Appendix H

Emissions Modeling

Deviation From Defaults

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1 Introduction

The emissions modeling for the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour ozone nonattainment area was performed in conjunction with the regional haze modeling being done by the Southeast Regional Planning Organization, Visibility Improvement State and Tribal Association of the Southeast (VISTAS) and the fine particulate matter (PM2.5) and ozone modeling being done by the Association of Southeastern Integrated Planning (ASIP). VISTAS and ASIP are run by the ten Southeast states (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. The emissions preprocessing model used to ready the emissions for input into the air quality model was the Spare Matrix Operator Kernel Emissions (SMOKE) modeling system.

1 Deviation From Everyday Modeling

The VISTAS/ASIP modeling was an annual simulation. It would be too resource intensive to process all sources sectors for everyday of the year. Therefore, to produce an emissions inventory to support the annual modeling, representative time periods were selected and modeled.

The area and nonroad mobile sources were modeled as a block of Thursday, Friday, Saturday, Sunday, Monday, one per month (total of 60 days modeled for the annual simulation). Similarly, the on-road mobile sources were represented by an entire single week for each month. This selection criteria allows for the representation of day-of-the-week variability in the on-road motor vehicles, and models a representation of the meteorological variability in each month.

The stationary point sources, which include the electric generating units (EGUs) and Non-EGUs, were modeled everyday of the annual simulation. This was due to the plume rise calculations used to parse the emissions into the various layers of the model is different everyday depending on the meteorological inputs. Additionally, VISTAS/ASIP modeled large wildland fires as day specific sources with plume rise incorporated into the emissions modeling. Similar to the stationary point sources, the biogenic emissions were modeled everyday of the annual simulation since the amount of volatile organic compounds emitted is significantly impacted by temperature and solar radiation.

For the area, nonroad mobile and on-road mobile sources, the holidays were modeled as a Sunday. Table 1 describes the representative time period for all source categories.

Table1. Representative Time Period for Emissions Modeling

Source Category	BaseG frequency of run
Area Sources	5 days per month
Biogenic	Everyday
Canada_area	5 days per month
Canada_point	5 days per month
Dust	5 days per month
EGU	Everyday
Fire_cenrap	Everyday
Hi_file_typ	Everyday
Lo_file_typ	5 days per month
Mexico_area	5 days per month
Mexico_point	5 days per month
mms_area	5 days per month
mms_point	Everyday
Non-EGU	Everyday
Nonroad Mobile	5 days per month
On-road Mobile	7 days per month

2 Point Source Deviation

The VISTAS/ASIP emissions modeling used results from the Integrated Planning Model (IPM) to generate future year emissions for the EGU source sector. Duke Energy and Progress Energy updated their plans for complying with North Carolina's Clean Smokestacks Act and the emission projections for the plans varied substantially from the IPM results (Table 2). Therefore, the North Carolina Division of Air Quality (NCDAQ) replaced the IPM emission projections for 2009 with projections from the 2006 Duke Energy and Progress Energy compliance plans. The Clean Smokestacks Act can be found in Appendix M.

Another point source deviation was the temporal profiles used for the typical emissions for the EGU source sector. Instead of using the 2002 continuous emissions monitoring (CEM) profiles for the EGUs, a typical temporal profile was created using data from 2000 through 2004. How the typical temporal profiles were generated is discussed in detail in Appendix F.1.

Table 2. Comparison of 2009 emissions for Duke and Progress compliance plans vs. IPM.

Facility	Compliance Plan 2009 NOx (tpy)	IPM 2009 NOx (tpy)
Duke Energy Facilities		
Allen	5,774	3,018
Belews Creek	4,296	5,230
Buck	1,713	1,788
Cliffside	2,740	2,619
Dan River	1,539	1,134
Marshall	12,903	12,262
Riverbend	1,944	1,989
Total Duke Energy	30,909	28,040
Progress Energy Facilities		
Asheville	3,057	1,049
Cape Fear	1,350	1,249
Lee	3,110	3,901
Mayo	1,741	1,748
Roxboro	6,350	4,069
Sutton	5,840	4,361
Weatherspoon	2,822	2,239
Total Progress Energy	24,270	18,616