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April 27, 2015

Mr. Sufi Mustafa
New Mexico Environment Department
Air Quality Bureau
Modeling Section
525 Camino de Los Marquez, Suite 1
Santa Fe, NM 87505

via email: sufi.mustafa@state.nm.us

RE: Air Quality Analysis Report
Permit Number: PSD 3449-R6
Hobbs Generating Station
Hobbs, New Mexico

Dear Mr. Mustafa,

On behalf of Lea Power Partners, LLC (LPP), CAMS eSPARC is submitting the attached air quality analysis report in support of a significant revision to Prevention of Significant Deterioration (PSD) Air Quality Permit PSD 3449.

Hobbs is a natural gas fueled, nominal 600 MW net output power plant with two advanced firing temperature, Mitsubishi 501F combustion turbine generators (CTGs), each provided with its own heat recovery steam generator (HRSG) including duct burners, a single condensing, reheat steam turbine generator (STG), and an air cooled condenser serving the STG. The plant generates electricity for sale to Southwestern Public Service Company, its successors or assigns. The facility is located approximately 10 miles west of Hobbs in Lea County, New Mexico.

This permit revision is intended to resolve discrepancies between the hourly emission rate representations of some of the auxiliary equipment currently in operation at Hobbs Generating Station and the rates actually listed in the PSD permit. The initial Title V permit application (Permit P244), as submitted on June 8, 2009, included vendor representations that were never incorporated into the facility Title V or PSD permits. These representations were for auxiliary equipment, including the firewater pump diesel engine (FP-1), the standby generator diesel engine (G-1), the auxiliary cooling water towers (AC-1, AC-2 and AC-3) and the inlet chillers (IC-1, IC-2 and IC-3).

The attached report outlines the results of the Air Quality Analysis, conducted in accordance the modeling protocol submitted to NMED on April 1, 2015. The necessary adjustments to the equipment emission rates result in increased permit allowable emission rates for NOx, CO, PM_{10} and $PM_{2.5}$ from FP-1 and G-1, and increases in TSP, PM_{10} and $PM_{2.5}$ from AC-1, AC-2, AC-3, IC-1, IC-2, and IC-3. There are no required increases in SO_2 emission rates. The results of this analysis, as described in this report, demonstrate compliance with the applicable New Mexico Ambient Air Quality Standards (NMAAQS), NAAQS, and PSD Increments.

Please contact me at (281) 333-3339 x201 or via email at mjohnson@camsesparc.com, if you have any questions or need additional information.

Sincerely,

Mona Caesar Johnson, P.E.
CAMS eSPARC, LLC
Attachment: Modeling Protocol

Hobbs Generating Station
Significant Revision to NSR Permit PSD 3449-M2
Air Dispersion Modeling Report

Submitted to
New Mexico Environment Department
Air Quality Bureau

Submitted by
Lea Power Partners, LLC
Houston, Texas 77002

Prepared by
CAMS eSPARC, LLC
1110 NASA Parkway, Suite 212
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April 2015

Air Dispersion Modeling Report

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Attachments

1 PURPOSE OF MODELING

On April 1, 2015 Lea Power Partners, LLC (LPP) submitted an air dispersion modeling protocol in support of a significant revision to NSR Permit PSD 3449-M2 for Hobbs Generating Station (Hobbs). LPP is proposing a significant revision to its NSR Permit PSD 3449-M2 to resolve discrepancies between the hourly emission rate representations of some of the auxiliary equipment currently in operation at Hobbs and the rates actually listed in the PSD permit. The initial Title V permit application (Permit P244), as submitted on June 8, 2009, included vendor representations that were never incorporated into the facility Title V or PSD permits. These representations were for auxiliary equipment, including the firewater pump diesel engine (FP-1), the standby generator diesel engine (G-1), the auxiliary cooling water towers (AC-1, AC-2 and AC-3) and the inlet chillers (IC-1, IC-2 and IC-3).

No physical changes or changes in the method of operation have been made to any of these units since their initial installation at Hobbs. However, during the Title V renewal process, it was discovered that the currently authorized emission rates do not align with vendor information supplied in the original June 2009 Title V permit application. Additionally, it was discovered that the represented flow rates for the cooling towers and the inlet chillers require modifications to reflect as-built conditions. Therefore, through this permitting action, LPP is requesting that the permitted emission rates for these units be updated to reflect those achievable based on the vendor guarantees. In addition to these changes, LPP is also requesting authorization of a new 500 gallon gasoline tank, a 500 gallon diesel tank, and a 100 gallon diesel tank, which are insignificant sources of VOC and do not require a demonstration of compliance through air dispersion modeling analysis.

The necessary adjustments to these emission rates reflect increases in NOx, CO, PM_{10} and $PM_{2.5}$ from FP-1 and G-1, and increases in TSP, PM_{10} and $PM_{2.5}$ from AC-1, AC-2, AC-3, IC-1, IC-2, and IC-3. There are no required increases in SO_2 emission rates. Accordingly, LPP is submitting this modeling report to demonstrate compliance with the New Mexico Ambient Air Quality Standards (NMAAQS), NAAQS, and PSD Increments for these pollutants as required. Since these emission rate increases require a minor modification under New Source Review, an air quality analysis of 1-hour NO_2 and 1-hour SO_2 impacts was not required[1].

FP-1 and G-1 are emergency equipment that operate less than 100 hours per year and 500 hours per year, respectively. Because of their intermittent use, these emission sources were not required to be included in the original modeling for the site. However, LPP understands that an exemption from modeling requirements is no longer available for intermittent use of emergency equipment. Therefore, these sources are addressed in this air dispersion modeling analysis. However, FP-1 and G-1 have not been included in the PSD Increment Analysis. Standby and emergency equipment that operates less than 500 hours per year are not considered increment consuming sources according to New Mexico Air Quality Bureau Air Dispersion Modeling Guidelines, Revised February 18, 2014.

[1] New Mexico Air Quality Bureau Air Dispersion Modeling Guidelines, Revised February 18, 2014.

The auxiliary cooling towers and inlet chillers were constructed and operating prior to the $PM_{2.5}$ baseline date of November 2013 and the proposed emission rate corrections are de minimis. Therefore, a $PM_{2.5}$ increment analysis is not required for this permitting action. However, the PM_{10} emission rate increases are included in the significance level analysis for PM_{10}.

On April 9, NMED approved the Hobbs modeling protocol. This Air Dispersion Modeling Report summarizes the results of the NAAQS, NMAAQS and PSD analyses for NO_2, CO, TSP, PM_{10} and $PM_{2.5}$, as applicable. A summary of the applicable air quality analysis is provided in Table 1.

Table 1 – Evaluated Constituents

Constituent	NAAQS	NMAAQS	PSD Increment*
Nitrogen Dioxide (NO_2)	Annual	Annual 24-hour	Annual
Carbon Monoxide (CO)	8-hour 1-hour	8-hour 1-hour	-
Particulate Matter (PM_{10})	24-hour	-	Annual 24-hour
Particulate Matter ($PM_{2.5}$)	Annual 24-hour	-	NA NA
Total Suspended Particulate Matter (TSP)	-	Annual 24-hour 30-day 7-day	-

* G-1 and FP-1 not be included in the PSD Increment Analysis. Standby and emergency equipment that operates less than 500 hours per year are not considered increment consuming sources according to New Mexico Air Quality Bureau Air Dispersion Modeling Guidelines, Revised February 18, 2014. The auxiliary cooling towers and inlet chillers are not $PM_{2.5}$ increment consuming sources because they were in operation prior to the $PM_{2.5}$ baseline date.

2 FACILITY DESCRIPTION

Hobbs is a natural gas fueled, nominal 600 MW net output power plant with two advanced firing temperature, Mitsubishi 501F combustion turbine generators (CTGs), each provided with its own heat recovery steam generator (HRSG) including duct burners, a single condensing, reheat steam turbine generator (STG), and an air cooled condenser serving the STG. The plant generates electricity for sale to Southwestern Public Service Company, its successors or assigns. The facility is located approximately 10 miles west of Hobbs in Lea County, New Mexico.

The following sources are permitted to operate at the facility, and are not affected by this permitting action:

- Two (2) advanced gas-fired CTGs;

- Two (2) heat recovery steam generator (HRSG), including duct burners;
- One (1) steam turbine generator (STG), and
- One (1) air cooled condenser serving the STG.

The following pieces of auxiliary equipment are included in the proposed significant revision to NSR Permit PSD 3449-M2. To support the permit application, an air quality analysis was performed for the emission rate increases from the following equipment:

- Firewater pump diesel engine (FG-1);
- Standby generator diesel engine (G-1);
- Auxiliary cooling water towers (AC-1, AC-2 and AC-3); and
- Inlet chillers (IC-1, IC-2 and IC-3).

3 FACILITY IDENTIFICATION AND LOCATION

Hobbs is located approximately 10 miles west of Hobbs City in Lea County, New Mexico, an area that is classified by the United States Environmental Protection Agency (US EPA) as attainment with the NAAQS[2]. The Standard Universal Transverse Mercator (UTM) coordinates of the station are 658,413 meters East and 3,622,425 meters North, Zone 13, with NAD83 datum at an elevation of approximately 3615 feet above mean sea level.

4 AIR DISPERSION MODELING INPUTS

4.1 Model Selection

The air dispersion modeling analyses were performed using the **A**MS/**E**PA **R**egulatory **MOD**el (AERMOD) (version number 14134). The AERMOD model was selected because it is approved by the EPA as a Preferred/Recommended model and is also approved by the New Mexico Air Quality Bureau modeling staff.

AERMOD is a steady-state plume dispersion model for assessment of pollutant concentrations from a variety of sources. AERMOD estimates ground-level pollutant concentrations due to multiple point, area, or volume sources based on an up-to-date characterization of the atmospheric boundary layer. The model employs hourly sequential preprocessed (AERMET) meteorological data. The AERMOD model is applicable to receptors on all types of terrain, including flat terrain, simple elevated terrain (below height of stack), intermediate terrain (between height of stack and plume height), and complex terrain (above plume height). In addition, AERMOD provides a smooth transition of algorithms across these different terrains. Therefore, AERMOD was selected as the most appropriate model to perform

[2] http://www.nmenv.state.nm.us/aqb/

the air quality impact analyses. The Oris Solutions, LLC software program "BEEST for Windows" was be used as the interface to set up the model inputs and perform the model runs.

4.2 Emission Rates

All averaging periods were modeled using the maximum short-term and long-term emission rates proposed in the permit application. The emergency equipment (FP-1 and G-1) operates less than 500 hours per year each. For these sources, use of an annual average emission rate is proposed for comparison to the annual standard. In addition, these sources do not operate for more than 6 hours in any 24-hour period. Accordingly, the emission rate for the 24-hour averaging periods were adjusted to reflect the operating scenario by multiplying the maximum hourly proposed emission rate (lb/hr) by 6 (hr) and dividing it by 24 (hr).

The auxiliary cooling towers (AC-1, AC-2, and AC-3) were included in the original modeling analysis for the initial pre-construction authorization. Each tower (referenced as AUX1, AUX2, and AUX3 in the February 2007 Modeling Summary) was modeled at the total rate for all three towers (0.02 lb-PM_{10}/hour). Therefore, the original modeling represented emission rates higher than the proposed correction (0.013 lb-PM_{10}/hour) per tower and no additional modeling is necessary for PM_{10}. However, $PM_{2.5}$ was not required to be modeled at the time the original permit application was submitted. Both PM_{10} and $PM_{2.5}$ emission rates were modeled to support the demonstration of compliance with the applicable NAAQS for the current significant revision application.

The Inlet Chillers (IC-1, IC-2, and IC-3) were included in the original modeling analysis for the initial pre-construction authorization. Each tower (referenced as CHILL1, CHILL2, and CHILL3 in the February 2009 Modeling Summary) was modeled at the total rate of 0.01 lb-PM_{10}/hour per each of four cells which is less than the proposed rate, based on vendor-supplied flow rates, of 0.03 lb-PM_{10}/hour for each of the four cells. Also, $PM_{2.5}$ was not required to be modeled at the time the original permit application was submitted. Both PM_{10} and $PM_{2.5}$ emission rates were modeled to demonstrate compliance with the NAAQS for the current significant revision application.

The gasoline tank and the diesel tanks are insignificant sources and are not required to be addressed in this air dispersion modeling analysis.

4.3 Terrain Data

The terrain height difference between the modeled source and each receptor may vary. For each source/receptor combination, the relationship may be characterized as flat terrain, simple terrain, intermediate, or complex terrain. This variation affects the dispersion and the relative plume height of modeled sources. The terrain surrounding Hobbs is generally flat with some minor elevation changes.

The terrain data and elevations obtained from the air dispersion modeling files submitted for the original permit application (October, 2006) were used. Additional terrain data needed for the receptors, sources, buildings base, and controlling hill elevations was obtained from the most recent 7.5 minute DEM data currently available and the AERMAP processing program. AERMAP is a preprocessor program which processes the terrain information to provide inputs to AERMOD. The output from AERMAP provides not only base elevations for the receptors, but also an effective "hill height" that enables AERMOD to make more realistic simple to complex terrain concentration calculations. The AERMAP processing files are provided electronically on the CD included as Attachment A.

4.4 Building Wake Effects

Building wake effects occur when the air flow around buildings influences the dispersion of pollutants. A building wake (downwash) analysis was performed to determine appropriate downwash parameters for the major structures at the facility. Downwash parameters were calculated using the latest version of the EPA Building Profile Input Program (BPIP-PRIME, version number: 04274). Approximate rectangles were used to assess the building wakes effects of irregularly shaped structures. Only structures that are solid all the way to ground level or significantly obstruct air flow are included in the downwash analysis. In addition, the AERMOD POINTCAP and POINTHOR beta options for capped and horizontal stacks were used.

The BPIP-PRIME input and output files are included in Attachment A. A summary of downwash structures and heights is provided in Table 2.

Table 2 – Downwash Structures and Heights

Building Modeling ID	Height (m)
HRSGA1	25.78
HRSGA2	25.78
STEAM	17.68
CONTROL	6.10
HRSGB1	25.78
HRSGB2	25.78
ADMIN	6.10
CHILLER1	15.24
CHILLER2	15.24
CHILLER3	15.24
AUX	15.24
AI_02	4.57
AI_01	4.57
TK_01	10.67
TK_02	10.67
TK_03	10.67
TK_04	10.67
TK_05	10.67
MakeUpW	6.10
FHBLDG	3.66

4.5 Urban/Rural Classification

The land surrounding Hobbs in all directions is open country with no significant development. Therefore, rural dispersion coefficients were used with AERMOD model.

4.6 Receptor Grid Description

The receptor grid defines the locations at which the ground level impacts are calculated based on the dispersion of the emissions from the sources in the model input. For each pollutant, the radius of significant impact around facility is established using a Cartesian grid that extends 10-kilometers in all directions from the property boundary. The grid starts at the fenceline that restricts public access to the plant. The location of all project emission sources is known. Receptor spacing follows the guidance provided by New Mexico Air Quality Bureau[3]. A 50-meter grid spacing was used for the facility boundary receptors. A 100-meter spacing extends out to 1-km from the facility boundary in each direction for a fine grid resolution. Following the 100-meter spacing grid, receptors were placed with 250-meter spacing to a distance of 2.5-km from the facility boundary. For intermediate and rough grid resolutions, 500-meter spacing and 1000-meter spacing were extended to 5-km and 10-km beyond the facility boundary, respectively. The elevations of facility sources, receptors and surrounding sources were determined using the most recent 7.5 minute DEM data currently available.

4.7 Meteorological Data

The meteorological data from the Empire Abo station was used for this project. This meteorological data set is recommended by NMED Air Quality Bureau for the eastern New Mexico and it is considered to be representative of meteorological conditions at the facility. The one-year met data set, EMPABO_93-4.zip, collected in 1993-1994 and available on the New Mexico Environmental Department website[4] was used.

4.8 NO_2 Conversion

A Tiered approach was used to asses NO_2 emissions from the combustion equipment.

- Tier 1: Tier 1 a total conversion of NOx to NO_2. As a first step in the modeling process, total NOx emissions are assumed equivalent to NO_2 emissions. If compliance with the significance level is not demonstrated using this level of analysis, Tier 2 is applied.
- Tier 2: Tier 2 is a fixed rate conversion technique. The fixed rate of conversion of 75%, which is the Ambient Ratio Method (ARM) default adopted in the Guideline on Air Quality Models, is applied to the source specific NOx emission rates. A 40% conversion from NOx to NO_2 can be used for demonstrating compliance with the 24-hour NO_2 NMAAQS, provided that an in-stack NO_2/NOx ratio of 0.4 or below can be justified.
- Tier 3: Tier 3 utilizes ozone reaction techniques. There are two methods that take into account the ozone that mixes into the plumes and encourages NO_2 formation: Ozone Limiting Method

[3] "Air Dispersion Modeling Guidelines", New Mexico Air Quality Bureau, Revised February 18, 2014
[4] http://www.nmenv.state.nm.us/aqb/modeling/metdata.html

(OLM) and Plume Volume Molar Ratio Method (PVMRM). Both these techniques are accepted and are built into AERMOD.

The analysis for the annual NO_2 averaging period was performed using a Tier 1 full conversion approach. Meanwhile, the short term 24-hr NO_2 analyses were performed using Tier 2 NOx to NO_2 conversion factors. For the Tier 2 approach, a fixed 80% NOx to NO_2 conversion factor was applied to the firewater pump diesel engine (FP-1), the standby generator diesel engine (G-1) and the off property sources. For the CTGs, a 40% NOx to NO_2 conversion factor was used since the industry recommended average NO_2/NOx in-stack ratio of .091[5] for these sources justifies the use of a 40% factor.

5 RADIUS OF IMPACT (ROI) ANALYSIS

A significant impact analysis was conducted for the NO_2, CO, TSP PM_{10}, and $PM_{2.5}$ emissions to determine if predicted concentrations warrant a Cumulative Impact Analysis (CIA) or any further evaluation. For the ROI analysis, the modeled ground level concentrations due to operation of the project were compared to the corresponding air quality Significant Impact Levels (SILs).

If the pollutant does not result in an ambient impact greater than the SIL established in the New Mexico Environmental Department modeling guidelines, then the ROI is considered zero for the analyzed standard or increment. If the ambient impact of the pollutant is greater than the significance level, the maximum extent of the significant impact area was determined, which is measured from the center of the facility sources to the furthest extent of significant impact. The maximum extent represents the ROI. The area within the ROI becomes the modeling domain for the CIA.

The maximum off-property modeled concentrations were below the SILs for all pollutants and averaging periods except for the 24-hour NO_2 and 24-hour $PM_{2.5}$ SILs. Consequently, a CIA was performed for the 24-hour NO_2 NMAAQS, and 24-hour $PM_{2.5}$ NAAQS, discussed in Section 6. The results of the ROI analysis are summarized in Table 3 and the electronic modeling files are provided in Attachment A.

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[5] CAPCOA Engineering Managers, CAPCOA, "Modeling Compliance of The Federal 1-Hour NO2 NAAQS" October 2011, Appendix C, Page 58

Table 3 – ROI Analysis Results

Pollutant	Averaging Period	Modeled Concentration (µg/m^3)	SIL (µg/m^3)
NO_2	24-hour	44.44	5
	Annual	0.44	1
CO	1-hour	184.69	2,000
	8-hour	83.16	500
TSP[1]	24-hour	1.98	5
	Annual	0.16	1
PM_{10}	24-hour	1.57	5
	Annual	0.083	1
$PM_{2.5}$	24-hour	1.16	0.3
	Annual	0.0093	1.2

(1) There are no significance levels for the 30-day or 7-day averages. It is assumed that if a receptor is not significant for annual and 24-hour periods, then it is not significant for the other periods.[6]

6 CUMULATIVE IMPACT ANALYSIS

The CIAs were performed including the impacts from all the Hobbs sources (on-property sources), and any other sources within 50 Km plus the ROI or 65 km of Hobbs, whichever is greater (off-property sources). The purpose of the CIA is to show that the proposed project concentrations (maximum modeled impact concentrations plus background concentrations) do not cause or contribute to a NAAQS/NMAAQS violation. An inventory of the surrounding sources was obtained from the Merge Master regional sources database. The background concentrations used for the CIAs were obtained from the New Mexico Air Quality Bureau[7].

The modeling results for the CIAs are provided in Table 4. The results demonstrate compliance with the 24-hour NO_2 NMAAQS, and the 24-hour $PM_{2.5}$ NAAQS. The electronic modeling files are provided in Attachment A.

[6] "Air Dispersion Modeling Guidelines", New Mexico Air Quality Bureau, Revised February 18, 2014

[7] "Air Dispersion Modeling Guidelines", New Mexico Air Quality Bureau, Revised February 18, 2014

Table 4 – CIA Results Summary

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration [1] ($\mu g/m^3$)	NMAAQS/NAAQS Standard ($\mu g/m^3$)
NO_2	24-hour	149.61	0.10	149.71	188.06
$PM_{2.5}$	24-hour	5.56	12.4	17.96	35

(1) Total Concentration ($\mu g/m^3$) = Modeled Concentration ($\mu g/m^3$) + Background Concentration ($\mu g/m^3$)

Total Concentration ($\mu g/m^3$) = 149.61 + 0.10 = 149.71 ($\mu g/m^3$)

7 CLASS I AREAS ANALYSIS

The nearest Class I area to the proposed power station is Carlsbad Caverns National Park (Eddy County, NM), located approximately 120 km southwest of Hobbs. Since this Class I area is located at a distance greater than 100 km from the proposed site, it may be assumed that Hobbs has negligible impact at this distance and a Class I Area Impact Analysis is not required.

8 SECONDARY $PM_{2.5}$ FORMATION

$PM_{2.5}$ is either directly emitted from a source (primary emissions) or formed through chemical reactions with SO_2 and NO_X already in the atmosphere (secondary formation). Secondary $PM_{2.5}$ formation due to chemical transformations occurs slowly, often over hours or even days, depending on atmospheric conditions and other variables. As the SO_2 and NO_x plume travels, it becomes increasingly diffuse. Thus, the secondary $PM_{2.5}$ ground-level impacts typically occur at some distance from associated precursor gaseous emission sources. Any ground-level impacts are expected to be considerably smaller than the impacts associated with directly emitted $PM_{2.5}$ and are unlikely to overlap with nearby maximum primary $PM_{2.5}$ impacts.

EPA has not recommended a near-field model that includes the necessary chemistry algorithms to estimate secondary impacts in an ambient air analysis. On May 20, 2014, EPA issued the document *Guidance for $PM_{2.5}$ Permit Modeling* that outlines approaches for addressing secondary $PM_{2.5}$ formation. The EPA promulgated Significant Emissions Rate (SER) for $PM_{2.5}$ and its precursors, NO_x and SO_2. The $PM_{2.5}$ SER for direct emissions, defined as 10 tpy, and the $PM_{2.5}$ precursors SERs, defined as 40 tpy for both NO_x and SO_2. Based on this guidance, the proposed permit revision falls into "Case 1: No Air Quality Analysis" category due to the direct $PM_{2.5}$ emissions being less than the 10 tpy SER and the SO_2 and NO_x emissions being less than the 40 tpy SER. According to EPA's draft guidance, for Case 1 category sources, no air quality analysis is necessary for these sources to account for $PM_{2.5}$ secondary formation.

9 OZONE ANALYSIS

The proposed NO_x emission rate for the PSD permit revision is less than 100 tpy; therefore, an ozone screening analysis is not required for this project.

Attachment A

Air Dispersion Modeling Electronic Files