APPENDIX 5.1C

PSD Protocol

APPENDIX 5.1C

Protocol for Increments Analysis

Overview of Requirements for Increments Analysis

The federal Prevention of Significant Deterioration (PSD) program is intended to ensure that economic growth in areas with good air quality occurs without causing the deterioration of that air quality to unhealthful levels. The PSD program contains a number of requirements that apply to new or modified sources of air pollution that are located in clean air areas.

These PSD program requirements, applied on a pollutant-specific basis, include conducting an increments analysis to demonstrate that no increments will be exceeded as a result of the proposed new or modified source.

The CCGS project is **not** expected to trigger the requirements of the PSD program. Therefore, an increment analysis is not proposed at this time. The protocol which follows presents the methods and assumptions to be used in the modeling impacts analysis.

Attachments – Modeling Protocol dated 4-27-09. (21 pages).

April 27, 2009

Dr. Glen Long
Bay Area Air Quality Management District
939 Ellis St.
San Francisco, CA. 94109

Re: Air Quality Modeling Protocol for the Contra Costa Generating Station

Dear Glen:

Attached is the Air Quality Modeling Protocol for the Contra Costa Generating Station (CCGS). Radback Energy is proposing to construct and operate a nominal 640-megawatt[1] (MW) power generation facility near the intersection of Bridgehead Road and Wilbur Avenue in Oakley, Contra Costa County. The project will include:

- Installation of new power generation equipment consisting of two (2) combustion turbine generators, each with a duct-fired dedicated heat recovery steam generator (HRSG), operating in combined-cycle mode.
- Installation of a new diesel engine-driven fire pump.
- Installation of a single condensing steam turbine generator.
- Installations of a single air cooled condenser to condense the steam exhausting from the steam turbine.
- Installation of an auxiliary boiler to provide process heat when the facility is offline and during startups.
- Installation of an evaporating fluid cooler to remove heat from a closed-loop auxiliary cooling system.
- Installation of all required auxiliary support systems.

The proposed project will be a major new source as defined by the District's Siting Regulations, and will be subject to District requirements for emission offsets and air quality modeling analyses for criteria pollutants and toxics. The proposed project will also trigger the Prevention of Significant Deterioration (PSD) significant emission rates for some of the pollutants.

[1] Approximate facility net output with both combustion turbines operating at 100% load and maximum HRSG duct firing at average January conditions (47 degrees F, 73% relative humidity).

The applicant will submit air quality impact analyses to both the Bay Area Air Quality Management District (BAAQMD) and the California Energy Commission (CEC). The modeling analysis will include impact evaluations for those pollutants shown in Table 1 and the CEC requirements for evaluation of project air quality impacts. The purpose of this document is to establish the procedure for meeting the BAAQMD and CEC air quality modeling requirements for the proposed project.

Table 1
PSD Significant Emissions Thresholds

Pollutant	**Cumulative Increase (tons/yr)**
NO_x	100
SO_2	100
CO	100
PM10/PM2.5	100

The project will result in emissions that will exceed PSD significant emissions thresholds for carbon monoxide (CO). Furthermore, emissions of oxides of nitrogen (NO_x), particulate matter (PM10/2.5) will also be major under the PSD program. Sulfur dioxide (SO_2) and volatile organic compounds (VOC) are expected to be below the significant emission levels. The project will also trigger CEC modeling requirements for cumulative and construction-based impacts.

Emissions from the proposed project will also exceed the BAAQMD thresholds defining a major source for purposes of New Source Review (NSR). The project triggers the BAAQMD offset requirements for NO_x and POC as emissions of other criteria pollutants are below the offset trigger levels. As part of the major PSD source permit application, an air quality, toxics, and cumulative impacts analyses are required. Modeled ambient impacts are expected to be below the levels at which preconstruction monitoring is required. The results of these analyses will be presented in detail in the AFC and the application for a Determination of Compliance.

As part of application process and in accordance with the BAAQMD requirements ("*Permit Modeling Guidance,*" June 2007), a modeling protocol is required. This modeling protocol outlines the proposed use of air dispersion modeling techniques that will be used to assess impacts from the proposed facility, and has been prepared by Atmospheric Dynamics, Inc. on behalf of Contra Costa Generating Station. This protocol also follows modeling guidance provided by the U.S. Environmental Protection Agency (USEPA) in its "*Guideline on Air Quality Models*" (including supplements), the National Park Service's "*Permit Application Guidance for New Air Pollution Sources*" (Bunyak, 1993), the Federal Land Managers' "*Air Quality Related Values Workgroup (FLAG) Draft Phase I Report*" (June 2008), and the "*Interagency*

Workgroup on Air Quality Modeling (IWAQM) Phase II Recommendations" (1998), as well as BAAQMD modeling guidance.

Impacts from operation of the facility will be compared to the following in Table 2:

Table 2 Air Quality Criteria	NO_2	PM_{10}	CO	SO_2
PSD Significant Impact Levels	✓	✓	✓	✓
PSD Monitoring Exemption Levels	✓	✓	✓	
PSD Increments	✓	✓		
Ambient Air Quality Standards	✓	✓	✓	✓
Class I and Class II Visibility	✓	✓		✓
Impacts to Soils and Vegetation	✓	✓	✓	✓
Class I Area Acid Deposition	✓			✓

Concurrent with the submittal of the Application for Certification (AFC) to the California Energy Commission, the applicant will be applying to the BAAQMD for an Authority to Construct and a Determination of Compliance for the proposed project. Attached for your review is a description of the analytical approach that will be used to comply with District modeling requirements for the project.

We look forward to working with you. If you have any questions, please do not hesitate to call me at (805) 569-6555. Thank you for your attention in this matter.

Sincerely,

Atmospheric Dynamics, Inc.

Gregory Darvin

Gregory S. Darvin
Senior Meteorologist

cc:
Keith Golden, California Energy Commission

INTRODUCTION AND FACILITY DESCRIPTION

The proposed project site is located near the intersection of Bridgehead Road and Wilbur Avenue in Oakley, Contra Costa County. The UTM coordinates of the proposed project are 610102 meters easting, 4207574 meters northing (NAD83, Zone 10). The project is located approximately 1.5 kilometers (km) southeast of the Contra Costa Power Plant. The site currently is made up of open areas.

The proposed facility will include two GE Frame 7FA combustion turbines, each rated at a nominal 188 MW[2]. Associated with each combustion turbine will be a heat recovery steam generator (HRSG) equipped with duct burners. The combustion turbines will incorporate dry low NO_x (DLN) combustors for primary NO_x control. The HRSG duct burners will be of a low-emissions design for primary NO_x control. Each turbine/HRSG will have its own exhaust stack. In addition to DLN combustors for the combustion turbines and low-emissions duct burners in the HRSGs, each turbine/HRSG train will be equipped with an SCR system using ammonia as the reaction agent in the final NO_x control process, and an oxidation catalyst for control of CO emissions. Each stack will have a CEMS as required by the BAAQMD and Title IV acid rain regulations. Each of the new combustion turbines/HRSGs will operate in combined-cycle mode and will fire natural gas only.

Steam generated by the HRSGs will be used to drive a steam turbine generator. Exhaust steam from the steam turbine will be condensed by an air-cooled condenser. Other equipment to be located on the site will support the energy generation processes including a demineralized water production system, water storage tanks and forwarding pumps, electrical switchyard, ammonia storage and containment, administration building, maintenance/warehouse building, gas compressors, etc.

Additionally, an auxiliary boiler will be provided to produce steam for various process uses when the facility is offline and during startups. The auxiliary boiler will utilize a low-emissions burner for primary NOx control and will be provided with an SCR system using ammonia as the reaction agent for final NOx control. Control of CO emissions will rely on good combustion practices.

The facility's fire protection system will include a diesel engine-driven emergency fire pump. The fire pump engine will meet applicable U.S. Environmental Protection Agency (USEPA) Tier 3 emissions standards.

Because the facility will use an air-cooled condenser as opposed to wet mechanical draft cooling tower, particulate matter will not be generated by the equipment used to condense steam. The facility will include a small evaporative fluid cooler, which will be

[2] Approximate gross output of combustion turbine operating at 100% load at average January conditions (47 degrees F, 73% relative humidity).

used to remove heat from the facility's closed-loop auxiliary cooling system. The evaporative fluid cooler will be provided with high-efficiency drift eliminators to minimize the particulate matter emitted from the unit. In addition, the evaporative fluid cooler will typically only operate during hot weather. At other times, the closed-loop auxiliary cooling system will use an air-cooled heat exchanger (i.e. fin-fan cooler) which, like the air-cooled condenser, will not generate particulate matter.

PROPOSED AIR QUALITY DISPERSION MODELS

United States Environmental Protection Agency (USEPA) dispersion models proposed for use to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations include the AERMOD modeling system (version 07026 with the associated meteorological and receptor processing programs AERMET version 06341, AERSURFACE version 08009, and AERMAP version 09040) for modeling most facility operational and construction impacts in both simple and complex terrain, the Building Profile Input Program for PRIME (BPIP-PRIME version 04274) for determining building dimensions for downwash calculations in the models, the SCREEN3 model (version 96043) for determining inversion breakup and shoreline fumigation impacts, and the use of the California Health Risk Assessment models/protocols for determining toxic impacts, which includes the HARP On-Ramp program. These models, along with options for their use and how they are used, are discussed below. These models will be used for the following:

- Comparison of operational and construction impacts to significant impact levels (SILs), ambient monitoring significance thresholds, California Ambient Air Quality Standards (CAAQS), National Ambient Air Quality Standards (NAAQS), and PSD Increments using AERMOD;
- Cumulative impacts analyses with AERMOD in accordance with local/state/ USEPA/CEC requirements;
- Toxics analyses using ARB algorithms as incorporated into state/CEC requirements; and
- Assessment of impacts to soil and vegetation

EXISTING METEOROLOGICAL AND AIR QUALITY DATA

Available Meteorological Data: Hourly observations of certain meteorological parameters are used to define the area's dispersion characteristics. These data are used in approved air dispersion models for defining a project's impact on air quality. These data must meet certain criteria established by the USEPA and the following discussion details the proposed data and its applicability to this project.

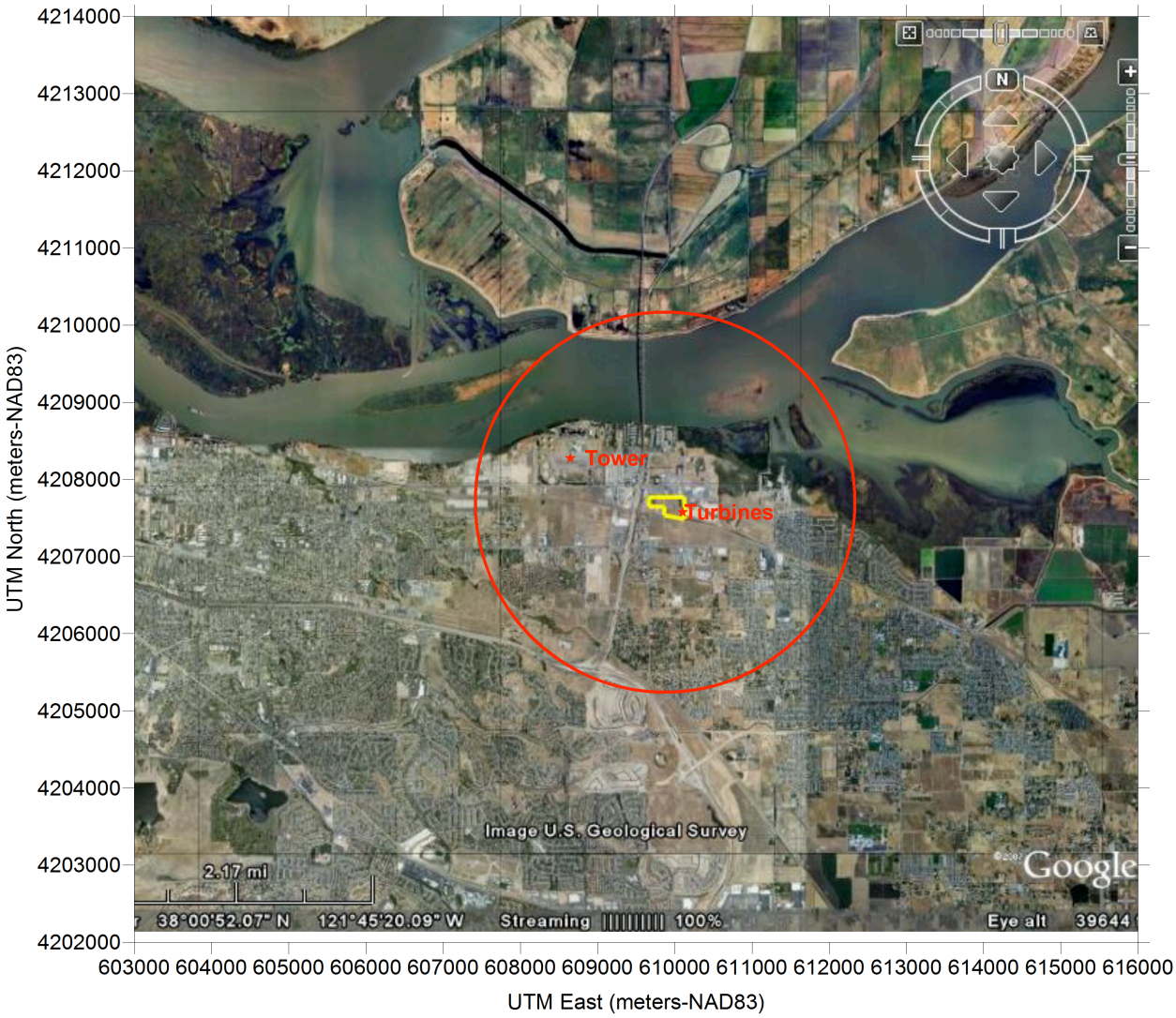
The nearest representative surface data set in the general area of the proposed Project is the PG&E database collected at the Contra Costa Power Plant (CCP), located

approximately 1.5 km northwest of the Project site. This surface meteorological data set was provided by the BAAQMD for the years 2001-2002, and 2004-2006 and for each of the listed years, data recovery exceeds 90 percent. The corresponding upper air data was collected at the Oakland International Airport for the same time periods.

The area surrounding the project site, within three (3) km, can be characterized as a mixture of developed, low density residential and undeveloped land, based on review of the Land Use/Land Cover (LULC) data as well as Google Earth data. Towards the north, the area is predominately water, undeveloped land, or rural. Figure 1 displays an aerial photograph that generally outlines the urban and rural area surrounding the project site. In accordance with the Auer land use classification methodology (USEPA's "*Guideline on Air Quality Models*"), land use within the area circumscribed by a three km radius around the facility is slightly more than 50 percent rural as shown in Figure 1. Therefore, in the modeling analyses supporting the permitting of the facility, rural coefficients will be assigned.

Air Quality Modeling Meteorological Data Representativeness: The proposed use of the five (5) years of surface meteorological data collected at the CCP monitoring location would satisfy the definition of on-site data. USEPA 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. Specifically, the meteorological data requirement originates from the Clean Air Act in 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 USEPA's guidance on the use of on-site monitoring data are also outlined in the On-Site Meteorological Program Guidance for Regulatory Modeling Applications (USEPA, 1987). The representativeness of meteorological data is dependent upon: (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.

Figure 1
Land Use Within 3-KM of the CCGS Site



First, the meteorological monitoring site and proposed project location are in close proximity, at approximately the same elevation and with roughly the same topography surrounding each location. Second, the meteorological monitoring site and proposed project location are located roughly about the same distance and in the same orientation to significant terrain features that might influence wind flow patterns. In addition, there are no nearby (localized) significant terrain features between or surrounding the proposed project site and/or the meteorological monitoring site that would limit the use of the meteorological data for the proposed project. Third, surface characteristics

such as surface roughness, Bowen ratio, and Albedo are relatively consistent throughout the area.

Representativeness is defined in the document "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." Judgments of representativeness should be made only when sites are climatologically similar, as is the case with the meteorological monitoring site and the proposed project location. In determining the representativeness of the meteorological data set for use in the dispersion models at the project site, the consideration of the correlation of terrain features to prevailing meteorological conditions, as discussed earlier, would be nearly identical to both locations since the orientation and aspect of terrain at the proposed project location correlates well with the prevailing wind fields as measured by and contained in the meteorological dataset. In other words, the same mesoscale and localized geographic and topographic features that influence wind flow patterns at the meteorological monitoring site also influence the wind flow patterns at the proposed project site.

Surface characteristics are determined with AERSURFACE using LULC data in accordance with USEPA guidance documents ("*AERMOD Implementation Guide,*" 1/09/08; and "*AERSURFACE User's Guide*," EPA-454/B-08-001, 1/08) as described below. AERSURFACE uses U.S. Geological Survey (USGS) National Land Cover Data 1992 archives (NLCD92) to determine the midday albedo, daytime Bowen ratio, and surface roughness length representative of the surface meteorological station. ***Bowen ratio*** is based on a simple unweighted geometric mean while ***albedo*** is based on a simple unweighted arithmetic mean for the 10x10 km square area centered on the selected location (i.e., no direction or distance dependence for either parameter). ***Surface roughness length*** is based on an inverse distance-weighted geometric mean for upwind distances up to one (1) km from the selected location. The circular surface roughness length area (1-km radius) can be divided into any number of sectors as appropriate (USEPA guidance recommends that no sector be less than 30° in width).

Running AERSURFACE at both the meteorological monitoring and proposed site locations produced almost identical results for both Bowen ratio and albedo while the surface roughness lengths between the two sites were somewhat different. Comparing the LULC data at the Project site to the CCP monitoring site showed that the same general land use categories exist around the Project site and the monitoring site, with the CCP monitoring site location including more overwater areas. The predominant land use in the area is made up of commercial, industrial, transportation categories as well as low intensity residential with mixed use open space.

Due to the slight differences in surface roughness between the meteorological monitoring location and the Project site, AERSURFACE will be executed for the Project

site using the BAAQMD-recommended sectors (76° - 147°, 147° - 277°, 277° - 355°, and 355° – 76°). Representative surface moisture input was determined by the BAAQMD for each month of every year using Antioch Pump Plant 3 meteorological station precipitation data and the percentile method specified in the AERSURFACE User's Guide. The surface moisture determinations were provided by BAAQMD. Months assigned to each season were as follows: Spring—February and March; Summer—April through July; Autumn—August through October; Winter—November through January. The merged AERMET Stage 2 output provided by BAAQMD for CCP surface data and Oakland upper air data will be re-processed by AERMET Stage 3 for the site-specific values of the Project Site. Both sets of meteorological data will be used to model the facility and the worst-case from either sets of runs will be used. Figures 2 and 3 shows the areas used to determine the surface roughness length (with sectors) and albedo/Bowen ratio parameters, respectively.

For these reasons and also as discussed above, the meteorological data selected for the proposed project are expected to satisfy the definition of representative meteorological data. Thus, it is our assessment that the meteorological data collected at the CCP site are identical to the dispersion conditions at the project site and to the regional area. Five-year quarterly wind roses for the modeling data set will also be provided in the application.

Figure 2
Contra Costa Power Met Tower
and Proposed Project Locations

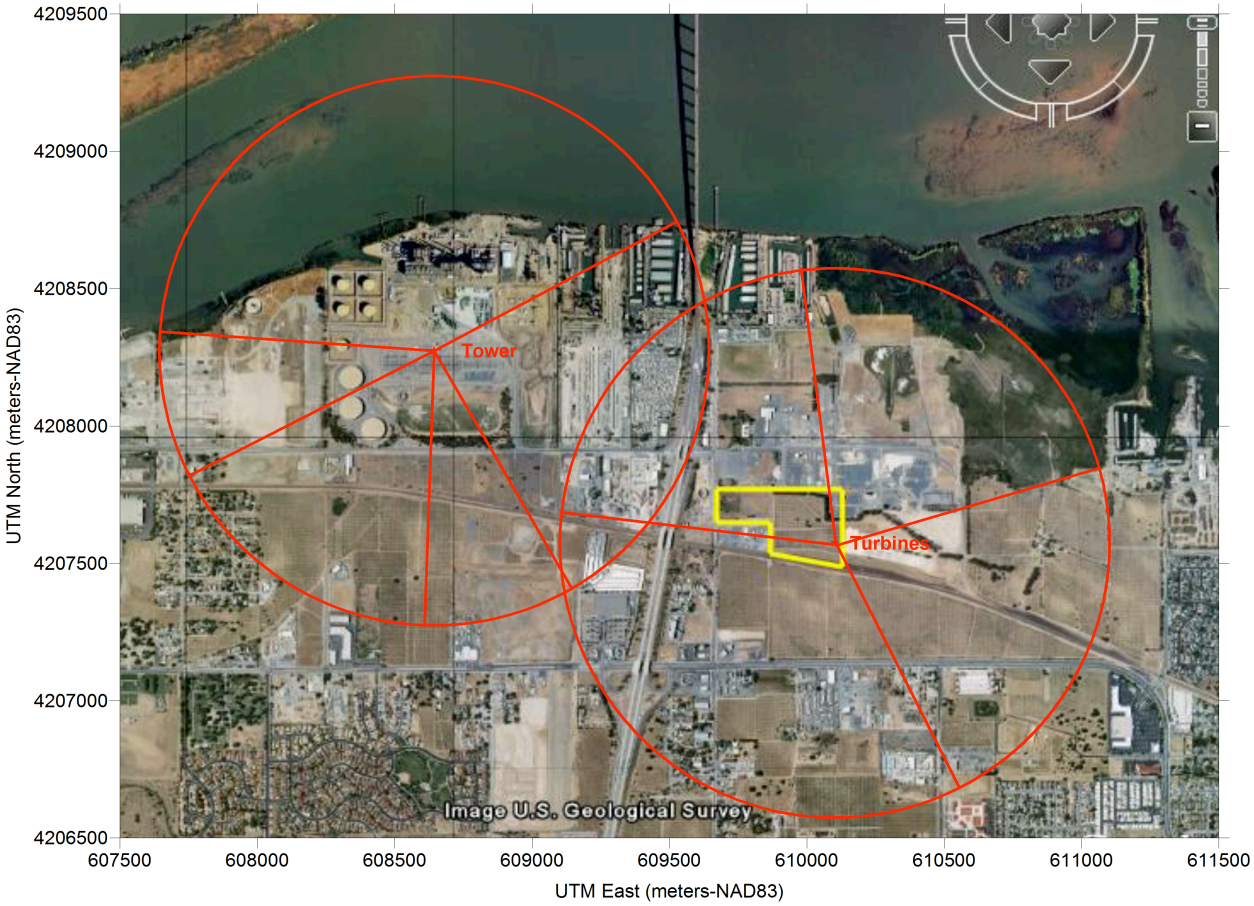
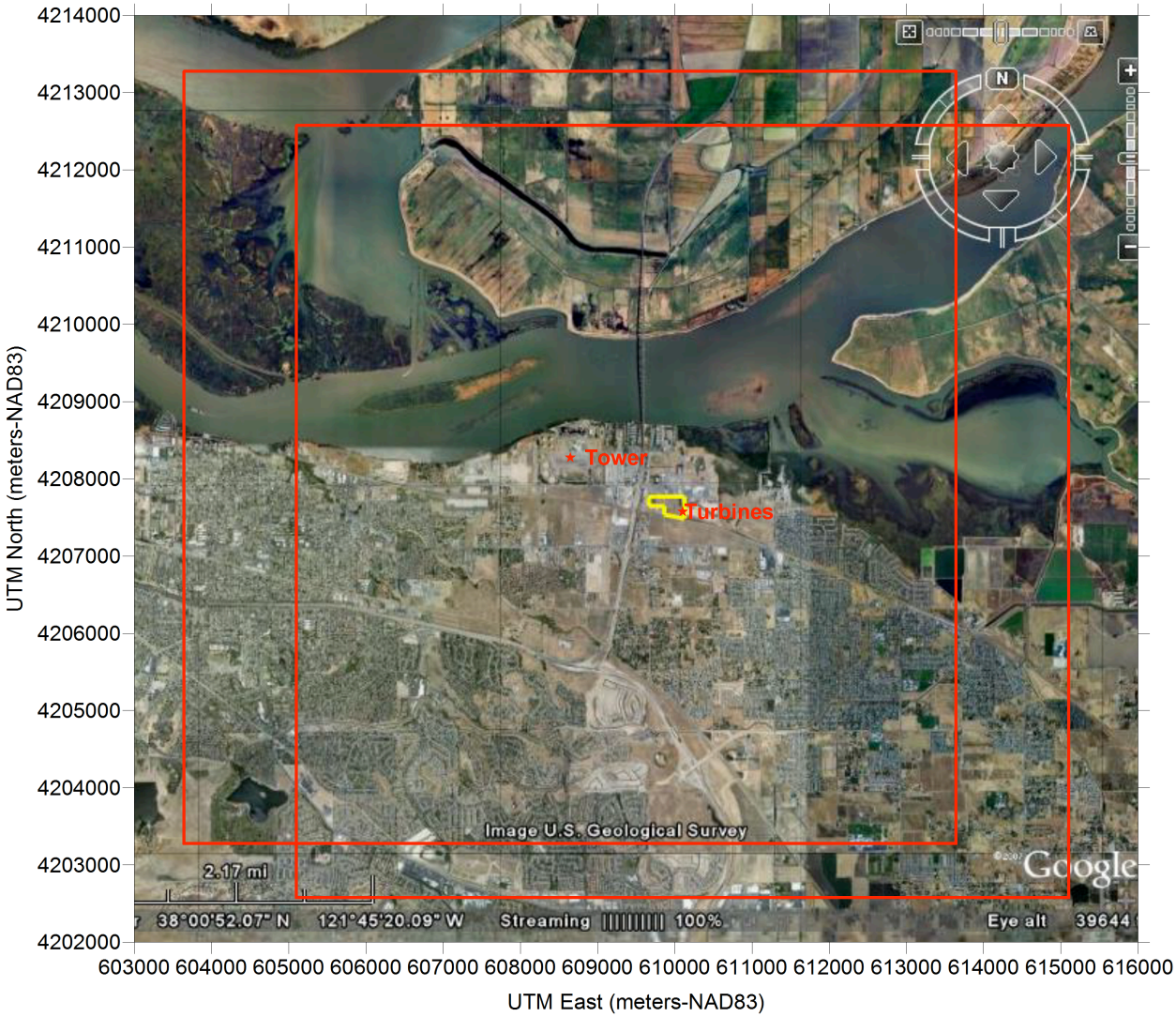


Figure 3
Contra Costa Power Met Tower
and Proposed Project Locations



Existing Baseline Air Quality Data: The nearest criteria pollutant air quality monitoring sites to the proposed project site would be the stations located at Bethel Island, Pittsburg and Concord. Ambient monitoring data for these sites for the most recent 3-year period (2006-2008) is summarized in Table 1. Data from these sites is estimated to present a reasonable representation of background air quality for the project site and impact area.

Table 1
Summary of Air Quality Monitoring Data for Most Recent 3 Year Period

Pollutant	Site	Avg. Time	2006	2007	2008
Ozone, ppm	Bethel Isl.	1 Hr Max	.116	.093	.109
	Pittsburg		.105	.100	.106
	Bethel Isl.	8 Hr Max	.085	.071	.076
	Pittsburg		.079	.067	.067
PM_{10}, ug/m^3	Bethel Isl.	24 Hr Max	82	47	478
	Pittsburg		58	56	74
	Bethel Isl.	Annual AM	19.4	18.8	24
	Pittsburg		19.9	19.4	20
$PM_{2.5}$, ug/m^3	Concord	24 Hr 98th Percentile	38.8	45	38
	Concord	Annual AM	19.0	8.7	10.2
CO, ppm	Bethel Isl.	1 Hr Max	1.3	1.1	1.0
	Pittsburg		3.3	2.8	2.8
	Bethel Isl.	8 Hr Max	1.0	.8	.8
	Pittsburg		1.9	1.5	1.4
NO_2, ppm	Bethel Isl.	1 Hr Max	.044	.048	.03
	Pittsburg		.052	.051	.044
	Bethel Isl.	Annual AM	.008	.008	.006
	Pittsburg		.011	.01	.009
SO_2, ppm	Bethel Isl.	1 Hr Max	.017	.018	.012
		3 Hr Max	.011	.013	.009
		24 Hr Max	.007	.005	.004
		Annual AM	.002	.002	.002
	Pittsburg	1 Hr Max	.045	.047	.023
		3 Hr Max	.025	.024	.015
		24 Hr Max	.009	.007	.006
		Annual AM	.003	.002	.002

Source: BAAQMD website, Air Quality Monitoring Summaries for 2006, 2007 2008,. USEPA AIRS Data System, EPA Website, 2009.
Notes:
CO = carbon monoxide
NO_2 = nitrogen dioxide
PM_{10} = sub 10-micron particulate matter
$PM_{2.5}$ = sub 2.5-micron particulate matter
ppm = parts per million
SO_2 = sulfur dioxide
AM = Arithmetic Mean

Table 2 shows the background air quality values based upon the data presented in Table 1. The background values represent the highest values reported for the site during any single year of the most recent three-year period.

Table 2
Background Air Quality Values

Pollutant and Averaging Time	Background Value, $\mu g/m^3$
Ozone – 1-hr	227
Ozone – 8-hr	166.5
PM_{10} – 24-hr	82
PM_{10} – Annual	24
$PM_{2.5}$ – 24-hr	45
$PM_{2.5}$ – Annual	10.2
CO – 1-hr	3771
CO – 8-hr	2171
NO_2 – 1-hr	98.1
NO_2 – Annual	20.8
SO_2 – 1-hr	122.2
SO_2 – 3-hr	65.0
SO_2 – 24-hr	23.4
SO_2 – Annual	7.8
Sulfate, 24 -hr	nd

Source: Conversions from Table 1, 2008.
Notes:
CO = carbon monoxide
NO_2 = nitrogen dioxide
PM_{10} = sub 10-micron particulate matter
$PM_{2.5}$ = sub 2.5-micron particulate matter
SO_2 = sulfur dioxide
Conversion factors used for conversion from ppm units for gaseous pollutants in the previous table were based on the AAQSs as follows:
Ozone: 1958 ug/m^3 per ppm (235 ug/m^3 / 0.12 ppm)
CO: 1143 ug/m^3 per ppm (40,000 ug/m^3 / 35 ppm)
NO_2: 1887 ug/m^3 per ppm (100 ug/m^3 / 0.053 ppm)
SO_2: 2600 ug/m^3 per ppm (1300 ug/m^3 / 0.5 ppm)

The attainment status of the proposed project site is designated for the NAAQS and CAAQS as follows:

Pollutant	CAAQS	NAAQS
Ozone (1-hour)	Non attainment	Non attainment
Ozone (8-hour)	Non attainment	Non attainment
PM_{10}	Non attainment	Unclassified
$PM_{2.5}$	Non attainment	Unclassified/Attainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide (NO_2)	Attainment	Unclassified/Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Sulfates	Attainment	---
Lead	Attainment	Attainment
*May 11, 2007 Federal Register (72 FR 26718) effective June 11, 2007.		

AIR QUALITY MODELING PROCEDURES WITH AERMOD/SCREEN3

Several dispersion models are proposed for use to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations as described above. AERMOD and SCREEN3 will be used to determine facility impacts on Class II areas in the immediate Project vicinity in simple, intermediate, and complex terrain areas during both Project operations and during construction of the Project. The AERMOD and SCREEN3 models will be used for comparison of impacts to significant impact levels, monitoring significance thresholds, and compliance with PSD Increments and AAQS.

Screening Modeling: A variety of facility operating conditions (e.g., minimum, maximum, and average ambient temperatures) and a range of turbine loads will be conducted to identify which operating condition causes worst-case ambient air impacts. The modeling will be performed for stack characteristics and emissions for all applicable short-term averaging times (pollutants and averaging times with AAQS) using one or five years of the selected meteorological dataset (described above). The worst-case short-term operating condition(s) so identified will be used in the refined modeling described below. Source characteristics for annual average impacts will be based on average operating conditions (i.e., average annual temperature, average operating load and duct-firing conditions, and worst-case annual emissions based on permitted hours of operation for both normal and startup, shutdown, and malfunction conditions). If the screening modeling with both sets of all five years of meteorological data shows that one of the datasets is worst-case for all averaging times (i.e., surface characteristics for the Project site vs. surface characteristics for the meteorological monitoring location), the refined modeling will only be performed with that dataset.

Refined Modeling: The purpose of the refined modeling analysis will be to demonstrate that air emissions from the Project will not cause or contribute to a

NAAQS/CAAQS violation and will not cause a significant health risk impact. For modeling the project's operational impacts under normal and startup, shutdown, or malfunction conditions due to emissions from the proposed sources (as well as temporary project construction impacts) on nearby simple, complex, and intermediate terrain, the AERMOD model will be used with both sets of five (5) years of hourly meteorological data (unless the screening shows that one data is predominant as described above). The Federal rule adopting AERMOD as a preferred USEPA model became effective December 9, 2005. Therefore, the most recent version of AERMOD will be used for the Project modeling analyses (AERMOD version 07026 and AERMAP version 09040). AERMOD is a steady-state plume dispersion model that simulates transport and dispersion from multiple point, area, or volume sources based on updated characterizations of the atmospheric boundary layer. AERMOD uses Gaussian distributions in the vertical and horizontal for stable conditions, and in the horizontal for convective conditions; the vertical distribution for convective conditions is based on a bi-Gaussian probability density function of the vertical velocity. For elevated terrain AERMOD incorporates the concept of the critical dividing streamline height, in which flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. AERMOD also uses the advanced PRIME algorithm to account for building wake effects.

As part of the input requirements into AERMET and AERMOD, a land use classification must be made. The area surrounding the Project site was determined to be primarily rural following the methods outlined by the Auer land use classification method. As part of the AERMET input requirements, albedo, Bowen ratio, and Surface Roughness must be classified by season. These values will be determined with the AERSURFACE using the latest USEPA guidance (i.e., AERMOD Implementation Guide, revised January 9, 2008, and the AERSURFACE User's Guide (USEPA-454/B-08-001) as described earlier. AERMOD input data options are listed below following these USEPA modeling guidance documents.

- Final plume rise
- Stack tip downwash
- Regulatory default option (i.e., calm and missing meteorological data processing and elevated terrain heights option)

Flagpole receptors are not proposed to be used. AERMAP will be used to calculate receptor elevations and hill height scales for all receptors from DEM data in accordance with USEPA guidance.

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, 1994). The Guideline allows a nationwide default conversion rate of 75% for annual NO_2/NO_x ratios.

Should NO_2 concentrations need to be examined in a more rigorous manner, the Ozone Limiting Method (OLM) will be used. Hourly ozone data collected at the appropriate monitoring station (most likely Bethel Island or Pittsburg) will be used in the OLM analysis to calculate hourly NO_2 concentrations from hourly NO_x concentrations. The years of ozone data used will be for the same years as the meteorological data modeled. The OLM is incorporated into the AERMOD program and involves an initial comparison of the estimated maximum NO_x concentration and the ambient O_3 concentration to determine which is the limiting factor to NO_2 formation. If the O_3 concentration is greater than the maximum NO_x concentration, total conversion is assumed. If the NO_x concentration is greater than the O_3 concentration, the formation of NO_2 is limited by the ambient O_3 concentration. In this case, the NO_2 concentration is set equal to the O_3 concentration plus a correction factor that accounts for in-stack and near-stack thermal conversion (typically 10% is used).

Fumigation Modeling: The SCREEN3 model will used to evaluate inversion breakup and shoreline fumigation impacts for all short-term averaging periods (24 hours or less). The methodology outlined in BAAQMD Modeling Guidance and EPA-454/R-92-019 (Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised) will be followed for this analysis. Combined impacts for all sources under fumigation conditions will be evaluated based on BAAQMD modeling guidelines.

Specifically, inversion breakup and shoreline fumigation (Type I and Type III) analyses will be performed with SCREEN3. For the Type III analysis, the default Thermal Internal Boundary Layer (TIBL) factor in the SCREEN3 model is normally set at a value of 6. Shoreline fumigation for TIBL factors from 2 to 6 will also be calculated. The highest impact result from varying the TIBL factor will then be considered the maximum shoreline fumigation impact.

For sources with plume heights less than the TIBL height or not subject to inversion breakup fumigation, their contributions to fumigation impacts were determined using SCREEN3 with all meteorological conditions and ignoring terrain at the distance of the maximum fumigation concentration. The fumigation concentration is then combined with the maximum SCREEN3 concentration from the other sources. The combined fumigation concentrations are also compared to the maximum SCREEN3 concentrations under normal dispersion for all meteorological conditions. If fumigation impacts are less than SCREEN3 maxima under normal dispersion, no further analysis is required based on Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019).

If fumigation impacts exceed SCREEN3 maxima, then fumigation impacts longer than 1-hour averages will be evaluated based on Section 4.5.3 of Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019) guidance on converting to 3-, 8- and 24-hour average concentrations.

Based upon land use classification, the following procedures were recommended for rural land use by the BAAQMD:

- Run SCREEN3 in rural mode, then calculate fumigation impacts. For shoreline fumigation, vary TIBL factor between 2 and 6. For sources not subject to fumigation, also run SCREEN3 using flat terrain for downwind distances equal to maximum fumigation distances. Determine maximum combined impacts as discussed above.

- Calculate the SCREEN3 maximum impact for normal dispersion for all SCREEN3 meteorological conditions for flat terrain for all sources. For fumigation impacts greater than the SCREEN3 maxima under normal dispersion, multiply the distance dependent ratio times the highest fumigation impacts.

- Adjust concentration for appropriate averaging periods.

GEP Stack Height and Downwash: 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-dependent "equivalent building dimensions" if a stack is being influenced by structure wake effects. The BPIP-PRIME output is formatted for use in AERMOD input files.

Receptor Selection: Receptor and source base elevations will be determined from US Geological Survey (USGS) Digital Elevation Model (DEM) data using the 7-1/2-minute format (*i.e.*, most likely 10-meter spacing between grid nodes for this area). All coordinates (both sources and receptors_ will be referenced to UTM North American Datum system implicit in the DEM data used (most likely 1927, NAD27, Zone 10). The receptors from the DEM files will be placed exactly on the DEM nodes if possible. Every effort will be made to maintain receptor spacing across DEM file boundaries.

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. The maximum extent of the significant impact isopleth for any pollutant will be used to represent the impact radius.

For the full impact analyses, a nested grid will be developed to fully represent the significance area(s) and maximum impact area(s). If 10-meter DEM data are available for the Project area, the downwash receptor grid will have a receptor spacing of 10-meters along the facility fence line and out to 300 meters from the Project. An intermediate receptor grid with 50-meter receptor spacing will extend from the downwash receptor grid out to 2000 meters from the Project. A coarse receptor grid with 200-meter receptor spacing will extend from the intermediate receptor grid

outwards at least 10 km (or more as necessary to calculate the significant impact area). When maximum impacts occur in areas outside the 10-meter spaced receptor grid, additional refined receptor grids with 10-meter resolution will be placed around the maximum impacts and extended as necessary to determine maximum impacts. Ambient concentrations within the facility fence line will not be calculated. DEM receptor locations will be input into AERMAP (version 06341) along with 10-meter or 30-meter DEM data files to calculate hill height scales as per USEPA guidance.

Ambient Air Quality Impact Analyses: In evaluating the impacts of the proposed project on ambient air quality, ADI will model the ambient impacts of the project, add those impacts to background concentrations, and compare the results to the state and Federal ambient standards for SO_2, NO_2, PM_{10}, $PM_{2.5}$, and CO. The project impacts will also be compared to the PSD significance levels in Table 3.

In accordance with BAAQMD and USEPA guidance (40 CFR part 51, Appendix W, Sections 11.2.3.2 and 11.2.3.3), the highest modeled concentration will be used to compare with the significant impact levels (SILs). The highest modeled concentration will be used to demonstrate compliance with all short-term and annual CAAQS/NAAQS. With respect to the Federal PM2.5 24-hour standard, the 98th percentile will be used. Compliance with other short-term NAAQS may also be demonstrated consistent with the format of the short-term NAAQS (see 40 CFR 50).

PSD INCREMENT CONSUMPTION ANALYSIS

Increment consumption of NO_x and PM10/2.5 will be evaluated if impacts from the facility are above PSD modeling significance levels as listed in Table 3. Appropriate increment consuming sources will be determined in consultation with the BAAQMD to determine total increment consumption.

Preconstruction Monitoring Requirements

Section 2-2-414.3 of the BAAQMD rules requires an applicant's air quality analysis to contain preconstruction ambient air quality monitoring data for purposes of establishing background pollutant concentrations in the impact area of the proposed facility. However, according to Rule 2-2-111, an applicant may be exempted from the requirement for preconstruction monitoring if the predicted air quality impacts of the facility do not exceed the specified *de minimis* levels listed in Table 4. An applicant may also, at the APCO's discretion, rely on existing continuous air quality monitoring data collected at District-approved monitoring stations to satisfy the requirement for preconstruction monitoring.

Table 3
PSD Ambient Significance Levels

Pollutant/ Avg. Period		Significance Level (μg/m³)	Class I Increment (μg/m³)	Class II Increment (μg/m³)
	- Annual	1	2	20
	- 24-hour	5	5	91
SO_2	- 3-hour	25	25	512
PM10	- Annual	1	4	17
/2.5	- 24-hour	5	8	30
NO_2	- Annual	1	2.5	25
	- 1-hour	19	-	-

Table 4
Preconstruction Monitoring Thresholds

CO: 8-hr average	575 μg/m³
PM_{10}: 24-hr average	10 μg/m³
NO_2: annual average	14 μg/m³
SO_2: 24-hr average	13 μg/m³

ADDITIONAL IMPACTS ANALYSIS

The additional impacts analysis is an assessment of the impacts of air, ground, and water pollution on soils, vegetation, and visibility caused by any increase in emissions of any regulated pollutant from the modification under review, and from associated growth. There are four parts of the additional impacts analysis: 1) growth, 2) ambient air quality impact analysis, 3) soils, water, and vegetation analysis, and 4) visibility impairment. This analysis will follow USEPA's guidance provided in the New Source Review Workshop Manual (October 1990 draft).

The growth analysis will quantify the number of employees, the availability of housing in the area, and associated commercial and industrial growth, and construction related activities and mobile sources. The number of employees is not envisioned to be large enough to result in a quantifiable increase in emissions from residential, commercial, or industrial growth (e.g., less than 30 employees).

While Class II visibility is not protected, a visual plume blight analysis must be performed as required under the PSD program. As such, the VISCREEN model will be used to assess this potential.

CLASS I AREA IMPACTS

Point Reyes National Seashore is located approximately 82 kilometers west-northwest of the Project location. Additionally, Pinnacles National Monument is located 170 kilometers south-southeast. Following the most recent FLAG Workshop procedures (June 2008), the use of Best Available Control Technology (BACT), the use of emission offsets, and because the predominant wind directions are not towards these Class I areas, the Federal Land Managers may allow the project to "screen out" of a full CALMET/CALPUFF analysis. Both the National Park Service (Point Reyes National Seashore) and the U.S. Forrest Service (Pinnacles National Monument) have been contacted with regards to this project and will formally comment on the project along with the analysis needed for the PSD permit. If a formal CALMET/CALPUFF analysis is required, a separate modeling protocol will be submitted. Class I significance modeling for the increment will be assessed, however.

ADDITIONAL IMPACTS ANALYSIS REQUIRED FOR CEC ANALYSES

The additional impacts analysis is an assessment of the impacts of air pollution on soils and vegetation, which includes the potential impacts of deposition. Additionally, cumulative impacts and construction impacts will be assessed.

Screening Health Risk Assessment: A screening health risk assessment will be conducted to evaluate air toxics. The latest version of the Health Risk Assessment Program (HARP version 1.2a) and the HARP On-Ramp will be used to characterize risks from the proposed facility. These models, along with options for their use and how they are used, are discussed below. The screening health risk assessment will be conducted in accordance with the procedures developed by the California Air Resources Board and the Office of Environmental Health Hazard Analysis.

The HARP program is a tool that assists with the programmatic requirements of the Air Toxics Hot Spots Program, and it can be used for preparing health risk assessments for other related programs such as air toxic control measure development or facility permitting applications. HARP is a computer based risk assessment program, which combines the tools of emission inventory database, facility prioritization, air dispersion modeling, and risk assessment analysis. Use of HARP promotes statewide consistency in the area of risk assessment, increases the efficiency of evaluating potential health impacts, and provides a cost effective tool for developing facility health risk assessments. HARP may be used on single sources, facilities with multiple sources, or multiple facilities in close proximity to each other.

The HARP On-Ramp program will be used to convert the AERMOD output files into a form that can be used by HARP. The HARP On-Ramp program is basically a post-processor that will take ASCII post files from AERMOD and process these files to calculate acute, chronic, and cancer impacts, identical to the methods used in the current version of HARP.

The screening health risk assessment will be carried out in three steps. First, emissions of toxic air pollutants from the project will be calculated. Next, the HARP On-Ramp subroutine will be used to convert the maximum AERMOD concentration at each receptor due to the operation of the proposed project. A separate analysis will be conducted for construction generated PM_{10}, as per CEC requirements. The high-resolution receptor grids as derived from the facility AERMOD modeling will then be used in HARP. Finally, the HARP will be used to evaluate acute, chronic and cancer risks through inhalation and non-inhalation pathways based upon the maximum predicted concentration at each receptor. Some of the assumptions used in running the HARP program will be set as follows:

- Emission rates for non-criteria pollutants will be based upon the expected fuel use of the engines.
- Number of residents affected will be based upon the updated 2000 population data for those census tracts or portions of census tracts, which lie within the maximum impact receptor radius of the proposed facility.
- Number of workers affected will be based upon the county average percentage of non-farm workers as compared to the total county population in 2000. This average will be applied to all affected census tracts.
- Deposition velocity is taken to be 0.02 m/s, as recommended by ARB for controlled sources.
- Fraction of residents with gardens is taken to be 0.15, which is probably conservatively high for the urban area.
- Fraction of produce grown at home is taken to be 0.05, which is also believed to be conservatively high.

The receptor grids used for the HARP risk analyses are similar to those used for the refined modeling, with the addition of discrete receptor annotations representing the 1st, 2nd, and 3rd highest impact points, *i.e.*, MIR-1, MIR-2, and MIR-3. In addition, the point of maximum impact (PMI), maximally exposed individual resident (MEIR), and the maximally exposed individual worker (MEIW) will be shown. A complete list of the discrete sensitive receptors within 1 mile of the facility will be included in the application as well as census tract population data, census tract maps and affected tracts within 6 miles of the facility.

The HARP program results for acute and chronic inhalation and chronic non-inhalation exposures, cancer burden and individual cancer risk (workplace and residential) for the combustion sources will be summarized. Separate calculations will be shown for each

type of exposure and risk.

Cumulative Impacts: Pursuant to CEC guidelines, a cumulative impacts analysis will be required and must consider the additional impacts of the following sources located within 8 miles of the project site.

- Sources with impacts on existing air quality that are not reflected in the ambient air quality data used to establish background. These sources are generally those which have received permits authorizing construction but are not yet in operation and sources which have commenced operations subsequent to the data used to establish background air quality levels. Data derived from the BAAQMD, CARB, and USEPA AIRS monitoring data systems indicate that air quality data for the project region is available up to the end of year 2008. As such the cumulative analysis will concentrate on the above types of sources permitted or becoming operational after January 1, 2008.

Construction Impacts 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. Construction of the proposed project will be divided into three main construction phases: (1) site preparation; (2) construction of foundations; and (3) installation and assembly of mechanical and electrical equipment. The construction impacts analysis will include a schedule for construction operation activities. Site preparation is expected to include site excavation, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations will begin. Once the foundations are finished, the installation and assembly of the mechanical and electrical equipment will begin.

Fugitive dust emissions from the construction of the project result from (1) dust entrained during excavation and grading at the construction site; (2) dust entrained during onsite travel on paved and unpaved roads and across the unpaved construction site; (3) dust entrained during aggregate and soil loading and unloading operations; (4) dust entrained from raw material transfer to and from material stockpiles; and (5) wind erosion of areas disturbed during construction activities. Heavy equipment exhaust emissions result from (1) exhaust from the heavy equipment used for excavation, grading, and construction of onsite structures; (2) exhaust from a water truck used to control construction dust emissions; (3) exhaust from diesel welding machines, gasoline-powered generators, air compressors, and water pumps; and (4) exhaust from gasoline-powered pickup trucks and Diesel flatbed trucks used onsite to transport workers and materials around the construction site. Diesel and gasoline truck exhaust emissions will result from transport of mechanical and electrical equipment to the project site and transport of rubble and debris from the site to an appropriate landfill.

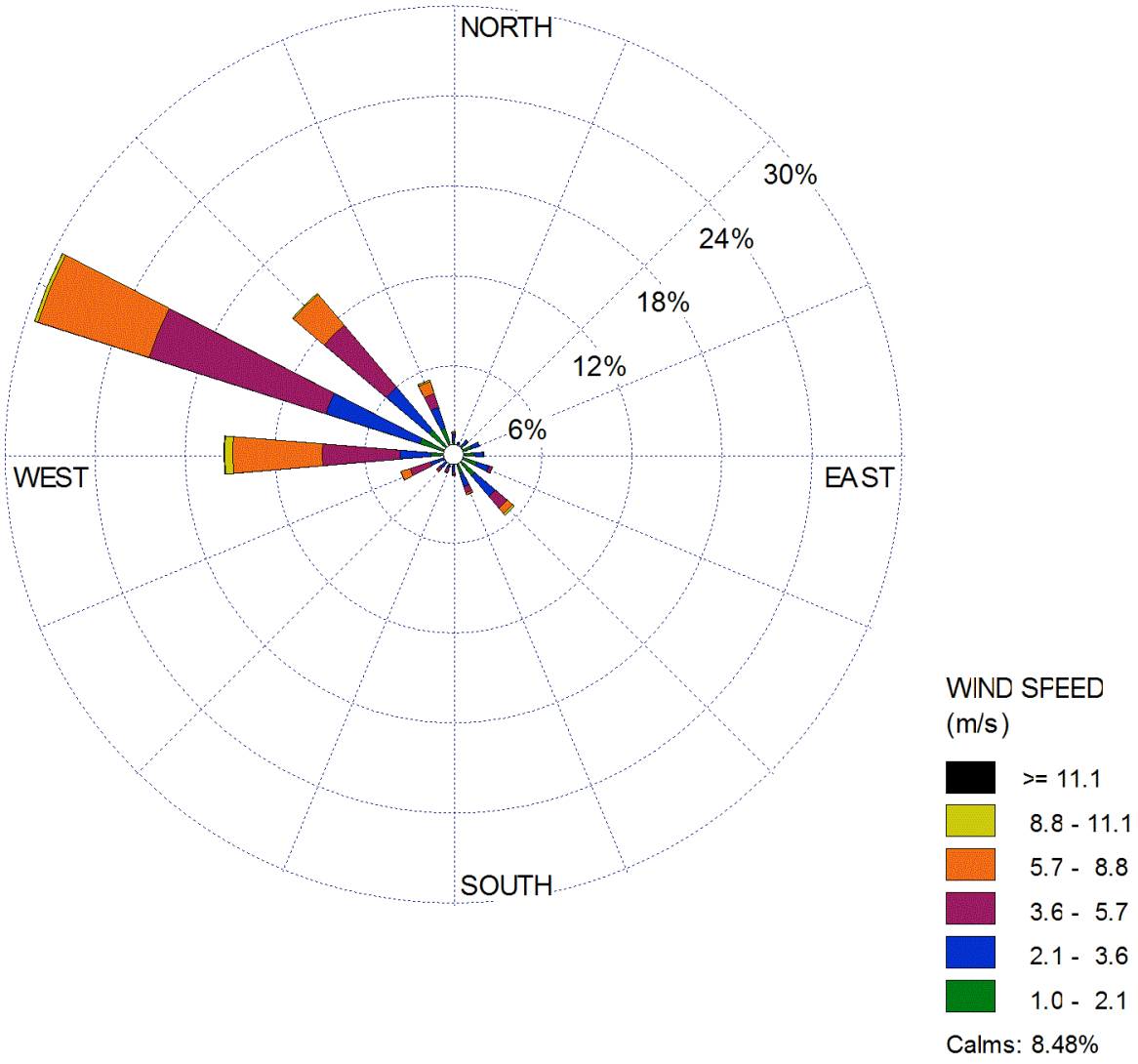
Diesel exhaust emissions may also result from transport of raw materials to and from stockpiles.

Emissions from a worst-case day will be calculated for each of the three main construction phases and only the phase with the highest emissions will be modeled. As the construction impacts are expected to occur for a relatively short time compared with the lifetime of the project, only short-term averaging periods (24 hours or less) will be included in the construction modeling analysis.

The same USEPA-approved model (AERMOD), receptor grids, modeling options with the exception of the TOXICS keyword to reduce model run time, and meteorological data as described earlier for Project operations will be used to estimate ambient impacts from construction emissions. The construction site in the modeling analysis will be represented as either area or volume sources for fugitive dust emissions and as area, volume, or point sources for combustion emissions.

FINAL MODELING SUBMITTAL

As part of the final modeling analyses, the BAAQMD and CEC agencies will be supplied with the following materials:

- Copies of sections of the US Geological Survey (USGS) 7-1/2-minute (1:24,000) map(s) showing the facility;
- Modeling summaries of maximum impacts for each air quality model;
- All modeling outputs (including BPIP and meteorological files) on CD-ROM disc, together with a description of all filenames;
- Plot plan showing emission points, nearby buildings (including dimensions), property lines, fence lines, and
- Figure showing the building identifiers in the BPIP run(s) and plot plan.

Annual CCP Wind Rose