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Docket Number:	08-AFC-09C
Project Title:	Palmdale Energy Project (Formerly Palmdale Hybrid Power Plant) - Compliance
TN #:	206521-3
Document Title:	Palmdale Energy LLC's Response to City of Lancaster Data Request Set No.1 (1-13) DR-5 (Part 2)
Description:	N/A
Filer:	Marie Fleming
Organization:	DayZen LLC
Submitter Role:	Applicant Representative
Submission Date:	11/5/2015 4:21:44 PM
Docketed Date:	11/5/2015

Section 6 AIR QUALITY MODELING ANALYSIS

6.1 AIR QUALITY IMPACT ANALYSIS

This section describes the results, in both magnitude and spatial extent of ground level concentrations resulting from emissions from the Project. The maximum-modeled concentrations were added to the maximum background concentrations to calculate a total impact.

Potential air quality impacts were evaluated based on air quality dispersion modeling, as described herein and presented in the August 2015 Modeling Protocol submitted to USEPA Region 9. A copy of the August 2015 Modeling Protocol is included in Appendix B. All input and output modeling files are contained on a CD ROM disk provided to USEPA Region 9 Staff under separate cover. All modeling analyses were performed using the techniques and methods as discussed with USEPA Region 9 through development of a modeling protocol. Modeling analyses specific to the Antelope Valley Air Quality Management District (AVAQMD) permitting process and the California Energy Commission (CEC) Application for Certification (AFC) were submitted separately to the appropriate public agencies.

6.2 DISPERSION MODELING

For modeling the potential impact of the Project in terrain that is both below and above stack top (defined as simple terrain when the terrain is below stack top and complex terrain when it is above stack top) the United States Environmental Protection Agency (USEPA) guideline model AERMOD (version 15181) was used as well as the latest versions of the AERMOD preprocessors to determine surface characteristics (AERSURFACE version 13016), to process meteorological data (AERMET version 15181 and AERMINUTE version 14337), and to determine receptor elevations and slope factors (AERMAP version 11103). The purpose of the AERMOD modeling analysis was to evaluate compliance with all Federal air quality modeling requirements.

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 later discussion details the proposed data and its applicability to this project.

The proposed project site is located in northern Los Angeles County just west of the northwest corner of the Palmdale Air Force Plant 42 Complex (aka Palmdale Airport) and about 2.5 km west-northwest of the ASOS (Automated Surface Observing System) meteorological monitoring site at the Palmdale Airport. ASOS monitoring sites measure surface meteorological data such as wind speed and direction, temperature, pressure, cloud heights, and sky cover. ASOS surface data are generally selected for processing for AERMOD because ASOS hourly data are routinely recorded and archived, generally meet USEPA data completeness criteria, instruments are located in unobstructed areas meeting USEPA siting criteria, and instrument heights and sensor sensitivities meet USEPA instrument specifications. Also, short-term (1-minute) wind direction and speed data are generally available that can be processed by USEPA programs to eliminate excessive calm observations and to give hourly averages consistent with USEPA modeling requirements. These Palmdale ASOS surface data, when processed with AERMET as described below, result in data recovery rates greater than 90 percent for every quarter in the five-year period in accordance with USEPA requirements ("Meteorological Monitoring Guidance for Regulatory Modeling Applications," EPA-454/R-99-005). Generally, surface data parameters of wind speed, wind direction, and temperature must individually exceed 90% both by quarter and year, as well as wind speed, direction, and stability (turbulence) parameters combined, before any substitutions. These criteria are equaled for all quarterly/annual periods of the surface data selected (the only data substitutions used for any the meteorological data processing were for upper air data in parts of 2010 as described later).

All of these data (hourly and minute surface data from the Palmdale Airport and appropriate upper air data) were processed with the USEPA-programs described above (AERMET and AERMINUTE) to generate meteorological datasets to be input to AERMOD.

AERMOD input data options are listed below. Use of these options follows the USEPA's modeling guidance. Generally the regulatory default (DFAULT) model option was used for processing missing and calm hours, evaluating stack-tip downwash, and calculating elevated terrain effects. The regulatory default option also specifies no exponential decay, no gas/particle deposition, and no dry/wet depletion. All sources were modeled as rural sources. When modeling NO_2 with the Ozone Limiting Method (OLM) for the cumulative impact analyses, the DFAULT setting cannot be used but the model was allowed to default to all of the other settings above.

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.

Flagpole receptors were not used (ground level concentrations were calculated). AERMAP was used to calculate receptor elevations and hill height scales for all receptors from NED data in accordance with USEPA guidance. Selection of the receptor grids is discussed below.

<u>NO_2 Modeling Procedures</u>: Project only NO_2 impacts were assessed using a conservative Tier 2 analysis, using the Ambient Ratio Method (ARM), adopted in the *Guideline on Air Quality Models*. The Guideline allows a nationwide default conversion rate of 75% for annual NO_2/NO_x ratios and 80% for 1-hour NO_2/NO_x ratios (not to be confused with the proposed ARM2 methodology). ARM may be performed either by using the ARM model option or by multiplying the modeled NO_x concentrations by the appropriate ratios. The Tier 2 analyses can be performed without justification to, or prior approval of, the permitting authority.

A Tier 3 analysis was used to assess cumulative 1-hour NO_2 impacts due to the magnitude of modeled impacts for Plant 42 sources (i.e., the Lockheed-Martin and Northrup-Grumman multisource inventories). The Tier 3 analysis was based on the methodology described in the Modeling Protocol. The Tier 3 analysis calculated one-hour NO_2 concentrations for comparison with the NAAQS by using the ozone limiting method (OLM) for the cumulative impact analysis only. The OLM analysis used ambient hourly background ozone measured at the Lancaster monitoring station for the modeled years of 2010-2014. The Lancaster monitoring data has been shown above to be a conservative representation of the project site.

The ozone data were first processed to remove missing data. This was accomplished by interpolating ozone concentrations for periods with one to three missing hours (nightly calibrations usually result in 1-2 hours of missing data at the same time for all days). When substituting ozone concentrations from periods with up to 24 consecutive missing hours, the maximum ozone concentration from the hour before/after the missing period or the ozone concentrations from the same hour for the day before/after the missing period was used. The few remaining extended periods of missing data were replaced with the maximum ozone concentrations for the same hour for the four days before/after the missing hour.

There was extremely good ozone data recovery rates from the Lancaster monitoring site during the years modeled (2010-2014). There were 2,506 total hours of 1 or 2 consecutive missing hours that were interpolated, nearly all occurring each night around midnight due to USEPA-required daily zero/span/precision checks.

There were only 193 hours of missing data that occurred during consecutive hours for up to one day. These missing data represent 0.4% of the entire period. About three or four periods of 3-5 consecutive missing hours occurred each year, most likely due to site maintenance and QA activities. There were about four whole days of missing data (7/23/2011, 8/22-23/2012, 6/13-14/213, and 12/14-15/2014), most likely due to instrument malfunctions/repairs. These missing data were replaced with the maximum value from the hour before/after the missing period or the same hour from the day before/after.

Finally, there was one extended period of 60 hours of consecutive missing data during 10/31-11/3/2014, representing 0.1% of the data period. These missing data were replaced with the maximum value from the same hour for the four days before or after the missing period.

Excluding the periods of 1-2 consecutive missing hours due most likely to USEPA-required site activities, missing data only totals 0.5% of the entire data period. The periods of missing data are flagged by "I", "R", and "M" flags, respectively, after each ozone reading in the hourly ozone input file read by AERMOD.

Compliance with the 1-hour NAAQS for the cumulative modeling analyses also included using the 3rd highest seasonal NO_2 concentration for each hour from the Lancaster monitoring station, averaged over the three years, for determining the background NO_2 concentration, as outlined in USEPA guidance documents (March 1, 2011 USEPA memorandum *"Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour $N0_2$ National Ambient Air Quality Standard"*). The three year NO_2 background data was for the period of December 2010 through November 2013. This data period was used in order to keep seasonal periods consistent across years of data (December-February being contiguous). Also, calendar year 2014 was not used since there were a large number of extended periods of missing NO_2 data. Prior to calculating the seasonal background data by hour, missing periods of NO_2 data were replaced using similar procedures to those used for ozone.

In support of the Tier 3 OLM NAAQS analysis, the modeling methods also included:

- In-stack NO_2/NOx ratios (ISR) for all PEP modeled sources (turbines, auxiliary boiler, emergency generator, and fire pump) were based on the national default of 0.5.
- For the cumulative background sources (i.e., Lockheed-Martin, Northrup-Grumman, and Boeing), the default NO_2/NO_x ISR of 0.2 was used per recent USEPA guidance (September 30, 2014 USEPA memorandum "*Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the $N0_2$ National Ambient Air Quality Standard"*). The use of the default 0.2 ISR was selected as per the Guidance for the background sources since most are located at distances greater than one to three kilometers from the project site.
- AERMOD-default ambient equilibrium NO_2/NOx ratio of 0.9 was used.
- The option OLMGROUP ALL was used.

6.3 ADDITIONAL MODEL SELECTION

In addition to AERMOD and its pre-processors, the USEPA program Building Profile Input Program for PRIME (BPIP-PRIME, current version 04274) was used.

Good Engineering Practice Stack Height Analysis

Formula Good Engineering Practice (GEP) stack height is the greater of 65 meters or the height calculated by BPIP-PRIME based on the heights and locations of all onsite structures, which was 99.05 meters for the all the facility stacks (turbines, auxiliary boiler, fire pump, and emergency generator) due to the air cooled condenser. The design stack heights are all less than their GEP stack heights, so downwash effects were included in the modeling analysis.

BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD. Figure 6-1 shows the structures included in the BPIP-PRIME downwash analysis.

6.4 RECEPTOR GRID SELECTION AND COVERAGE

Receptor and source base elevations and receptor hill slope factors were determined from the U.S. Geological Survey (USGS) National Elevation Dataset (NED) using either 1/3-arcsecond (~10-meter) spacing for receptor grids with spacing between adjacent receptors of less than 100 meters or 1-arcsecond (~30-meter) spacing for receptor grids with spacing greater than 100 meters. All coordinates were referenced to UTM North American Datum 1983 (NAD83), Zone 11. The NED files will extend beyond the receptor grid boundaries as appropriate for the hill slope factors.

Cartesian coordinate receptor grids are 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 receptor grids used in this analysis are listed below.

- Receptors were placed along the proposed Project fenceline with a 10-meter or less receptor spacing.
- Receptors extending outwards from the proposed Project fenceline in all directions at least 500 meters from project with a 20-meter receptor spacing were modeled, called the downwash receptor grid.
- An intermediate receptor grid with a 100-meter resolution was modeled that extended outwards from the edge of the downwash grid to one (1) kilometer (km) from the Project.
- The first coarse receptor grid with 200-meter spacing extended outwards from the edge of the intermediate grid to 5 km from the Project, while the second coarse grid with 500-meter receptor spacing extended to 10 km from the Project.
- In addition, the 500-meter spaced coarse grid was extended to 20 km from the Project in order to delineate the extent of the NO_2 significant impact area.
- Finally, if necessary, refined receptors grids with 20-meter resolution were modeled around any location on the coarse and intermediate grids where a maximum impact was modeled for the PEP facility modeling analyses (i.e., with a PEP impact that was above the concentrations on the downwash grid). Based on the locations of the maximum modeled concentrations, no refined receptor grids were required as all maximum PEP facility impacts occurred on the 10-meter fenceline or 20-meter downwash receptor grids.

Concentrations within the facility fenceline were not calculated. Neither were impacts calculated for locations inside the Plant 42 fenceline in the NO_2 and PM10/PM2.5

cumulative impact analyses which includes sources at the Lockheed-Martin, Northrup-Grumman, and Boeing facilities inside Plant 42 (Plant 42 is not open for public access). Receptor grid Figures 6-2 and 6-3 displays the receptors grids used in the modeling assessment with respect to the PEP fenceline.

6.5 METEOROLOGICAL DATA SELECTION

The project vicinity and immediate areas of Antelope Valley are relatively flat, an important consideration in the selection of surface meteorological data for use in assessing the projects impacts on regional air quality. Under these circumstances (large expanses of relatively flat terrain), the nearest surface meteorological data meeting USEPA siting and instrument criteria would be expected to be the most representative of the project location. The Palmdale Air Force Plant 42 Complex (aka Palmdale Airport) ASOS (Automated Surface Observing System) data fulfill both criteria, being located in the immediate project vicinity and meeting USEPA siting and instrument criteria. Thus, the Palmdale Airport ASOS data are proposed as the surface meteorological data for modeling facility emissions. The ASOS monitoring site is located only about 2.5 km east-southeast of the PEP location at nearly the identical elevation above mean sea level. The close proximity of the ASOS station to the project site virtually assures that it could be considered representative, if not the equivalent, of onsite data.

Both the ASOS and PEP sites are located in the relatively flat Antelope Valley at nearly identical distances and orientations from the relatively distant mountains which define the valley boundaries. There are no intervening terrain features between the ASOS location and project site to adversely affect the relative synoptic-scale wind patterns at either location (compared to each other). The current ASOS location from the NCDC Historical Observing Metadata Repository (HOMR) was verified and then refined to its exact location based on Google Earth photos (location is shown in Figure 6-4). The 1-minute and 1-hour ASOS data for Palmdale Airport were downloaded from the appropriate National Climatic Data Center (NCDC) FTP websites, and processed with the USEPA-programs AERMET and AERMINUTE.

The representative radiosonde upper air observations nearest to the project site are Edwards Air Force Base (AFB) and the Yuma Proving Ground. Unfortunately, soundings at military installations like Edwards AFB and Yuma, Arizona are not taken every day. The nearest representative civilian airports with 12Z soundings taken every day are Las Vegas, NV, Phoenix AZ, and Tucson, AZ – all relatively high desert locations in the Southwest United States like the Project location. Recent radiosonde measurements at Las Vegas did not begin until December 2010, which would preclude the collection of a complete continuous 5-year period of meteorological data using Las Vegas soundings alone. Phoenix soundings are taken only during the summer months, i.e., June 21st through September 18th for 2010, but the data are relatively complete for the three months with soundings and are more representative of the site than Tucson. Tucson soundings are taken for all of 2010, but many of the second and third quarter soundings are missing the first few levels of data, including the surface level.

Therefore, the second quarter Tucson data were supplemented with soundings taken at Edwards (April 8, 10, 12, 14, 16, 17, 19, 20; May 15, 17, 18, 19, 25, 27; and June 2, 14) and Yuma (April 5, 28; May 13; and June 1, 3, 7, 8). These Phoenix/Tucson (2010, supplemented with Edwards AFB/Yuma) and Las Vegas (2011-2014) radiosonde data were processed with AERMET as the upper air meteorological data for modeling facility emissions. These upper air data were downloaded from the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL) website.

The Palmdale Airport ASOS instrumentation has been at its present location with the current configuration of sensors since February 8, 2007 according to HOMR (with available 1-minute data since January 2007). Therefore, the most recent five-year period (2010-2014) was selected. The surface and upper air data selected were described in the April 2015 Modeling Protocol and were approved for use in the modeling analysis by AVAQMD. These 2010-2014 Palmdale ASOS surface data and concurrent Las Vegas/Phoenix/Tucson radiosonde data were processed with the latest versions of AERMET (version 15181) and AERMINUTE (version 14337). AERMINUTE/AERMOD default and standard options were used, including MODIFY for upper air data in Stage 1, the default ±1 hour window for 12 Zulu (Z) sounding data (4 AM Pacific Standard Time or 5 AM Mountain Standard Time) in Stage 3, and a 0.5 m/s threshold wind speed for 1-minute ASOS data in Stage 3.

The proposed use of the five (5) years of Palmdale Airport ASOS surface meteorological data 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 facility 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.

First, the Palmdale Airport meteorological monitoring site is the closest ASOS site and located in very close proximity to the facility location, about 2.5 kilometers to the east-southeast, with nearly identical elevations above mean sea level (amsl). Second, both locations are located in the same area of the broad and relatively flat Antelope Valley. Third, the ASOS monitoring location at the airport was selected to be far enough from wind flow perturbations caused by buildings and other features. Fourth, the period of meteorological data selected at the time of the modeling analyses (2010-2014) would be expected to be the most representative of current conditions, with the same general land uses surrounding the current ASOS location and airport as well as the proposed project site. In fact, a review of historical and current Google Earth photo aerials, shows that nearby land uses now at both locations are similar to the land uses reflected in the 1992 NLCD. These data meet the USEPA data recovery requirements for air quality modeling as described above.

The surface characteristics of land uses, roughness lengths, Bowen ratios, and albedos are very similar for the two locations. AERSURFACE results for both the ASOS location and proposed project site for the areas circumscribed by a 1 km radius around each location are shown on Table 6-1.

Table 6-1
Surface Characteristics for Palmdale ASOS Location and the PEP Site

Standardized Land Use Category (for area within a 1km radius)	ASOS Location	PEP Site
Low Intensity Residential:	0.3%	0.7%
Commercial/Industrial/Transportation:	32.1%	10.3%
Bare Rock/Sand/Clay:	1.0%	5.1%
Shrubland:	54.0%	80.6%
Grasslands/Herbaceous:	11.7%	3.3%
Pasture/Hay:	0.8%	-
Row Crops:	0.1%	-

Most of the land use in the general region consists of shrubland or agricultural classifications. The larger percentage of commercial land use for Palmdale ASOS location is due to the airport runways as shown in Figure 6-4. Transportation land use has smaller roughness lengths than commercial/industrial land uses and would be similar to the roughness lengths for shrubland and grasslands that predominate the project site. Therefore, land use categories at the two site locations are very similar with transportation/shrublands/grasslands comprising 90% or more of the total land use types within 1 km of both locations.

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.

For these reasons, the Palmdale Airport meteorological data selected for use in modeling emissions from the proposed project are expected to satisfy the definition of representative meteorological data and are similar to the dispersion conditions at the project site and to the regional area. Annual and quarterly wind roses for the five-year modeling period are shown in Appendix C with the annual wind rose presented in Figure 6-5.

In addition to surface and upper air meteorological data, AERMET requires input summaries of the surface characteristics for the area surrounding the surface data monitoring site, which are processed and included in the AERMET meteorological data input to AERMOD. These input surface characteristics to AERMET were calculated with the USEPA-program AERSURFACE (version 13016) based on USEPA guidance. AERSURFACE uses 1992 National Land Cover Data (NLCD) from the United States Geological Survey (USGS) to determine land use based on standardized land cover categories. For this analysis, the Southern California NLCD file from the USGS website referenced in the AERSURFACE User's Manual:

(http://edcftp.cr.usgs.gov/pub/data/landcover/states/)

were used. A review of historical Google Earth images shows only minor changes in land use within 1 km of the current Palmdale ASOS location from the time of the 1992 NLCD to the present time. Therefore, the primary surface characteristics derived from the 1992 data (roughness length) should be representative of current conditions.

AERSURFACE was executed in accordance with the USEPA guidance documents "*AERMOD Implementation Guide,"* March 19, 2009, and "*AERSURFACE User's Guide*," EPA-454/B-08-001, revised January 16, 2013. AERSURFACE determines 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, both 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 the USEPA-recommended one (1) km radius 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 30º in width). However, only one 360° sector was used for calculating roughness lengths due to the homogeneity of the area within the USEPA-recommended radius of 1 km, as shown in Figure 6-6. Aerial photographs showing the land use in areas around the Palmdale ASOS site and project site are included in the Modeling Protocol, which has been included for reference in Appendix B. Months were assigned to seasons in AERSURFACE as follows: November through April as fall (autumn with un-harvested cropland) and May through October as summer (midsummer with lush vegetation) as has been done for previous projects in the Mojave Desert Air Basin. Other AERSURFACE options were selected as Airport=YES, continuous snow cover = NO, and arid = YES.

Temporal variations of monthly precipitation must be considered to calculate the albedo for AERMET processing in accordance with USEPA recommendations. Precipitation data should be measured at the nearest representative location to the surface data with the most complete precipitation record, particularly for the years of meteorology being modeled. Historical precipitation data are measured at both the Palmdale and Lancaster Airports, as well as cooperative stations at both cities. Palmdale Airport is obviously the most representative and has the most complete data for the modeling period (2010-2014) as well as a 30-year period (although not continuous since precipitation data weren't measured/recorded from 1974-1998). The monthly precipitation amounts from the Palmdale Airport for the latest 30 years (1960-1973 and 1999-2014) were sorted and compared to the monthly precipitation amounts for the five years of meteorological data modeled with AERMOD (2010-2014). The modeled months with precipitation amounts in the range of the driest 9 years by month for the 30-year climatology are given the albedo for DRY conditions. The modeled months with precipitations amounts in the range of the wettest 9 years by month for the 30-year climatology are given the albedo for WET conditions. The remainder of the modeled months is given the albedo for AVG (average) conditions and represents the middle 22 years by month in the 30-year precipitation climatology (in addition, any modeled month with 0.05" or less of precipitation are given the albedo for DRY conditions). The 30-year precipitation climatology is shown in Table 6-2 and the AERSURFACE inputs/outputs are shown in Table 6-3.

Table 6-2
Palmdale Airport 30-year Precipitation Climatology Summary

SORT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.83
3	0.00	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.96
4	0.00	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08
5	0.03	0.06	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.21
6	0.03	0.07	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.44
7	0.03	0.10	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	2.73
8	0.05	0.18	0.15	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	2.93
9	0.09	0.23	0.15	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.14	3.73
10	0.10	0.32	0.22	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.16	3.74
11	0.14	0.43	0.22	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.17	3.80
12	0.18	0.43	0.25	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.18	3.80
13	0.22	0.50	0.29	0.09	0.00	0.00	0.00	0.00	0.00	0.01	0.27	0.23	3.98
14	0.22	0.54	0.33	0.11	0.00	0.00	0.00	0.00	0.00	0.02	0.34	0.32	4.06
15	0.23	0.69	0.40	0.13	0.00	0.00	0.00	0.00	0.00	0.02	0.34	0.35	4.11
16	0.26	0.81	0.42	0.13	0.00	0.00	0.01	0.00	0.00	0.06	0.43	0.60	4.47
17	0.36	0.82	0.49	0.19	0.01	0.00	0.01	0.00	0.00	0.08	0.45	0.62	5.07
18	0.42	0.97	0.50	0.23	0.02	0.00	0.01	0.00	0.00	0.08	0.51	0.67	5.43
19	0.43	1.23	0.53	0.28	0.03	0.00	0.01	0.01	0.00	0.13	0.73	0.71	5.65
20	0.59	1.39	0.57	0.34	0.03	0.00	0.03	0.04	0.01	0.14	0.73	0.71	5.78
21	0.84	1.44	0.65	0.37	0.07	0.00	0.04	0.04	0.02	0.15	0.87	0.77	5.91
22	0.97	1.93	0.68	0.43	0.13	0.00	0.04	0.04	0.04	0.21	1.00	1.03	6.05
23	1.19	2.17	0.68	0.45	0.15	0.00	0.04	0.05	0.12	0.21	1.00	1.11	6.90
24	1.23	2.33	0.69	0.51	0.16	0.00	0.05	0.09	0.24	0.22	1.15	1.43	7.27
25	1.35	2.72	0.88	0.62	0.18	0.02	0.06	0.12	0.26	0.23	1.18	1.74	7.55
26	1.48	2.87	0.94	0.65	0.18	0.11	0.09	0.12	0.33	0.31	1.60	1.89	8.45
27	1.81	3.33	1.02	0.67	0.24	0.15	0.14	0.14	0.40	1.39	1.86	2.57	9.04
28	2.86	3.60	1.29	0.74	0.25	0.22	0.15	0.32	0.66	1.56	2.40	2.97	9.44
29	3.04	3.75	1.41	1.47	0.32	0.29	0.50	0.36	0.85	2.69	4.01	3.30	10.90
30	3.15	4.57	1.56	1.52	0.96	0.45	0.58	1.76	1.75	2.76	4.89	3.42	12.96
2010	2.86	1.93	0.29	0.65	0.00	0.00	0.04	0.00	0.00	1.56	0.27	3.30	10.90
2011	0.42	0.69	1.41	0.01	0.01	0.00	0.14	0.00	0.85	0.14	0.45	0.35	4.47
2012	0.09	0.43	0.65	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.18	2.08
2013	0.36	0.10	0.25	0.00	0.15	0.00	0.09	0.04	0.00	0.08	1.86	0.00	2.93
2014	0.00	1.39	0.57	0.13	0.96	0.00	0.00	0.04	0.12	0.00	0.00	2.57	5.78

Sorted Data - The 30-years of climatology were SORTED to determine DRY/AVG/WET months. Generally, the driest and wettest 9 years were used to delineate DRY/WET (AVG was anything in-between). The one exception: months with precipitation ≤ 0.05” were considered DRY.

Table 6-3
Palmdale Airport Monthly Inputs/Outputs to AERSURFACE

Month	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Seasonal Assumptions for Surface Roughness (meters) and Albedo												
Season	Fall	Fall	Fall	Fall	Summer	Summer	Summer	Summer	Summer	Summer	Fall	Fall
Arid	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Airport	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Surface Roughness (meters)												
	0.119	0.119	0.119	0.119	0.119	0.119	0.119	0.119	0.119	0.119	0.119	0.119
Noontime Albedo												
	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Bowen Ratio based on the following surface moisture contents												
2010	WET	WET	AVG	WET	DRY	DRY	DRY	DRY	DRY	WET	AVG	WET
2011	AVG	AVG	WET	DRY	DRY	DRY	WET	DRY	WET	AVG	AVG	AVG
2012	DRY	AVG	AVG	WET	DRY	DRY	DRY	DRY	DRY	DRY	DRY	AVG
2013	AVG	DRY	AVG	DRY	WET	DRY	WET	DRY	DRY	AVG	WET	DRY
2014	DRY	AVG	AVG	AVG	WET	DRY	DRY	DRY	WET	DRY	DRY	WET
Bowen Ratio by Year/Month												
2010	0.89	0.89	1.96	0.89	2.98	2.98	2.98	2.98	2.98	0.70	1.96	0.89
2011	1.96	1.96	0.89	4.14	2.98	2.98	0.70	2.98	0.70	1.42	1.96	1.96
2012	4.14	1.96	1.96	0.89	2.98	2.98	2.98	2.98	2.98	2.98	4.14	1.96
2013	1.96	4.14	1.96	4.14	0.70	2.98	0.70	2.98	2.98	1.42	0.89	4.14
2014	4.14	1.96	1.96	1.96	0.70	2.98	2.98	2.98	0.70	2.98	4.14	0.89

These surface characteristics were used in the USEPA-program AERMET to generate representative meteorological data for modeling the proposed PEP emissions. Land use surrounding the facility location has changed little since the 1992 NLCD based on historical Google Earth photos as described above, so AERSURFACE was used to determine urban/rural land uses and percentages for the area within three (3) km of the proposed site location. About 15% of this area around the proposed project site is characterized as urban, consisting of commercial (airport buildings) and transportation (runways) land uses. The other 85% of this area would be characterized as rural, consisting mostly of shrubland (66%), grasslands/pasture/hay (8%), bare rock (7%), and residential (4%) land uses. In accordance with the Auer land use classification methodology (USEPA's "*Guideline on Air Quality Models*"), since the land use within the area circumscribed by a three km radius around the facility is greater than 50 percent rural, the urban dispersion options in AERMOD will not be used in the modeling analyses supporting the permitting of the facility.

Figure 6-1

Buildings/Structures Used in BPIP

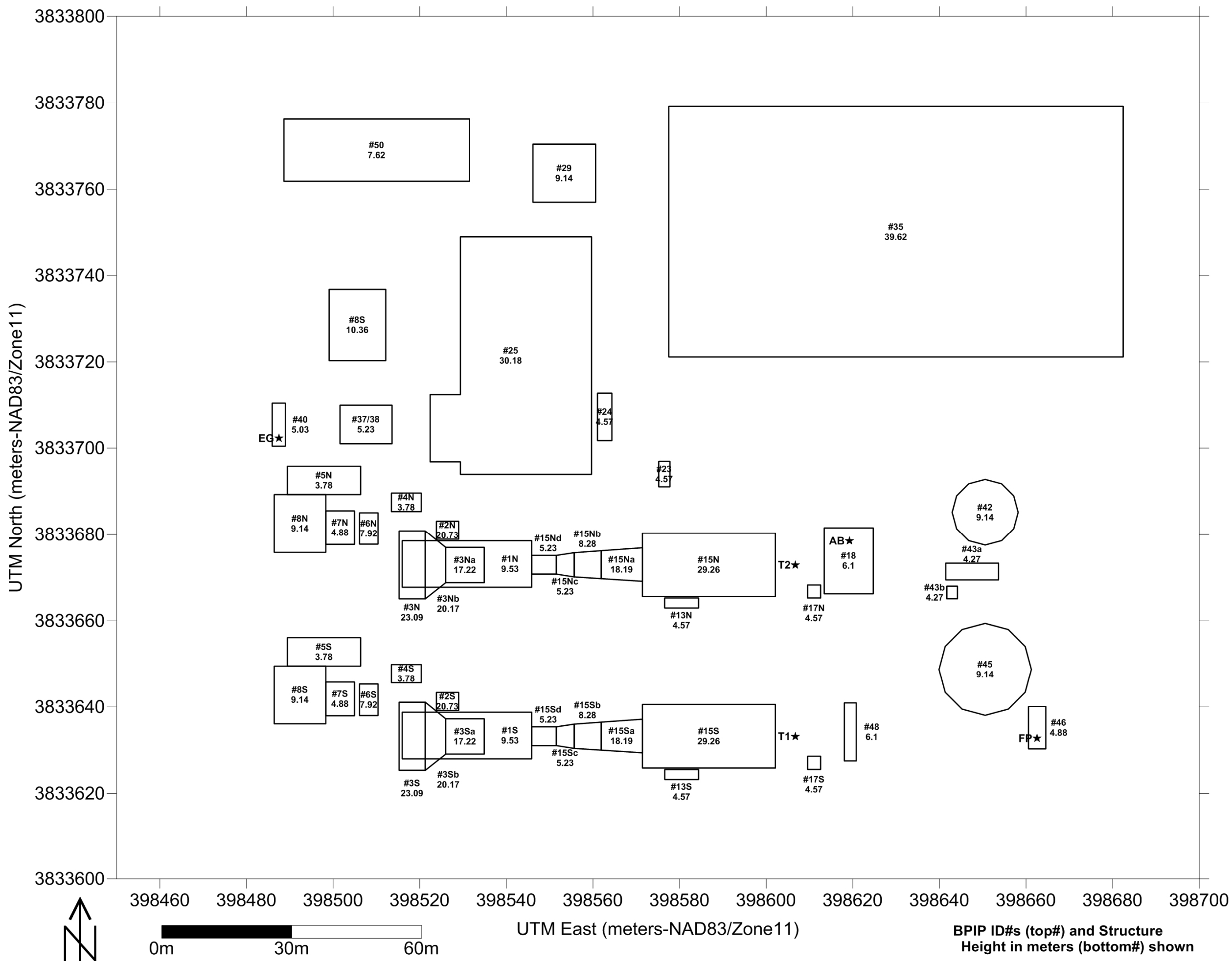
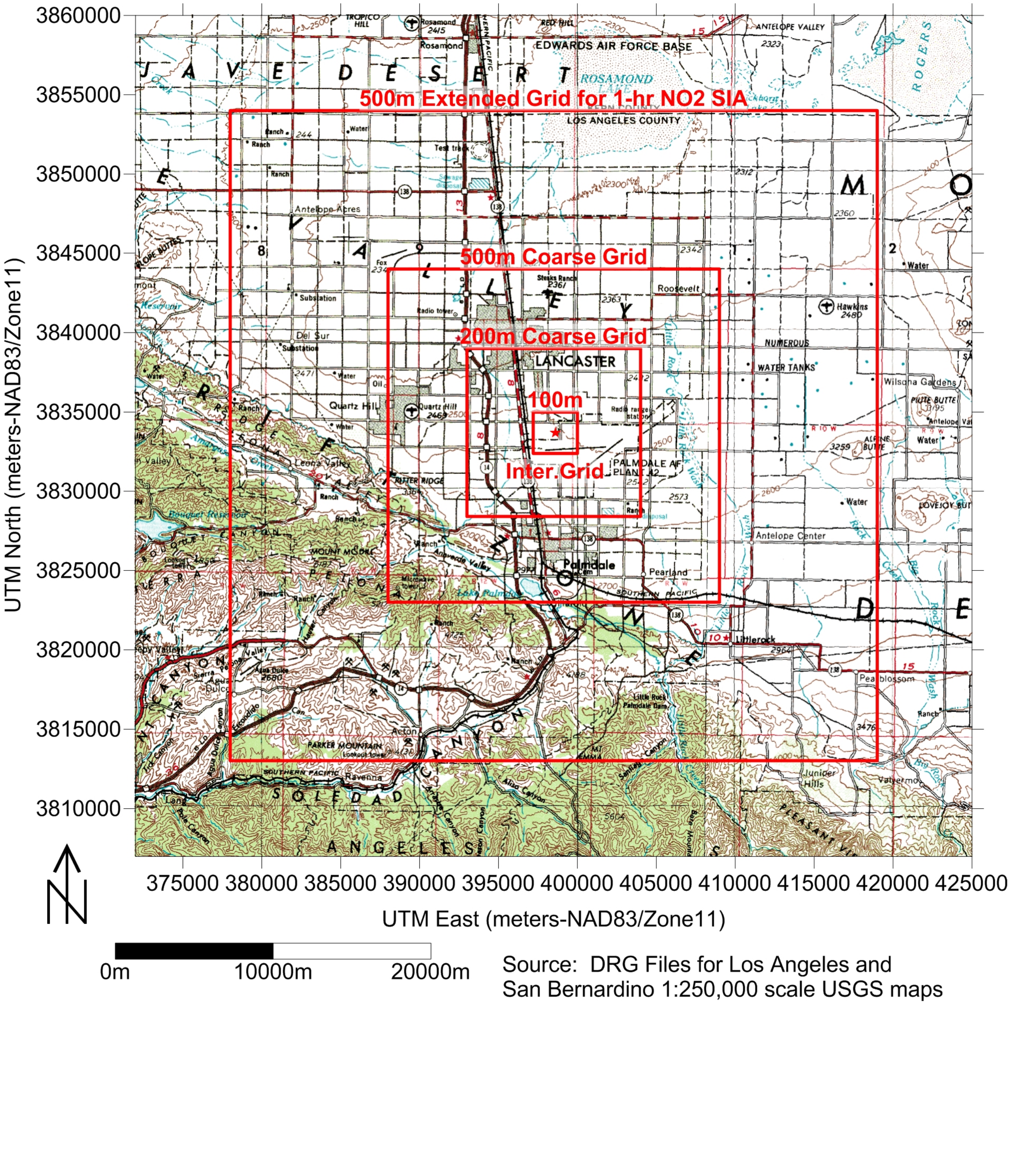


Figure 6-2

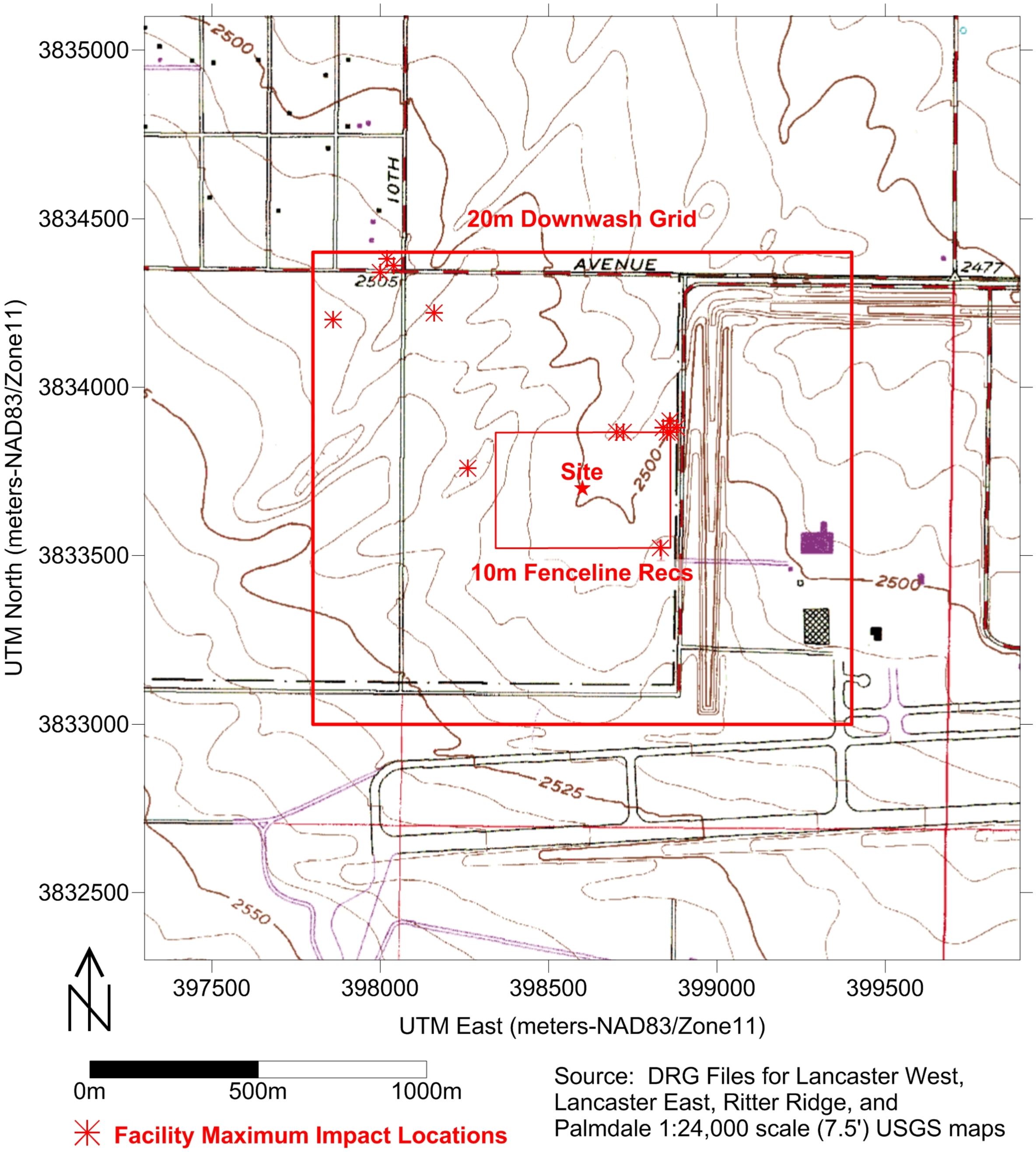
Coarse Receptor Grids



Source: DRG Files for Los Angeles and San Bernardino 1:250,000 scale USGS maps

Figure 6-3

Downwash Receptor Grid



Source: DRG Files for Lancaster West, Lancaster East, Ritter Ridge, and Palmdale 1:24,000 scale (7.5') USGS maps

Figure 6-4

Palmdale ASOS Location

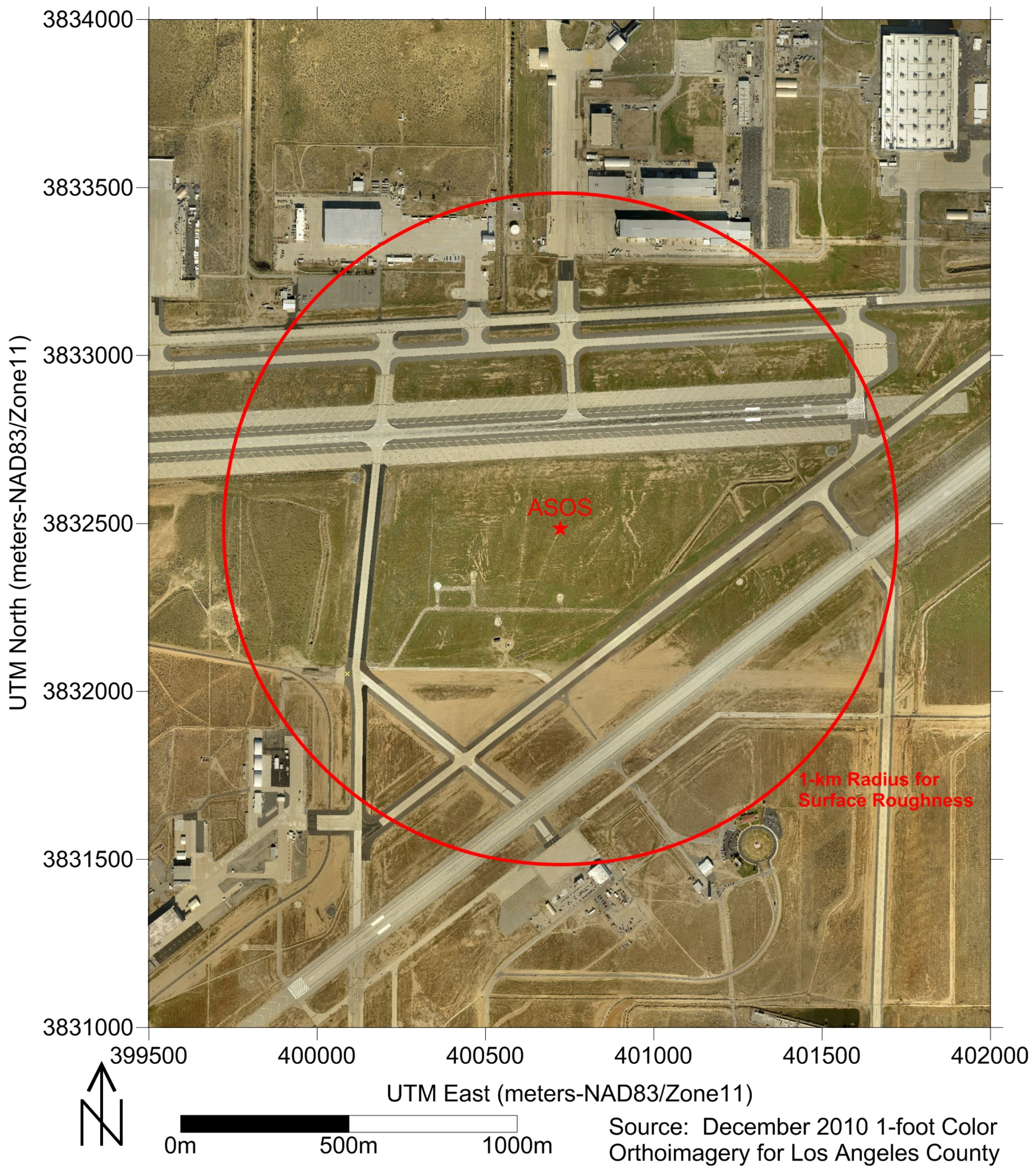


Figure 6-5

Annual Palmdale Wind Rose (2010-2014)

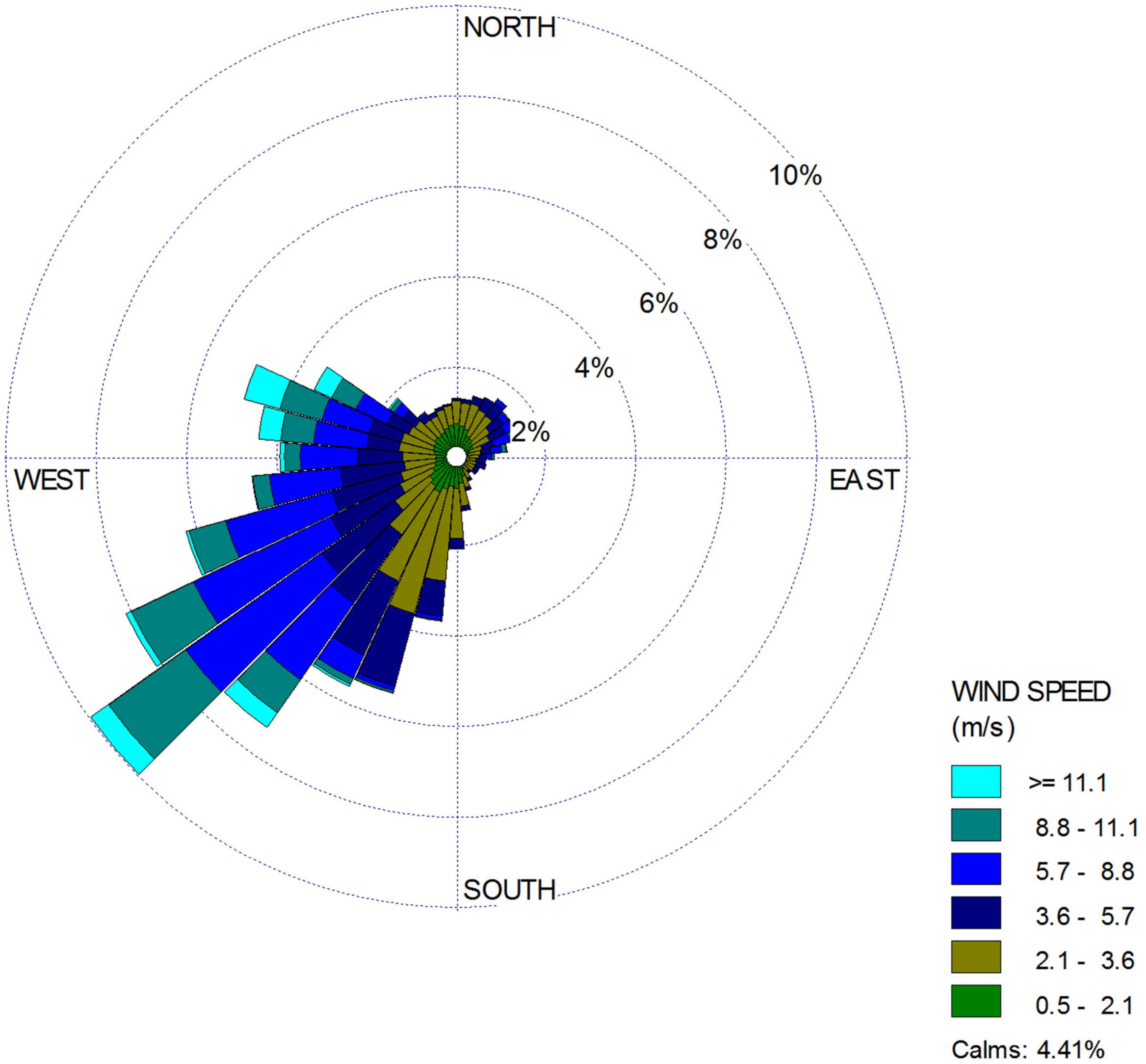
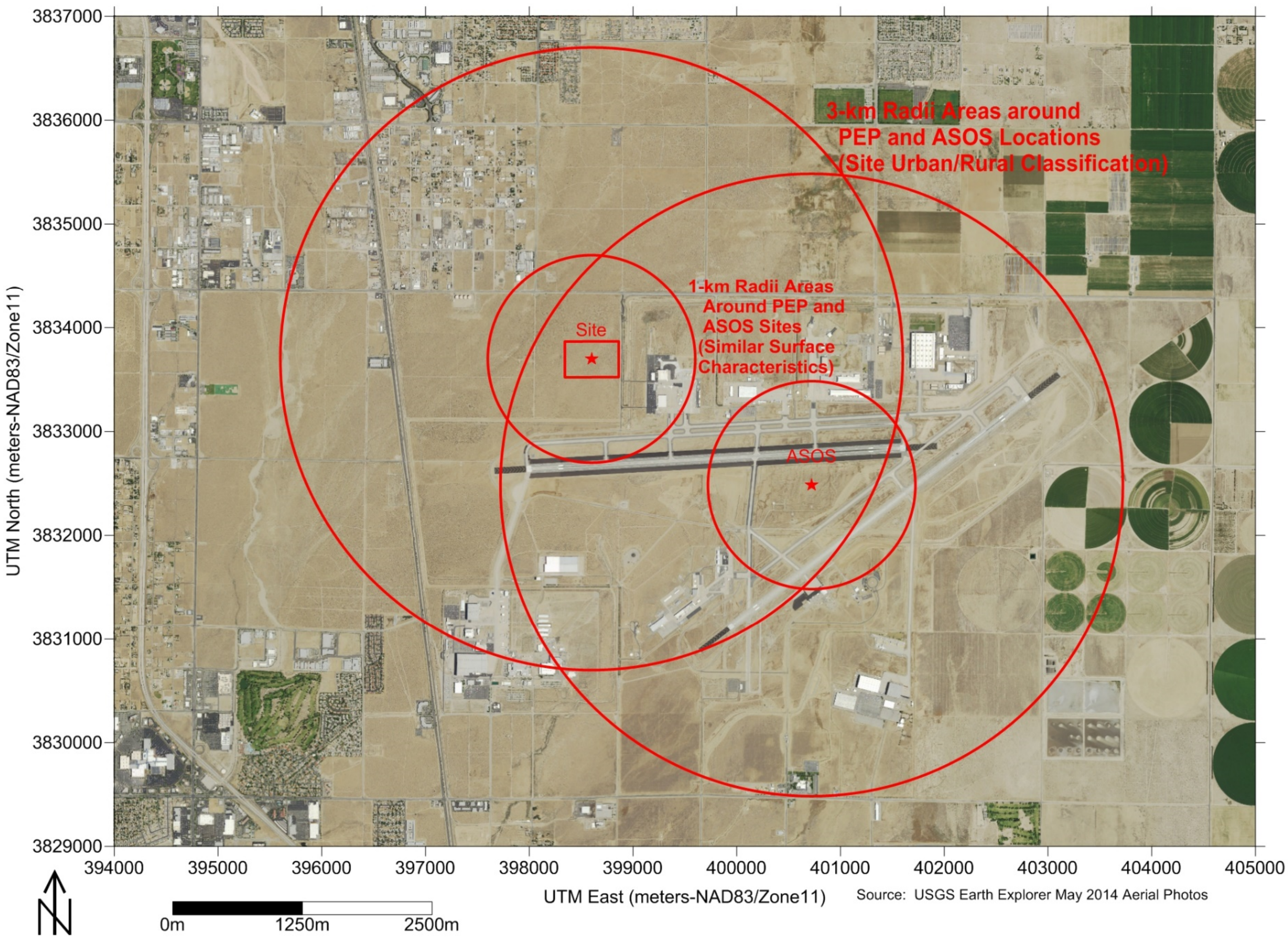


Figure 6-6

Land Use in the Project Area



Section 7 AIR QUALITY IMPACT ANALYSIS

The following sections present the analyses for determining the changes to ambient air quality concentrations in the region of the PEP. These analyses are comprised of a project only screening assessment to determine the worst-case emissions and stack parameters, refined modeling assessment used to calculate the proposed project changes to ambient air quality, and cumulative assessments, which are used to analyze the proposed project plus nearby existing sources.

7.1 SCREENING ANALYSIS

Operational characteristics of the combustion turbines, such as emission rate, exit velocity, and exit temperature vary by operating loads and ambient temperatures. The PEP turbines will be operated over a variety of temperature and load conditions from 40% to 100%, with and without duct-firing and evaporative cooling systems. In addition, the auxiliary boiler, which allows the project to have fast start capability, will be utilized when the turbines are not operational. Thus, an air quality screening analysis was performed that considered these effects. Detailed results of the screening assessments are provided in Appendix C.

For the turbines, a range of operational characteristics over a variety of ambient temperatures was assessed using AERMOD and all five years of hourly meteorology (year 2010-2014). This included various turbine loads and duct firing and evaporative cooling conditions for four ambient temperatures: 23°F (a cold day), 64°F (annual average conditions), 98°F (a hot day), and 108°F (maximum high temperature day). The combustion turbine operating condition that resulted in the highest modeled concentration in the screening analysis for each pollutant and for averaging periods of 24 hours or less were used in the refined impact analyses. The 64°F condition was assumed to represent annual average conditions. As such, no screening analyses were performed for annual average concentrations (the annual refined analyses were modeled with the stack parameters for the 64°F case at 100 percent load without duct firing, which is the majority case duct firing will only occur for 1,500 hours per year).

The results of the turbine load/temperature screening analysis are listed in Appendix C. The screening analysis shows that the worst-case load and ambient temperature condition is 100 percent load with duct firing and without evaporative cooling at 23°F (Case 2) for all pollutants and averaging times other than 24-hour PM10/PM2.5. For PM10/PM2.5, the 64ºF case at 43 percent load without duct burner is the worst-case condition (Case 27). It should be noted that this low load case would not be expected to occur for a full 24-hour period as the facility operator would most likely utilize a single turbine at full load in place of two turbines at a very low load. Thus, Case 2 was also assessed for the PM10/PM2.5 24-hour averages as it produced the second highest impacts for this pollutant and averaging time, and matched the worst-case condition for the other pollutants and short-term averaging times.

A screening analysis was also performed for the auxiliary boiler, which may be used continuously when the turbines are not in operation. This analysis showed that the auxiliary boiler (without the turbines) produced maximum 8-hour CO impacts (as compared to 1-hour of auxiliary boiler operation and 8 hours of turbine operations).

7.2 REFINED ANALYSIS

Based on the results of the screening analyses, all PEP sources were modeled in the refined analysis for comparisons with Significant Impact Levels (SILs) and National Ambient Air Quality Standards (NAAQS).

Impacts during normal operations were based on continuous turbine operations at the worst-case screening condition and appropriate auxiliary boiler operations – i.e., one hour of auxiliary boiler operation for 1-hour and 3-hour averaging times and two hours of auxiliary boiler operation for 8-hour and 24-hour averaging times. As noted above in the screening analyses, the auxiliary boiler produced higher 8-hour impacts by itself for continuous operation (without turbine emissions) and Project only 8-hour CO impacts were modeled as such in the refined analysis.

Testing of the fire pump and emergency generator will not take place during the same hour or during startup of the turbines. Therefore, the refined modeling analyses considered operation of either the fire pump or emergency generator, but not both, for one (1) hour averaging times under normal operations. This was done as the engine with the higher emissions does not always produce the largest concentrations, due in part to the difference in source location relative to fenceline, differing downwash effects, and differences in final plume rise. The refined modeling analysis results showed that the fire pump produced higher 1-hour Project impacts for CO while the emergency generator produced higher 1-hour Project impacts for NO_2. Since both engines will NOT be tested during turbine startup, the emergency equipment was not included in the startup/shutdown analyses for 1-hour averaging times. For longer periods (3-hour, 8-hour, and 24-hour short-term averaging times) for both normal and startup/shutdown conditions, both the fire pump and emergency generator were modeled for one testing period per day (60 minutes for the fire pump and 30 minutes for the emergency generator). Also, since these two pieces of emergency equipment would be tested far less than 100 hours/year, they were included in 1-hour NO_2 NAAQS modeling analyses at their annual average emission rates per USEPA guidance due to the statistical nature of these standards.

For startup operations, the PEP will use Siemens Flex Plant design which will allow for fast facility startup and shutdown times to 45 minutes or less. Since Gaussian modeling is based on one (1) hour steady state conditions, the startup/shutdown emission rates used for refined modeling assumed the remaining one (1) hour time periods were at full load, non-duct fired operation (while the turbines can be at 100 percent full load at the end of each start cycle, 100 percent plant load is not achieved until the second hour). For example, to model the one (1) hour cold start condition of 39 minutes, the entire cold start emissions were assumed to be emitted over 39 minutes with the remaining 21 minutes in the hour set to full load, non-duct fired operation emissions after adjusting the full load emission by the time (0.35). For the two (2) proposed turbines, start-up/shutdown emissions were also accounted for in the refined analysis for all short-term (24-hours or less) and long-term (annual) averages in the air quality modeling. For modeling the short-term averaging times, the highest one-hour startup emissions from the combustion turbines (cold start) were used for determining one-hour NO_x and CO impacts. For the eight-hour CO modeling during startup, one cold start (1-hour), one shutdown (1-hour), one hot start and four (4) hours of base load operation were assumed (this scenario was used to assess a turbine trip during a startup period). The annual emission estimates already included emissions from start-up, shutdown, and maintenance activities. Detailed emission calculations for all averaging periods are included in Appendix A. The refined modeling assessment included the following assumptions and conditions for both normal and startup/shutdown conditions:

- Auxiliary boiler operation is up to 24 hours per day during turbine non-operation and 4,884 hours per year
- Fire pump testing occurs up to 60 minutes per day, 52 hours per year
- The emergency generator testing occurs up to 30 minutes per day, up to 26 hours per year
- Evaporative fluid cooler operates 24 hours per day
- Turbines can operate 24 hours per day with duct firing
- Worst-case annual modeled emissions for NO_x, PM10 and PM2.5: 6,460 hours base load, 1,500 hours of duct burner operation, 35 warm starts, 5 cold starts, 40 shutdowns = 8,000 hours (Operational Case 1), with stack characteristics for the most frequent annual operating condition (Case 11)
- Cold, warm, and hot start stack parameters are based on Case 27 at 43 percent load
- Cold start is 39 minutes which is the worst case start plus 21 minutes of non-duct fired base load emissions for the 23^{o}F day. The auxiliary boiler is in operation until the end of the startup period.
- Based on the limited number of cold starts per year (no more than 52 are possible) compliance with the statistical form of the 1-hour NO_2 NAAQS was based on warm and/or hot start emissions in accordance with USEPA requirements (startup conditions that occur infrequently, in this case less than 100 hours/year, do not need be considered for these two NAAQS). Compliance

with the CO NAAQS was based on cold start emissions/conditions based on the deterministic form of the standard (highest of the annual second-high concentrations modeled over five years).

- Similarly, while the firepump or emergency generator emissions would not need to be included in the 1-hour NO_2 NAAQS analysis since they will operate less thann 52 hours/year, they were conservatively included in the 1-hour NO_2 NAAQS analysis at their annual average emission rates as per USEPA guidance.
- CO 8-hour impacts calculated as one (1) cold start + one (1) hot start + two (2) shutdowns + four hours base load with duct burners. The auxiliary boiler has two hours of operations. Both the fire pump and emergency generator are assumed to be tested during the eight hour period.
- For any one hour time period, both turbines could be in cold, warm, hot startup or shutdown.
- The fire pump and emergency generator will not be tested during the one (1) hour turbine start cycle, but are included in the eight (8) hour start case.
- Auxiliary boiler assumed to operate during the period of any type of start until the end of the start cycle.
- PM10 and PM2.5 24-hour modeled concentrations were based on both the worst-case screening condition (two turbines at 43 percent load for 24-hours for 64°F (Case 27)), as well as 24-hours of turbine full load operation (no start up or shutdowns) with duct burners on a 23^{o}F day (Case 2) since Case 27 was not considered realistic. The maximum of both cases is reported in the analyses. The auxiliary boiler was assumed to be in operation for two (2) hours for both PM cases modeled. Both the fire pump and emergency generator were also assumed to be tested during this time frame.

Also, since startup emissions for PM10/PM2.5 would be less than during normal operations, the short-term impacts analyses for these pollutants did not consider start-up conditions (i.e., startup conditions were already considered in the refined analyses by modeling normal operating conditions/emissions). Detailed emission calculations for all averaging periods are included in Appendix A.

Formation of secondary PM2.5 from the emissions of precursor pollutants such as NO_2 and SO_2 can occur at downwind distances over time periods of hours or days. The creation of secondary PM2.5 can increase the total concentration of the total PM2.5 impacts by adding to the direct PM2.5 emissions from the project. EPA has published guidance on how to account for secondary PM2.5 from the precursors of NO_2 and SO_2 (EPA Guidance for PM2.5 Permit Modeling, March 2014). Within this guidance, EPA has developed two assessment cases from which secondary impacts should be addressed. For the CPEC project, where direct emissions of PM2.5 and NOx will exceed the significant emission rates, the EPA allows a qualitative or a hybrid qualitative/quantitative approach for assessing the secondary air quality impacts.

It is unlikely that NO_2 and SO_2 emissions will significantly impact secondary PM2.5 formation. But it is possible that some transformation will occur, although given the time for the transformation to occur, secondary PM2.5 impacts are expected to occur at distances much farther downwind than the PM2.5 SIA. However, to assess secondary formation, a semi-quantitative assessment was made using *Appendix D of the EPA Guidance for PM2.5 Permit Modeling (May 2014)*. Here, the formation of secondary PM2.5 is accounted for by dividing the projected emissions by a region average offset ratio. The national ratio for SO_2 is 40 and for NO_x is 100 for the Western U.S. Total PM2.5 emission are calculated by multiplying the primary PM2.5 modeled concentration by the ratio obtained from the secondary equivalent calculation.

For the PEP project, this results in the following:

- Total Equivalent PM2.5 = Primary 2.5 + (SO_2/40) + (NOx/100) =
  81.01 tpy + (11.39 tpy/40) + (139 tpy/100) = **82.68 tpy**
- Total Equivalent PM2.5/Primary 2.5 = 82.68 tpy / 81.01 tpy = **1.02**

Thus, all modeled emissions of PM2.5 for the PEP sources (turbines, auxiliary boiler, and emergency equipment) were increased by a factor of 1.02 to account for the secondary formation for sources emitting significant amounts of secondary precursor emissions (note, the proposed project is not PSD significant for SO_2 emissions, which would not need to be included in the evaluation of secondary PM2.5 impacts according to USEPA guidance, but are conservatively included here for completeness). The increased PM2.5 emissions are shown separately from PM10 emissions below.

The worst-case modeling input information for each pollutant and averaging period are shown in Table 7-1 for normal operating conditions and combustion turbine startup/shutdown conditions. As discussed above, the combustion turbine stack parameters used in modeling the impacts for each pollutant and averaging period reflected the worst-case operating condition for that pollutant and averaging period identified in the load screening analysis.

Table 7-1
Stack Parameters and Emission Rates for Each of the Modeled Sources

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Vel. (m/s)	Stack Diam. (m)	Emission Rates (g/s)			
					NO_x	CO	PM10	PM2.5
Averaging Period: 1-hour for Normal Operating Conditions (Case 2)								
Each Turbine	48.768	358.7	17.68	6.7056	2.331	1.424	-	-
Auxiliary Boiler	18.288	422.04	20.42	0.9144	0.152	0.510	-	-
Fire Pump	5.944	823.71	28.13	0.1270	6.464E-4	0.144	-	-
Emergency Generator	6.096	677.04	158.76	0.2032	6.267E-3	0.187	-	-
Averaging Period: 8-hours for Normal Operating Conditions (Auxiliary Boiler Only)								
Each Turbine	48.768	358.7	17.68	6.7056	-	N/A	-	-
Auxiliary Boiler	18.288	422.04	20.42	0.9144	-	0.510	-	-
Fire Pump	5.944	823.71	28.13	0.1270	-	0.018	-	-
Emergency Generator	6.096	677.04	158.76	0.2032	-	0.023	-	-
Averaging Period: 24-hours for Normal Operating Conditions (both Case 2 and Case 27 assessed for PM)								
Each Turbine (Case 2)	48.768	358.7	17.68	6.7056	-	-	1.487	1.517
Each Turbine (Case 27)	48.768	353.7	10.48	6.7056	-	-	1.008	1.028
Auxiliary Boiler	18.288	422.04	20.42	0.9144	-	-	8.505E-3	8.675E-3
Fire Pump	5.944	823.71	28.13	0.1270	-	-	3.565E-4	3.636E-4
Emergency Generator	6.096	677.04	158.76	0.2032	-	-	1.047E-3	1.068E-3
Averaging Period: Annual (Case 11 with no DB, no EVAP)								
Each Turbine	48.768	363.7	17.84	6.7056	1.988	-	1.160	1.183
Auxiliary Boiler	18.288	422.04	20.42	0.9144	1.455E-2	-	9.740E-3	9.935E-3
Fire Pump	5.944	823.71	28.13	0.1270	6.464E-4	-	5.079E-5	5.181E-5
Emergency Generator	6.096	677.04	158.76	0.2032	6.267E-3	-	1.492E-4	1.522E-4
Averaging Period: 1-hour for Start-up/Shutdown Conditions (Case 27)								
Each Turbine	48.768	353.7	10.48	6.7056	6.795	52.849	-	-
Auxiliary Boiler	18.288	422.04	20.42	0.9144	0.152	0.510	-	-
Averaging Period: 8-hours for Start-up/Shutdown Conditions (Case 2)								
Each Turbine	48.768	358.7	17.68	6.7056	-	15.944	-	-
Auxiliary Boiler	18.288	422.04	20.42	0.9144	-	0.128	-	-
Fire Pump	5.944	823.71	28.13	0.1270	-	0.018	-	-
Emergency Generator	6.096	677.04	158.76	0.2032	-	0.023	-	-

7.3 NORMAL OPERATIONS IMPACT ANALYSIS

In order to determine the magnitude and location of the maximum impacts for each pollutant and averaging period, the AERMOD model was used with all five (5) years of meteorology. Table 7-2 summarizes maximum modeled concentrations for each criteria pollutant and associated averaging periods. Concentrations of NO_2 were computed using the Ambient Ratio Method (ARM) following USEPA guidance, namely using national default values of 0.80 (80%) and 0.75 (75%) for 1-hour and annual average NO_2/NO_x ratios, respectively.

USEPA guidance prescribes the use of the Significant Impact Levels (SILs) to establish the "significant impact area" (SIA), which is used to identify the appropriate geographic area in which a multi-source NAAQS and increment impacts analysis should be conducted. The "impact area" is identified by drawing a circle around the site with a radius equal to the distance to the farthest location where an exceedance of the SIL is modeled to occur. The impact area is the geographical area for which the required air quality analyses for the NAAQS and PSD increments are carried out. This area includes all locations where the significant increase in the potential emission of a pollutant from a new source, or significant net emission increase from a modification, will cause a significant ambient impact (i.e., equal or exceed the applicable SIL). This impact area is then also used in a multi-source cumulative impacts analysis to "guide the identification of other sources to be included in the modeling analyses."

The maximum impacts for normal and startup/shutdown facility operating conditions are also compared on Table 7-2 to the USEPA SILs for all applicable pollutants. As applicable, the maximum modeled impacts for all five years of meteorological data used for comparisons to the SILs were based on the form of the NAAQS in accordance with USEPA guidance. Namely, the 5-year average of the daily 1-hour maximum impact for each year at each receptor was used for the 1-hour NO_2 NAAQS SIL. The 5-year average of the 24-hour maximum impact for each year at each receptor was used for the 24-hour PM2.5 SIL. And annual PM2.5 SILs were based on the 5-year average of the annual impact at each receptor in accordance with USEPA guidance.

The maximum PEP concentrations of 1-hour NO_2, 24-hour PM10 and PM2.5, and annual PM2.5 are greater than the USEPA Class II SILs. The maximum distance from the PEP for the furthest significant impact is also shown in Table 7-2 as 18.9 kilometers (km) for 1-hour NO_2 (base load operation with duct burner), 1.76 km for 24-hour PM2.5, 1.18 km for annual PM2.5, and 0.65 km for 24-hour PM10. These significant impact areas (SIAs), and receptors, are shown in Figures 7-1 through 7-5. Maximum PEP concentrations for 1-hour and 8-hour CO, annual NO_2, and annual PM10 are less than the applicable SILs. The 1-hour NO_2 SILs during startup extended to distances beyond

26 km. Based on recent EPA modeling guidelines which focus on the 10 km distances for cumulative 1-hour NO_2 assessments, the base load case with duct burner on was selected for modeling the closure of the SIA.

Table 7-2
Air Quality Impact Results for
Refined Modeling Analysis of Project – Significant Impact Levels

Pollutant	Avg. Period	Maximum Concentration ($\mu g/m^3$)	Class II SIL ($\mu g/m^3$)	Sig.Impact Area Radius (km)
Normal Operating Conditions				
NO_2 [a]	1-hr 5-year Avg of Max's	14.22	7.5	18.9
	Annual Max	0.981	1.0	--
CO	1-hour Max	123.8	2,000	--
	8-hour Max	29.48 [b]	500	--
PM10	24-hour Max	7.22[c] (6.34)	5	0.57[c] (0.65)
	Annual Max	0.750	1	--
PM2.5	24-hr 5-yr Avg of Max's	6.46[c] (5.59)	1.2	1.76[c] (1.68)
	5-yr Avg of Ann.Conc's	0.723	0.3	1.18
Start-up/Shutdown Periods				
NO_2 [a]	1-hr 5-year Avg of Max's	56.51	7.5	>26
	1-hour Max	574.5	2,000	--
CO	8-hour Max	88.58	500	--
	8-hour Max	88.58	500	--

[a] NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80%) and 0.75 (75%) ratios, respectively.

[b] CO 8-hour facility impacts greater for auxiliary boiler operating continuously without any concurrent turbine operations.

[c] PM10/PM2.5 24-hour worst-case impacts are for 43% load Case 27, which would be unlikely to occur for two turbines for a full 24-hours (i.e., two turbines at less than 50% load). The worst-case for 24-hour operations at 75% and 100% loads for PM10/PM2.5 is the same as the other pollutants – Case 2 (these impacts shown in parentheses).

Under USEPA's PSD regulations, an applicant must conduct a "source impact analysis", which demonstrates that "allowable emission increases from the source in conjunction with all other applicable emissions increases or reductions (including secondary emissions), would not cause or contribute to air pollution in violation of: (1) Any NAAQS in any region; or (2) Any applicable maximum allowable increase (increment) over the baseline concentration in any area."

If a source's modeled impact at any offsite location exceeds the relevant SIL, the source owner must then conduct a "multi-source" (or "cumulative") air quality analysis to determine whether or not the source's emissions will cause or contribute to a violation of the relevant NAAQS or applicable PSD increment. The PSD increment consumption analysis assures that, in those locations currently meeting the federal NAAQS (i.e., those deemed "attainment" or "unclassifiable"), the concentration of a given pollutant cannot increase by an amount greater than the "maximum allowable increase" specified by the Clean Air Act and/or the PSD regulations for the particular pollutant since the baseline date. Based on the modeling results, the only pollutants which exceeded the applicable Class II SILs were the following:

- 1-hour NO_2;
- 24-hour PM10; and
- 24-hour and annual PM2.5.

Thus, in the preparation of the multisource PSD Class II Increment and/or NAAQS analyses below, only these pollutants and averaging periods were assessed.

USEPA's PSD regulations also require an applicant to provide preconstruction monitoring data for purposes of use in the Source Impacts Analysis. However, a source is exempt from this requirement if its modeled impact in any area is less than pollutant-specific "significant monitoring concentrations" ("SMC"), which USEPA has generally established as five times the lowest detectable concentration of a pollutant that could be measured by available instrumentation. Table 7-3 lists the SMCs for each applicable pollutant. As can be seen from the table above, maximum PEP impacts are less than the SMCs for nearly all pollutants – namely CO, PM10, and NO_2 (the project is not subject to PSD review for SO_2). The PEP modeled concentrations of PM2.5 are above the vacated SMC for 24-hour average.

Even if a source's potential impacts exceeds the corresponding SMC, and the applicant must therefore provide preconstruction monitoring data as part of its Source Impact Analysis, that does not necessarily mean the applicant must install and operate a new monitor at the project site. Rather, according to USEPA guidance, an applicant may satisfy the preconstruction monitoring obligation in one of two ways: (i) Where existing ambient monitoring data is available from representative monitoring sites, the permitting agency may deem it acceptable for use in the Source Impacts Analysis; or (ii) where existing, representative data are not available, then the applicant must obtain site-specific data.

As a general matter, the permitting agency has substantial discretion "to allow representative data submissions (as opposed to conducting new monitoring) on a case-by-case basis." In determining whether existing data are representative, EPA guidance has emphasized consideration of three factors: monitor location, data quality and currentness of the data. The permitting agency also may approve use of data from a representative "regional" monitoring site for purposes of the NAAQS compliance demonstration.

The Lancaster monitoring station's objective is for measuring background air quality to support compliance with the Ambient Air Quality Standards. The spatial scale of the monitoring station is middle scale for gaseous pollutants (ozone, CO, and NO_2) and neighborhood scale for particulate matter (PM10 and PM2.5). Based on these two spatial scales, the overall objective of the monitoring station is population oriented.

The maximum modeled offsite impacts are below the NO_2, PM10 and CO SMCs, thus for these pollutants, the applicant is requesting an exemption of the preconstruction monitoring requirements.

For O_3, the close proximity, currentness, and representative conditions to the project site of the existing Lancaster monitoring station would satisfy the EPA requirements for waiving the preconstruction monitoring requirements for this pollutant.

Accordingly, the project will propose utilizing the nearby urban based monitoring data from Lancaster (NO_2, PM10, CO and O_3) as conservative estimates of background concentrations in order to further satisfy the preconstruction monitoring requirements for these pollutants. Thus, no pre-construction ambient air quality monitoring is proposed for these pollutants.

As the SMC for PM2.5 was vacated, preconstruction monitoring of PM2.5 cannot be exempted based on modeling results. But if existing monitoring data can be determined to be representative, then the use of the existing data would satisfy the need to collect additional data PM2.5. Based on the close location of the Lancaster Division Street PM2.5 monitoring site (2.5 miles north of the project location) and the currentness and data quality of the PM2.5 monitoring data, preconstruction monitoring for this pollutant is proposed.

Based on the above analyses, the requirements for waiving preconstruction monitoring would be satisfied. The existing ambient monitoring data, collected by the within the project region would be sufficient to meet the needs of any pre-construction monitoring program and are proposed for use in place of collecting pre-construction monitoring data.

Table 7-3
Significant Monitoring Concentrations

CO: 8-hr average	575 µg/m^3
PM_{10}: 24-hr average	10 µg/m^3
$PM_{2.5}$ 24-hr average*	4 µg/m^3
NO_2: annual average	14 µg/m^3
SO_2: 24-hr average	13 µg/m^3

Note: The 24-hour PM2.5 SMC has been vacated.

Based on the modeling analyses, the applicable PEP concentrations are compared to the NAAQS in Table 7-4. All of the maximum PEP concentrations occurred in the immediate vicinity of proposed project, either on the facility fence-line or on the downwash receptor grid. The maximum concentrations for all five years of meteorological data modeled were used for comparison to the annual NO_2 NAAQS and the 1-hour and 8-hour NAAQS for CO. For the other NAAQS, the PEP concentrations in the table were based on the form of the NAAQS, namely: High Second-High (H2H) values for the 24-hour PM10; the 5-year average of the annual 98^{th} percentile 1-hour daily maxima for the 1-hour NO_2 NAAQS and, for PM2.5, the 5-year average of the annual 98^{th} percentile 24-hour impacts and the 5-year average of the annual impacts. Compliance with the NAAQS was demonstrated for all pollutants and averaging times.

Table 7-4
Air Quality Impact Results for
Refined Modeling Analysis of Project – National Ambient Air Quality Standards

Pollutant	Avg. Period	Modeled Concentration (μg/m^3)	Background (μg/m^3)	Total (μg/m^3)	National Ambient Air Quality Standards (μg/m^3)
Normal Operating Conditions					
NO_2 [a]	1-hr 5-yr Avg of 98th%	13.49	81	94	188
	Annual Max	0.981	15.1	16.1	100
CO	1-hour Max	123.8	2,176	2,300	40,000
	8-hour Max	29.48 [b]	1,603	1,632	10,000
PM10	24-hour H2H	6.93[c] (6.07)	80	87	150
	24-hr 5-yr Avg of 98th%	4.74[c] (4.15)	18	23	35
PM2.5	5-yr Avg of Ann Conc's	0.723	6.1	6.8	12.0
Start-up/Shutdown Periods					
NO_2 [a]	1-hr 5-yr Avg of 98th%	51.40	81	132	188
CO	1-hour Max	574.5	2,176	2,751	40,000
	8-hour Max	88.58	1,603	1,692	10,000

[a] NO_2 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80%) and 0.75 (75%) ratios, respectively.

[b] CO 8-hour facility impacts greater for auxiliary boiler operating continuously without any concurrent turbine operations.

[c] PM10/PM2.5 24-hour worst-case impacts are for 43% load Case 27, which would be unlikely to occur for two turbines for a full 24-hours (i.e., two turbines at less than 50% load). The worst-case for 24-hour operations at 75% and 100% loads for PM10/PM2.5 is the same as the other pollutants – Case 2 (these impacts shown in parentheses).

7.4 CUMULATIVE IMPACT ANALYSIS

In addition to modeling the PEP concentrations, cumulative modeling analyses were performed for pollutants and averaging times greater than the SIL. Typically, based on the General Air Quality Modeling Guidelines, only those facilities with a significant concentration gradient in the vicinity of a new source need to be included (GAQM 8.2.3). Two nearby source groups could generate this concentration gradient and are those based on Lockheed Martin Aeronautics and Northrup Grumman, both within or adjacent to U.S. Plant 42 near the Palmdale airport. Inventories of emissions and stack parameters were provided as CEDAIRs transaction files by the AVAQMD and were comprised of over 250 sources at these two facilities. In support of limiting the inventory of sources, as many of the emission points at both facilities were comprised of sources with very low emissions, Mr. Chris Anderson, Air Quality Engineer at AVAQMD requested that the small mobile sources not be included.

The emission inventory data provided by the AVAQMD included both maximum short-term hourly emissions as well as annual emissions. For the short term averaging periods, the maximum hourly emissions as provided were assumed to occur for 1-hour and 24-hour time periods. Emergency equipment (emergency generators) were not modeled for 1-hour NO_2 NAAQS analyses consistent with USEPA guidance (as discussed above for the facility modeling analyses). Short-term 24-hour PM10 and PM2.5 emissions for these emergency sources were adjusted for one hour of operation (testing) during the 24-hour averaging time. The annual emissions, based on actuals for the years 2013 and 2014, were used to represent the annual concentration impacts.

Per USEPA guidance, the larger impact area was then surveyed to identify other "nearby sources", which also should be included in the cumulative impacts analysis. Both Appendix W and the Draft NSR Workshop Manual require that the cumulative and increment impacts analysis to include "nearby sources", which includes "[a]ll sources expected to cause a significant concentration gradient in the vicinity of the source or sources under consideration." Appendix W further instructs that the "impact of nearby sources should be examined at locations where interactions between the plume of the point source under consideration and those of nearby sources (plus natural background) can occur". Emphasizing that "[t]he number of sources is expected to be small except in unusual situations".

Emissions for a number of existing background sources were supplied by the AVAQMD and are shown on Table 7-5. This also includes the sources at Plant 42 which are made up of the Boeing Defense, the Lockheed-Martin and the Northrup-Grumman facilities. The placement of these Plant 42 sources relative to the project is displayed in Figure 7-6. All of the existing facilities were screened with a Q/D analysis, where Q is the ton/year emission rate and D is the distance in km from the multisource facility to either the proposed source (for short-term averaging times) or the nearest SIA boundary (for annual averaging times). This screening method has been used on past PSD permit applications and was used on the previous PHPP project. Generally, facilities with a Q/D value of less than 20 tpy/km are excluded from further analysis. But, rather than using this bright line value of 20 tpy/km, a more conservative approach was used which would not automatically exclude sources that were less than 20.

The Boeing Defense facility is within the annual PM2.5 SIA, but has 24-hour PM10, 24-hour PM2.5, and 1-hour NO_2 Q/D values less than 20 tpy/km. Nevertheless, it was included in all four cumulative analyses based on its proximity to the proposed PEP facility. Similarly, while the Lockheed-Martin facility only has an annual PM2.5 Q/D value greater than 20 tpy/km, the 1-hour NO_2 Q/D value is close to 20 tpy/km and was included in the NO_2 cumulative analysis and also the 24-hour PM10 and 24-hour PM2.5 cumulative analyses based on the facility's close proximity. None of the Northrup-Grumman Q/D values were close to 20 tpy/km, but were included in all four cumulative analyses, Thus, the Plant 42 sources (Boeing Defense, Lockheed-Martin and Northrop-Grumman) that might cause a significant concentration gradient(s) within or near the SIAs and were included in all four PM10, PM2.5, and NO_2 cumulative impact analyses *regardless of the Q/D values*. All of the other facilities were located some distance from the proposed PEP facility and generally had small Q/D values, mostly 3 tpy/km or less. The only facilities with a PM10 Q/D greater than 10 tpy/km was located more than 13 kilometers from the proposed PEP facility, and would not be expected to therefore cause a significant PM10 concentration gradient in the project vicinity. Therefore, all of the other non-Plant 42 facilities were excluded from further cumulative modeling analyses based on a careful consideration of the results of the Q/D analysis shown in Table 7-5.

Tables 7-6 and 7-7 present the emissions and stack parameters for the modeled Plant 42 source inventory. The Lockheed and Northrup stack data were provided by the AVAQMD in CEDAIRS format. The Boeing emissions were modeled as an area source.

The results of the cumulative modeling analysis, with the PEP sources combined with the Lockheed, Northrup, and Boeing emissions, were then added to the background monitored data collected at the Lancaster monitor, located approximately 2.5 miles from the PEP. By incorporating the Plant 42 sources in conjunction with the PEP and adding in the existing background data from the Lancaster Division Street monitoring station, the resultant cumulative NAAQS results would be considered a conservative estimate. The cumulative modeling analyses would be considered conservative as many of the modeled sources are already in the background air quality data set. The use of the

Lancaster monitoring station data is conservative in of itself, as the location of the monitor is near the Sierra Highway (110 meters), the Antelope Valley Freeway (< 4 km), and within 50 meters of Division Street. The Southern Pacific Railway is within 80 meters of the monitoring station. Thus, this monitoring data when combined with the cumulative inventories from Plant 42 (Lockheed, Northrup, and Boeing) plus the PEP emissions would produce a conservative modeling analysis.

The ozone limiting method (OLM) was used for the 1-hour NO_2 cumulative modeling analyses as described above. NO_2/NO_x ISR ratios were based on USEPA guidance (a default of 0.5 for the PEP project sources, for all operating cases including startup, and a default of 0.2 for background sources in the cumulative inventory). Concurrent ozone data (2010-2014) used in the Tier 3 OLM analysis were obtained from the Lancaster monitoring station. For the cumulative 1-hour NO_2 NAAQS analyses, the third highest seasonal value by hour, averaged over three years, were included in the AERMOD modeling per USEPA guidance (March 1, 2011 USEPA memorandum *"Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour $N0_2$ National Ambient Air Quality Standard"*). A more complete discussion of the OLM data and techniques is described above and included in the Modeling Protocol.

Table 7-5
PEP - Q/D Analysis for Cumulative Source Facility Inventory

ID	name	Stk data	PM10, tpy	PM2.5, tpy	NOx, tpy	UTM Coors (NAD83/Zone11) X, meters	Y, meters	Facility Dist, km	Q/D, tpy/km 24-hr PM10	24-hr PM2.5	Annual PM2.5	NOx
124702154	Boeing Defense	All EIM equip	0.03662	0.03662	0.4004	399290.0	3833550.0	0.69	0.05	0.05	inside SIA	0.58
	Lockheed-Martin/North	yes/multiple	9.51	9.50	30.17	400167.0	3833484.6	1.57	6.06	6.05	24.36	19.22
	Lockheed-Martin/South	yes/multiple				397975.0	3830563.0	3.15				
	Northrup-Grumman	yes/multiple	7.75	7.76	9.126	401240.2	3833497.4	2.64	2.94	2.94	5.32	3.46
50302008	Robertson Ready Mix	none	39.62	15.13	0	408695.5	3825054.5	13.26	2.99	1.14	1.25	0.00
54802058	Granite Construction	6642	0.036	0.036	0	407564.0	3822930.0	13.97	1.51	1.51	1.65	0.00
		other processes	21.07 (a)	21.07	0							
182803087	G. Wheeler Farms	14 ICEs	0.413	0.413	28.67	396165.1	3841750.6	8.46	0.06	0.06	0.07	4.25
		other processes	0.092	0.092	7.315							
122802470	Antelope Valley Disposal	201	0.438	0	2.14	394488.6	3826036.7	8.66	2.29	0.23	0.27	0.25
		other processes	19.38	2.01	0							
114801989	Antelope Valley Press	none	25.72	0	0	397662.3	3825005.8	8.70	2.96	0.00	0.00	0.00
122802129	Lancaster Landfill	6906 flare	3.477	0	2.63	397436	3845300	11.71	0.96	0.06	0.07	0.22
		other processes	7.77	0.75	0							
141702442	Shea-Traylor	none	5.26	0.14	0	406583.0	3822949.4	13.35	0.39	0.01	0.01	0.00
103601836	Holliday Rock	8178	2.12	0.668	0	409169.8	3823067.3	14.95	3.00	1.12	1.21	0.00
		other processes	42.66	16.05	0							
103603089	Holliday Rock	none	30.27	9.13	0	408485.5	3823143.8	14.42	2.10	0.63	0.69	0.00
180403054	Bolthouse Farms	18 ICEs	1.61	1.594	39.51	various locations(b)		20.00	0.08	0.08	0.08	1.98
		new ICE	0	0	0							
1401927	Vulcan Materials	90003 ICE	0.0027	0.0027	1.313	406769.4	3822744.0	13.62	12.02	4.70	5.14	0.10
		other processes	163.75	63.99	0							
1402825	Vulcan Materials	90003 ICE	0	0	0	420695.3	3821888.4	25.03	2.70	0.95	1.00	0.00
		other processes	67.57	23.83	0							

(a) PM10 emissions of 1.96 tpy set equal to PM2.5.

(b) Distance from facility based on previous PHPP permit materials.

Table 7-6
Modeled Cumulative Inventory Sources–Short-Term/Annual Emissions

Stack ID#	Short-Term Emission Rates (g/s)			Annual Emission Rates (g/s)		
Lockheed	**NOx**	**PM10**	**PM2.5**	**NOx**	**PM10**	**PM2.5**
50020	-	8.026E-8	8.026E-8	-	3.653E-8	3.653E-8
90001	4.533E-2	3.503E-3	3.503E-3	2.475E-3	1.910E-4	1.910E-4
90003	4.301E-2	3.503E-3	3.503E-3	5.332E-3	4.335E-4	4.335E-4
90004	4.882E-1	1.368E-2	1.321E-2	4.681E-4	1.312E-5	1.267E-5
90038	5.689E-2	2.238E-2	2.238E-2	1.774E-2	6.978E-3	6.978E-3
90039	2.477E-1	2.121E-2	2.121E-2	1.244E-2	1.064E-3	1.064E-3
90040	4.497E-1	2.121E-2	2.121E-2	1.309E-2	6.175E-4	6.175E-4
90041	1.336E+0	1.391E-2	1.343E-2	5.032E-4	4.141E-6	5.061E-6
90047	4.721E-1	2.362E-2	2.281E-2	4.203E-4	2.103E-5	2.031E-5
90055	6.167E-1	1.323E-2	1.278E-2	4.295E-4	9.215E-6	8.899E-6
90139	2.370E-1	2.409E-2	2.327E-2	1.650E-4	1.678E-5	1.620E-5
90142	8.634E-2	1.229E-2	1.187E-2	4.731E-5	6.733E-6	6.503E-6
90182	2.243E-2	1.971E-1	1.971E-1	4.731E-5	6.733E-6	6.503E-6
90184	2.817E-3	1.659E-4	1.137E-4	1.318E-4	7.764E-6	5.322E-6
90185	1.126E-1	6.640E-3	6.640E-3	1.286E-5	7.566E-7	5.192E-7
Northrup	**NOx**	**PM10**	**PM2.5**	**NOx**	**PM10**	**PM2.5**
61201	-	7.557E-2	7.557E-2	-	7.566E-2	7.566E-2
61202	-	7.557E-2	7.557E-2	-	7.566E-2	7.566E-2
61203	-	4.400E-4	4.400E-4	-	4.401E-4	4.401E-4
61204	-	4.400E-4	4.400E-4	-	4.401E-4	4.401E-4
61205	-	4.400E-4	4.400E-4	-	4.401E-4	4.401E-4
61206	-	4.400E-4	4.400E-4	-	4.401E-4	4.401E-4
61207	-	4.400E-4	4.400E-4	-	4.401E-4	4.401E-4
90101	4.760E-2	9.790E-3	9.790E-3	2.419E-3	4.975E-4	4.975E-4
90102	3.797E-2	7.809E-3	7.809E-3	6.378E-3	1.312E-3	1.312E-3
90103	4.760E-2	9.790E-3	9.790E-3	3.508E-5	7.215E-6	7.215E-6
90106	1.292E-1	7.972E-3	7.972E-3	1.695E-2	1.046E-3	1.046E-3
90301	7.301E-2	0.000E+0	1.083E-2	5.044E-5	7.482E-6	7.482E-6
90302	1.512E-4	3.100E-2	3.100E-2	1.620E-4	1.697E-5	1.697E-5
90401	1.541E+0	7.706E-2	7.448E-2	8.437E-3	4.218E-4	4.077E-4

Boeing Sources	NOx (g/s/sq.m)	PM10 (g/s/sq.m)	PM2.5 (g/s/sq.m)	NOx (g/s/sq.m)	PM10 (g/s/sq.m)	PM2.5 (g/s/sq.m)
	6.230E-8	5.697E-9	5.697E-9	6.230E-8	5.697E-9	5.697E-9

Table 7-7
Modeled Cumulative Inventory Sources–Stack Parameters

Stack ID#	Stack Height (m)	Temp(K)	Velocity (m/s)	Diameter (m)	Source Type	UTM-X(m)	UTM-Y(m)	Z(m)
Lockheed Sources								
50020	6.10	30.4**	5.68**	-	VOLUME	397897.00	3830714.10	788.36
90001	2.60	551.8	101.29	1.676	POINT	400183.01	3833420.90	761.44
90003	3.05	551.8	101.29	1.676	POINT	400155.00	3833420.90	761.48
90004*	16.76	1005.2	7.70	0.091	POINT	400148.99	3833431.90	761.44
90038	3.05	551.8	286.14	1.219	POINT	397997.01	3830564.90	787.18
90039	2.60	551.8	271.23	1.219	POINT	397959.01	3830562.00	787.57
90040	5.35	551.8	271.23	1.219	POINT	397968.99	3830562.00	787.45
90041*	12.19	942.5	16.68	0.152	POINT	398015.99	3830576.90	787.03
90047*	6.10	1005.2	2.87	0.061	POINT	397468.99	3831076.90	790.46
90055*	13.72	930.5	10.68	0.152	POINT	397355.99	3830518.10	793.26
90139*	6.10	881.8	2.67	0.091	POINT	397217.99	3831059.10	791.48
90142*	12.19	979.8	1.31	0.091	POINT	398468.99	3831727.10	780.90
90182	3.05	340.15	3.048	1.2192	POINT	398002.01	3830731.00	787.09
90184	1.83	948.5	3.81	0.091	POINT	400162.99	3833612.10	759.81
90185*	12.19	925.2	2.34	0.091	POINT	399420.99	3831331.10	775.96
Northrup Sources								
61201	6.10	291.8	3.05	3.048	POINT	401017.79	3833341.06	758.96
61202	6.10	291.8	3.05	3.048	POINT	401022.31	3833341.06	758.96
61203	6.10	291.8	3.05	3.048	POINT	402096.59	3833716.06	757.26
61204	6.10	291.8	3.05	3.048	POINT	402100.49	3833717.04	757.25
61205	6.10	291.8	3.05	3.048	POINT	402103.61	3833717.04	757.25
61206	6.10	291.8	3.05	3.048	POINT	402076.11	3833710.94	757.28
61207	6.10	291.8	3.05	3.048	POINT	402078.09	3833710.94	757.28
90101	12.50	551.8	6.62	0.914	POINT	401232.61	3833498.05	758.19
90102	12.50	551.8	8.84	0.914	POINT	401243.99	3833496.09	758.19
90103	12.50	551.8	11.09	0.914	POINT	401244.11	3833498.05	758.18
90106	7.32	551.8	0.03	0.610	POINT	402026.89	3833710.94	757.26

90301*	10.67	505.2	18.29	0.305	POINT	402047.09	3833710.94	757.26
90302	10.67	505.2	18.29	0.305	POINT	402049.19	3833710.94	757.26
90401*	10.36	605.2	1.37	0.213	POINT	402051.39	3833710.94	757.26
Boeing Sources								
	2.0	430.0	430.0	2.13	AREA	399380	3833390	763.5
'*Emergency equipment not included in 1-hour NO_2 NAAQS analyses and assumed to run one hour for 24-hr PM10/PM2.5 analyses. '**Volume and area source locations above are the center of the source. Volume source has horizontal and vertical dimensions instead of temperature and velocity, respectively. Area source has X, Y, and sigma-z dimensions instead of temperature, velocity, and diameter, respectively.								

Results of the multisource inventory cumulative modeling analyses are compared to the NAAQS in Table 7-8. All modeled cumulative concentrations, when combined with background air quality data demonstrate compliance with the NAAQS.

Table 7-8
Air Quality Impact Results for
Cumulative Modeling Analysis – Ambient Air Quality Standards

Pollutant	Avg. Period	Modeled Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	National Ambient Air Quality Standard (µg/m³)
Normal Operating Conditions					
NO_2	1-hr 5-yr Avg of 98th%	N/A	N/A	111	188
PM10	24-hour H2H	6.94	80	87	150
PM2.5	24-hr 5-yr Avg of 98th%	4.86	18	23	35
	5-yr Avg of Ann Conc's	0.775	6.1	6.9	12.0
Start-up/Shutdown Periods					
NO_2	1-hr 5-yr Avg of 98th%	N/A	N/A	126	188
NO_2 impacts were evaluated using the Ozone Limiting Method (OLM), with hourly seasonal background values added consistent with USEPA modeling guidelines (so separate modeled and background values not available). PM10/PM2.5 24-hour impacts are the worst-case for 43% load Case 27 or 100% load Case 2, both of which were evaluated					

PSD increment consumption was also assessed for all modeled pollutants with impacts above the applicable SILs. This includes 24-hour and annual PM2.5 and 24-hour PM10 averaging periods and pollutants. The previous PHPP project triggered the PM2.5 baseline date in October, 2012. Any sources permitted after the baseline date must assess PM2.5 increment consumption if the modeled project impacts are above the applicable annual or 24-hour SILs. Thus, this project will be the first increment consuming source of PM2.5 in the air basin. As the source is significant for the 24-hour and annual PM2.5 averaging periods, increment consumption was assessed. As this is the first source to be permitted in the basin, it is the only increment consumer for PM2.5. For 24-hour PM10, baseline had previously been triggered. Currently, AVAQMD does not track PM10 increment consumption. Thus, all of the NAAQS cumulative inventory sources were conservatively assumed to consume PM10 increment. The results of the increment consumption analysis are presented in Table 7-9. As shown in Table 7-9, the project will demonstrate compliance with PSD increments for PM2.5 and PM10.

Table 7-9
Air Quality Impact Results for
Cumulative Modeling Analysis – PSD Class II Increments

Pollutant	Avg. Period	Modeled Concentration (μg/m^3)	PSD Class II Increment (μg/m^3)
PM10	24-hour H2H	6.93	30
PM2.5	24-hour H2H	7.07	9
	Annual Max	0.765	4

7.5 CLASS I IMPACT ASSESSMENT

According to USEPA's Draft NSR Workshop Manual, an impact analysis must be performed for any PSD source which "may affect" a Class I area Draft NSR Workshop Manual, E.16. This includes any PSD source located within 100 km of a Class I area. However, Class I areas typically within 300 km are included in this type of analysis.

PEP is a major source for criteria pollutant emissions of NOx, CO, PM10, and PM2.5 and is therefore automatically subject to PSD permitting requirements. The nearest Class I area is the San Gabriel located 35 km from the PEP (see Figure 7-7). Ten (10) additional Class I areas are within 300 km of PEP. Table 7-10 lists the minimum and maximum distances and directions from PEP to each Class I area, along with the minimum and maximum Class I elevations. These values are based on the National Park Service (NPS) Class I receptor list on the Internet (converted from latitude/longitude to UTM NAD83 coordinates).

Following the most recent FLAG Workshop procedures (June 2010), the use of the Screening Procedure (Q/D) to determine if the project could screen out of a formal AQRV assessment for visibility and nitrogen deposition was made. Following the screening procedures in FLAG, Q is calculated as the sum (in tons/year) of emissions of NO_x, SO_x, PM10/2.5, and H_2SO_4 based on the worst-case day and adjusted to reflect 365 days of operation. The screening calculation takes the form of:

Q = sum (NO_x+PM+SOx+H_2SO_4) in lbs/hr (for 24-hours) for the worst-case day * 365 days/year

The worst-case day Q scenario of 327.3 is based on one (1) warm start, one (1) hot start, two (2) shutdowns and 22.1 hours of base load with duct firing (assuming a very cold day). Three Q/D scenarios are presented based on the proposed worst-case day operational scenarios. It should be noted that this case is the hypothetical worst-case day and would only occur on an infrequent basis. D is the nearest distance to the applicable Class I area in kilometers.

If Q/D is less than 10, then no AQRV analysis is required, as shown above for the nearest Class I area. Based on the ratio of Q/D, none of the Class I areas have a Q/D of greater than 10. In coordination with the FLMs (Park Service and Forrest Service), no AQRV analyses are required, with the exception of San Gabriel Wilderness Area, where the VISCREEN model was used to assess plume blight. The screening assessment does not apply to Class I increment or NAAQS, which are based solely on the Class I

SILs. Therefore, Class I Significance modeling for increment and NAAQS was performed in order to determine if the Class I SILs would be exceeded for the major source pollutants.

Table 7-10
DISTANCES/DIRECTIONS TO NEARBY CLASS I AREAS AND ELEVATIONS AND AQRV Q/D SCREENING RESULTS

Class I Areas	Minimum – Maximum Distance (km) from PEP	Range of Directions (deg) from PEP	Range of Class I Elevations (m-amsl)	Q/D (Worst Case)
San Gabriel	35.5-48.1	144.4-170.2	540-2216	9.22
Cucamonga	61.2-67.8	129.2-138.7	1505-2635	5.35
San Gorgonio	118.3-147.0	114.6-121.4	1027-3379	2.77
Domeland	119.4-154.2	352.6-359.6	924-2826	2.74
San Rafael	140.6-187.2	270.6-284.5	366-1898	2.33
San Jacinto	149.1-174.0	122.4-129.1	546-2798	2.20
Agua Tibia	164.8-176.3	141.1-144.4	563-1483	1.99
Joshua Tree NP	164.9-276.2	103.6-116.5	183-1686	1.99
Sequoia NP	188.2-233.1	342.3-357.0	537-4029	1.74
John Muir	204.2-338.5	344.2-359.1	1704-4142	1.60
Kings Canyon	220.5-294.1	342.2-355.5	1272-4004	1.49
***Q/D based on worst case day of 1 warm start, 1 hot start, 2 shutdowns, and 22.1 hours of base load with duct burning.**				

The San Gabriel Wilderness Area is within 50 km of the PEP site location and was thus evaluated with AERMOD using the same meteorology and modeling options as used in the Class II analyses described above. The receptor data (converted to UTM coordinates in NAD83 with the U.S. Army Corps of Engineers Corpscon program, version 6.0.1) were obtained from the NPS website.

For the remaining Class I areas, the current USEPA Modeling Guidelines suggest that the use of AERMOD be limited to distances of approximately 50 kilometers. Beyond 50 kilometers, the CALPUFF dispersion model is typically used to assess the long-range transport of pollutants. However, based on the recently proposed USEPA revisions to the Guideline on Air Quality Models (80 FR 54339, July 29, 2015), an alternative modeling approach using AERMOD was utilized for assessing Class I SILs. The approach utilizes an arc of receptors at 50 km distance from the PEP, with receptors placed at two (2) degree intervals in the direction of each Class I area, with receptor heights ranging from the lowest elevation to the maximum elevation for at 100 meter intervals for each Class I area. Using this modeling grid, the Class I SILs were assessed for each Class I area with the maximum for each Class I area listed in Table 7-11. These are the maximum 24-hour or annual impacts over the 5-years modeled. The results of the Class I SIL analysis demonstrates, including the results from the normal AERMOD modeling for the San Gabriel Wilderness Area (located within 50 km distance to the project), that all modeled impacts for annual NO_2, PM10 (24-hour and annual) and annual PM2.5 will be less than the applicable Class I SILs (there are no Class I SILs for CO). Thus, no Class I increment assessment or NAAQS analysis are required for 1 and 8-hour CO, annual NO_2, 24-hour and annual PM10 and annual PM2.5.

Table 7-11
Criteria Pollutant Class I SILs

Class I Area	Ann NO_2	24-hr PM10	Ann PM10	24-hr PM2.5	Ann PM2.5
San Gabriel	0.00474	0.16628	0.00369	0.16962*	0.00376
Cucamonga	0.00091	0.01290	0.00071	0.01316	0.00072
San Gorgonio	0.00194	0.03256	0.00151	0.03321	0.00154
Domeland	0.00696	0.13245	0.00541	0.13510*	0.00552
San Rafael	0.00285	0.09104	0.00221	0.09286*	0.00225
San Jacinto	0.00428	0.12866	0.00333	0.13123*	0.00340
Aqua Tibia	0.00351	0.09244	0.00273	0.09429*	0.00278
Joshua Tree	0.00629	0.14105	0.00489	0.14387*	0.00499
Sequoia	0.00737	0.14909	0.00573	0.15207*	0.00584
John Muir	0.00046	0.00599	0.00036	0.00611	0.00037
Kings Canyon	0.00067	0.01205	0.00052	0.01229	0.00053
Class I SIL	0.1	0.3	0.2	0.07	0.06

* Exceeds the Class I SIL

Class I SILs were exceeded for the 24-hour PM2.5 averaging period for some of the Class I areas. For those Class I areas with modeled concentrations greater than the 24-hour PM2.5 SILs, the PM2.5 NAAQS inventory was evaluated using the same receptor grids and methodologies that were used to assess the Class I SILs to demonstrate compliance with the NAAQS based on the 5-year average of the annual 24-hour 98th percentile impacts. Table 7-12 presents the Class I modeling results for 24-hour PM2.5 NAAQS. As the PEP will be the first baseline increment consuming source for PM2.5, the maximum 24-hour PM2.5 project impacts presented above can be compared to the Class I increment as a conservative assessment for the 24-hour High Second-High (H2H) increment. Based on the modeling results, the project impacts are much less than the Class I increment of 2.0 *u*g/m^3 and will be in compliance with the NAAQS.

Table 7-12
Class I NAAQS Analyses
for PM2.5 by Class I Area

Class I Area	Modeled Cumulative 24-hour PM2.5 NAAQS (µg/m³)	Background (µg/m³)	Total (µg/m³)
San Gabriel	0.042	18	18.042
Cucamonga	N/A	N/A	N/A
San Gorgonio	N/A	N/A	N/A
Domeland	0.050	18	18.050
San Rafael	0.027	18	18.027
San Jacinto	0.042	18	18.042
Agua Tibia	0.036	18	18.036
Joshua Tree NP	0.049	18	18.049
Sequoia NP	0.055	18	18.055
John Muir	N/A	N/A	N/A
Kings Canyon	N/A	N/A	N/A
N/A = impact less than the SIL			35

7.5.1 VISCREEN Plume Blight Analysis for San Gabriel Wilderness

A Level-1 visual plume impact was assessed with VISCREEN as recommended by the 1988 EPA Visibility Workbook (revised 1992) for the San Gabriel Wilderness Area, which is the only Class I area located within 50 kilometers miles of the PEP. A level-1 visual analysis requires the use of assumed worst-case meteorology, rather than the use of representative on-site meteorology. This includes use of F stability and a 1-meter per second wind that carries the plume very close to a hypothetical observer located in the Class I area.

VISCREEN uses two scattering angles to calculate potential plume visual impacts for cases where plumes are likely to be brightest (10 degrees or the forward scatter case) and darkest (140 degrees or the backward scatter case). The forward scatter case yields very bright plumes because the sun is placed nearly directly in front of the observer, which tends to maximize the light scattered by the plume. This geometry would rarely occur in reality. The backward scatter case yields the darkest possible plumes as the sun is directly behind the observer. Emissions input into the model are assumed to create an infinitely long, straight plume traveling toward the specified area. The model outputs the change in light extinction in terms of Delta E and contrast against both a terrain and sky background.

For terrain viewing backgrounds, the terrain is assumed to be black and located as close to the observer and the plume as possible. This assumption yields the darkest possible background against which the particulate plumes are likely to be most visible. In reality, terrain-viewing backgrounds in the project area would be considerably less dark and would be located farther from the observer.

No adverse impact is produced when the total color contrast (Delta-E) is 2.0 or less and the plume contrast (C) is 0.05 or less. For background visual range, a value of 257 km was used, based on data provided by USFS.

Since complex terrain separates the project site and the San Gabriel Wilderness Class I area, the use of E stability is allowed based upon Workbook guidance. Several non-default options were employed in this analysis. The plume particle mass median diameter of 1.5 um and density of 1 were used since the plume is generated from the combustion of natural gas, as opposed to coal, which was used to develop the default plume parameters in the EPA workbook.

Results of the Level-1 analysis in Table 7-13 demonstrated that for the 10 degree forward scatter with terrain or sky as background Delta-E and C would not exceed the screening level of 2.0 and 0.05, respectively for the San Gabriel Wilderness Area. Delta-E and Plume Contrast (C) would also not exceed their respective screening levels for 140 degree backward scatter with sky background. Delta-E and C screening criteria would not be exceeded for 140 degree backward scatter with terrain background.

The results of the Level 1 analysis for San Gabriel Class I area, no exceedances are predicted for plume contrast or color within the wilderness area. Hence, no further analysis is required.

Table 7-13
Level 1 VISCREEN Analysis Results for San Gabriel Wilderness Area

Class I Area	Nearest Boarder (km)	Furthest Boarder (km)	Delta E				Contrast			
			Sky 10	Sky 140	Terrain 10	Terrain 140	Sky 10	Sky 140	Terrain 10	Terrain 140
Class I Visibility Analysis (inside Class I Area)	35.5	48.1	0.231	0.575	1.223	0.295	0.003	-0.008	0.009	0.003
Criteria[1]			2.00	2.00	2.00	2.00	0.05	0.05	0.05	0.05

Class I Area	Nearest Boarder (km)	Furthest Boarder (km)	Delta E				Contrast			
			Sky 10	Sky 140	Terrain 10	Terrain 140	Sky 10	Sky 140	Terrain 10	Terrain 140
Class I Visibility Analysis (inside Class I Area)	35.5	48.1	0.231	0.575	1.223	0.295	0.003	-0.008	0.009	0.003

[1] VISCREEN results are provided for the two VISCREEN default worst-case theta angles. The two theta angles represent the sun being in front of the observer (theta = 10 degrees) or behind the observer (theta = 140 degrees).

7.6 VISCREEN CLASS II VISIBILITY MODELING

A plume blight analysis was also conducted for surrounding Class II areas for emissions from the PEP. The VISCREEN model was used to conduct the plume blight analysis with a background visual range of 257 kilometers, set equal to the background visual range used for the San Gabriel Wilderness Area Class I assessment. In identifying Class II areas for assessment, it was assumed that a sensitive wilderness area would be the best candidate. Based on distances to the nearby Class II wilderness areas, three were identified:

- Sheep Mountain Wilderness Area (44.3 km from PEP)
- Magic Mountain Wilderness Area (28.3 km from PEP)
- Pleasant View Ridge Wilderness (26.5 km from PEP)

Class II visibility is not a protected resource. However, Class I visual significance criteria was applied to the Level 1 assessment for the Class II areas. A Level 1 screening analysis is the most simplified and conservative approach employing default meteorological data with no site-specific conditions. Based on the use of a Level 1 analysis, where the input data, other than distances, are identical, including the use of background visual range, the Pleasant View Ridge Wilderness was selected, as it is the closest sensitive Class II area.

As before, several non-default options were employed in this analysis. The plume particle mass median diameter of 1.5 um and density of 1 were used since the plume is generated from the combustion of natural gas, as opposed to coal, which was used to develop the default plume parameters in the EPA VISCREEN workbook. E stability was selected as the terrain elevations at Pleasant View Ridge Wilderness are above the height of the stack.
able 7-14 contains the results of the Level 1 VISCREEN analysis for the representative Class II sensitive area. NO_x and PM_{10} emissions from the PSD Permit were used for this analysis. Results of the VISCREEN analysis were compared to Class I criteria provided in FLAG. Based on the results of the modeling in Table 7-14, the plume will not be perceptible at the Class II sensitive wilderness area.

Table 7-14
Level 1 VISCREEN Analysis Results for Pleasant View Ridge Wilderness

Class II Area	Nearest Boarder (km)	Furthest Boarder (km)	Delta E				Contrast			
			Sky 10	Sky 140	Terrain 10	Terrain 140	Sky 10	Sky 140	Terrain 10	Terrain 140
Class II Visibility Analysis (inside Class II Area)	26.5	42.0	0.542	0.967	1.726	0.402	0.001	-0.014	0.009	0.004
Criteria[1]			2.00	2.00	2.00	2.00	0.05	0.05	0.05	0.05

[1] VISCREEN results are provided for the two VISCREEN default worst-case theta angles. The two theta angles represent the sun being in front of the observer (theta = 10 degrees) or behind the observer (theta = 140 degrees).

Figure 7-1

1-Hour NO2 SIA - Normal Operations

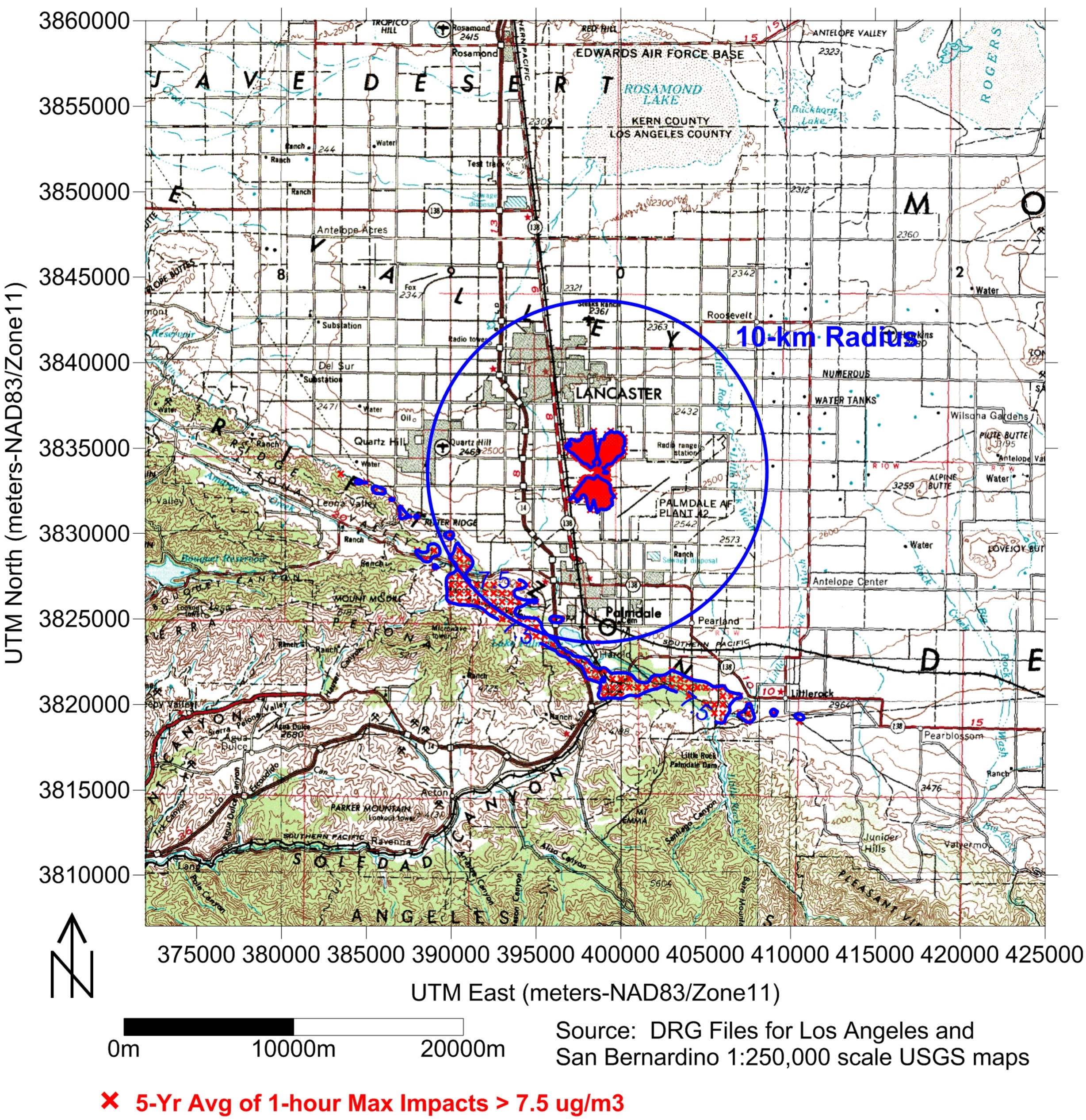
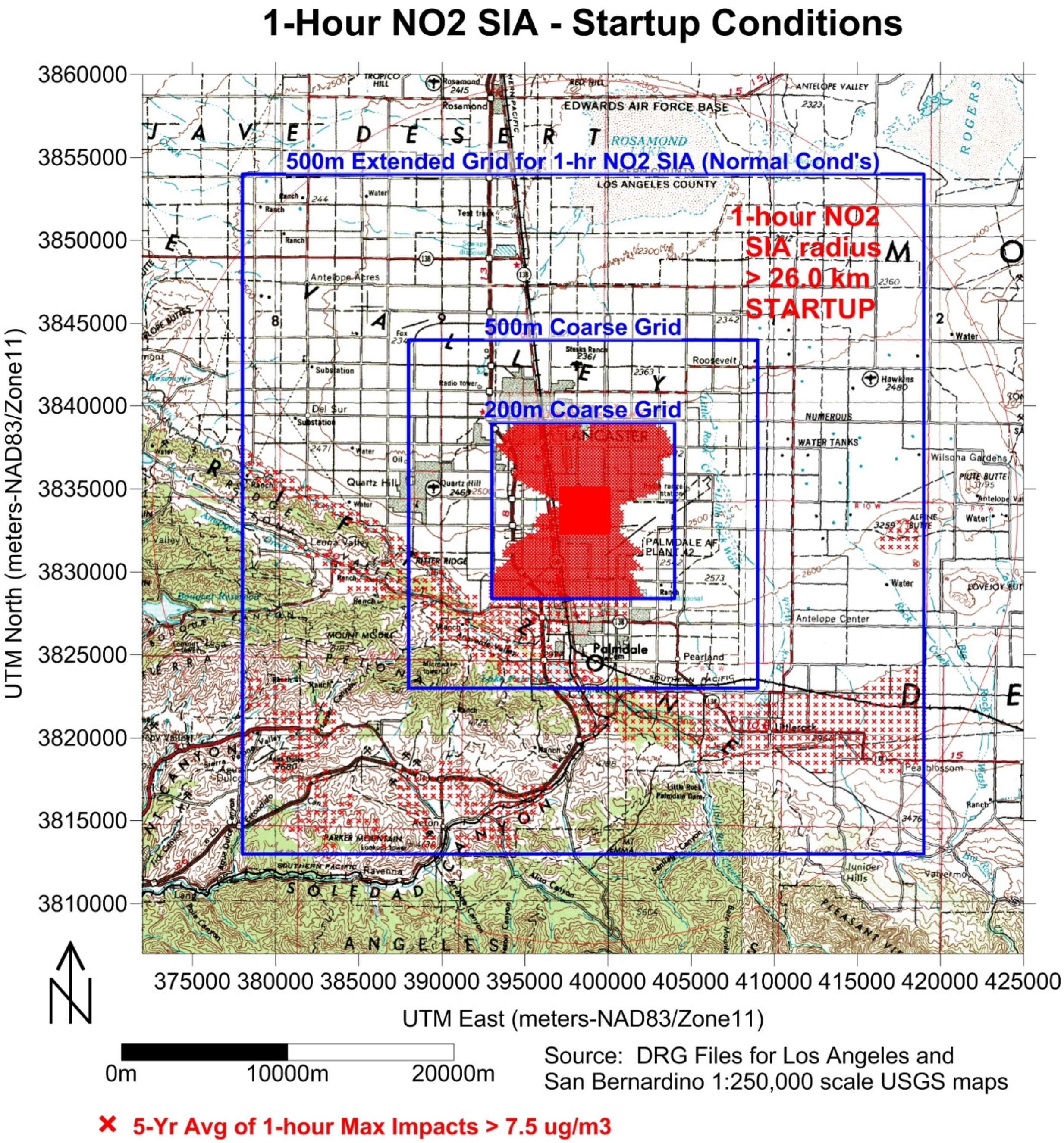


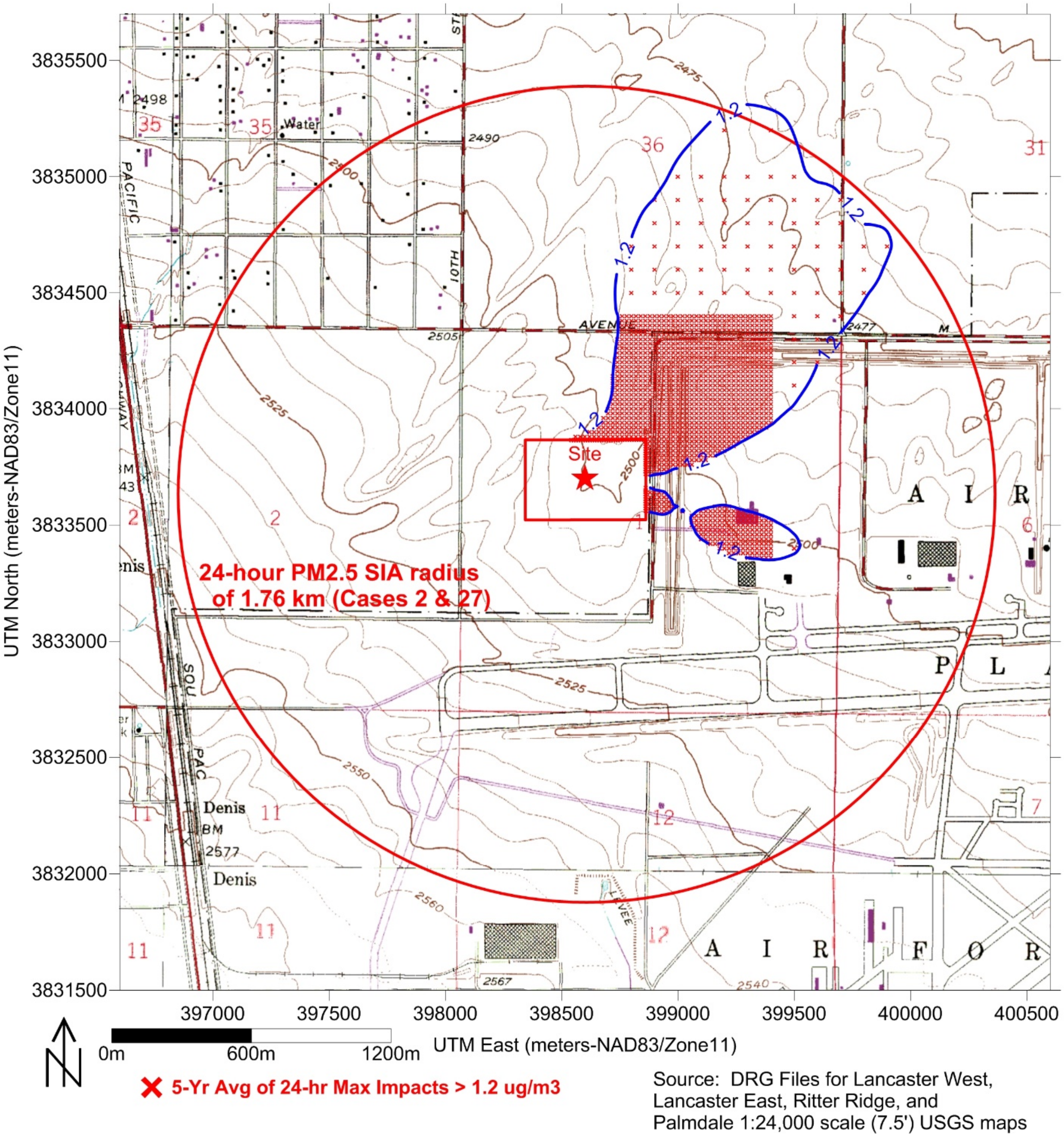
Figure 7-2



1-Hour NO2 SIA - Startup Conditions
500m Extended Grid for 1-hr NO2 SIA (Normal Cond's)
1-hour NO2
SIA radius
> 26.0 km
STARTUP
500m Coarse Grid
200m Coarse Grid
UTM North (meters-NAD83/Zone11)
UTM East (meters-NAD83/Zone11)
3860000
3855000
3850000
3845000
3840000
3835000
3830000
3825000
3820000
3815000
3810000
375000 380000 385000 390000 395000 400000 405000 410000 415000 420000 425000
N
0m
10000m
20000m
Source: DRG Files for Los Angeles and
San Bernardino 1:250,000 scale USGS maps
× 5-Yr Avg of 1-hour Max Impacts > 7.5 ug/m3

Figure 7-3

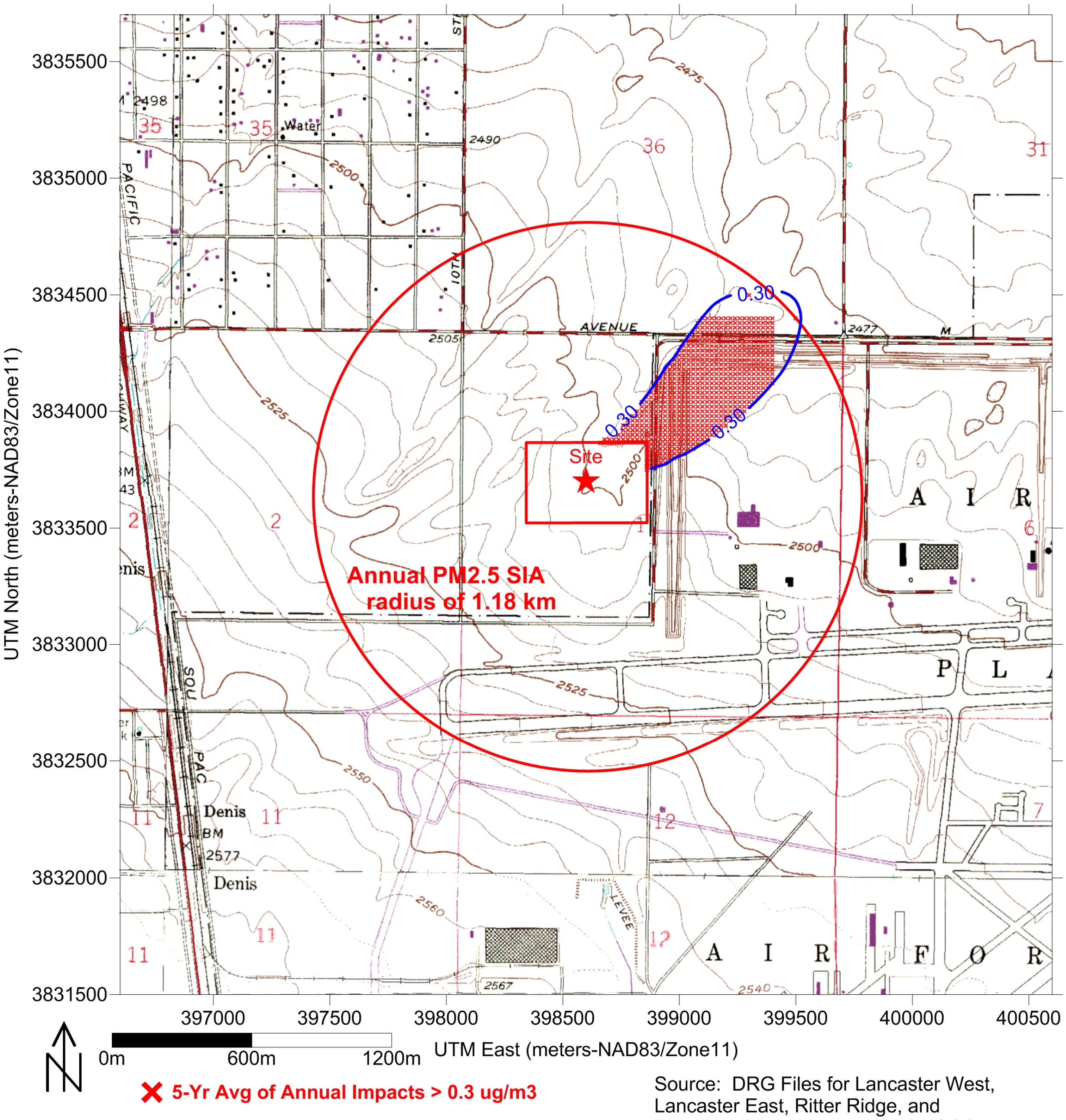
24-Hour PM2.5 SIA



Source: DRG Files for Lancaster West, Lancaster East, Ritter Ridge, and Palmdale 1:24,000 scale (7.5') USGS maps

Figure 7-4

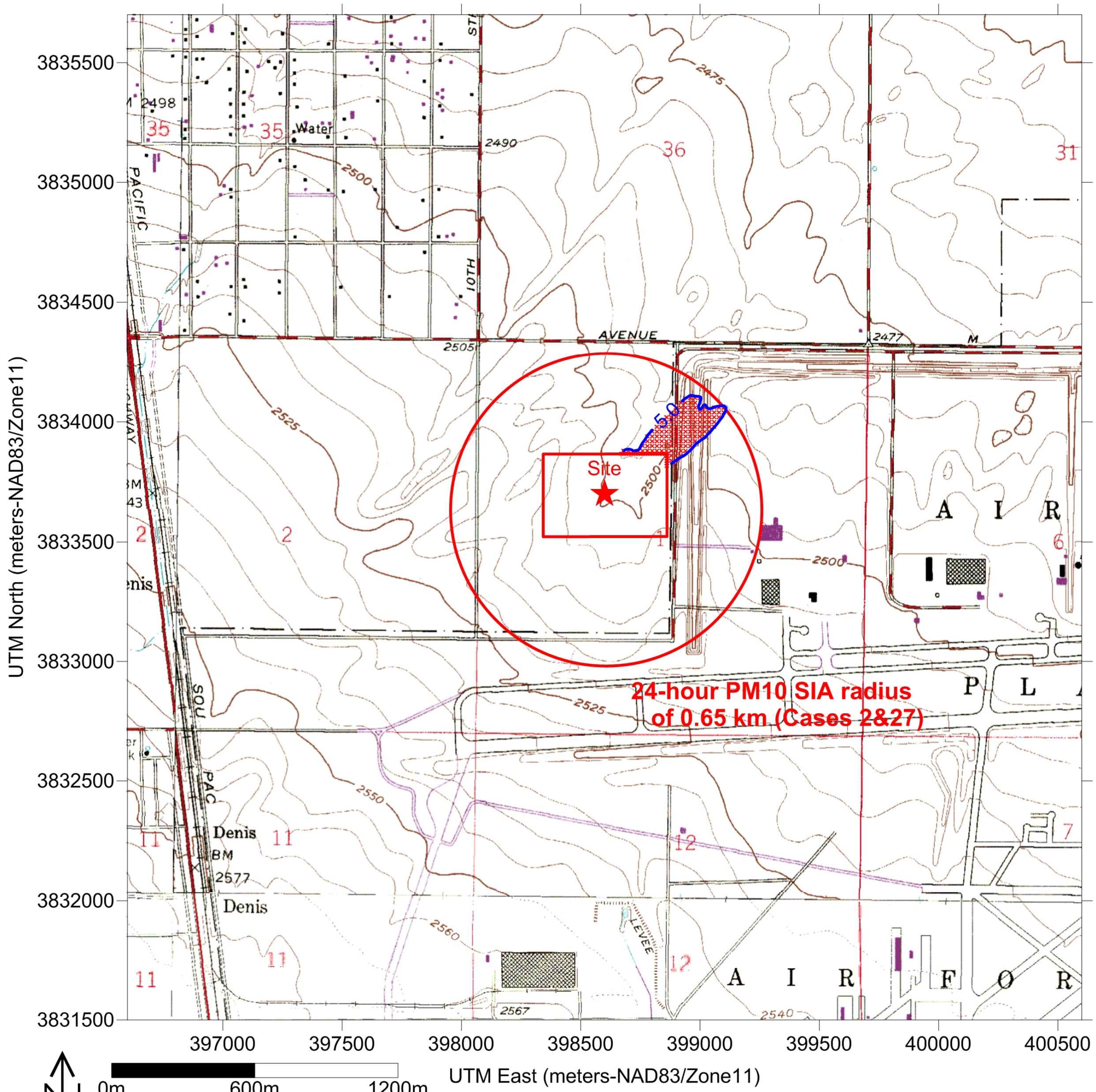
Annual PM2.5 SIA



Source: DRG Files for Lancaster West, Lancaster East, Ritter Ridge, and Palmdale 1:24,000 scale (7.5') USGS maps

Figure 7-5

24-Hour PM10 SIA



✕ **Maximum 24-Hour Impacts > 5.0 ug/m3**

Source: DRG Files for Lancaster West, Lancaster East, Ritter Ridge, and Palmdale 1:24,000 scale (7.5') USGS maps

Figure 7-6

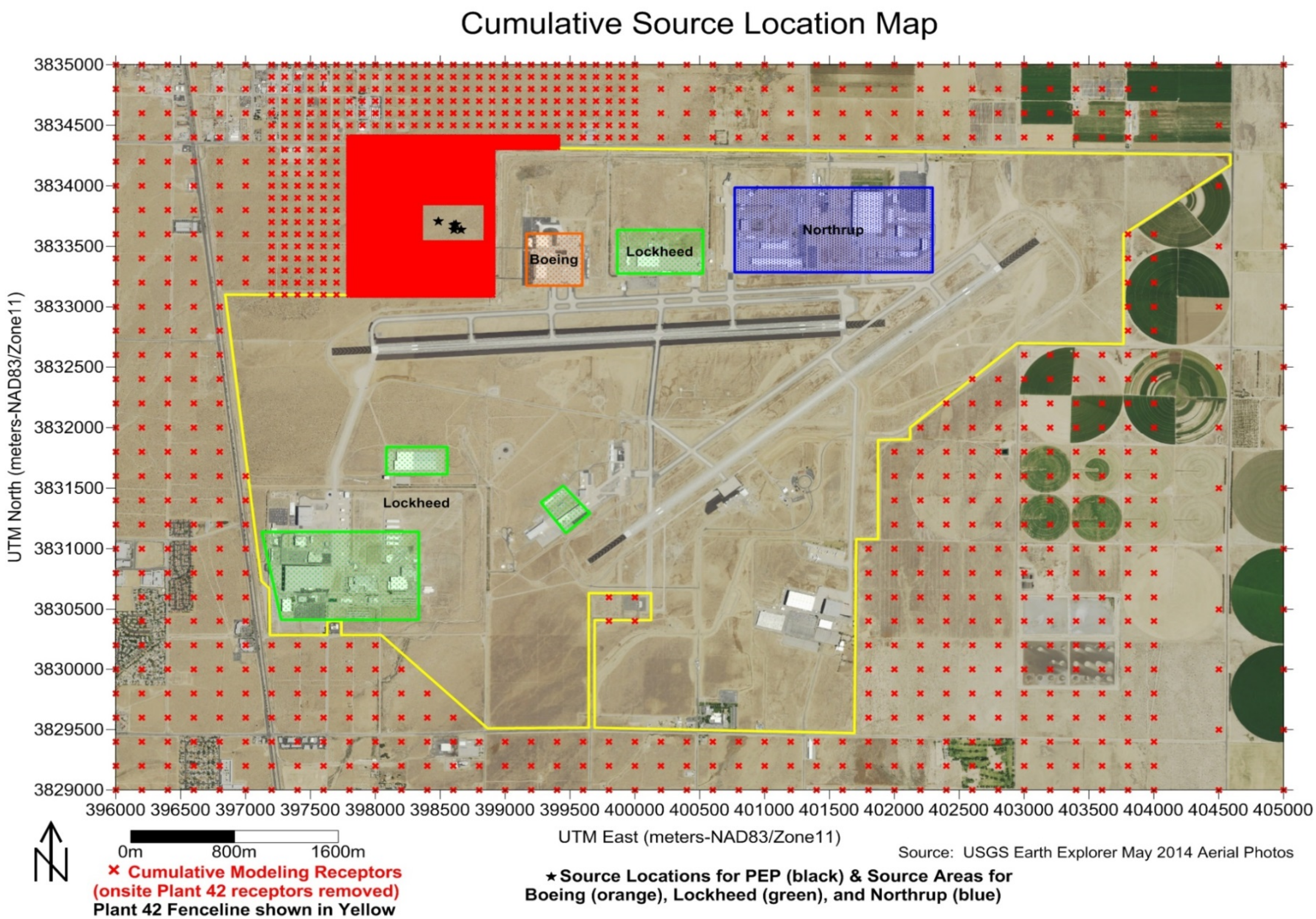
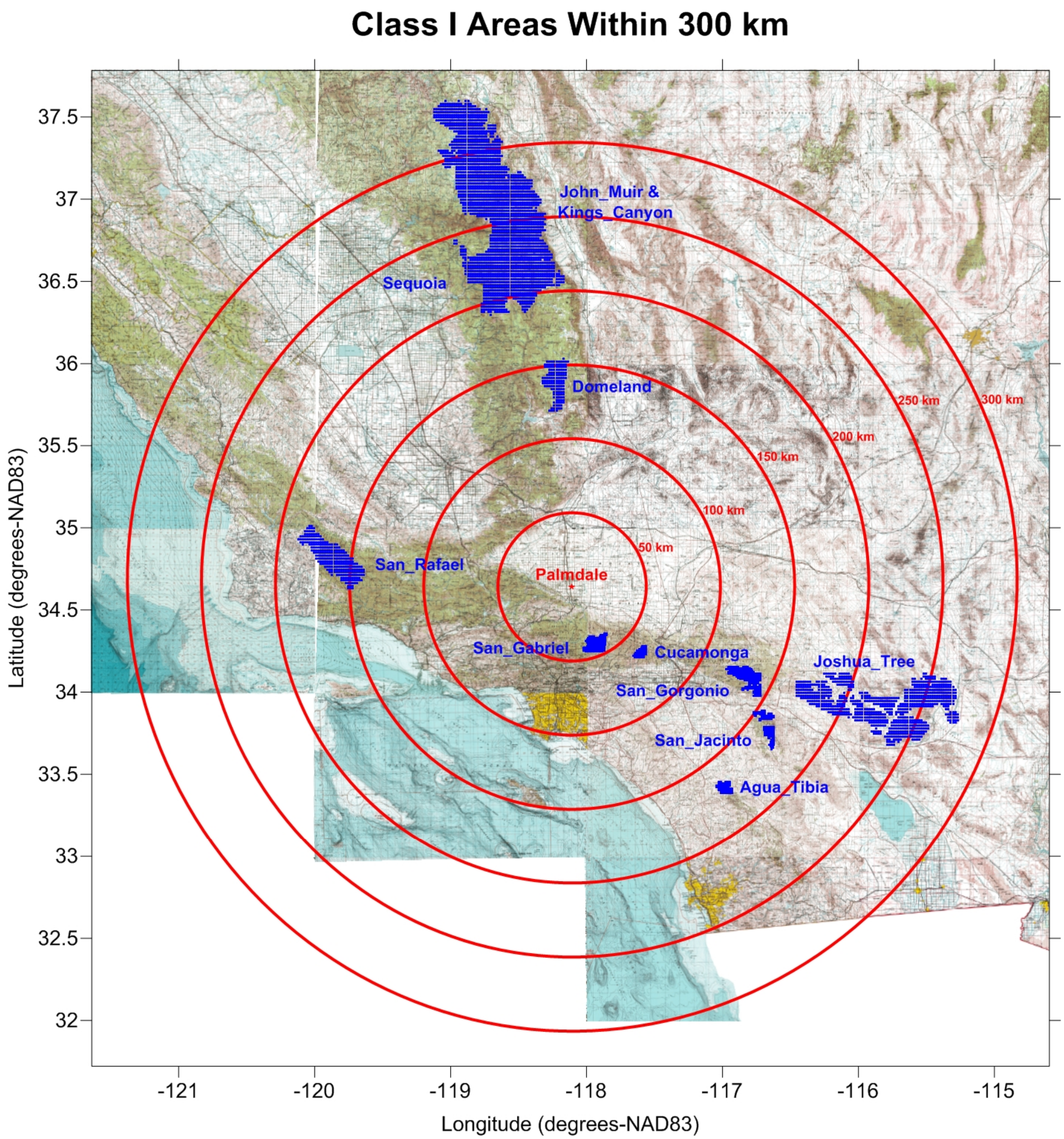

Cumulative Source Location Map
Boeing
Lockheed
Northrup
Lockheed
UTM North (meters-NAD83/Zone11)
3835000
3834500
3834000
3833500
3833000
3832500
3832000
3831500
3831000
3830500
3830000
3829500
3829000
396000 396500 397000 397500 398000 398500 399000 399500 400000 400500 401000 401500 402000 402500 403000 403500 404000 404500 405000
UTM East (meters-NAD83/Zone11)
N
0m 800m 1600m
× Cumulative Modeling Receptors
(onsite Plant 42 receptors removed)
Plant 42 Fenceline shown in Yellow
Source: USGS Earth Explorer May 2014 Aerial Photos
★ Source Locations for PEP (black) & Source Areas for
Boeing (orange), Lockheed (green), and Northrup (blue)

Figure 7-7



Class I Areas Within 300 km
John_Muir &
Kings_Canyon
Sequoia
Domeland
San_Rafael
Palmdale
San_Gabriel
Cucamonga
San_Gorgonio
Joshua_Tree
San_Jacinto
Agua_Tibia
50 km
100 km
150 km
200 km
250 km
300 km
Latitude (degrees-NAD83)
Longitude (degrees-NAD83)
37.5
37
36.5
36
35.5
35
34.5
34
33.5
33
32.5
32
-121
-120
-119
-118
-117
-116
-115

Section 8 SOCIOECONOMIC AND GROWTH IMPACTS

The socioeconomic and growth analysis presented herein was derived in its entirety and updated as needed, from the following source: *Palmdale Hybrid Power Plant, PSD Application, Supplemental Information, Section 7.0, AECOM, June 2010.* The applicant believes this analysis is still valid due to the following:

- The PEP facility is simply a redesign of the previous PHPP facility.
- The PEP facility will be located on the same site as the previous PHPP facility, but the plant footprint will be significantly smaller (50 acres vs. 333 acres).
- This 2010 analysis references the original 2009 analysis which is incorporated into this document by reference. The 2009 analysis is currently held by EPA Region 9 in the PHPP PSD file directory.

The previous AECOM analysis is as follows with revisions applicable to the PEP:

Similar to the other sections above, EPA indicated during the March 2010 conference call that the analysis of impacts due to project inducing growth provided in the PSD application submitted on April 1, 2009 was not sufficient. Specific guidance was not provided as to the improvements needed. Section 5.11, Socioeconomics, of the PHPP AFC (July 2008) analyzed the potential socioeconomic impacts of the construction and operation of the PHPP (now PEP). It included an evaluation of Project-related impacts on public services and infrastructure, as well as an evaluation of environmental justice.

The following assessment summarizes the findings of the Socioeconomics analysis that pertain to growth inducing impacts and also provides additional information regarding the growth inducing impacts associated with the provision of electricity. As defined by the California Environmental Quality Act (CEQA) Section 15126.2(d), growth inducing impacts of a proposed project shall address the ways in which the proposed project could foster economic or population growth or the construction of additional housing, directly or indirectly. This includes projects that would remove obstacles to growth and projects that would tax existing community service facilities such that construction of new facilities would be required. The PSD requirements for analyzing growth inducing impacts is specified at 40 CFR 52.21(o) which requires simply that the owner provide an analysis of general commercial, residential, industrial and other growth associated with the source or modification.

8.1 CONSTRUCTION PHASE POPULATION AND HOUSING IMPACTS

The Socioeconomics analysis in the supplemental analysis cited above concluded that nearly 350,000 construction workers are available within the combined Los Angeles, Kern, and San Bernardino county region to serve the previous Project, which was estimated to require 767 employees. The current proposed project is expected to require only 339 construction workers (average day value). The proposed Project would therefore draw from the construction work force in the region. It was assumed that few, if any, construction workers would permanently relocate to the nearby communities of Palmdale, Lancaster, Lake Los Angeles, Santa Clarita, etc. during the Project construction phase. This is because construction workers typically commute relatively long distances to their work sites. Should some construction workers choose to stay temporarily at a local area motel or hotel, there are at least 30 hotels in the vicinity (Palmdale and Lancaster) with rooms available to meet this demand. Should a portion of the workers relocate to the area for the duration of their construction assignments, impacts to available housing and population would be minor, as vacancy rates in Palmdale and Lancaster are both estimated at 3.7 percent. Construction impacts of the Project to population are therefore expected to be minimal, and the Project would not induce substantial population growth. Additionally, as the construction workforce is expected to either commute to the area or temporarily occupy the available supply of hotels or rentals in the area, the demand on the local housing supply is expected to be negligible. Construction of the Project would not result in a need for new housing.

8.2 OPERATION PHASE POPULATION AND HOUSING IMPACTS

According to the Socioeconomics analysis in the supplemental analysis cited above, the previous Project was expected to employ a total of 36 workers during operation. The proposed revised project is expected to employ 23 persons. Some of the Project operations jobs may involve relocation to the area for workers with specialized technical or managerial skills. However, as the overall size of the workforce needed for Project operation is small, population impacts would be less than significant, especially as some of these workers would likely already be residents of the local area. Further, due to the small number of workers needed for operation of the plant and the availability of local housing, operation of the Project is expected to have an insignificant impact on housing.

8.3 GROWTH INDUCING IMPACTS ASSOCIATE WITH THE PROVISION OF ELECTRIC POWER GENERATION

The purpose of the Project is to generate 645 MW (nominal) at the PEP through a natural gas-fired combined-cycle generating system. The Project will be fueled with natural gas delivered via a new natural gas pipeline.

California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system mix (e.g., wind and solar). For example, Senate Bill 1078 established the California Renewables Portfolio Standard Program (RPS) program in 2002 and required 20 percent renewable energy by 2017. In 2006, Senate Bill 107 codified an accelerated new deadline into law; 20 percent by 2010. Further, in 2008, Executive Order #S-14-08 increased the goal again to 33 percent renewable energy by 2020. In addition, the Global Warming Solutions Act (Assembly Bill 32) was passed in 2006 and requires the California Air Resources Board (CARB) to develop regulations and mechanisms aimed to reduce California's greenhouse gas emissions by 25 percent by 2020.

The Energy Commission staff-sponsored report reasonably assumes that non-renewable power plants added to the system would almost exclusively be natural gas-fueled. Nuclear, geothermal, and biomass plants are generally base load and not dispatchable. Solid fueled projects are also generally base load, not dispatchable, and carbon sequestration technologies needed to reduce the GHG emission rates to meet the EPS are not yet developed (CEC 2009). Further, California has almost no sites available to add dispatchable hydroelectric generation.

High GHG-emitting resources, such as coal, are effectively prohibited from entering into new contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, more than 18,000 GWh of energy procured by California utilities under these contracts will have to reduce GHG emissions or be replaced. This represents almost half of the energy associated with California utility contracts with coal-fired resources that will expire by 2030. If the State enacts a carbon adder or carbon tax3, all the coal contracts may be divested at an accelerated rate as coal-fired energy becomes uncompetitive due to the carbon adder or the capital needed to capture and sequester the carbon emissions. As contracts expire, new and existing generation resources will replace the lost energy and capacity. Some will come from renewable generation; some will come from new and existing natural gas fired generation (CEC 2010). PEP is a new plant that will support these goals.

While the provision of energy supports population and housing growth, the development of power infrastructure responds to an already existing demand and projected population growth. For example, year 2010 U.S. Census Bureau results showed that the Los Angeles County population was 10,718,007. The year 2010 populations of neighboring Kern and San Bernardino Counties were 1,086,113 and 2,059,420, respectively. Additionally, the total populations for Los Angeles, Kern, and San

Bernardino counties in 2010 was estimated to be 13,863,540 as compared to the 2000 population value of 11,953,913 (see Table 4-1).

These growth trends show that the Southern California region is expected to experience substantial population growth with or without implementation of the proposed PEP. Rather than induce growth, the PEP would supply energy in order to accommodate existing demand and already projected growth.

New resources like PEP will help supplement the replacement of lost generation from retired once through cooling plants. As water is a limited resource, with the use of dry cooling, this project will also be able to supplement the replacement of aging merchant power plants which rely on the use of wet cooling towers.

Finally, according to recent Draft Environmental Impact Reports (DEIRs) prepared by the Kern County Planning Department for the Pacific Wind Energy and PdV Wind Energy Projects, recent judicial review also supports the conclusion that additional energy supports existing demands and already projected growth. Plaintiffs in the 2007 Kerncrest Audubon Society v. Los Angeles Department of Water and Power case argued that the Environmental Impact Report (EIR) prepared for the Pine Tree Wind Development Project did not adequately address growth-inducing impacts of the Project. They argued that additional electricity generated by the Pine Tree Wind Development would result in additional growth in the Los Angeles area. The court, however, held that the additional electricity generated by the Project would meet the current forecast of growth in the Los Angeles area, and not cause growth. Therefore, it was not reasonable to require the EIR to include a detailed analysis of growth-inducing impacts. The conclusion reached in this case would apply equally to PEP.

Appendix E (Parts 1 and 2) contains updated socioeconomic data for the impacted region.

Section 9 BIOLOGICAL STUDIES

Biological Resources-Sensitive Plants and Animal Species

The original project included approximately 333 acres of total disturbance. The Modified Project has eliminated the solar components but is retaining the location for the power generating equipment thereby reducing the total disturbance to 70 acres (20 acres of temporary construction laydown area and 50 acres permanent area). The United States Fish and Wildlife Service (USFWS) previously consulted on the original project and issued a letter determining that the project would not likely adversely affect federally protected species and therefore no Biological Opinion and Incidental Take Statement would be required. Since the Modified Project involves the same land and there have been no new federally listed species known to occur in the project vicinity, the previous determination by the USFWS is still applicable. Therefore, no additional Biological Assessment documentation is required to support this PSD application.

The biological analyses presented herein were derived in their entirety from the following sources: (1) AFC Biological Resources, Section 5.3, July 2008, ENSR-AECOM, (2) PHPP Draft Biological Assessment, March 2009, AMEC Earth and Environmental, Inc., No. 6554000247, and (3) Addendum to the PHPP Biological Assessment, July 2011, AECOM, No. 601138227.

The applicant believes these analyses are still valid due to the following:

- The PEP facility is simply a redesign of the previous PHPP facility.
- The PEP facility will be located on the same site as the previous PHPP facility, but the plant footprint will be significantly smaller.

These documents are provided in electronic format (PDF files).

Section 10 SUMMARY AND CONCLUSIONS

The data and supporting analyses provided in this document demonstrate the following:

- All applicable requirements of the EPA are satisfied
- Emissions from the proposed modification will not cause or contribute to an exceedance of any state or federal AAQS or PSD increment
- Emission will be controlled using BACT
- Emissions will not cause detrimental effect to vegetation or soils
- Air Quality Related Values, including visibility, will be protected at all identified Class I areas
- The project will not cause significant population growth in the area.

The air quality analyses set forth in this document were conducted in accordance with EPA guidelines and requirements. Based on the results of these analyses, it is concluded that the Palmdale Energy Center will not pose an adverse threat to the maintenance of the local or regional AAQS, or to the health and welfare of the general public.

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