. Therefore, HARP is now compatible with AERMOD.

> *The other exposure pathways (e.g., the ingestion of homegrown produce or fish) are evaluated on a site-by-site basis. If the resident can be exposed through an impacted exposure pathway, then it must be included in the HRA.* ***However, if there were no vegetable gardens or fruit trees within the zone of impact for a facility, for example, then the produce pathways would not be evaluated****.*[14] [emphasis added]

3.4 Meteorological Data

Hourly surface meteorological data (e.g., hourly wind speed and direction and temperature) have been obtained from Pahrump, NV,[15] for calendar years 2006 through 2010. Cloud cover data from the Henderson Airport, near Las Vegas, will be used as no cloud cover data are collected at the Pahrump station. Upper air data were recorded at Elko, NV. These datasets will be processed using AERMET to generate AERMOD-compatible meteorological data for air dispersion modeling. The locations of these meteorological monitoring stations relative to the project site are shown in Figure 3. Five-year composite wind roses for the Pahrump site are included as Appendix B.

EPA defines the term "on-site data" to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may have a significant impact on air quality. The meteorological data requirement originates in the Clean Air Act at Section 165(e)(1), which requires an analysis "of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility."

This requirement and EPA's guidance on the use of on-site monitoring data are also outlined in the *On-Site Meteorological Program Guidance for Regulatory Modeling Applications.*[16] The representativeness of the data depends on (a) the proximity of the meteorological monitoring site to the area under consideration, (b) the complexity of the topography of the area, (c) the exposure of the meteorological sensors, and (d) the period of time during which the data are collected. The Pahrump, NV, monitoring station is 18 miles (28 km) from the project site, and is located in the same valley and at a similar elevation on the same high desert plateau. Therefore, the met data station meets criteria (a), (b) and (c) above. In addition, we proposed to use five years of meteorological data to ensure adequate representation of temporal variation. Based on these considerations, the applicant believes that the proposed meteorological data are representative of conditions at the project site.

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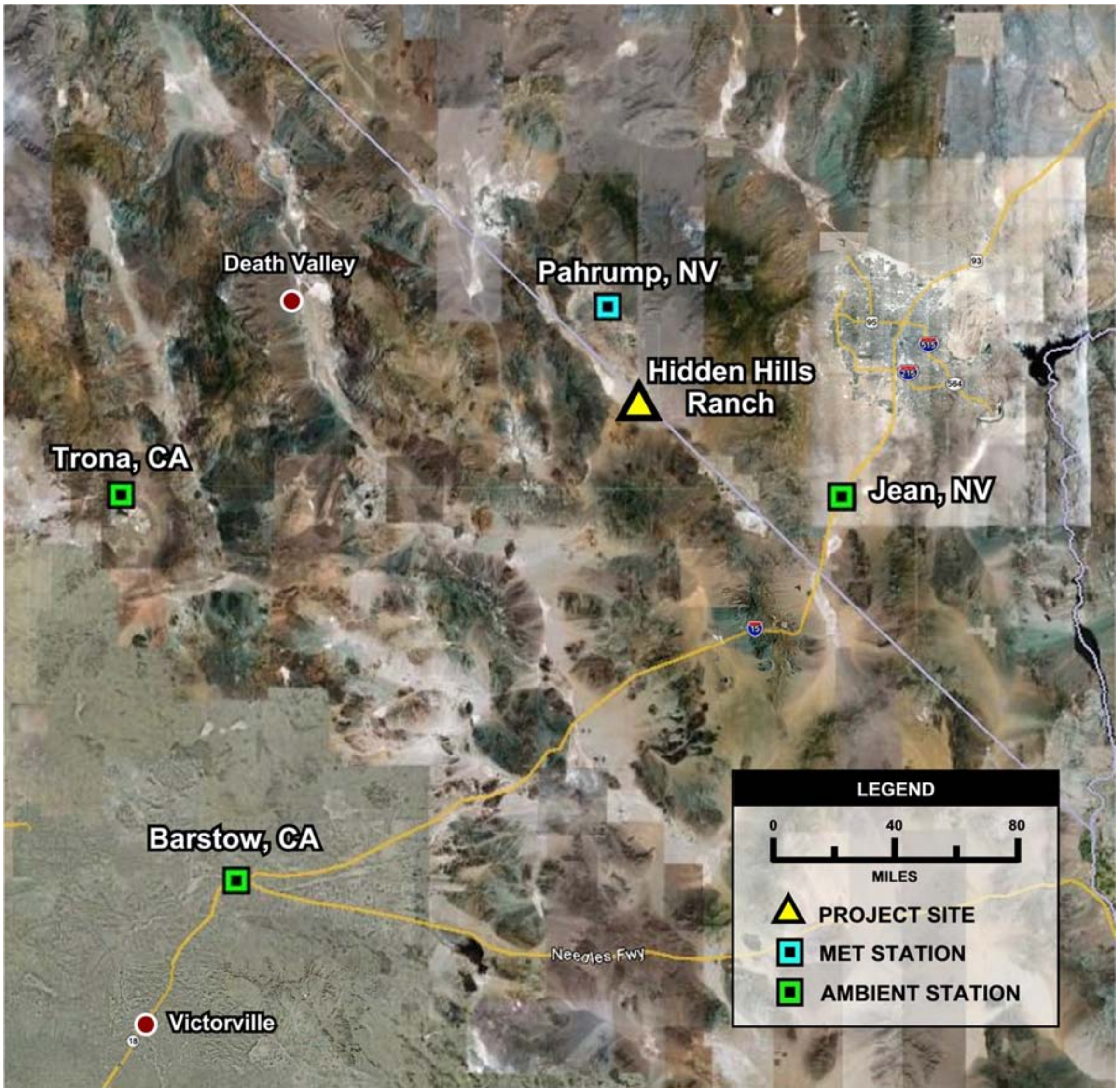
[14] OEHHA (2003) p. 5-3.
[15] Western Regional Climate Center, Pahrump, Nevada (DRI-CEMP) Weather Station. http://www.wrcc.dri.edu/weather/pahr.html
[16] USEPA (1987c).

Figure 3
Relative Locations of the Project and Monitoring Stations



Representativeness has also been defined in the "*Workshop on the Representativeness of Meteorological Observations*" (Nappo et. al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Representativeness is best evaluated when sites are climatologically similar, as are the project site and the Pahrump meteorological monitoring station. Representativeness has additionally been defined in the PSD Monitoring Guideline[17] as data that characterize the

[17] USEPA (1987a).

air quality for the general area in which the proposed project would be constructed and operated. As can be seen in Figure 3, the Pahrump meteorological monitoring station is in close proximity to the proposed project site (distance between the two locations is less than 18 miles with no significant intervening terrain features), and the same large-scale topographic features located to the east and south that influence the meteorological data monitoring station influence the proposed project site in the same manner.

The surface characteristics input to AERMET should be based on the topographic conditions in the vicinity of the meteorological tower used to provide meteorological data.[18,19] The values for the surface characteristics of albedo, Bowen Ratio and surface roughness appropriate to the area around the Pahrump meteorological monitoring station have been obtained from AERSURFACE, designed to aid in obtaining realistic and reproducible surface characteristic values for AERMET, following EPA guidance.[20]

Upper air meteorological data are taken from soundings obtained at Elko, NV, located approximately 335 miles northeast of the Project. The nearest upper air station to the project site is located at Desert Rock, NV. For the period 2006 through 2010, however, the upper air data from Desert Rock are incomplete—approximately 15% missing data, which exceeds the 10% EPA data completeness threshold.

The next closest upper air station is at Miramar Naval Air Station, California. However, Miramar is a coastal site, while Elko is an inland desert site and as such is climatologically more similar to the project site.

3.4.1 Missing Data Protocol

Using the OLM method to model project-generated 1-hour NO_2 concentrations requires the use of ambient monitored O_3 concentrations. Because the OLM method uses the ambient ozone concentration for a particular hour to limit the conversion of NO to NO_2, it is important to have ozone concentrations for every hour. It is also important that any missing hourly ozone concentration be filled in with a value that does not underestimate the ozone concentration for that hour, to avoid underestimating the resulting NO_2 concentration. In addition, computation of total hourly NO_2 concentrations requires use of the ambient monitored hourly NO_2 concentrations from the nearest monitoring station. As for the hourly ozone data, it is important to have a background NO_2 value for every hour that does not underestimate actual background.

As discussed above, background ambient O_3 and NO_2 concentrations for the project area during 2006-2010 will be obtained from the monitoring stations at Jean, NV and Trona, respectively. While these datasets exceed EPA's 90% completeness criterion (that is, more than 90% of the data values are present for each month), there are still occasional missing values that must be filled in. We propose to use linear interpolation, as described in "San Joaquin Valley Air Pollution Control District's EPA Background Files",[21] to fill

[18] USEPA (2005), §8.3.c
[19] USEPA (2009).
[20] http://www.epa.gov/scram001/7thconf/aermod/aersurface_userguide.pdf
[21] SJVAPCD (2011).

in the missing values. The SJVAPCD guidance follows EPA guidance[22] for a single missing hour, but uses a somewhat different approach for filling in multi-hour data gaps. As discussed earlier, the proposed project is not in the SJVAPCD. However, the SJVAPCD has prepared detailed guidance for evaluating one-hour NO_2 impacts from non-PSD projects that is not available from the state or other local districts. As we propose to follow this guidance for evaluating one-hour NO_2 impacts, we also propose to use this guidance to prepare the underlying datasets.

The procedure to be used for filling in multi-hour data gaps is as follows:

- If three or fewer consecutive hours of O_3 or NO_2 ambient concentrations are missing, linear interpolation will be used to fill in the missing concentrations based on the previous and subsequent hour concentrations from the same day as follows:

    - If only A_n is missing, then A_n = arithmetic mean of A_{n-1} and A_{n+1}, where A_{n-1} is the previous concentration and A_{n+1} is the subsequent concentration.

    - If A_n and A_{n+1} are missing, then $A_n = A_{n-1}*0.67+A_{n+2}*0.33$ and $A_{n+1} = A_{n-1}*0.33+A_{n+2}*0.67$.

    - If $A_{n-1,}$ A_n and A_{n+1} are missing, then $A_{n-1}= A_{n-2}*0.75+ A_{n+2}*0.25$, $A_n= A_{n-2}*0.5+ A_{n+2}*0.5$, $A_{n+1} = A_{n-2}*0.25+ A_{n+2}*0.75$.

- If four or more consecutive hours of O_3 or NO_2 ambient concentrations are missing, then substitution for each missing concentration will be by the arithmetic mean of the concentrations from the same hour of the most recent previous day and soonest subsequent day.

3.5 Receptor Grids

Receptor and source base elevations will be determined from USGS National Elevation Dataset (NED) data in the GeoTIFF format at a horizontal resolution of 1 arc-second (approximately 30 meters). All coordinates will be referenced to UTM North American Datum 1983 (NAD83), Zone 11. The AERMOD receptor elevations will be interpolated among the DEM nodes according to standard AERMAP procedure. For determining concentrations in elevated terrain, the AERMAP terrain preprocessor receptor-output (ROU) file option will be chosen. Hills will not be imported into AERMOD for CTDM-like processing.

Cartesian coordinate receptor grids will be used to provide adequate spatial coverage surrounding the project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations.

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[22] USEPA (2011a).

A 250-meter resolution coarse receptor grid will be developed and will extend outwards at least 10 km (or more if necessary to calculate the significant impact area).

For the full impact analyses, a nested grid will be developed to fully represent the maximum impact area(s). This grid will have 25-meter resolution along the facility fence-line in a single tier of receptors composed of four segments extending out to 100 meters from the fenceline, 100-meter resolution from 100 meters to 1,000 meters from the fenceline, and 250-meter spacing out to at least 10 km from the most distant source modeled, not to exceed 50 km from the project site. Additional refined receptor grids with 25-meter resolution will be placed around the maximum first-high or maximum second-high coarse grid impacts and extended out 1,000 meters in all directions. Concentrations within the facility fenceline will not be calculated.

The Regions to be imported in Geographical Coordinates for the USGS National Elevation Dataset (NED) data are bounded as follows:

- South West corner: Lat: 35.88, Lon: -116.04;
- North East corner: Lat: 36.11, Lon: -115.75.

The analysis will include receptors in California and Nevada.

3.6 Ambient Air Quality Impact Analyses (AQIA)

The majority of the pollutant emissions to the atmosphere from the proposed project will occur from combustion of natural gas in the boilers and diesel fuel in the emergency engines, with a small amount of additional particulate matter from cooling tower drift. The expected emission rates from all sources will be based on vendor data and additional conservative assumptions of equipment performance.

Exhaust and fugitive dust emissions impacts from trucks involved in washing the heliostat mirrors will also be quantified and assessed under CEQA. Impacts from these sources will be modeled in accordance with the procedures described for construction sources in Section 3.9 below.

3.6.1 Combustion Sources and Evaporative Coolers

The purpose of the ambient air quality impact analysis is to demonstrate compliance with applicable ambient air quality standards. Both USEPA and the District have regulations that prohibit construction of a project that will cause or contribute to violations of applicable standards.

If, for a given pollutant and averaging time, the project's impact is below the significance thresholds shown in Table 3, the project's impact is deemed to be *de minimis*, and no further analysis is required. If the project's impact is above the significance threshold, the project has the potential to cause or contribute to a violation of the ambient air quality standard at the times and locations where the threshold is exceeded. In that case, the

Table 3 Significance Levels for Air Quality Impacts in Class II Areas (µg/m^3)					
	Averaging Period				
Pollutant	**Annual**	**24-hour**	**8-hour**	**3-hour**	**1-hour**
NO_2	1	--	--	--	7.5[23]
SO_2	1	5	--	25	7.8[23]
CO	--	--	500	--	2000
PM_{10}	1	5	--	--	--
$PM_{2.5}$	0.3	1.2	--	--	--

analysis must consider the contribution of other sources to the ambient concentration. If the analysis indicates that there will be a violation of an ambient air quality standard, and the project's impact *at the time and place of the violation* is significant, then the project may not be approved unless the project's impact is reduced.

An air quality impact analysis is required for certification by the CEC and for issuance of a Determination of Compliance by the District. Each agency has its own criteria for preparation of the air quality impact analysis; however, the criteria used by the CEC and the District are similar enough that the same analysis will satisfy both.

<u>3.6.1.1 Step 1: Project Impact</u>

The first step in the compliance demonstration is to determine, for each pollutant and averaging period, whether the proposed new equipment for the project has the potential to cause a significant ambient impact at any location, under any operating or meteorological conditions. As indicated in the NSR Workshop Manual,[24] "[i]f the significant net emissions increase from a proposed source would not result in a significant ambient impact anywhere, the application is usually not required to go beyond a preliminary analysis in order to make the necessary showing of compliance for a particular pollutant." The significance levels for air quality impacts are shown in the following table. If the maximum modeled impact for any pollutant and averaging period is below the appropriate significance level, no further analysis is necessary.

No further analysis is necessary for any location where the modeled impacts from the project alone are below the significance thresholds shown in the table above.

> *The primary purpose of the SILs is to identify a level of ambient impact that is sufficiently low relative to the NAAQS or increments that such*

[23] EPA has not yet defined significance levels (SILs) for one-hour NO_2 and SO_2 impacts. However, EPA has suggested that, until SILs have been promulgated, interim values of 4 ppb (7.5 µg/m^3) for NO_2 and 3 ppb (7.8 µg/m^3) for SO_2 may be used (USEPA (2010c); USEPA (2010d)). These values will be used in this analysis as interim SILs.

[24] USEPA (1990), p. C.51.

> *impact can be considered trivial or de minimis. Hence, the EPA considers a source whose individual impact falls below a SIL to have a de minimis impact on air quality concentrations that already exist. Accordingly, a source that demonstrates that the projected ambient impact of its proposed emissions increase does not exceed the SIL for that pollutant at a location where a NAAQS or increment violation occurs is not considered to cause or contribute to that violation. In the same way, a source with a proposed emissions increase of a particular pollutant that will have a significant impact at some locations is not required to model at distances beyond the point where the impact of its proposed emissions is below the SILs for that pollutant. When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification.*[25]

For $PM_{2.5}$, the highest average of the maximum annual averages and of the 24-hour averages modeled over the five years of meteorological data will be compared with the SILs in Table 3 to determine whether the modeled $PM_{2.5}$ project impacts are significant.[26] For NO_2, the highest modeled concentrations will be compared with the SILs.

For pollutants with modeled project impacts below the significance thresholds, a summary table will show the maximum modeled project impacts plus background concentrations. Although this information is not required by federal modeling guidance, it will be provided as part of the CEQA analysis.

<u>3.6.1.2 Step 2: Project Plus Background</u>

Pollutants/averaging periods that are not screened out in Step 1 are required to undergo a full air quality impact analysis. In this step, the ambient impacts of the project are modeled and added to background concentrations. The results are compared to the relevant state and federal ambient standards.

The second step of the compliance demonstration is required to show that the proposed new project, in conjunction with existing sources, will not cause or contribute to a violation of any ambient air quality standard. As discussed in more detail below, the impacts of existing sources are represented by the existing ambient air quality data collected at the monitoring stations shown in Table 2. In accordance with Section 8.2.1 of Appendix W to 40 CFR Part 51,

> *Background concentrations are an essential part of the total air quality concentration to be considered in determining source impacts. Background air quality includes pollutant concentrations due to: (1)*

[25] USEPA (2010e), p. 64891.
[26] USEPA (2010a), p. 6.

Natural sources; (2) nearby sources other than the one(s) currently under consideration; and (3) unidentified sources. Typically, air quality data should be used to establish background concentrations in the vicinity of the source(s) under consideration.

The impact of natural sources and unidentified sources will be represented by ambient air quality monitoring data collected at the nearby monitoring stations. In this protocol, these impacts are characterized as part of the "regional background."

Nearby sources are those non-project sources that have the potential to create a significant concentration gradient in the project's impact area. Because of the remote location of the proposed project, we do not believe that there are any nearby, non-project sources that are not represented in the regional background monitoring data.

If a Step 2 analysis is required, the modeled impacts from all project sources will be added to the representative background concentration for a comparison with the NAAQS. In accordance with EPA guidelines,[27] the highest second-highest modeled concentrations will be used to demonstrate compliance with the short-term federal standards (except for the statistically based federal 1-hour NO_2 and SO_2, and 24-hour $PM_{2.5}$, standards) and the highest modeled concentration will be used to demonstrate compliance with the federal annual and all state standards. If the predicted total ground-level concentration is below the state or federal ambient air quality standard for each pollutant and averaging period, no further analysis is required for that pollutant and averaging period.

For the 1-hour average federal NO_2 standard for the District and CEC analyses, the comparison of impacts with the new federal 1-hour standard will be done in accordance with the four-tier process developed by the San Joaquin Valley Air Pollution Control District (SJVAPCD).[28] The tiered screening approach was developed to allow demonstration of compliance using the lowest amount of resources necessary. Each tier is a progressively more sophisticated and comprehensive analysis that reduces the level of conservatism without reducing the level of assurance of compliance.

- Tier 1 Analysis – In Tier 1, the maximum predicted 1-hour NO_2 concentration from all sources in the five-year modeling period is added to the representative background concentration for a comparison with the 1-hour NAAQS. If compliance is demonstrated using Tier 1 values, no further analysis is required.

[27] USEPA (2005), 11.2.3.2 and 11.2.3.3

[28] "This modeling protocol is meant to define the stepwise approach necessary to satisfy the requirements in General Guidance for Implementing the 1-Hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim NO_2 Significant Impact Level and the Applicability of Appendix W Modeling Guidance for 1-Hour NO_2 National Ambient Air Quality Standard. Nothing in this protocol should be taken as overriding guidance contained in those two memoranda, or Appendix W of Part 51 of Title 40 of the Code of Federal Regulations (40 CFR 51, Appendix W)."

- Tier 2 Analysis – Tier 2 is the same as Tier 1, except that the 8^{th} highest maximum predicted 1-hour NO_2 concentration (in the five-year modeling period) is used.

- Tier 3 Analysis – Tier 3 is the same as Tier 1, except that the highest 98^{th} percentile predicted 1-hour concentration at any receptor during the five-year modeling period is used. The 98^{th} percentile 1-hour predicted concentration will be determined as implemented in the current version of AERMOD.

- Tier 4 Analysis – The 98^{th} percentile predicted 1-hour concentrations developed under Tier 3 are paired in time with monitored NO_2 concentrations.

The one-hour SO_2 analysis will follow the same steps, except that Tier 2 will use the 4^{th} highest maximum predicted concentrations, while Tiers 3 and 4 will utilize the 99^{th} percentile predicted one-hour average SO_2 concentrations.

For the 24-hour average federal $PM_{2.5}$ standard for the District and CEC analyses, the comparison of impacts with the federal 24-hour average standard will be done in accordance with EPA March 23, 2010, guidance cited earlier.[29] This guidance calls for basing the initial determination of compliance with the standard on the 5-year average of the highest modeled annual and 24-hour averages, combined with background concentrations based on the form of the standards (the 3-year average of the annual $PM_{2.5}$ concentrations and the 3-year average of the 98th percentile 24-hour averages).[30] If a more detailed assessment of $PM_{2.5}$ impacts is required, a second tier analysis may be necessary. EPA's March 23, 2010, memo provides minimal guidance regarding this type of more detailed analysis, saying only: "a Second Tier modeling analysis may be considered that would involve combining the monitored and modeled $PM_{2.5}$ concentrations on a seasonal or quarterly basis, and re-sorting the total impacts across the year to determine the cumulative design value."[31] As no additional guidance has been provided, such an analysis would be discussed with the District prior to implementation.

3.7 Ambient Air Quality Data

The closest District-, state-, or federal-operated stations are used to provide representative background ambient levels for the project site during 2008–2010. These representative background levels are shown in Table 4. The monitoring station locations were shown previously in Figure 3.

[29] See footnote 26.
[30] Ibid, p. 9.
[31] Ibid p. 8.

Table 4 Background Concentrations, 2008-2010 (μg/m^3)[a]				
Pollutant	**Averaging Time**	**2008**	**2009**	**2010**
Trona (San Bernardino County)				
NO_2	1 hour (1st high) 1 hour (98th percentile)[b] Annual	**117** **80.8** **7.5**	92.1 73.3 7.5	97.8 79.0 --[a]
SO_2	1 hour 3 hours 24 hours Annual	**93.6** 15.6 **13.1** **2.7**	28.6 20.8 7.9 2.7	31.2 **23.4** 10.5 **--**
Barstow (San Bernardino County)				
CO	1 hour 8 hours (CA. 1st high)	**1,750** **1,333**	1,125 1,000	1,125 --
Jean, NV				
PM_{10}	24 hours Annual (CA)	**96** **14**	81.3 12.4	49 8.5
$PM_{2.5}$	24 hours (3-yr avg, 98th Percentile)[b,c] Nat'l 3-Year Avg AAM [d]	10.3 **4.9**	11.2 4.0	**11.4** 3.5

Notes:
[a] Insufficient data.
[b] Calculated from *http://www.epa.gov/mxplorer/index.htm*, "Query Concentrations" function
[c] See Table 5.
[d] Annual arithmetic mean

For NO_2, SO_2, PM_{10} and CO, the highest values monitored during the most recent available three-year period (shown in bold in Table 4) will be used to represent ambient background concentrations in the project area (except for the Tier 3 and 4 NO_2 analyses as described above). For CEQA analyses of 24-hour and annual $PM_{2.5}$ impacts, the three-year average of the 98th percentile 24-hour monitored levels for the period between 2006 and 2010 will be used to represent project background because these values corresponds to the method used for determining compliance with the federal $PM_{2.5}$ standards and are consistent with the guidance cited above. Table 5 shows the individual 98th percentile 24-hour averages used to calculate the 3-year averages shown in Table 4.

Table 5 98th Percentile 24-hour Average $PM_{2.5}$ Concentrations from Jean, NV					
Period	**2006**	**2007**	**2008**	**2009**	**2010**
Individual 98th Pctl Monitored Concentrations	8.5[a]	9.4[a]	12.9[a]	11.3[b]	10.1[b]
3-year Averages			10.3	11.2	11.4

Notes:
[a] From *http://www.epa.gov/oar/data/geosel.html*.
[b] Calculated from *http://www.epa.gov/mxplorer/index.htm*, "Query Concentrations" function

3.8 Health Risk Assessment

A health risk assessment (HRA) will be performed according to the Office of Environmental Health Hazard Analysis "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments" (August 2003). The HRA modeling will be prepared using CARB's Hotspots Analysis and Reporting Program (HARP) computer program (Version 1.4d, January 2011). The HARP model will be used to assess cancer risk as well as non-cancer chronic and acute health hazards. Because the TACs emitted by the project include PAHs, the HRA will address not only the inhalation pathway, but also the following three pathways: dermal absorption, soil ingestion, and mother's milk ingestion.[32]

The HARP model incorporates the ISCST3 model previously approved by USEPA. CARB offers a software program that allows AERMOD data to be imported into the HARP model, called HARP On-Ramp. The on-ramp will be used with most recent versions of AERMOD and HARP for the screening risk assessment.

3.9 Construction Air Quality Impact Analysis

The potential ambient impacts from air pollutant emissions during the construction of the project will be evaluated by air quality modeling that will account for the construction site location and the surrounding topography; the sources of emissions during construction, including vehicle and equipment exhaust emissions; and fugitive dust.[33]

Types of Emission Sources − Construction of the project can be viewed as three main sequential phases: site preparation; construction of foundations; and installation and assembly of power towers, boilers, steam turbines, and associated equipment. The construction impacts analysis will include a schedule for construction operation activities. Site preparation includes site excavation, excavation of footings and foundations, and backfilling operations.

Fugitive dust emissions from the construction of the project result from the following activities:

- Excavation and grading at the construction site;
- Onsite travel on paved and unpaved roads and across the unpaved construction site;
- Aggregate and soil loading and unloading operations;
- Raw material transfer to and from material stockpiles; and
- Wind erosion of areas disturbed during construction activities.

[32] Produce pathways are not included; see footnote 14.
[33] As discussed above, the procedures described in this section will also be used to evaluate the impacts of mirror washing activities under CEQA.

Engine exhaust will be emitted from the following sources:

- Heavy equipment used for excavation, grading, and construction of onsite structures;
- Water trucks used to control construction dust emissions;
- Diesel-fueled welding machines, gasoline-powered generators, air compressors, and water pumps;
- Gasoline-fueled pickup trucks and Diesel-fueled flatbed trucks used onsite to transport workers and materials around the construction site;
- Transport of mechanical and electrical equipment to the project site;
- Transport of rubble and debris from the site to an appropriate landfill; and
- Transport of raw materials to and from stockpiles.

Emissions from a peak activity day will be modeled. Annual average emissions over the construction period will also be calculated and modeled for comparison with annual standards.

Existing Ambient Levels – The background data discussed earlier will be used to represent existing ambient levels for the construction analysis as well as the analysis of the impacts of project operations.

Model Options – The AERMOD "OLMGROUP ALL" option will be used to estimate ambient impacts from construction emissions. The modeling options and meteorological data described above will be used for the modeling analysis.

The construction site will be represented as both a set of volume sources and a separate set of area sources in the modeling analysis. Emissions will be divided into three categories: exhaust emissions, mechanically generated fugitive dust emissions, and wind-blown fugitive dust emissions. Exhaust emissions and mechanically generated fugitive dust emissions (e.g., dust from wheels of a scraper) will be modeled as volume sources with a height of 6 meters. Wind-blown fugitive dust emissions, sources at or near the ground that are at ambient temperature and have negligible vertical velocity, will be modeled as area sources with a release height of 0.5 meters.

Combustion Diesel PM_{10} emission impacts from construction equipment will be evaluated to demonstrate that the cancer risk from construction activities will be below ten in one million at all receptors.

For the construction modeling analysis, the receptor grid will begin at the property boundary and will extend approximately one kilometer in all directions. Receptor spacing will be 60 meters, except for one tier of receptors along the project boundary composed of four segments with 25-meter spacing that extends out 100 meters.

3.10 Cumulative Air Quality Impact Analysis

To address CEC requirements, a cumulative air quality modeling impacts analysis of the project's typical operating mode will be performed in combination with other stationary source emissions sources within a six-mile radius that have received construction permits since January 1, 2010, or are in the permitting process. For each criteria pollutant, facilities having an emission increase of less than five tons per year are generally considered to be *de minimis*, and these facilities may be excluded from the cumulative impacts analysis after consultation with the CEC staff. Information on any recently constructed/permitted sources that might be appropriate for a cumulative air quality impact analysis (as defined above) will be requested from the GBUAPCD, Nevada Bureau of Air Quality Planning (NVBAQP) and Clark County Department of Air Quality and Environmental Management (DAQEM) as the area defined by a six-mile radius from the project boundaries extends into Nye and Clark Counties, Nevada.

Upon receipt of sufficient information from the local air agencies to allow air dispersion modeling of the recently constructed/permitted non-project sources to be included in the cumulative air quality impact analysis, AERMOD will be used in a procedure similar to that described earlier in this protocol.

4. REPORTING

The results of the criteria pollutant and TAC modeling will be integrated into the application documents, and will include the following information:

- Project Description – Site map and site plan along with descriptions of the emitting equipment and air pollution control systems.

- Model Options and Input – Model options, screening and refined source parameters, criteria pollutant and TAC emission rates, meteorological data, and receptor grids used for the modeling analyses.

- Air Dispersion Modeling – Dispersion modeling results will include the following:

    - Plot plan showing emission points, nearby buildings (including dimensions), cross-section lines, property lines, fence lines, roads, and UTM coordinates;
    - A table showing building heights used in the modeling analysis;
    - Summaries of maximum modeled impacts; and
    - Model input and output files, including BPIP-PRIME and meteorological files as well as hourly ozone and NO_2 files used in demonstrating compliance with the 1-hour NO_2 standard, in electronic format on a compact disc, together with a description (README file) of all filenames.

- HRA – The HRA will include the following:

    - Descriptions of the methodology and inputs to the construction and operation AERMOD runs;
    - Tables of TAC emission rates and health impacts;
    - Figures showing sensitive receptor locations; and
    - Model input and output files in electronic format on a compact disc, together with a description (README file) of all filenames.

5. REFERENCES

Briggs, G.A. (1972). *Discussion on Chimney Plumes in Neutral and Stable Surroundings*. Atmos. Environ. 6:507-510.

Cole, Henry S. and John E. Summerhays (1979). *A review of techniques available for estimating short-term NO_2 concentrations*, Journal of the Air Pollution Control Association, Volume 29, Number 8, pages 812-817, August 1979.

Nappo, C. J. et al. (1982). *The Workshop on the Representativeness of Meteorological Observations*, June 1981, Boulder, Co. Bull. Amer. Meteor. Soc., Vol. 63, No. 7, pp. 761-764. American Meteorological Society, Boston, MA.

Nevada Bureau of Air Quality Planning (2010), *Ambient Air Quality Monitoring Program - Pahrump Air Quality,* accessed at http://ndep.nv.gov/baqp/monitoring/pahrumpmonitor2.html

Office of Environmental Health Hazard Analysis (2003). *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments,* August 2003.

San Joaquin Valley Air Pollution Control District (2007). *Guidance for Air Dispersion Modeling*. http://www.valleyair.org/busind/pto/Tox_Resources/Modeling%20Guidance%20W_O%20Pic.pdf

San Joaquin Valley Air Pollution Control District (2010). *Procedure For Determining NO_2 Monitor Background Values (Design Values) For Use in Calculating NAAQS Compliance*. http://www.valleyair.org/busind/pto/Tox_Resources/NO2%20background%20Values.pdf

San Joaquin Valley Air Pollution Control District (2011). *EPA Background Files (Processing Notes)* http://www.valleyair.org/busind/pto/Tox_Resources/2011_Modeling/EPA-NO2/EPABackgroundFiles.pdf

USEPA (1985). *Guideline for Determination of Good Engineering Practice Stack Height* (Technical Support Document for the Stack Height Regulations) - Revised. EPA-450/4-80-023R.

USEPA (1987a). *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD),* Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-450/4-87-007, May 1987.

USEPA (1987b). *On-Site Meteorological Program Guidance for Regulatory Modeling Applications*.

USEPA (1987c). *Supplement A to the Guideline on Air Quality Models (Revised).*

USEPA (1990). *New Source Review Workshop Manual − Draft*. Office of Air Quality Planning and Standards, Research Triangle Park, NC.

USEPA (1992a). *Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models*. Dennis Atkinson and Russell F. Lee, Office of Air Quality Planning and Standards, Research Triangle Park, NC. July 7, 1992.

USEPA (1992b). *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources,* Revised, Report 454/R-92-019.

USEPA (1995). *Supplement C to the Guideline on Air Quality Models (revised).* Office of Air Quality Planning and Standards, Research Triangle Park, NC.

USEPA (1998). *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long-Range Transport Impacts*. Air Quality Modeling Group (MD-14), Research Triangle Park. National Park Service - Air Resource Division, Denver, Colorado. USDA Forest Service - Air Quality Program, Fort Collins, Colorado. U.S. Fish and Wildlife Service Air Quality Branch, Denver, Colorado.

USEPA (2000). *Meteorological Monitoring Guidance for Regulatory Modeling Applications*. Publication No. EPA-454/R-99-005. Office of Air Quality Planning & Standards, Research Triangle Park, NC. (PB 2001-103606) (Available at *www.epa.gov/scram001/*)

USEPA (2005). 40 CFR Part 51, Appendix W. *Guideline on Air Quality Models*. Last update November 9, 2005.

USEPA (2009). OAQPS, AERMOD Implementation Workgroup, "AERMOD Implementation Guide," Last Revised: March 19, 2009.

USEPA (2010a). OAQPS, Memo from Stephen D. Page, Director, to EPA Regional Modeling Contacts and others, "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS," March 23, 2010.

USEPA (2010b). OAQPS, Memo from Tyler Fox, Leader, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard," June 28, 2010.

USEPA (2010c). OAQPS, Memo from Stephen D. Page, Director, to EPA Regional Air Division Directors, "Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program," June 29, 2010.

USEPA (2010d), OAQPS, Memo from Stephen D. Page, Director, to EPA Regional Air Division Directors, "Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program," August 23, 2010.

USEPA (2010e). 75 FR 64864, "Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM2.5)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC)," October 20, 2010.

USEPA (2011a). Memo from Tyler Fox, Leader, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard," March 1, 2011.

USEPA (2011b). Technology Transfer Network, Support Center for Regulatory Atmospheric Modeling, Air Quality Models, AERMOD Release 11059 and latest guidance (Draft user's guide addenda dated 3/4/11). http://www.epa.gov/ttn/scram/

Appendix A

Information on CTSCREEN Model

The CTDMPLUS and CTSCREEN Models

Complex terrain impacts may need to be modeled with more accuracy than that provided by AERMOD. The use of more refined modeling techniques is specifically addressed in USEPA's Appendix W[34] modeling guidance, as follows:

> *Since AERMOD treats dispersion in complex terrain, we have merged sections 4 and 5 of appendix W, as proposed in the April 2000 NPR [Notice of Proposed Rulemaking]. And while AERMOD produces acceptable regulatory design concentrations in complex terrain, it does not replace CTDMPLUS for detailed or receptor-oriented complex terrain analysis, as we have made clear in Guideline section 4.2.2. CTDMPLUS remains available for use in complex terrain. [p. 68225]*
>
> *4.2.2 Refined Analytical Techniques*
> *d. If the modeling application involves a well defined hill or ridge and a detailed dispersion analysis of the spatial pattern of plume impacts is of interest, CTDMPLUS, listed in Appendix A, is available. CTDMPLUS provides greater resolution of concentrations about the contour of the hill feature than does AERMOD through a different plume-terrain interaction algorithm. [p. 68233]*

CTSCREEN is the same basic model as CTDMPLUS, except that meteorological data are handled internally in a simplified manner. As discussed in the CTSCREEN users guide,[35]

> *Since [CTDMPLUS] accounts for the three-dimensional nature of plume and terrain interaction, it requires detailed terrain and meteorological data that are representative of the modeling domain. Although the terrain data may be readily obtained from topographic maps and digitized for use in the CTDMPLUS, the required meteorological data may not be as readily available.*
>
> *Since the meteorological input requirements of the CTDMPLUS can limit its application, the EPA's Complex-Terrain-Modeling, Technology-Transfer Workgroup developed a methodology to use the advanced*

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[34] 40 CFR 51 Subpart W, as amended November 9, 2005 at 70 FR 68218, "Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions."

[35] USEPA, EPA-600/8-90-087, "User's Guide to CTDMPLUS: Volume 2. The Screening Mode (CTSCREEN)," October 1990.

> *techniques of CTDMPLUS in situations where on-site meteorological measurements are limited or unavailable. This approach uses CTDMPLUS in a "screening" mode--actual source and terrain characteristics are modeled with an extensive array of predetermined meteorological conditions.*
>
> *This CTDMPLUS screening mode (CTSCREEN) serves several purposes in regulatory applications. When meteorological data are unavailable, CTSCREEN can be used to obtain conservative (safely above those of refined models), yet realistic, impact estimates for particular sources.*

Therefore, the use of the CTSCREEN version of CTDMPLUS is consistent with USEPA guidance.

Appendix B

Composite Quarterly and Annual Wind Roses for Pahrump, NV
2006 – 2010

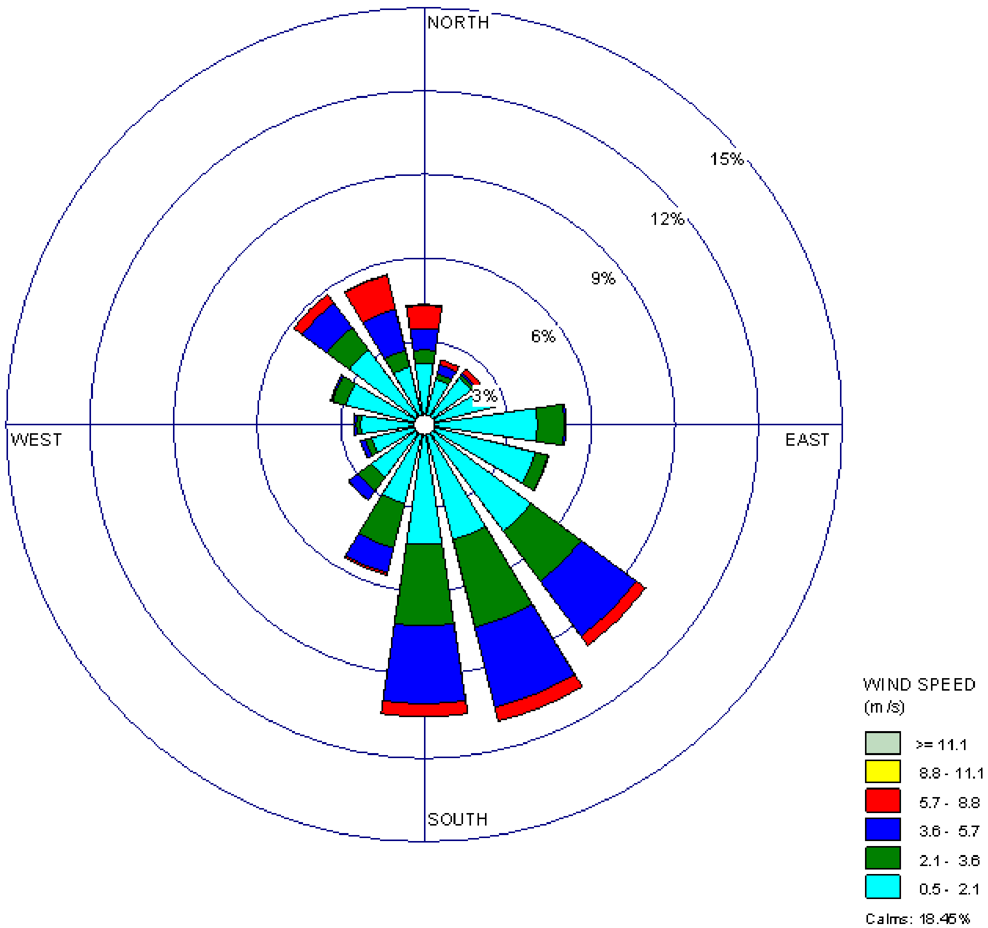
First Quarter, 2006 – 2010

WIND ROSE PLOT:

Pahrump, NV, 1st Quarter, 2006~2010

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2006 - 00:00
End Date: 3/31/2010 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

18.45%

TOTAL COUNT:

10824 hrs.

AVG. WIND SPEED:

1.87 m/s

DATE:

4/7/2011

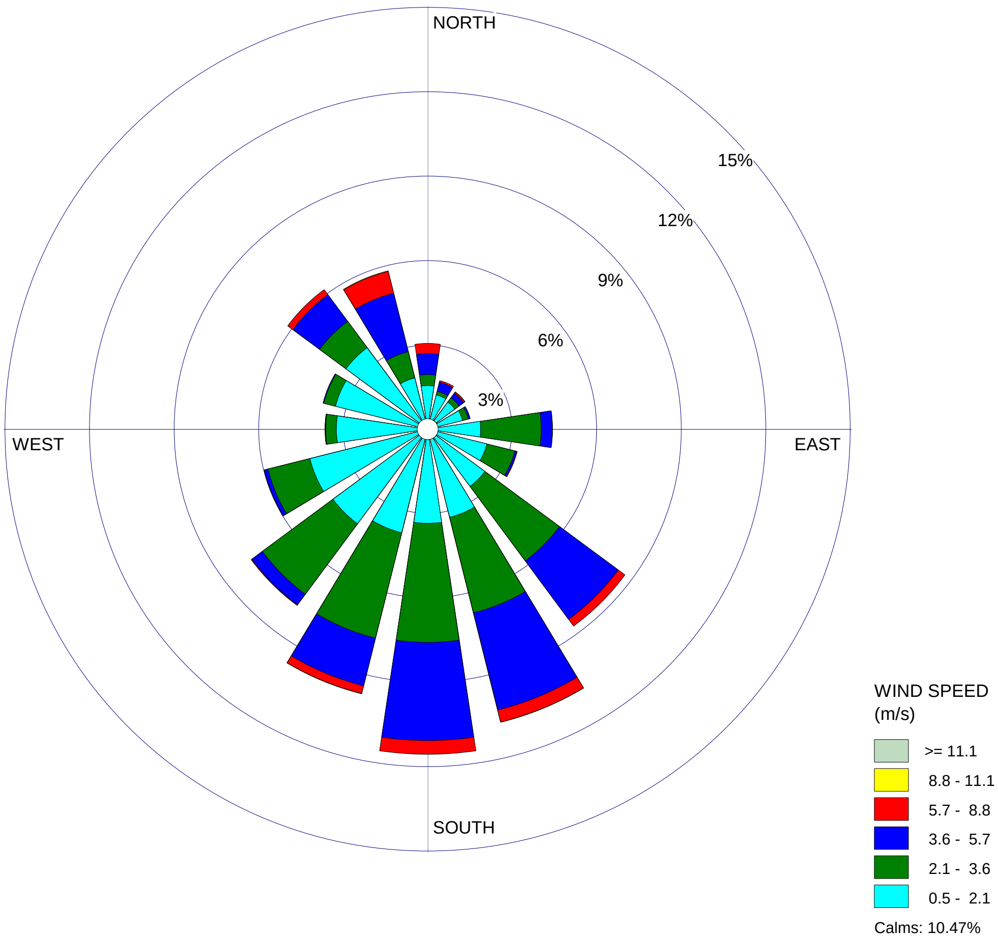
PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Second Quarter, 2006 – 2010

WIND ROSE PLOT:
Pahrump, NV, 2nd Quarter, 2006~2010

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:
Start Date: 4/1/2006 - 00:00
End Date: 6/30/2010 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:
10.47%

TOTAL COUNT:
10916 hrs.

AVG. WIND SPEED:
2.23 m/s

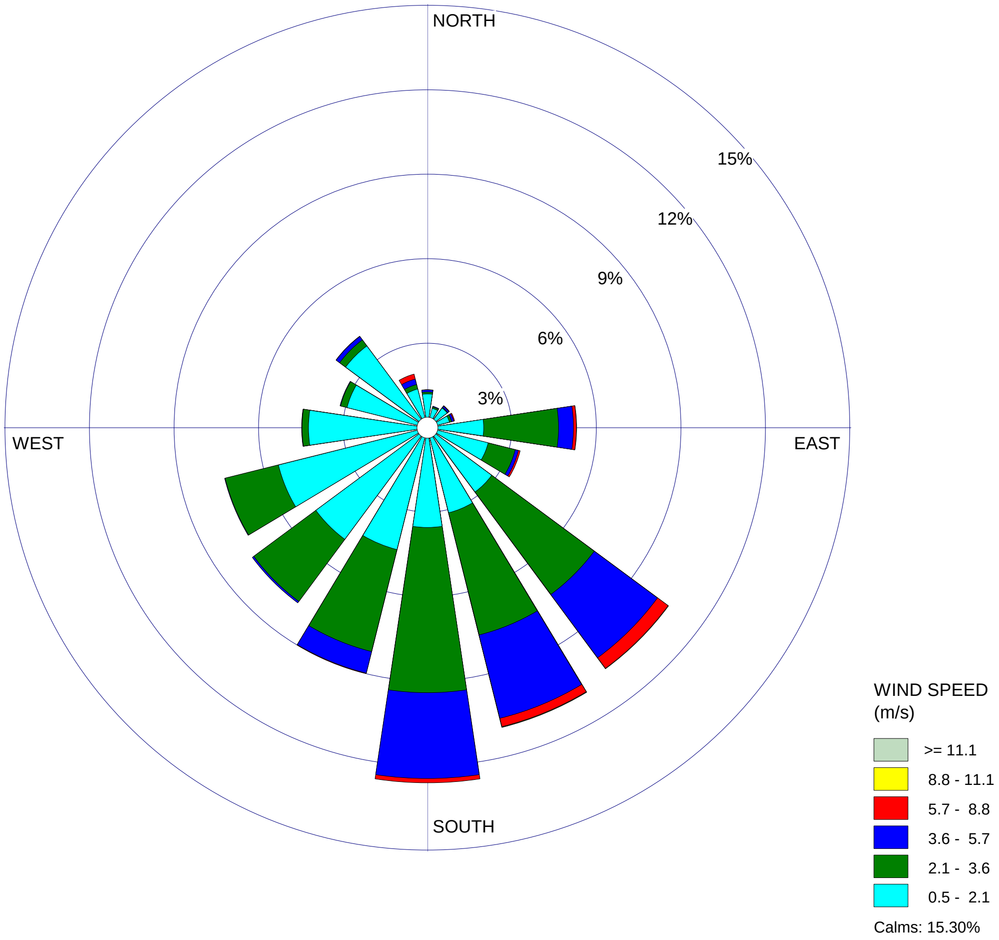
DATE:
4/7/2011

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Third Quarter, 2006 – 2010

WIND ROSE PLOT:	DISPLAY:
Pahrump, NV, 3rd Quarter, 2006~2010	**Wind Speed** **Direction (blowing from)**



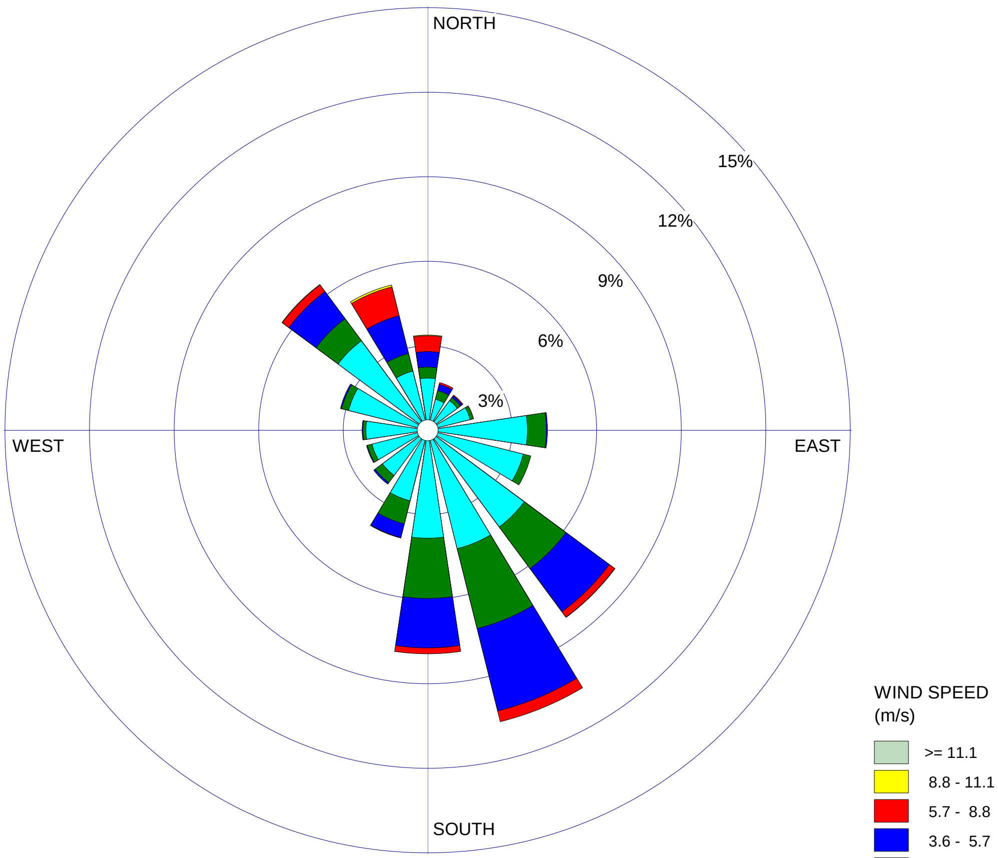
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 7/1/2006 - 00:00 **End Date: 9/30/2010 - 23:00**	MODELER:	
	CALM WINDS: **15.30%**	TOTAL COUNT: **11034 hrs.**	
	AVG. WIND SPEED: **1.89 m/s**	DATE: **4/7/2011**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Fourth Quarter, 2006 – 2010

WIND ROSE PLOT:
Pahrump, NV, 4th Quarter, 2006~2010

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:
Start Date: 10/1/2006 - 00:00
End Date: 12/31/2010 - 15:00

COMPANY NAME:

MODELER:

CALM WINDS:
31.00%

TOTAL COUNT:
11025 hrs.

AVG. WIND SPEED:
1.46 m/s

DATE:
4/7/2011

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

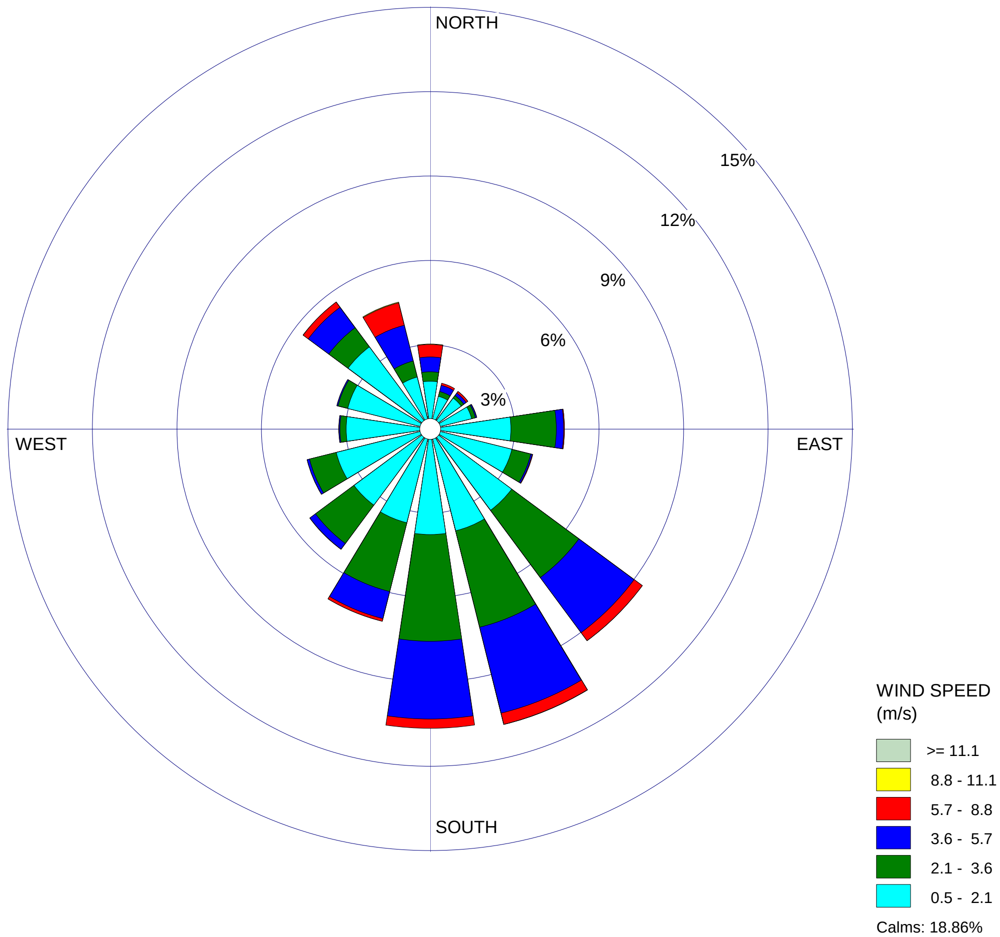
Annual, 2006 – 2010

WIND ROSE PLOT:

Pahrump, NV, ALL, 2006~2010

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2006 - 00:00
End Date: 12/31/2010 - 15:00

COMPANY NAME:

MODELER:

CALM WINDS:

18.86%

TOTAL COUNT:

43799 hrs.

AVG. WIND SPEED:

1.86 m/s

DATE:

4/7/2011

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

June 6, 2011

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Memo to: Gerry Bemis
Wenjun Qian
CEC Siting Division

From: Nancy Matthews Nancy Matthews

Subject: BrightSource Energy Hidden Hills Solar Project
Responses to CEC Comments on Modeling Protocol

Thank you for taking the time to meet with us on Tuesday, May 31, to discuss BrightSource Energy's proposed Hidden Hills Solar project in Inyo County. Among the topics we discussed was the April 27, 2011 air quality modeling protocol. You had several comments and requests for additional supporting information for some of the data and procedures proposed in the protocol. The purpose of this memo is to explain how we plan to address your comments in the Application for Certification that is expected to be filed in late July.

1. **Hourly ambient ozone and NO_2 used for modeling compliance with the NO_2 standards should be from the same monitoring station, as their chemistry is interrelated.**

Our preference would be to use ozone and NO_2 from the same monitor as well; however, we believe it is equally important to use the most representative data available and to use data that are conservative. The Jean, NV, station is the closest and most representative location at which ozone data are collected, so ozone data are taken from that monitor. Hourly NO_2 readings were also taken at Jean for many years; however, NO_2 monitoring terminated at Jean in 2007. While we could use older NO_2 and ozone data from Jean, this would result in ozone data that would be less representative of current ambient conditions. Because the hourly ozone data are used directly in AERMOD-OLM to limit modeled NO_2, we believe it is important for the ozone data to be as current and locally representative as possible.

The nearest NO_2 station to the project site is in Trona, CA. A comparison of maximum measured hourly and annual NO_2 from Trona and Jean from 2004 to 2006, as presented in Table 1, shows that NO_2 concentrations at Trona are much higher than NO_2 concentrations that would be expected to be found at the project site. By using NO_2 data from Trona, we are overestimating background NO_2. We believe this is a conservative approach to evaluating air quality impacts.

Finally, we note that while it is preferable to use NO_2 and ozone data from the same monitoring station, it is not unusual in siting cases to use ozone and NO_2 data from different stations in modeling analyses utilizing OLM and PVMRM.

Table 1
Comparison of Monitored NO_2 Concentrations: Trona, CA and Jean, NV

	Monitored Concentration, ppm		
Averaging Period/Station	**2004**	**2005**	**2006**
One hour			
Trona	0.055	0.053	0.050
Jean	0.032	0.039	0.036
Annual			
Trona	0.005	0.005	0.005
Jean	0.0035	0.0039	0.0035

Trona: CARB, ADAM website
Jean: BLM, Ivanpah SEGS FEIR

2. Surface roughness characteristics at Pahrump may not be adequately representative of conditions at the project site because of local development.

The attached figures, taken from Google Earth, show the area surrounding the Pahrump met station in 1994 and 2009. The area within one kilometer of the met station, which is used in the AERMOD model to define surface characteristics, has seen some isolated development to the south, the west and north-northeast. The rest of the area surrounding the met station remains undeveloped. The prevailing winds in the area are from the south through southwest, so only the development to the south would be likely to have any significant influence on meteorological conditions monitored at the station. Because of the sparse distribution and the regular shapes of these buildings, the impacts of these buildings on the monitor are expected to be minimal.

In addition, the surface characteristics associated with the Pahrump meteorological monitoring station have been derived using the AERSURFACE modeling tool. AERSURFACE uses land cover data from the U.S. Geological Survey National Land Cover Data 1992 archives, meaning that the land cover data used to develop surface characteristics for the Pahrump area reflects conditions in 1992, before the development shown in the May 2009 figure took place. The surface characteristics associated with the Pahrump met data are shown in Table 2, and the range of surface roughness is shown in Table 3. It is clear that the surface characteristics associated with the Pahrump met data reflect conditions consistent with “shrubland (arid region)” and are in no way similar to residential or commercial surface roughness values. Therefore, the surface characteristics associated with the Pahrump meteorological station data appropriately reflect surface characteristics at the project site.

Table 2
Summary of Surface Roughness Characteristics at Pahrump, NV

Sector Number	Beginning Deg.	Ending Deg.
1	150	345
2	345	150
Season	**Sector No.**	**Zo**
1	1	0.132
1	2	0.133
2	1	0.144
2	2	0.150
3	1	0.172
3	2	0.157
4	1	0.172
4	2	0.157

Table 3
Seasonal Values of Surface Roughness (m) for the NLCD92-21-Land Cover Classification System

Class Number	Class Name	Seasonal Surface Roughness[1] (m)					Reference
		1	2	3	4	5	
11	Open Water	0.001	0.001	0.001	0.001	0.001	Stull[2]
12	Perennial Ice/Snow	0.002	0.002	0.002	0.002	0.002	Stull[2]
21	Low Intensity Residential	0.54	0.54	0.50	0.50	0.52	40% 22 + 50% 43+ 10% 85[3]
22	High Intensity Residential	1	1	1	1	1	AERMET[4]
23	Commercial/Industrial/Transp (Site at Airport)	0.1	0.1	0.1	0.1	0.1	5%: 22 & 95%: 31[5]
	Commercial/Industrial/Transp (Not at Airport)	0.8	0.8	0.8	0.8	0.8	80%: 22 & 20%: 31[5]
31	Bare Rock/Sand/Clay (Arid Region)	0.05	0.05	0.05	NA	0.05	Slade[6]
	Bare Rock/Sand/Clay (Non-arid Region)	0.05	0.05	0.05	0.05	0.05	Slade[6]
32	Quarries/Strip Mines/Gravel	0.3	0.3	0.3	0.3	0.3	Estimate[7]
33	Transitional	0.2	0.2	0.2	0.2	0.2	Estimate[8]
41	Deciduous Forest	1.3	1.3	0.6	0.5	1	AERMET[4]
42	Evergreen Forest	1.3	1.3	1.3	1.3	1.3	AERMET[4]
43	Mixed Forest	1.3	1.3	0.95	0.9	1.15	(41+42)/2[9]
51	Shrubland (Arid Region)	0.15	0.15	0.15	NA	0.15	50% 51 (Non-Arid)[10]
	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.15	0.3	AERMET[4]
61	Orchards/Vineyards/Other	0.3	0.3	0.1	0.05	0.2	Garratt[11]
71	Grasslands/Herbaceous	0.1	0.1	0.01	0.005	0.05	AERMET[4]
81	Pasture/Hay	0.15	0.15	0.02	0.01	0.03	Garratt[11] & Slade[12]
82	Row Crops	0.2	0.2	0.02	0.01	0.03	Garratt[11] & Slade[12]
83	Small Grains	0.15	0.15	0.02	0.01	0.03	Garratt[11] & Slade[12]
84	Fallow	0.05	0.05	0.02	0.01	0.02	31 & 81,82,83[13]
85	Urban/Recreational Grasses	0.02	0.015	0.01	0.005	0.015	Randerson[14]
91	Woody Wetlands	0.7	0.7	0.6	0.5	0.7	(43+92)/2[15]
92	Emergent Herbaceous Wetlands	0.2	0.2	0.2	0.1	0.2	AERMET[4]

Source: Table A-3, USEPA AERSURFACE User's Guide, January 2008

3. It may not be appropriate to use default assumption that 10% of the NOx in the exhaust of all project emission sources is emitted as NO_2.

As discussed during the meeting, we will use the equipment-specific NO_2 fractions provided in the San Joaquin Valley APCD's NO_2 modeling guidance.[1] The fractions to be used are summarized in Table 4.

Table 4
In-Stack NO_2/NOx Ratios

SJV Equipment Category	Hidden Hills Source(s)	Ratio (%)
NG Boilers (all)	all boilers	10%
Diesel IC engines	Diesel emergency generators	20%
Diesel IC engine: 322 bhp water pump	Diesel fire pump engines	15.64%

4. The procedures used for filling in missing values in the NO_2 and ozone datasets may not be adequately conservative.

In the protocol, we proposed using the missing data filling procedures provided by the SJVAPCD on its website. As discussed in our meeting, the SDAPCD staff had developed a different data filling procedure that they used for a one-hour NO_2 modeling analysis for the Carlsbad Energy Center project. However, as we also discussed, the staffs of several air pollution control districts are working through CAPCOA to develop a CAPCOA-recommended procedure for filling in missing data. We consulted with the SJVAPCD staff on the status of the CAPCOA work, and Glenn Reed of the SJVAPCD provided draft guidance that is being submitted by a subcommittee for approval by CAPCOA. The SDAPCD, SJVAPCD, and other district staffs are collaborating on this draft guidance.

A copy of the draft guidance is attached. Our proposal to use linear interpolation for filling in single missing hours (p. 13 of the protocol) is consistent with the attached guidance ("For a single hour, it is widely accepted that the best method of gap filling is the use of a liner interpolation of the hour before and after the missing hour." Section 1.1.1), so we are not proposing to make any changes to the missing data procedure for single hours. For multiple hours, the draft guidance provides the SDAPCD-developed procedure as one of the options (Section 1.1.2.2, Option 2), so we will follow that procedure for multi-hour gaps.

[1] SJVAPCD, "Assessment of Non-Regulatory Option in AERMOD," Appendix C, March 2011. Accessed at http://www.valleyair.org/busind/pto/Tox_Resources/AssessmentofNon-RegulatoryOptioninAERMODAppendixC32111.xls.

Thank you again for your comments on the modeling protocol. If you have any questions regarding these responses, please do not hesitate to call.

Attachments

cc: Clay Jensen, BSE
Susan Strachan
Duane Ono, GBUAPCD

Figure 1
May 1994 View

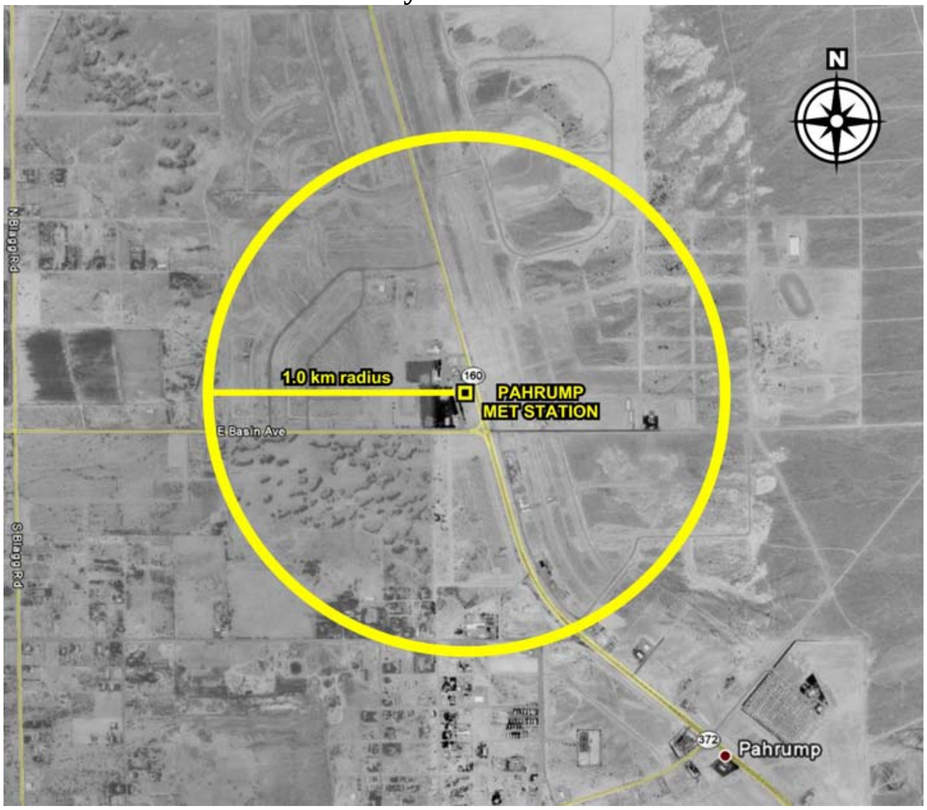
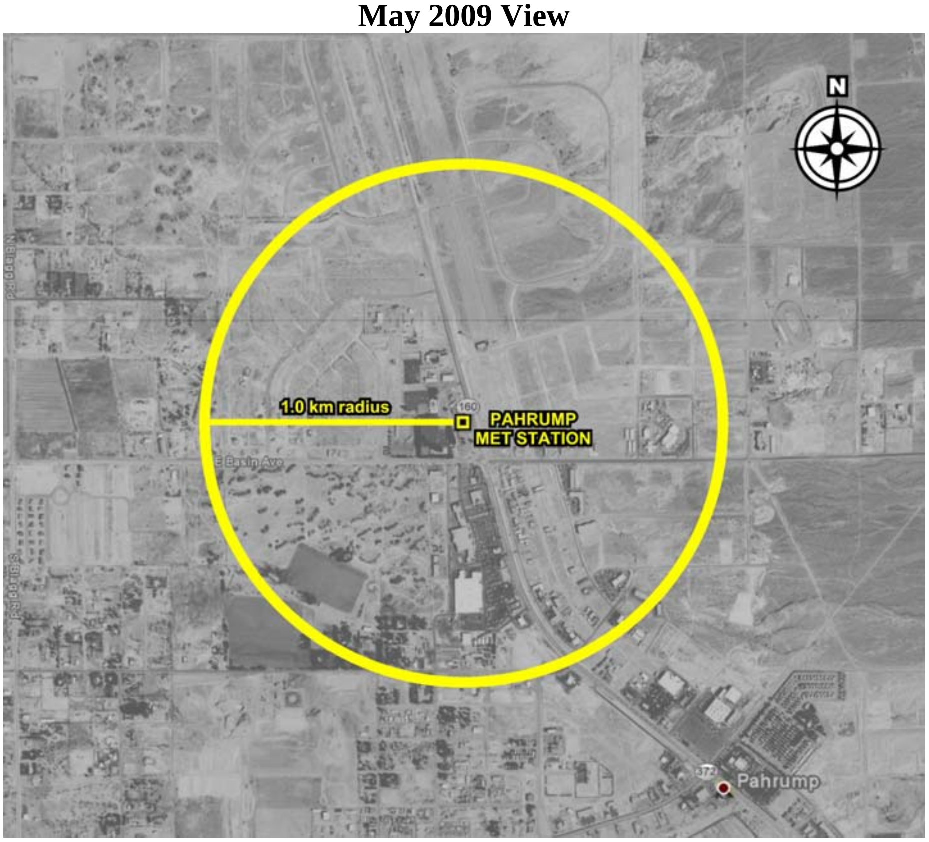


Figure 2
May 2009 View



1 Gap Filling For Ozone and NO_2 Datasets

There are several reasons why missing data may exist in a dataset. They may be missing because of equipment malfunction, human error, or maintenance of the monitoring equipment. Nevertheless data gaps should be addressed to ensure that underestimation of NO_2 impacts are minimized. The following section provides several options that may be used to fill-in data gaps. **Please note:** The reviewing agency should be consulted to determine the appropriate method to be used.

This section only describes the method by which missing data can be filled and does not describe in any detail the procedure used to create/update ozone or NO_2 files used in ISCST3 or AERMOD.

1.1 Missing Data Procedures

Several approaches may be taken when addressing missing data, but each has its own issues from being too conservative or not conservative enough. Therefore, the reviewing agency will need to determine which method is appropriate for its regulatory needs.

1.1.1 Single Hour

For a single hour, it is widely accepted that the best method of gap filling is the use of a liner interpolation of the hour before and after the missing hour. This method is also known as the mean-before-after.

- Sum of the concentrations for the hour before and after
- Divide the sum by 2

1.1.2 Multiple Hours

For data gaps spanning more than a single hour no single acceptable method has been developed to date. Therefore the following section will describe several methods that may be used to fill-in gaps when more than a single hour is missing. **Please note:** The methods presented here are not an exhaustive list of procedures that may be acceptable to the reviewing agency. Therefore, the reviewing agency should be consulted before processing any dataset.

Note: The following methods are only intended to be used for multiple consecutive missing hours, unless otherwise noted. If only a single hour is missing it is recommended that the method described in Section 1.1.1 be used.

1.1.2.1 Simple Fill Methods

These methods are considered to be simple fill methods because they require a minimum amount of resources to be implemented and are more conservative in nature.

Gap filling Methods for Multi-hour Gaps:

1. Maximum Annual Hourly Concentration Over the Model Period (5yrs)
   - Determine maximum hourly concentration for each year
   - Select the highest hourly concentration over the modeled period
   - Use this value to fill-in all remaining missing hours
2. Maximum Annual Hourly Concentration – For each year modeled
   - Determine maximum hourly concentration for each year
   - Use this value to fill-in all remaining missing hours
3. Maximum Annual Average Hourly Concentration – Over the modeling period (5yrs)
   - Determine maximum hourly concentration for each year
   - Take the average of the maximum hourly concentration over the modeled period
   - Use this concentration to fill-in all remaining missing hours
4. Quarterly Maximum Concentration – For each year
   - Determine maximum hourly concentration for each quarter (1^{st} Qtr = Jan - March, 2^{nd} Qtr = April – June, 3^{rd} Qtr = July – Sept, 4^{th} Qtr = Oct – Dec)
   - Use each quarter's maximum concentration to substituted for any missing data within that quarter until all missing data is filled
5. Monthly Maximum Concentration
   - Determine maximum hourly concentration for each month
   - Use each month's maximum concentration to fill gaps for any missing data within that month until all missing data is filled.

1.1.2.2 Complex Fill Methods

The method described in this section are considered complex in nature since they are resource intensive and may require some programming or expertise in meteorology and using spreadsheets. Additionally, this method provides a more realistic interpolation of the actual missing data because it accounts for the diurnal and seasonal change in ozone and NO_2 concentration.

Gap Filling Methods:

1. Monthly Hourly Concentration - Option 1 (For each year)
   - For each month determine the maximum concentration for each hour (1, 2, 3, …) of the day. For each month you should have 24 values.

- For each missing hour within a month use the corresponding maximum hourly concentration.
- Perform the above steps until all hours are filled.
- Any missing hour will be filled in manually

2. Monthly Hourly Concentration - Option 2 (For each year)
    a. Fill any single missing hour with the maximum of the:
        i. Preceding hour
        ii. Succeeding hour
        iii. Same hour of day on previous day
        iv. Same hour of day on succeeding day

        If there is missing data for either iii and/or iv, use only the maximum of the available data to fill the missing hour (both a and b are guaranteed to be present since only single missing hours are filled in this step). Note that the most likely scenario for both c and d to be missing is for years when the monitor is calibrated at the same hour each day. In this case, the 30-day rolling average (see step b) for that hour will also not be available.

    b. For hours that are not filled by step a (all periods with more than one hour missing), fill the missing hour with the maximum for that hour of day for a 30-day rolling period centered on the hour (i.e., for the 15 preceding days and the 15 succeeding days). Note that 30-day rolling period will extend into the preceding and succeeding year at the start or end, respectively, of the modeling period.
    c. For hours not filled by step b, fill the missing data with the maximum of the 30-day rolling period for the preceding or succeeding hour.
    d. Any hours not filled by steps a–c, are likely periods with more than a month of missing data for all hours. These will be filled on a case-by-case basis.
    e. **For NO_2 File Only** - Check all filled hours for which the filled concentration is higher than the maximum monitored concentration recorded for that day (for a complete day of missing data, the maximum monitored concentration is considered zero for purposes of this comparison). If the filled concentration is higher than the appropriate nth highest daily maximum monitored concentration for the calendar year for determining compliance with federal 1-hour standard (e.g., for 351 or more days of valid data, the 8^{th} highest daily maximum is the appropriate value), then replace filled concentration with the appropriate nth highest daily

maximum to fill that hour. Note: This prevents the filling procedure from changing the nth highest daily maximum for the year.

Nancy L. Matthews

From: Wenjun Qian <WQian@energy.state.ca.us>
Sent: Thursday, June 09, 2011 12:19 PM
To: Nancy L. Matthews
Cc: Gerry Bemis; Gary Rubenstein
Subject: RE: BrightSource Energy Hidden Hills Ranch: followup onmodeling protocol

That's correct. Thank you for providing the responses to us.

Wenjun Qian, PhD
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>>> "Nancy L. Matthews" <NMatthews@sierraresearch.com> 6/9/2011 12:14 PM
>>> >>>
Hi, Wenjun-

Just a quick note to follow up on our telephone conversation a few minutes ago regarding the Hidden Hills project modeling protocol, confirming that our followup correspondence provided adequate additional information and no additional changes are needed to the proposed data or methodology.

Thank you--

Nancy

From: Nancy L. Matthews
Sent: Monday, June 06, 2011 10:31 AM
To: gbemis@energy.state.ca.us; Wenjun Qian (wqian@energy.state.ca.us)
Cc: Nancy L. Matthews; Gary Rubenstein
Subject: BrightSource Energy Hidden Hills Ranch: followup on modeling protocol

Gerry and Wenjun-

Attached is some additional information regarding the issues discussed at our meeting last week. If you have any questions regarding this additional information, or any remaining concerns, please do not hesitate to call me.

Thank you--

Nancy Matthews

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Nancy L. Matthews

From: Nancy L. Matthews
Sent: Monday, June 06, 2011 10:38 AM
To: dono@gbuapcd.org; Jan Sudomier
Cc: Nancy L. Matthews; Gary Rubenstein
Subject: FW: BrightSource Energy Hidden Hills Ranch: followup on modeling protocol
Attachments: response to CEC comments on protocol 0611.pdf

Duane and Jan—

We met with the CEC staff a few days after we met with you, and they had some comments on our modeling protocol. Our response to those comments is attached—the only substantive change is in the method used for addressing missing hourly NO2 and ozone data in the OLM datasets, and the new method we propose to use is more conservative and consistent with what we expect CAPCOA final guidance to be.

If you have any questions regarding this issue, or any other aspect of the project, please feel free to call. Thank you--

Nancy

From: Nancy L. Matthews
Sent: Monday, June 06, 2011 10:31 AM
To: gbemis@energy.state.ca.us; Wenjun Qian (wqian@energy.state.ca.us)
Cc: Nancy L. Matthews; Gary Rubenstein
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