Attachment B:

Modeling Review Summary Document

Modeling Review Summary Document

The Texas Commission on Environmental Quality review of American Electric Power Service Corporation's modeling of the Oklaunion Power Station.

Introduction

The August 2015 "Data Requirements Rule" (DRR) for the 2010 SO_2 National Ambient Air Quality Standard (NAAQS) requires states to identify the sources within their borders emitting 2,000 or more tons per year of SO_2 in order to determine where further evaluation for the purposes of air quality characterization is needed. The Texas Commission on Environmental Quality (TCEQ) submitted a list to the United States Environmental Protection Agency (EPA) in early 2016 identifying sources with SO_2 emissions at or above the DRR-specified threshold. On May 4, 2016, the EPA concurred with the TCEQ's list of sources subject to the DRR. The DRR required air agencies to notify the EPA by July 1, 2016 of the air quality characterization method planned to evaluate each of the areas where the sources subject to the DRR are located. On June 29, 2016, the TCEQ notified EPA of plans to utilize modeling to characterize air quality for the Oklaunion Power Station and surrounding Wilbarger County. The TCEQ also provided a modeling protocol to the EPA, as required by the DRR.

On December 19, 2016, American Electric Power Service Corporation (AEPSC) submitted modeling to the TCEQ to demonstrate compliance with the 2010 SO_2 NAAQS by the Oklaunion Power Station as required in the DRR. Revised modeling files were submitted to the TCEQ on January 3, 2017. The TCEQ Air Permits Division (APD) reviewed the modeling and this document provides a summary of the modeling review. The complete modeling report is located in Attachment C.

Project Identification

The Oklaunion Power Station consists of one electric generating unit located near the Oklahoma border, approximately 12 kilometers (km) southeast of Vernon, Texas. The area around the plant is classified as rural for purposes of air quality modeling as there are no towns or areas with significant population in the vicinity of the plant. The modeling used actual operating conditions and meteorological data for the period 2013 to 2015. The modeling followed the approaches detailed in the modeling protocol submitted to EPA in June 2016, and is consistent with EPA's SO_2 NAAQS Designations Modeling Technical Assistance Document.

Model Used and Modeling Techniques

AEPSC used Version 15181 of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). AERMOD Version 15181 was the regulatory version of AERMOD at the time AEPSC conducted the modeling. The AERMOD modeling used regulatory default options.

A. Land Use

AEPSC performed a land use/land cover analysis using AERSURFACE consistent with guidance given in the AERMOD Implementation Guide (August 3, 2015). The recommended input data, the National Land Cover Data 1992 archives (NLCD92), were used for this analysis. The AERSURFACE analysis calculated albedo, Bowen ratio, and surface roughness were used to develop the meteorological data set.

AEPSC determined terrain elevations within the modeling domain using AERMAP (Version 11103). The input data used for this analysis were National Elevation Data (NED) data obtained from the United States Geological Survey (USGS).

B. Meteorological data

AEPSC used meteorological data for years 2013-2015 in the modeling analysis. AERMET (Version 15181) was used to process raw surface and upper air meteorological data.

AEPSC used AERMINUTE (Version 15272) to process one- and five-minute wind data to generate hourly average winds for input to AERMET.

Surface Station and ID: Wichita Falls, TX (Station # 13966)
Upper Air Station and ID: Fort Worth, TX (Station #: 3990)
Meteorological Dataset: 2013-2015
Profile Base Elevation: 313.9

These meteorological stations are the nearest stations to the Oklaunion Power Station containing the required input data for AERMET and AERMINUTE. The meteorological stations are representative to use given that there are no significant terrain barriers between the site and the meteorological stations.

Though AEPSC did not process meteorological data for the last six hours of years 2013, 2014, and 2015, the final results are not affected based on modeling conducted by the APD that includes meteorological data for the last six hours of each of the three years.

C. Receptor Grid

The receptor grid AEPSC used in the modeling analysis began at the Unit 1 stack with a spacing of 100 meters (m) and extended out to 4 km from the stack; a spacing of 250 m from 4 km to 9 km from the stack; a spacing of 500 m from 9 km to 16 km from the stack; a spacing of 1000 m from 16 km to 26 km from the stack; and a spacing of 2000 m from 26 km to 52 km from the stack.

D. Building Wake Effects (Downwash)

AEPSC developed downwash parameters using BPIP-Prime (version 04274). The APD validated and found the buildings are generally consistent with aerial photography. Three buildings (building IDs LSTRUCK, SVCBLDG, EQPSTRG) were not consistent with aerial photography. However, these buildings are not the dominant downwash structures and will not affect the final results.

Modeling Emissions Inventory

The emission source coordinates are in the Universal Transverse Mercator (UTM) Zone 14 North, North American Datum of 1983 (NAD83) coordinate system. The APD validated the location of the emission source using aerial photography. The following table lists the emission source parameters used in the modeling.

Table 1. Point Source Parameter Information

Unit	Modeled Source ID	Easting (meters)	Northing (meters)	Stack Height (meters)	Stack Temperature (K)	Stack Exit Velocity (meters/sec)	Stack Diameter (meters)
Unit 1	SN01	483787	3771326	137.9	variable	variable	7.01

The exhaust flue at Oklaunion Power Station has Continuous Emissions Monitor Systems (CEMS) installed and operating that measure SO_2, flow, temperature, and other parameters specified in 40 Code of Federal Regulation 75. The hourly data elements listed as "Variable" in Table 1 denote the use of actual hourly conditions based on CEMS and other operating data sources. AEPSC prepared an hourly emissions file based on the actual hourly emissions, actual operating temperature, and actual exit velocity for years 2013-2015.

The Oklaunion Power Station includes an emergency generator and a diesel fire pump which have the potential to emit SO_2. The emergency generator and diesel fire pump are not included in the modeling analysis since they can be considered intermittent sources. The EPA has noted through guidance that compliance demonstrations for the 1-hour SO_2 NAAQS should be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. The emergency generator operated for 3.1 hours in 2013, 6.4 hours in 2014, and 5.3 hours in 2015. The diesel fire pump operated for 6.4 hours in 2013, 7.3 hours in 2014, and 22.8 hours in 2015. Based on the limited hours of operation, the emergency generator and diesel fire pump meet the intent of the intermittent guidance and it was appropriate to exclude the sources from the modeling analysis.

With respect to other nearby sources of SO_2, the Oklaunion Power Station is a relatively isolated source. TCEQ emissions inventory data from 2015 lists one source located within 15 km with approximately 1 ton of reported SO_2 emissions. Given the distance and magnitude of emissions, this source would not be expected to cause a significant concentration gradient in the vicinity of the Oklaunion Power Station, and the emissions are sufficiently represented in the analysis via monitored background concentrations. There are no other sources in Wilbarger County that reported SO_2 emissions for 2015.

Modeling Results

The predicted maximum ground level concentration (GLCmax) is 34.06 µg/m³, and this represents a three-year average of the high, fourth high (or 99th percentile) maximum daily 1-hour concentrations. The location of the GLCmax is approximately 3500 m from the modeled stack to the west-northwest. Table 2 lists the location of the predicted GLCmax. The location is in the UTM Zone 14 NAD83 coordinate system.

Table 2. Modeling Results

Easting (meters)	Northing (meters)	Averaging Time	GLC (µg/m³)	Background (µg/m³)	Total (µg/m³)	Standard (µg/m³)
480387	3771926	1-hr	34.06	7.9	41.96	196

Background concentrations were obtained from the EPA Aerometric Information Retrieval System (AIRS) monitor 40-109-1037 located at 2501 E. Memorial Rd., Oklahoma City, Oklahoma. The three-year average (2013-2015) of the 99th percentile of the annual distribution of the maximum daily 1-hour concentrations was used for the 1-hour value. The use of this monitor is reasonable given the lack of SO_2 sources in both the area around the Oklaunion Power Station and the Oklahoma City monitor.

Based on the results listed in Table 2, the Oklaunion Power Station demonstrates compliance with the 1-hour 2010 SO_2 NAAQS when modeled with actual operational data and meteorological data for years 2013-2015.