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November 13, 2006

Mr. Robert Worl
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Supplement IV in Response to Data Requests and Workshop Queries in Support of the Application for Certification for the Sun Valley Energy Project (05-AFC-03)

Dear Mr. Worl:

Attached are one original and 12 copies of Valle del Sol Energy, LLC's Supplement IV in Response to Data Requests and Workshop Queries in Support of the Application for Certification for the Sun Valley Energy Project (05-AFC-03).

If you have any questions about this matter, please contact me at (916) 286-0278 or Jenifer Morris at (714) 841-7522.

Sincerely,

Douglas M. Davy, Ph.D.
AFC Project Manager

Attachment

cc: T. McCabe
L. Kostrzewa
J. Morris
S. Galati
V. Yamada

Supplemental Filing

Supplement IV in Response to Data Requests and Workshop Queries

In support of the

Application for Certification

for the

Sun Valley Energy Project

Romoland, California

(05-AFC-03)

Submitted to the:

California Energy Commission

Submitted by:

Valle del Sol Energy, LLC

A wholly owned subsidiary of

EDISON MISSION ENERGY®

An EDISON INTERNATIONAL® Company

With Technical Assistance by:

CH2MHILL

Sacramento, California

October 2006

Contents

Introduction

The following is Valle del Sol Energy, LLC's (VSE's) fourth supplemental filing in response to Data Requests for the Sun Valley Energy Project (SVEP) (05-AFC-03) and other information requests from staff and other parties. Additional staff questions have arisen subsequent to the Staff's filing of formal Data Requests, and these are called workshop queries, for convenience. Some workshop queries resulted from the April 25, 2006, Data Request Response Workshop. Others have arisen through subsequent discussions with Staff. Responses or information submittals such as this one are numbered consistently with the Data Request numbers (for example, DR-15 is a response to Staff Data Request number 15), or are given a unique and sequential number with the WSQ prefix (for "workshop query").

Transmission System Engineering

Transmission System Engineering

Generation Tie-Line Route

WSQ-8 *Has Southern California Edison clarified their role in developing a finalized routing for the generation tie line between the SVEP and the Valley Substation? If so, please provide this information.*

Response: During further discussions with Southern California Edison (SCE) in connection with SCE's interconnection study process, SCE has identified two generation tie-line options in addition to the project design option as described in the Application for Certification. These options are shown in Attachment TSE-1, Figure WSQ-8. One of these options, called Option 1, is very similar to the project design tie-line as described in the AFC and depicted in AFC Figure 5.1-1. In this design configuration, the tie-line extends from the northernmost corner of the SVEP parcel in a northeasterly direction, connecting to the southwest corner of the SCE Valley Substation. Option 1 uses this same routing, and takes into consideration the planned relocation of an SCE 115 kV transmission line that runs along the northern side of McLaughlin Road and connects to the Valley Substation from the west. This existing line will be relocated to accommodate a new 500 kV generation tie-line being constructed for the Inland Empire Energy Center. This relocated 115 kV line will run along the southern boundary of the Valley Substation, to connect with the substation's 115 kV bus. Option 1 would run parallel with and south of this relocated line, and would connect with the substation in the approximate center of the substation's southern boundary. This line would be approximately 900 feet in length (distance outside of the SVEP property boundary).

Generation tie-line Option 2 identified in Figure WSQ-8 would route the tie-line southeast within the SVEP property boundary and along the SVEP's northern boundary to a point just east of the SVEP's eastern boundary. From there, the tie-line would extend to the northeast across the Burlington Northern Santa Fe (BNSF) railroad and Matthews Road. On the northeast side of Matthews Road, the tie-line would angle slightly, turning due north to the Valley Substation, to a connecting point in the center of the substation's southern boundary (same as Option 1). The portion of Option 2 that would be located outside of SVEP's property boundary would be about 950 feet in length.

Although Figure WSQ-8 does not indicate the precise locations of transmission towers, it is likely that towers would be placed on either side of the BNSF/Matthews Road corridor. Option 1 would require turning towers at the southeast corner of the Valley Substation and at the substation center, where the line would turn north to enter the substation. Option 2 would require turning towers on either side of the BNSF/Matthews Road corridor and a tower at the substation and may also require an intermediate tower between the BNSF/Matthews Road corridor and the substation.

It is our understanding currently that VSE would be responsible for the generation tie connection as far as the first tower to the east of Matthews Road and that SCE would construct and own the tie-line on SCE property from that point to the Valley Substation. The final choice of generation tie-line route will be made by SCE.

In terms of environmental effects, Option 1 is nearly identical to the existing project design. The only significant difference is that Option 1 would include the turn to the east, paralleling the relocated 115 kV line from McLaughlin Road, and one or two additional towers. The additional towers would be located on SCE property at the perimeter of the substation. The additional towers would have a negligible effect, from a visual resources point of view, because the substation area is already congested with towers and transmission lines and because the new towers would not block a scenic or protected viewshed.

Option 1 is within the area surveyed for biological and cultural resources. Portions of Option 2 were not surveyed for cultural resources, but potential impacts would be limited to the two or three (maximum) tower locations if cultural resources were present. The biological reconnaissance included the Option 2 route. Neither option would cause impacts to wetlands or endangered species.

Attachment TSE-1

SCE Interconnection Options

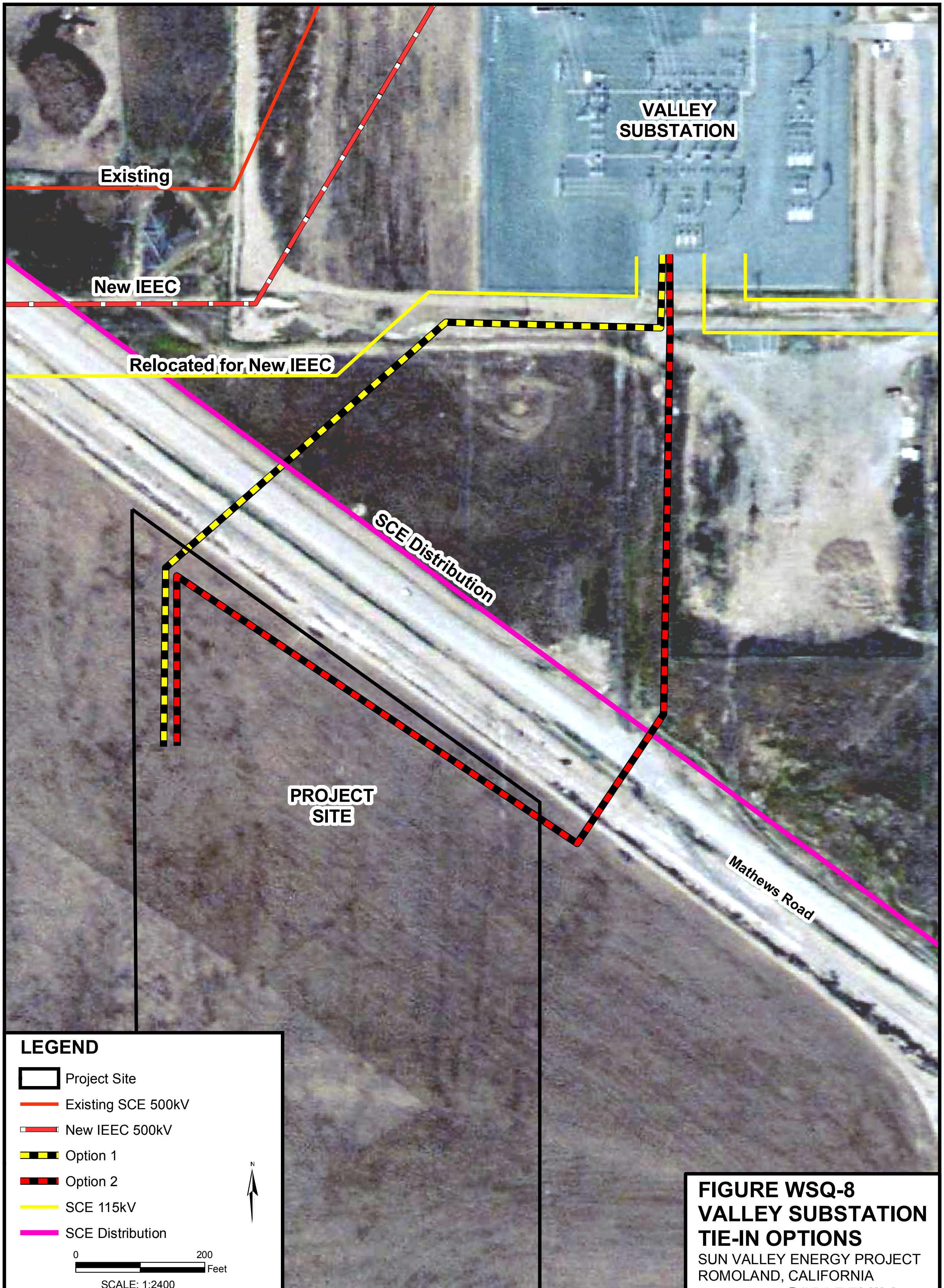


FIGURE WSQ-8
VALLEY SUBSTATION TIE-IN OPTIONS
SUN VALLEY ENERGY PROJECT
ROMOLAND, CALIFORNIA
CH2MHILL

Visual Plume Analysis

Visual Plume Analysis

Visible Plume Modeling Results

DR67. If the applicant performed a visible plume modeling analysis in support of the AFC Visual Resources conclusion, please provide the modeling results, any meteorological data used in the analysis, a full discussion of all assumptions, the name and version of the model used, and all model input and output files. If a modeling analysis was not performed, please provide any analysis that supports the visible water vapor plume discussion in the AFC.

Response: The visual plume modeling analysis is included as Attachment VP-1.

Attachment VP-1

Visible Plume Analysis

Cooling Tower Plume Modeling Analysis for the Edison Mission Energy Sun Valley Project

Prepared by:

Atmospheric Dynamics, Inc.
2925 Puesta del Sol Rd.
Santa Barbara, CA 93105

November 9, 2006

Cooling Tower Plume Modeling Analysis
Edison Mission Energy - Sun Valley Energy Project

Introduction

This report was prepared to summarize an analysis of potential cooling tower visual water vapor plumes from the cooling towers at the proposed Sun Valley Energy Project (SVEP). This study was conducted to support the visual resources assessment, which will involve a separate analysis of the visual resources impacts of cooling tower plumes, if they are present.

Edison Mission Energy (EME) is proposing to use a five (5) cell wet mechanical-draft cooling tower to reject heat to the atmosphere. The air leaving the cooling towers is usually saturated with moisture and warmer than the ambient air, causing a wet exhaust plume to be created. The saturated exhaust plume may be or may not be visible depending on the specific meteorological conditions. The potential for visible plume formation is also based on cooling tower operational factors that can occur in conjunction with existing meteorological conditions. Visible plume formation from the five (5) natural gas-fired turbines is not expected to occur since the turbine exhaust is hot and contains very little moisture.

Potential issues associated with cooling tower plumes include the presence of visible plumes and the occurrence of ground level fogging and/or icing episodes that involve the ground contact of visible plumes. In order to evaluate the effects on the local and regional environment, a modeling analysis was conducted to simulate the cooling tower plumes from the proposed project using five (5) years of meteorological data.

The modeling analysis presented below is conservative because it does not take into account the likely conditions in which the power plant would actually operate. Specifically, SVEP is a peaking power plant that is expected to operate primarily during peak power demand periods. Peak power demands generally occur during mid-day hours, particularly during hot summer or fall months, when the climatic conditions that result in visible plume formation are not present. However, since the computer modeling technique does not easily segregate the specific hours during which the peak power demand would occur, the results of the vapor plume modeling analysis assumed continuous operation of the power plant during all daylight/non-rain hours. The results presented below considerably over-predict the project's creation of visible plumes and do not represent the true operational profile of this project.

Modeling Techniques

The Seasonal/Annual Cooling Tower Impact Program (SACTI, Version 11-01-90) was used to assess potential for the SVEP cooling tower to form visible vapor plumes. SACTI was developed by Argonne National Laboratory[1] for the Electric Power Research Institute (EPRI) to address the following potential adverse impacts of cooling towers:

- plume visibility
- deposition of cooling tower drift
- ground-level fogging and icing
- shadowing by the plume & reduction of solar energy

SACTI contains algorithms for both natural and mechanical-draft cooling towers arranged singly or in clusters. Plume merging and associated enhanced plume rise are treated by the routines contained in the model. While the SACTI model does not have any official regulatory endorsement, this model has been applied for a large number of projects where cooling tower impact assessments were required. The characteristics of the tower and the preparation of the meteorological data set are discussed below.

The characteristics of the proposed cooling tower are listed in Table 1. These input parameters were obtained from EME's engineering consultant based on preliminary seasonal design data for the facility.

A five (5) year meteorological data set was constructed using hourly surface observations from the Riverside Municipal Airport meteorological station, which is located near the proposed project location, for the years 2001 through 2005. As discussed below, night-time hours were removed from the meteorological data set, as were day-time hours for which where weather or other phenomenon would impair visibility. Figure 1 displays a wind rose constructed from all hours of the five (5) year data. The average wind speed is 3.3 m/s and high winds greater than 6 m/s are infrequent (8 percent for the five year data set). Wind speeds either missing or less than the threshold of the anemometer at Riverside occur for 34 percent of the total time period. A lack of precision for light winds is not expected to unduly influence the outcome of the modeling for ground-level fogging, however, because such fogging effects require plume touchdown and would typically be associated with high wind conditions.

Given the length of time of the data used in the SACTI analysis, the data used are considered representative of the climatic conditions of the project area where plume formation can occur. Even with this representative data set, short-term variability in conditions can affect the prediction of cooling tower plume impacts. Therefore, the results of the analysis are considered an indicator of likely occurrence and not an absolute predictor of events.

Modeling Results

Cooling Tower

The SACTI model was applied to simulate plumes from the proposed cooling towers using the

[1]Argonne National Laboratory, 1984. Users Manual: Cooling-Tower -Plume Prediction Code. Prepared for Electric Power Research Institute, 3412 Hillview Avenue, Palo Alto, CA 9404, EPRI CS-3403-CCM, April, 1984.

five (5) year meteorological data set and tower design characteristics described below. Default options were assumed for the input variables controlling the model's operation. The five (5) year data set was input into SACTI to produce a five (5) year average frequency distribution for condensed plume length, condensed plume height, plume shadowing, and ground-level fogging. Although the model provides information on plume shadowing and drift deposition, the focus of our analysis and the discussion that follows is on visible plume dimensions and ground based fogging.

Table 1. Cooling Tower Input Parameters

Parameter	Value
Type	linear mechanical draft 1 tower, 5 cells
Heat Dissipation Rate (MW)	190
Circulation Rate (gpm)	32,500
Total Tower Air Flow (kg/s)	1076 – 1107
Max Drift Rate (%)	0.0005
Salt Concentration (gm/gm)	2.03E-3
Orientation	One banks of 5 in-line cells aligned east to west
Height (m)	12.2
Equivalent Total Cell Diameter (m)	20.4
Exit Velocity & Temperature	variable, calculated by the model assuming saturation conditions

Conditions favoring a long condensed plume occur more frequently in the fall and winter seasons, as atmospheric conditions, such as lower air temperature and higher relative humidity, are more favorable during these periods for plume formation. Also, plume formation tends to occur more frequently during night-time hours and during adverse weather conditions. Since EME has committed to a lighting plan that minimizes illumination, cooling tower plumes would not be visible at night. Unless illuminated by on-site sources, the cooling tower plumes would not be visible. The SACTI meteorological data set was therefore modified by removing all nocturnal hours, which accounted for 50 percent of all the hours in the five (5) year data set. In addition, daytime observations with fog, precipitation, visibility less than 3 miles, or ceiling heights less than 500 feet were excluded from the meteorological data set as, under these conditions, a visible plume from the cooling tower would be obscured by these local weather phenomena. For the Riverside meteorological data set, these adverse weather conditions account for 9.7% of the total valid (daylight hours) observations. Table 2 summarizes these statistics.

Table 2	**Total hours**	**Day hours**	**Night Hours Removed from Analysis**	**Limited Visibility Hours Removed from Analysis**	Total Hours Modeled With SACTI
Year					
2001	8352	4077	4275	477	3600
2002	8423	4184	4239	487	3697
2003	8608	4330	4278	414	3916
2004	8636	4323	4313	351	3972
2005	8612	4331	4281	327	4004

Thus, the five (5) year meteorological data set was modified by removing both night-time hours and hours with weather obscuring phenomena. In total, these conditions accounted for 55% of all the hours (day, night, and obscuring weather) in the data set. The SACTI model was then applied to the remaining data to assess the cooling tower plumes under daytime conditions when a condensed plume would most likely also be a visible plume. Of particular interest was the analysis of visible plume formation during the months when formation of larger and more visible plumes is most likely, namely the fall and winter seasons. The occurrence of low temperatures coupled with high(er) relative humidity occurs with a greater frequency during these seasons. Plume formation is favored during these types of low temperature/high humidity conditions because, under these conditions, the ability of the atmosphere to absorb water vapor is greatly reduced as the air mass is at or near saturation.

The results of the cooling tower analysis are summarized in Attachments 1-5 for the tower for the annual and seasonal seasons. The attachments present the frequency distributions of the primary model output variables, namely plume length and height, which is depicted by downwind sector and radial distance from the center of the cooling tower array.

Cooling Tower Plume Formation

The SACTI results are summarized below for the annual and each of the four seasons. The annual summary indicate that the majority of visible plumes will be less than 250 meters (820 feet) in length. Modeling results indicate that, based on total hours, plume formation will occur 20 percent of the time during valid visible hours at locations up to 600 meters (1,968 feet) from the site. Larger downwind visible plume lengths are possible and are predicted during the spring and winter seasons, but the downwind visible plume length will be less than 400 meters (1300 feet) for 70 percent of all the hours where a visible plume will form. SACTI also predicts that the visible plume height will average 150 meters, and have a median radius of 40 meters (131 feet) on an annual basis. For the winter season, the average plume length (when visible) will be longer, at 325 meters (1066 feet). For winter, SACTI predicts an average visible plume height of 180 meters with a median radius of 45 meters, similar to the annual averages.

The level of visibility of the modeled plumes was also assessed, based upon the opacity of the predicted visible plumes. SACTI does not directly calculate plume opacity, but it does calculate the total hours of cooling tower plume shadowing. Assuming that a plume with sufficient opacity will cause a shadow, the modeling shows that plumes with enough opacity to cause shadowing would be longer than 100 meters less than 20 percent of the time on an annual basis. Thus, a majority of the plumes that do form will not be opaque enough to cause shadowing at distances beyond 100 meters and most plumes that do form at distances greater than 100 meters could have less opacity such that ground shadowing would occur on a less frequent basis.

TABLE 3 Seasonal Plume Characteristics from SACTI

	Annual	*Winter*	*Spring*	*Summer*	*Fall*
Plume Characteristics (meters)					
Median Length	250	325	325	225	225
Median Height	175	180	175	100	150
Median Radius	40	45	45	35	40
Limit of Shadowing [a]	60	100	25	150	50

a- 80% of visible plumes

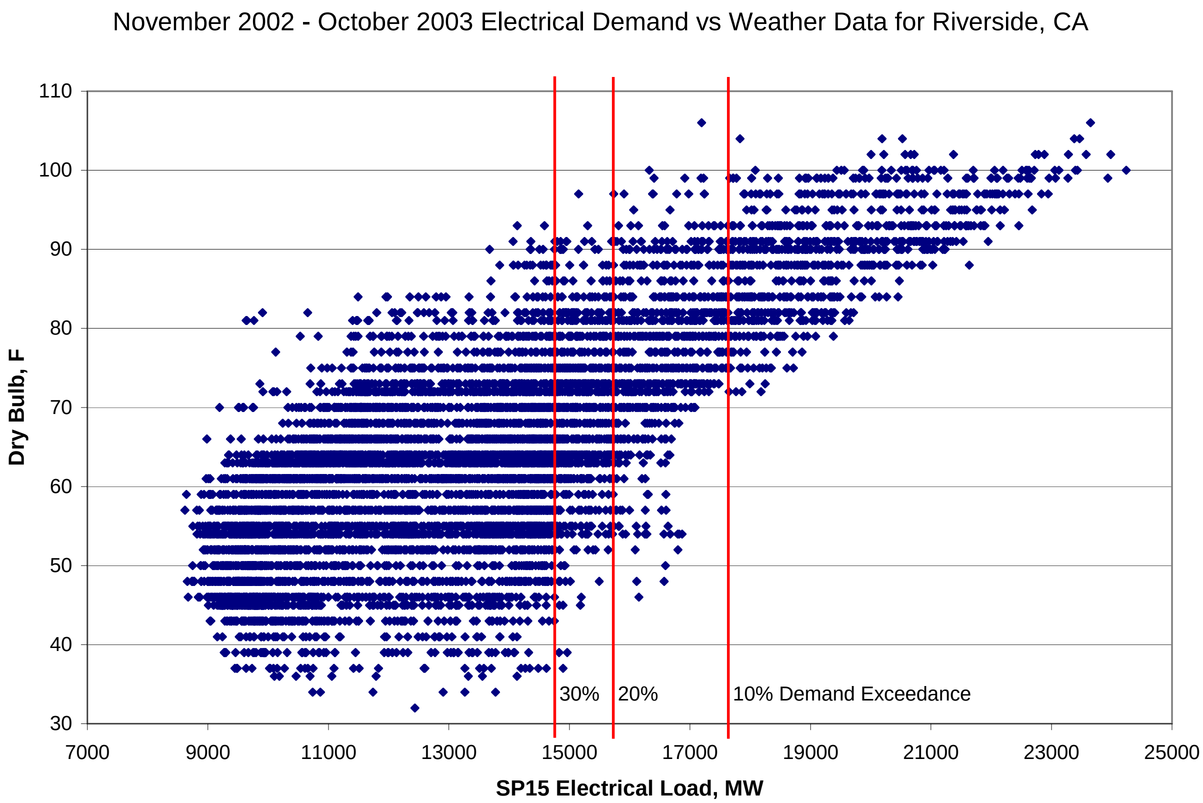
Ground level fogging

The potential for ground-level fogging on nearby areas was also assessed with SACTI. Potential fogging conditions can occur when atmospheric conditions allow the cooling tower plume to generate a cloud that contacts the ground. This can occur under periods of high humidity or high wind speed and favorable temperatures and stabilities with the fog being nucleated or generated by the cooling tower plume. Should fog be generated across a highway or other thoroughfare, it may become a potential hazard, and mitigation measures such as signs and traffic assistance may be needed. In order for fogging to affect roadway operations, the cooling tower plume must touchdown on the road surface and be condensed. This requires high winds (low plume rise), the right wind direction, low dew-point depression, and low temperatures.

SACTI was run with all hours of the five (5) year data base, including nighttime and low-visibility hours. There were only 2.6 hours of predicted fogging from the cooling tower, considering all wind directions and all hours, or on an annual basis, 0.5 hours per year. Thus, the potential for fogging is nearly zero.

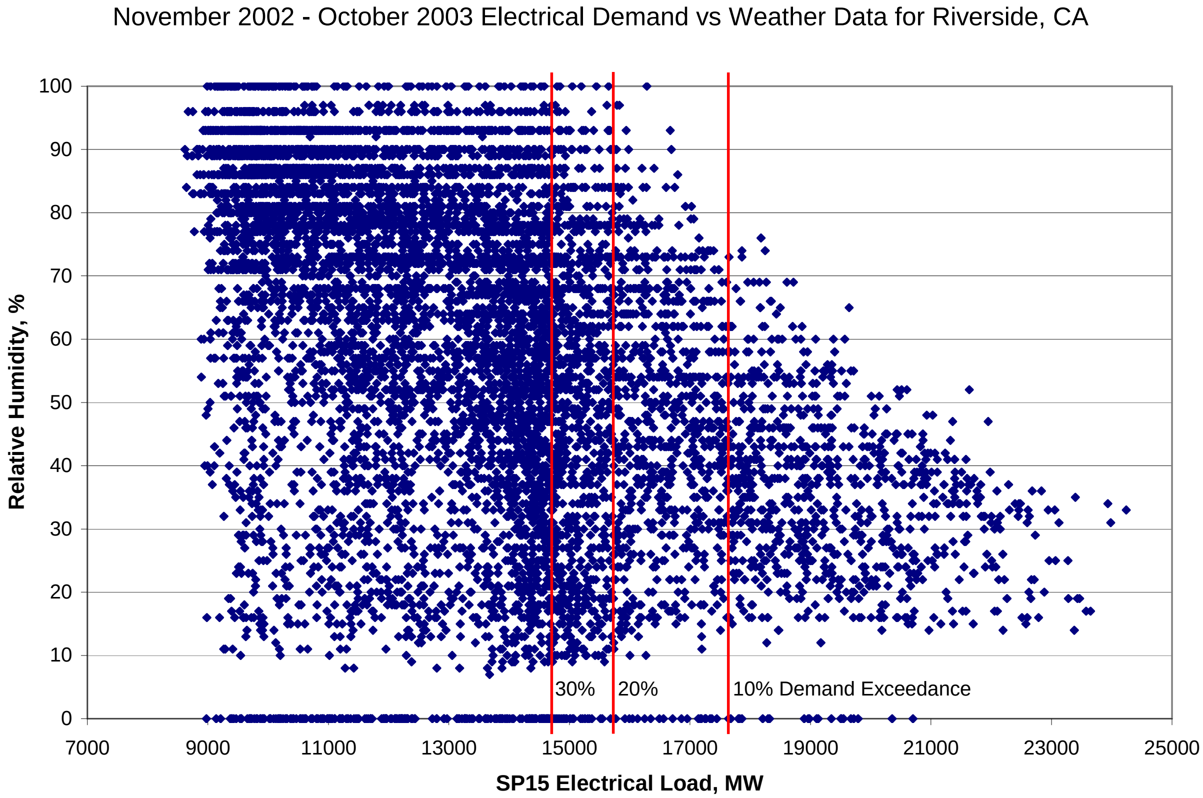
Project Operation

The SACTI model was modified to produce an output listing of the meteorological conditions that produced a visible plume. The SACTI cooling tower plume modeling output shows that a visible plume generally only occurs when relative humidity exceeds 85%. In order to evaluate the likelihood of this atmospheric condition coinciding with plant operation, hourly electric load data from the California ISO for the SP15 zone (effectively SCE’s and SDG&E’s service area) for the period of November 2002 through October 2003 was obtained, and hourly weather data for Riverside, CA for the same period was obtained. As one would expect, regional electrical loads are highest when dry bulb temperatures are highest due to air-conditioner use on hot summer days, as illustrated in the chart below.

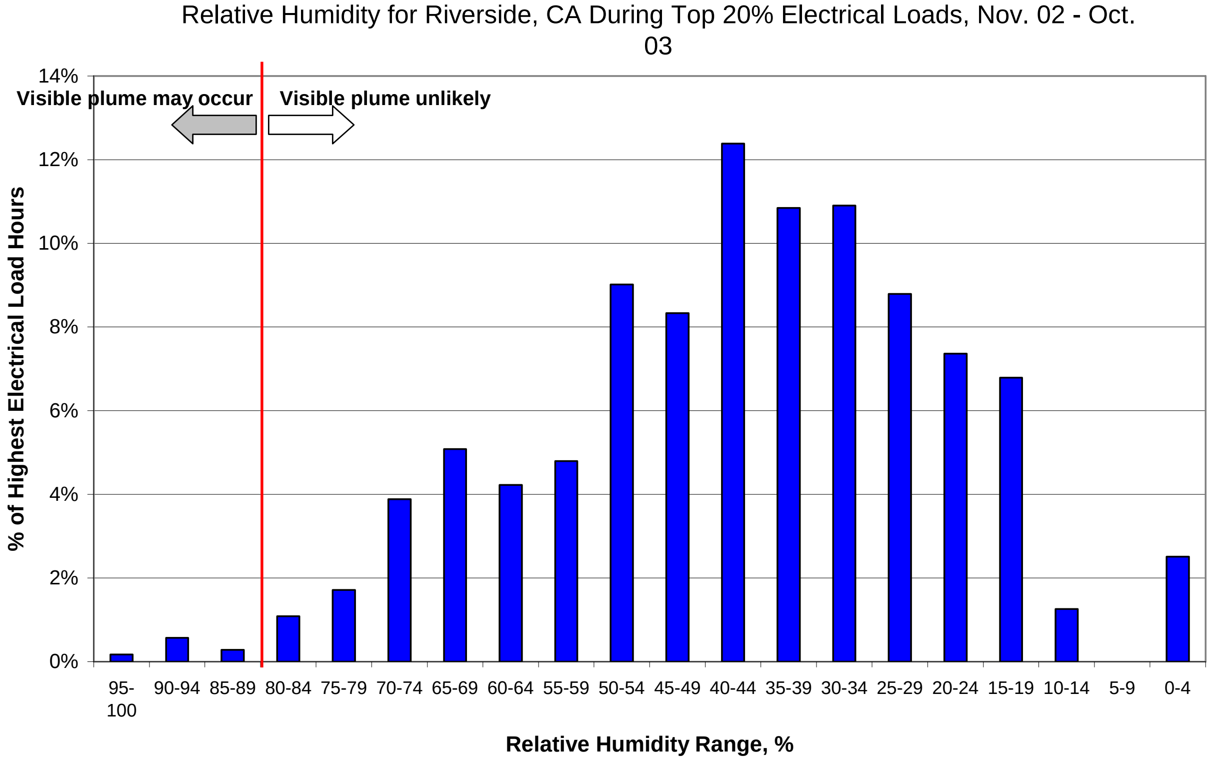


The vertical red lines indicate the SP15 electrical loads that are exceeded 10%, 20% and 30% of the time (i.e., 10%, 20% and 30% of the data points are to the right of the respective lines). Although a peaking powerplant may occasionally be called on to run to alleviate a power grid emergency or unexpected outage of a baseload powerplant, almost all operation of peaking powerplants will be during the highest electrical loads.

On hot summer days, as dry bulb temperatures (and corresponding electrical loads) increase to afternoon peaks, relative humidity naturally decreases due to the increased moisture-holding ability of the warmer air. It would be expected, then, that high electrical loads would correlate negatively with high relative humidity. The chart below is a plot of the same electrical loads as those in the preceding chart, but versus the relative humidity prevailing at the time of those loads, and illustrates the expected negative correlation.



The chart below is a frequency distribution of the relative humidity during the hours corresponding to the highest 20% of electrical loads. Relative humidity only exceeds the 85% level at which visible plume may occur during 1.0% of the hours in which the highest 20% of electrical loads occurred during the one year period for which data was obtained. Expressed as a percent of the entire year, 1.0% of 20% of the year is an incidence of less than 0.2%.

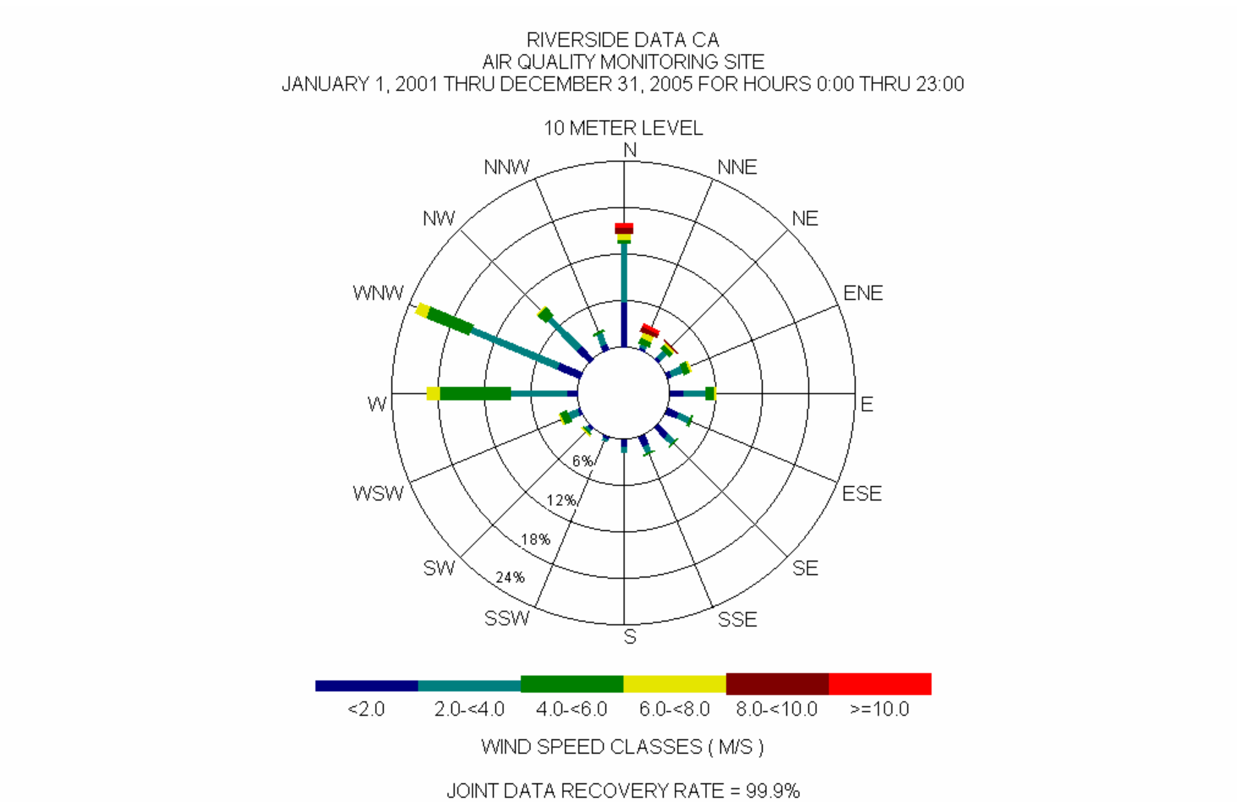


Summary

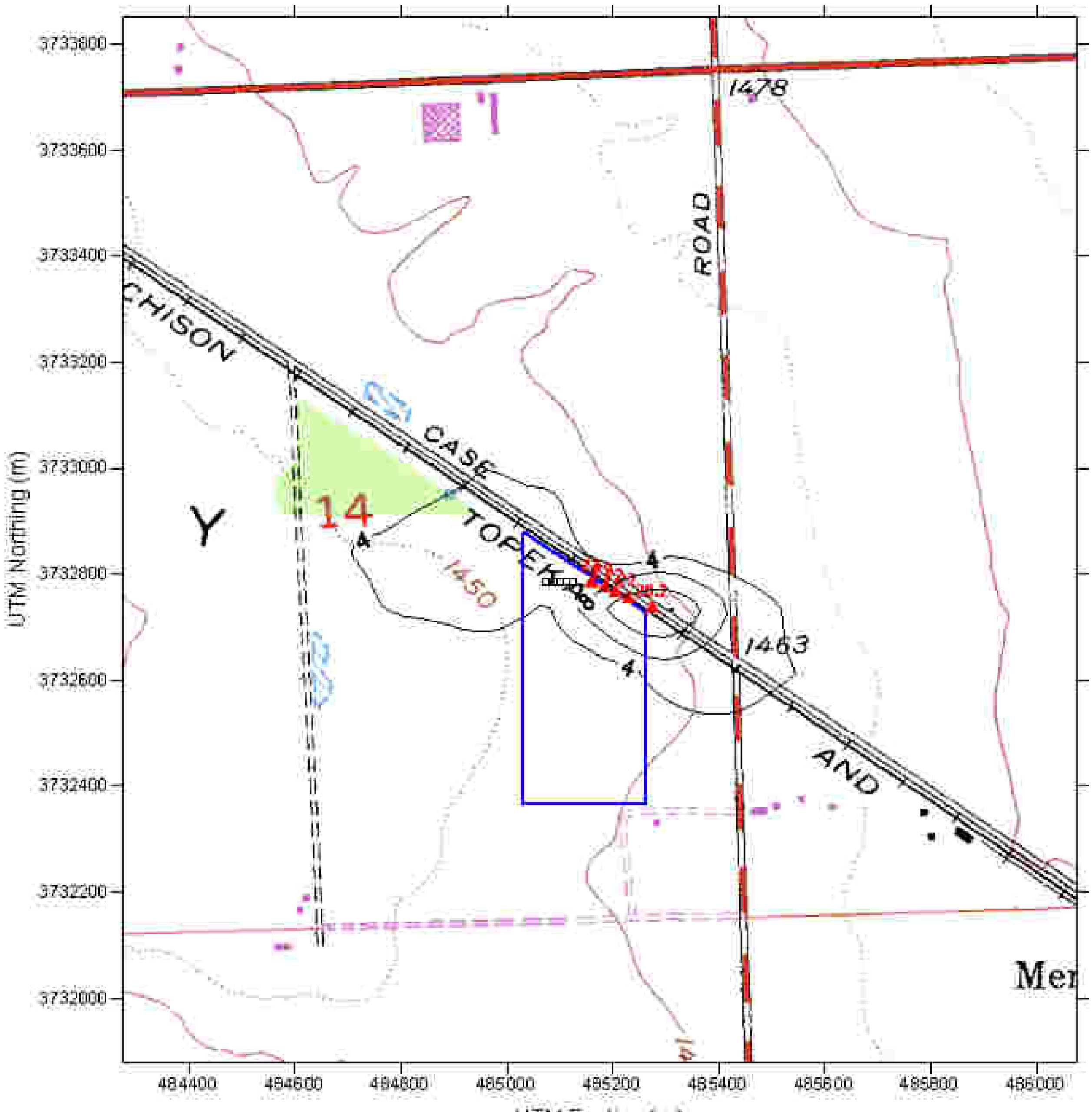
A cooling tower modeling analysis was conducted using SACTI and five (5) years of Riverside Municipal Airport meteorological data. Since there is no realistic method to run the model during the hours of typical peaker plant operation, all daylight/non-rain hours were included in the analysis, which thereby assumes that the project would be in operation at all times. With this highly unlikely profile, modeling results indicate that plume formation could result 20 percent of the time during valid, visible hours—justly barely meeting the CEC's previously established significance criteria for base-loaded power projects. However, this result would require that the SVEP peaker operate during 100% of the daylight hours—historically unprecedented for peaking power project. As described in the AFC, the SVEP is expected to have an annual capacity factor of 30 percent. Even if the project operated during 50% of the daylight hours this would reduce the predicted plume formation to 10 percent of the time during valid, visible hours, well below the CEC's 20 percent criteria for potential significance. Moreover, the previous section, Project Operation, provides a detailed analysis based on real operational experience and predicted the vastly reduced incidence of 0.8 percent of the year for operation during the highest 20% of electrical loads when the relative humidity exceed 85%.

Model simulations also indicate that when plumes are visible, they are more likely not to have enough opacity to cause a ground-based shadow. Thus, the plume may not have enough opacity to be considered a significant visual plume. No plume fogging is predicted to occur in the general vicinity of the project site.

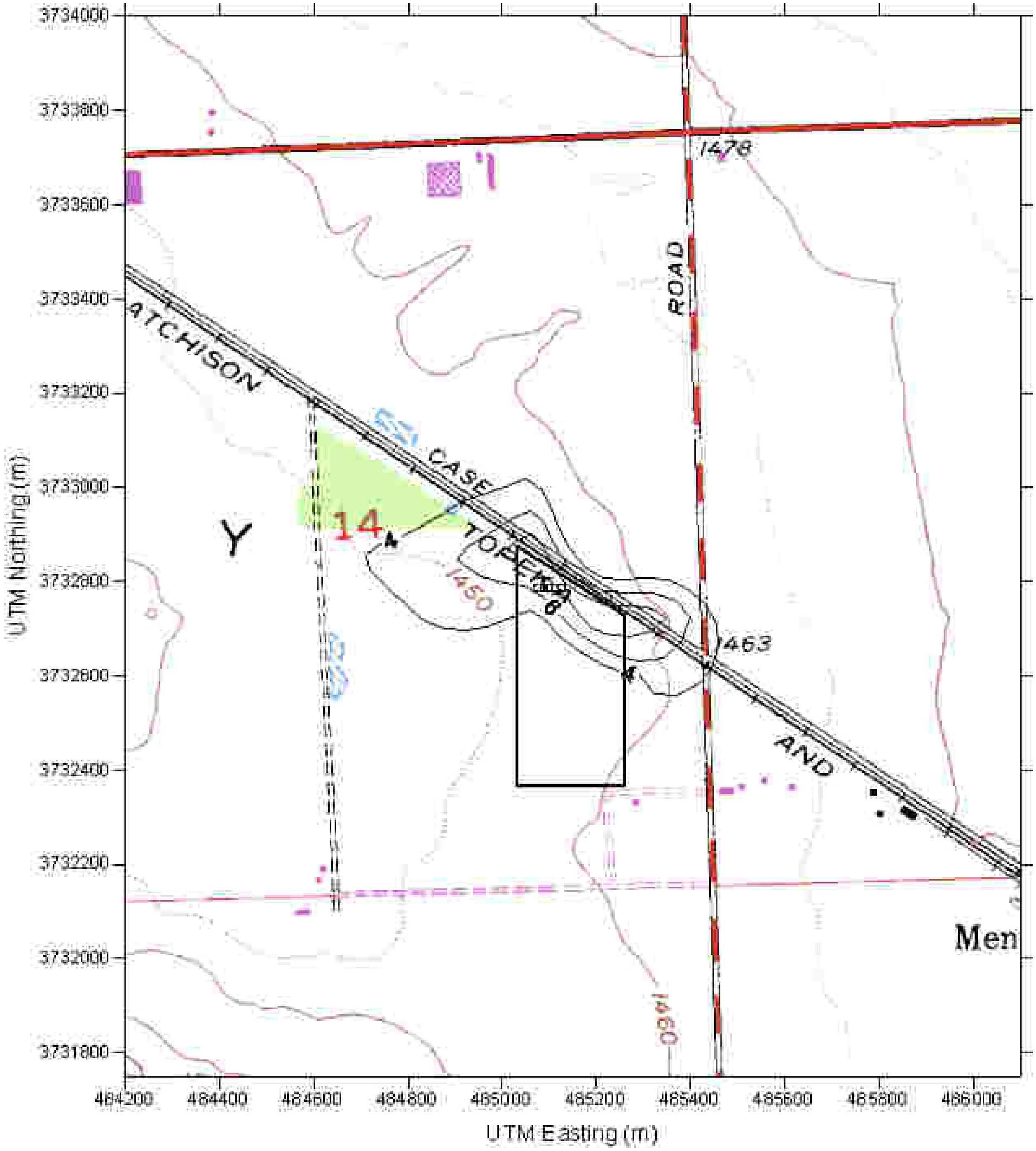
Figure 1
Annual Wind Rose (2001-2005)
Riverside, CA Airport



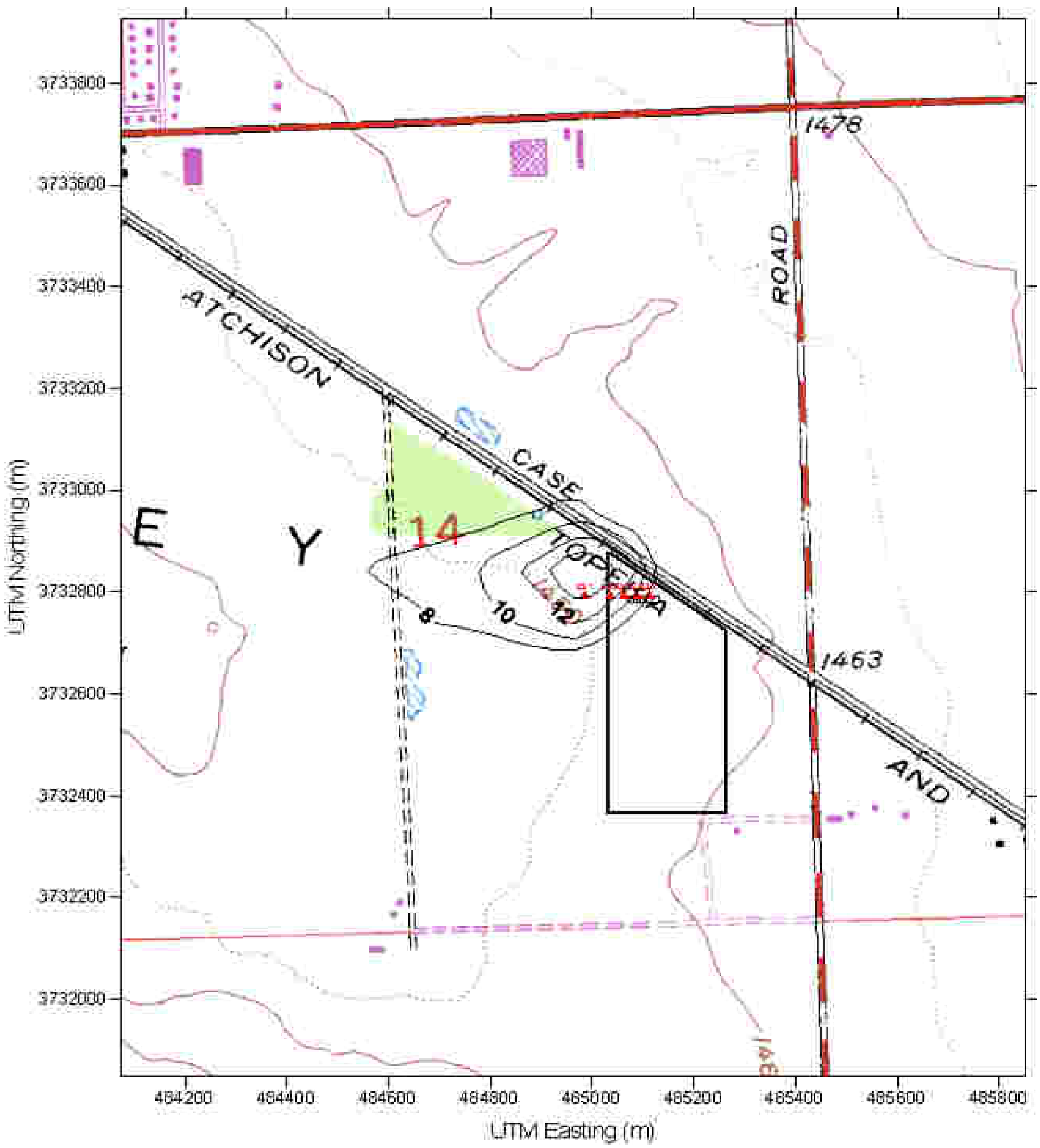
Sun Valley SACTI Modeling
% hours/ Annual (All Seasons)
Visibile Plume Length
FULL LOAD
Good Visibility Hours
Red = 20% or more HRS

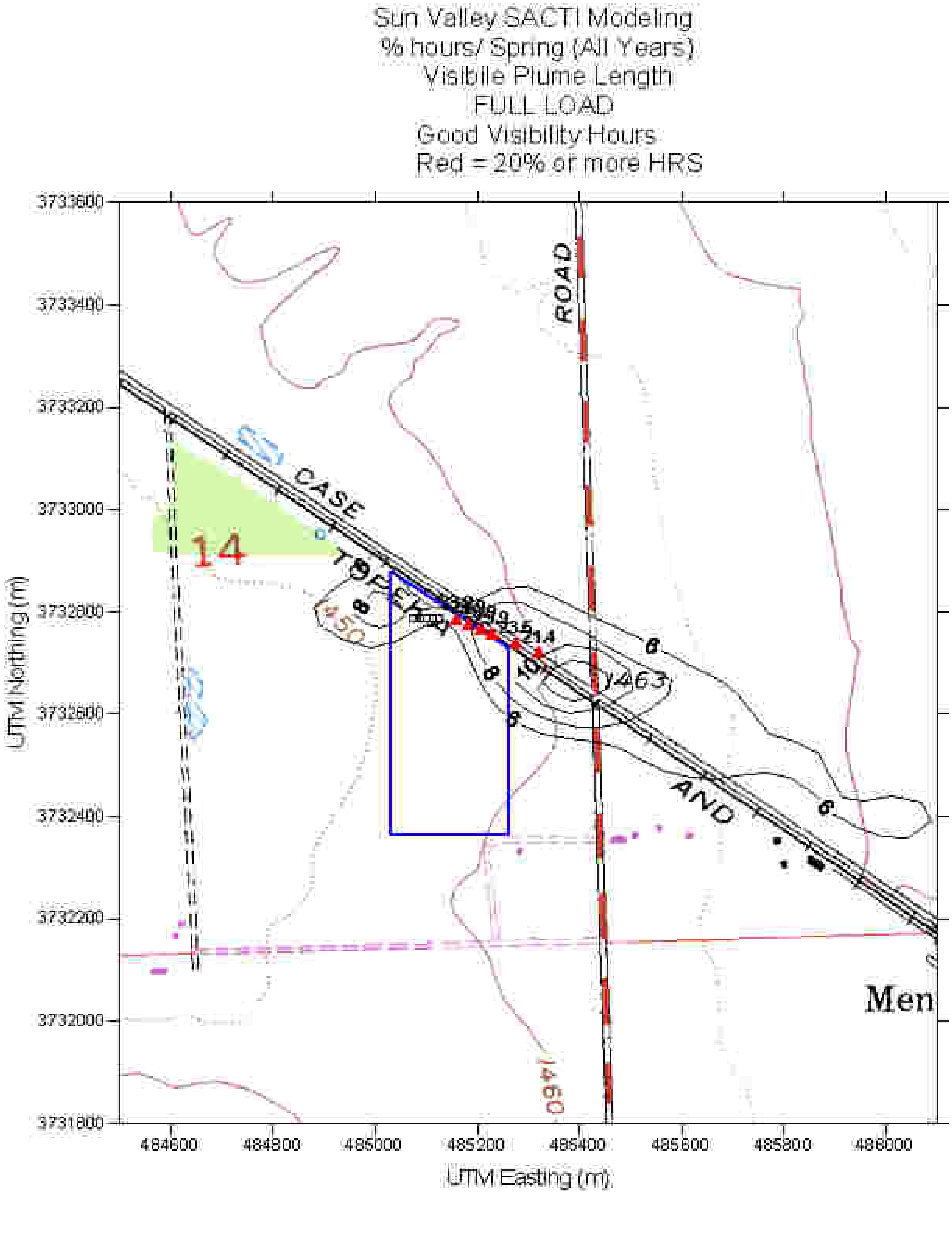


Sun Valley SACTI Modeling
% hours/ Fall (All Years)
Visibile Plume Length
FULL LOAD
Good Visibility Hours
Red = 20% or more HRS



Sun Valley SACTI Modeling
% hours/ Winter Seasons
Visibile Plume Length
FULL LOAD
Good Visibility Hours
Red = 20% or more HRS




Sun Valley SACTI Modeling
% hours/ Spring (All Years)
Visibile Plume Length
FULL LOAD
Good Visibility Hours
Red = 20% or more HRS
UTM Northing (m)
UTM Easting (m)
3733600
3733400
3733200
3733000
3732800
3732600
3732400
3732200
3732000
3731800
484600
484800
485000
485200
485400
485600
485800
486000
ROAD
CASE
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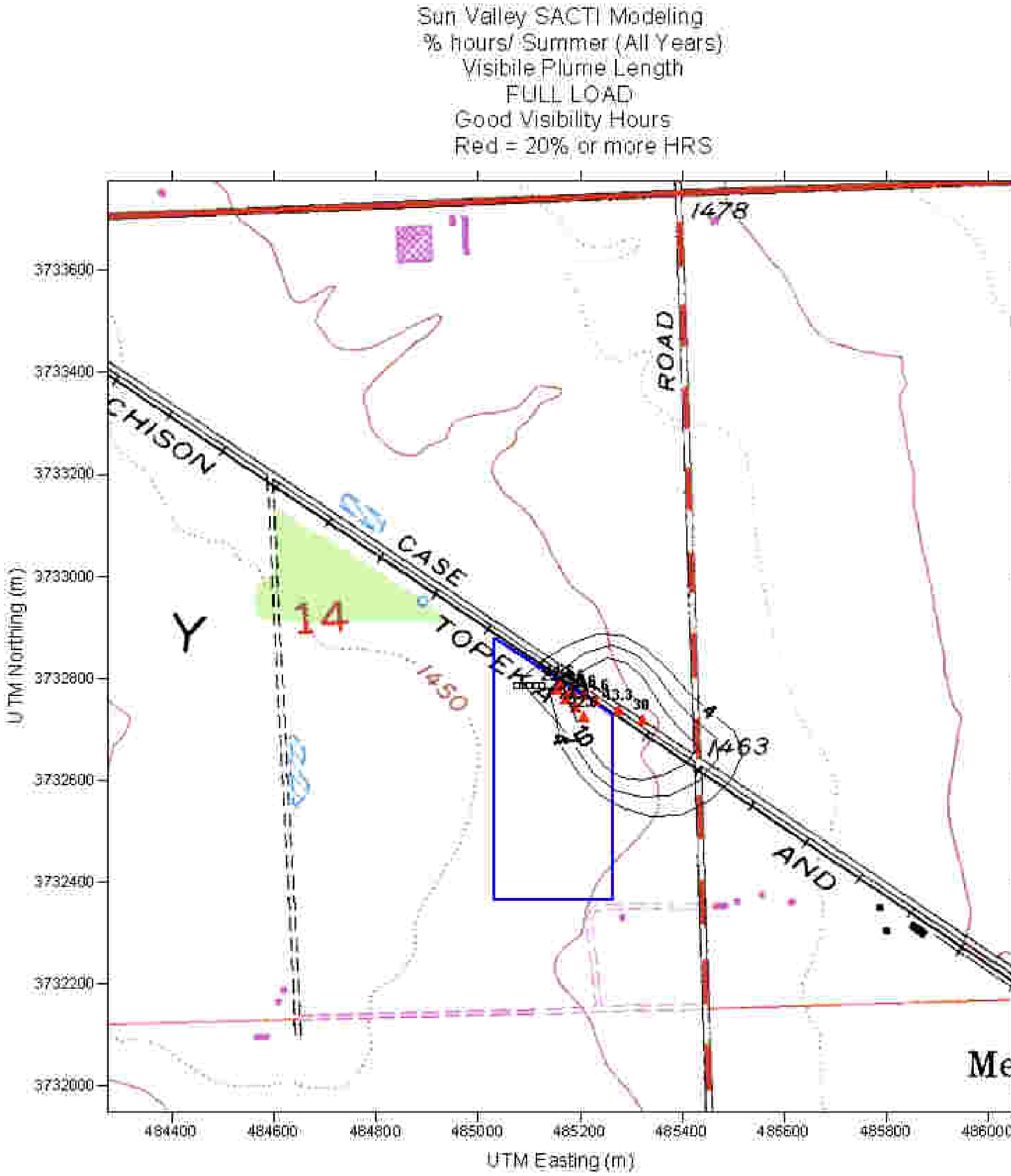
Men
1463
1460



Sun Valley SACTI Modeling
% hours/ Summer (All Years)
Visibile Plume Length
FULL LOAD
Good Visibility Hours
Red = 20% or more HRS
UTM Northing (m)
UTM Easting (m)
3733600
3733400
3733200
3733000
3732800
3732600
3732400
3732200
3732000
484400
484600
484800
485000
485200
485400
485600
485800
486000
1478
ROAD
CHISON
CASE
TOPEKA
AND
Y
14
1450
1463
Me