

Taylor Energy Center Preliminary PSD Class II Modeling

Overview

Taylor Energy Center (TEC) preliminary air quality impacts with respect to Prevention of Significant Deterioration (PSD) Class II increment consumption and the Florida Ambient Air Quality Standards (AAQS) were estimated using the EPA AERMOD dispersion model, five years of hour-by-hour meteorological data, and a comprehensive receptor grid. Each of these major modeling issues, as well as the modeling results, is discussed in the following sections.

AERMOD Model

The AMS/EPA Regulatory Model (AERMOD) modeling system was used to conduct the ambient air impact analysis. EPA approved use of AERMOD as a Guideline on Air Quality Modeling (GAQM) Appendix A preferred model effective December 9, 2005. AERMOD is recommended for use in a wide range of regulatory applications, including both simple and complex terrain. The AERMOD modeling system consists of meteorological and terrain pre-processing programs (AERMET and AERMAP, respectively) and the AERMOD dispersion model. The latest version of AERMOD (Version 04300 – October 27, 2004) was used to assess TEC air quality impacts at receptors located within 50-km of the project site.

Meteorological Data

The AERMOD meteorological preprocessor AERMET (Version 04300) was used to process surface and upper air meteorological data collected at the Tallahassee Municipal Airport (Weather Bureau, Air Force and Navy [WBAN] Station No. 93805). Raw surface and upper air data for the years 2000 to 2004 was obtained from the National Climatic Data Center (NCDC). Missing surface and upper air data (i.e., data gaps) were filled in accordance with EPA guidance.

Receptor Grids

Receptors were placed at locations considered to be *ambient air*, which is defined as “that portion of the atmosphere, external to buildings, to which the general public has access.”

Consistent with GAQM and FDEP recommendations, the ambient impact analysis used the following Cartesian receptor grids:

- Near-Field Cartesian Receptors: Receptors beginning from the main boiler stack and extending out to 3 kilometers (km) at 100-meter spacing.
- Mid-Field Cartesian Receptors: Receptors between 3 km and extending to approximately 6 km at 250-meter spacing.

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- Far-Field Cartesian Receptors: Receptors between 6 km and extending to approximately 15 km at 500-meter spacing.

Model Results

A summary of the PSD Class II area modeling results are provided on Table 1. TEC impacts for all PSD pollutants are below the PSD significant impact levels (SILs) with one exception - the highest 24-hour average sulfur dioxide (SO₂) impact of 5.8 µg/m³ exceeded the PSD SIL of 5.0 µg/m³ by 15 percent.

TEC air quality impacts are projected to be well below the PSD Class II increments and FAAQS. The highest Taylor Energy Center 24-hour average SO₂ impact is only 6.4 and 2.2 percent of the PSD Class II increment and FAAQS, respectively. TEC air quality impacts for all other PSD pollutants and averaging times are lower.

**Table 1. Taylor Energy Center
Preliminary PSD Class II Impacts - AERMOD Modeling Results**

| Pollutant | Averaging Period | Maximum Impacts ($\mu\text{g}/\text{m}^3$) | | | | | | PSD Class II Standards | | | | | Florida AAQS | | |
|------------------|------------------|--|-------|-------|-------|-------|-------|----------------------------------|--------------|------------------|--|--------------------|------------------------------|-------|---------------|
| | | 2000 | 2001 | 2002 | 2003 | 2004 | Max. | SIL ($\mu\text{g}/\text{m}^3$) | % of SIL (%) | Exceed SIL (Y/N) | Increment ($\mu\text{g}/\text{m}^3$) | % of Increment (%) | AAQS | | % of AAQS (%) |
| | | | | | | | | | | | | | ($\mu\text{g}/\text{m}^3$) | (ppm) | |
| SO ₂ | Annual | 0.735 | 0.521 | 0.726 | 0.884 | 0.763 | 0.884 | 1 | 88.4 | N | 20 | 4.4 | 60 | 0.02 | 1.5 |
| | 24-Hour | 5.8 | 4.3 | 5.5 | 5.3 | 5.0 | 5.8 | 5 | 115.9 | Y | 91 | 6.4 | 260 | 0.1 | 2.2 |
| | 3-Hour | 14.9 | 16.3 | 14.6 | 13.6 | 14.0 | 16.3 | 25 | 65.1 | N | 512 | 3.2 | 1,300 | 0.5 | 1.3 |
| NO ₂ | Annual | 0.386 | 0.274 | 0.381 | 0.464 | 0.401 | 0.464 | 1 | 46.4 | N | 25 | 1.9 | 100 | 0.05 | 0.5 |
| PM ₁₀ | Annual | 0.110 | 0.078 | 0.109 | 0.133 | 0.114 | 0.133 | 1 | 13.3 | N | 17 | 0.8 | 50 | N/A | 0.3 |
| | 24-Hour | 0.87 | 0.64 | 0.83 | 0.80 | 0.76 | 0.87 | 5 | 17.4 | N | 30 | 2.9 | 150 | N/A | 0.6 |
| CO | 8-Hour | 23.2 | 22.3 | 21.6 | 22.6 | 22.6 | 23.2 | 500 | 4.6 | N | N/A | N/A | 10,000 | 9 | 0.2 |
| | 1-Hour | 63.9 | 71.6 | 53.7 | 62.7 | 59.5 | 71.6 | 2,000 | 3.6 | N | N/A | N/A | 40,000 | 35 | 0.2 |

SIL = Significant Impact Level

AAQS = Ambient Air Quality Standards

Source: ECT, 2006.