DEVELOPMENT OF EMISSION BUDGET INVENTORIES FOR REGIONAL TRANSPORT NO_x SIP CALL

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Chapter I
Introduction

The purpose of this document is to describe the development of the emissions and control data used in the United States (U.S.) Environmental Protection Agency's (EPA) Regional Transport NO_x State Implementation Plan (SIP) Call Notice of Final Rulemaking (NFR) and to describe the process for calculation of the associated Statewide budgets.

Chapter II of this document describes the development of the electric generating unit (EGU) point source data and budget, Chapter III describes the development of the non-EGU point source data and budget, Chapter IV describes the stationary area and nonroad mobile source data and budget, and Chapter V describes the highway vehicle data and budget.

It should be noted that there were several comment periods during which EPA received comments on various aspects of the SIP Call emissions inventories. As a result of the Notice of Proposed Rulemaking (NPR) and Supplemental Notice of Proposed Rulemaking (SNPR) public comment periods, EPA revised the inventories with approved data addressing issues such as emission estimate revisions, missing sources, retired sources, incorrect source sizes, base year control levels, and facility name changes.   Details of these comments and their affect on the base inventory can be found in the response to significant comments document for the NFR (EPA, 1998a).

In addition to the NPR and SNPR public comment periods, in the NFR (63 FR 57427) EPA allowed commenters an additional opportunity to request revision to the source specific data used to establish each State's budget in the SIP Call. This opportunity for comments ended on November 23, 1998.

When EPA published its correction and clarification notice to the NFR (63 FR 71220), EPA reopened the comment period for emissions inventory revisions. This comment period was restricted to comments related to the baseline sub-inventory information used to establish the State's budgets. This comment period ended on February 22, 1999.

The emissions inventories described in this document reflect the public comments accepted by EPA. The EPA's review and acceptance/rejection of specific comments is contained in EPA's "Responses to the 2007 Baseline Sub-Inventory Information and Significant Comments for the Final NOx SIP Call," (EPA, 1999).

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Chapter II
Electric Generating Unit Point Source Emissions

A. Development of Base Year Emissions

The base year electric generating unit (EGU) emissions were developed to provide the EGU data necessary for determining the 2007 budget case and to supply data for use in air quality modeling of the budget case. A base year EGU inventory was developed using the higher of 1995 or 1996 heat input (determined at the State-level) for the purpose of calculating the 2007 budget case (as explained below). A 1996 base year EGU inventory was developed for the air quality modeling. For each base year inventory, both seasonal and daily emissions estimates were developed.

The base year EGU inventories consist of both electric utility units and nonutility electricity generating units. The nonutility electricity generating units include independent power producers (IPPs) and nonutility generators (NUGs).

Eight data sources were used to develop the base year EGU emissions data:

1. EPA’s Acid Rain Data Base (ARDB) (Pechan, 1997c);
2. EPA’s 2007 Integrated Planning Model Year 2007 (IPM);
3. EPA’s Emission Tracking System/Continuous Emissions Monitoring System (ETS/CEM) (EPA, 1997b);
4. DOE’s Form EIA-860 (DOE, 1995a);
5. DOE’s Form EIA-767 (DOE, 1995b);
6. EPA’s National Emissions Trends Data Base (NET) (EPA, 1997c);
7. DOE’s Form EIA-867 (DOE, 1995c); and
8. The OTAG Emission Inventory (Pechan, 1997a).

Each of these data sources is described below.

EPA’s Acid Rain Data Base (ARDB) was developed in response to the Acid Rain Program authorized under Title IV. The data base was originally an update to the boiler-based National Allowance Data Base Version 3.11 (NADBV311) which was used in the calculation of the SO_2 allowances as specified in Title IV. Over the last few years, the data base has been expanded to include ETS/CEM 1994-1996 SO_2, NO_x, CO_2, and heat input; as well as 1985-1995 NET utility data, boiler identification, characteristics, and locational data. The existing boilers and planned turbines (as of 1990) in the ARDB are used as units for the EGU.

EPA’s 2007 Integrated Planning Model Year 2007 (IPM) data base represents a unit-level disaggregated IPM Clean Air Act (CAA) baseline simulation developed for OTAG air quality modeling. The IPM includes over 7,000 units (nationally) with data on existing electricity generating units. This information is maintained in EPA's National Electric Energy Data System (NEEDS). In general, the generator-level utility turbines and engines, as well as nonutility units that are not required to report to EPA under the Title IV program, are included in IPM. However for purposes of developing the EGU base year inventory, IC engines were included in the non-EGU inventory, rather than in the EGU inventory. This is because emissions and emission reductions for all IC engines (including both engines used for purposes of generating electricity and engines used for other purposes such as powering pumps on gas lines) were determined in the same way (see Chapter 3 for a more complete discussion of the treatment of IC engines). Supplemental data, provided by EPA, including the start year, the base year (1994) NO_x rate, and type of ownership, were added to the IPM data base. This information was used to obtain NO_x emissions and heat input data for these units. Where units could be matched to other inventories, actual locational data are included in the IPM; otherwise, county centroids are used.

EPA's Emission Tracking System/Continuous Emissions Monitoring System (ETS/CEM) data contains hourly SO_2, CO_2, NO_x rate, and heat input data at the monitoring stack level and boiler level for all boilers included in the Acid Rain Program that was mandated by Title IV of the Clean Air Act Amendments of 1990 (CAAA). In 1994, data were collected from the 263 Phase I boilers; beginning in 1995, data are collected from Phase II as well as Phase I affected boilers. These data were used to provide NO_x emissions and heat input.

DOE's Form EIA-860 is an annual utility survey, "Annual Electric Generator Report," that provides utility data on a generator level. Both existing and planned generators are reported. The data include generator identification, status, capacity, prime mover, and fuel type(s). Units reported on this form were generally only included in the EGU file if they also were included in the IPM file since NO_x emissions and heat input are not derivable from Form EIA-860 alone. This form was useful, however, in providing other information, such as prime mover and unit status.

DOE's Form EIA-767 is an annual utility survey, "Steam-Electric Plant Operation and Design Report," that contains data for fossil fuel steam boilers such as fuel quantity and quality; boiler identification, locational, status, and design information; and flue gas Desulfurization scrubber and particulate collector device information. Note that boilers in plants with less than 10 MW do not report all data elements. The relationship between boilers and generators is also provided, along with generator-level generation and nameplate capacity. Note that boilers and generators are not necessarily in a one-to-one correspondence.

EPA's NET fossil fuel steam data base is developed annually by EPA. The data base was initially based on DOE's Form EIA-767 data, but the coal NO_x emissions have been superseded by calculations using EPA NO_x rates, and the NO_x, SO_2 and heat input data from ETS/CEM, if available. Source Classification Codes (SCCs) are assigned to each boiler based on boiler and fuel characteristics; AP-42 emission factors are used to calculate VOC, CO, PM10, and PM2.5 emissions. The 1990 and 1995 NET data bases were used to obtain SCCs, stack parameters, NO_x emissions and heat input.

DOE's Form EIA-867 "Annual Nonutility Power Producer Report" is similar in content to, although more limited than, the utility Forms EIA-860 and EIA-767. The EIA-867, however, is a confidential form, and aside from the facility identification data (which includes State and capacity), EIA can only provide most data from this form on an aggregated basis. Only a few of the units in this file were ultimately used since it was difficult to obtain NO_x emissions, heat input, or locational data unless they could be matched to another source.

The OTAG data base was developed by collecting and compiling electric utility emission inventory data from States in the OTAG domain. This 1990 inventory contains summer day emission estimates, as well as variables required for air quality modeling. This data base was used to obtain NO_x emissions and locational data.

In general, the operating units in the ARDB identified the steam boilers, while the IPM data base identified the generator-level utility turbines and engines, as well as the nonutility units. While some units were obtained from the other data bases, the primary purpose of the other data bases was to add variables required for modeling to the units identified by the ARDB or IPM data.

In order for a unit to be used, it had to have enough data to estimate emissions. Data had to be available on either daily or seasonal heat input or daily or seasonal NO_x emissions. The NO_x emission rate was also required, but a default NO_x emission rate from AP-42 was assigned to units that had data on heat input or emissions, but no NO_x rate. The emissions from 421 units could not be estimated because there was no NO_x emissions or heat input information available to EPA for these units. This suggests that these units may not have operated in the summer seasons of 1995 and 1996.

The first step in developing the base year data was to develop a file containing all available heat input, NO_x emissions and NO_x rate information. The second step involved assigning SCCs. In the third step stack parameters needed for air quality modeling were added to the inventory.

Step 1. Seasonal NO_x Emissions and Heat Input

The hierarchy for obtaining seasonal NO_x emissions and heat input for a particular unit identified from the above sources of information is provided below.

For the 1995/1996 base year:

a Determine what year of data to use for a given boiler, based on the State that the boiler is in and whether 1996 or 1995 heat input was higher for that State.

b. Based on that boiler year information, use ETS/CEM data to obtain 1995 seasonal NO_x rate and 1995 seasonal heat input, or 1996 seasonal NO_x rate and 1996 seasonal heat input to calculate seasonal NO_x emissions.

c. Based on that boiler year information, use the 1995 NET data base (or 1996 data projected from the 1995 NET) for annual NO_x emissions and heat input, then convert to seasonal emissions.

d. Use 1990 OTAG file for ozone season day (OSD) NO_x emissions and OSD heat input (or July month heat input and divide by 31), then convert to seasonal emissions and forecast to the base year.

e. Use IPM NO_x rate and 2007 July heat input, calculate NO_x emissions, convert to seasonal emissions, and backcast to the base year.

f. If there is a heat input and no NO_x emissions or rate, assign an AP-42 default NO_x rate based on SCC and convert to seasonal emissions.

For the 1996 base year:

a. Use ETS/CEM 1996 file for seasonal NO_x emissions and 1996 seasonal heat input.

b. Use the 1996 projected from the1995 NET data base for annual NO_x emissions and heat input, then convert to seasonal emissions.

c. Use 1990 OTAG file for OSD NO_x emissions and OSD heat input (or July month heat input and divide by 31), then convert to seasonal and forecast to the base year.

d. Use IPM NO_x rate and 2007 July heat input, calculate NO_x emissions, convert to seasonal emissions, and backcast to the base year.

f. If there is a heat input and no NO_x emissions or rate, assign an AP-42 default NO_x rate based on SCC and convert to seasonal emissions.

Step 2. Source Classification Codes (SCCs)

The methodology for assigning SCC is as follows:

a. Match the unit to the NET 1995 or 1990 inventory and assign the major SCC (based on heat input) to the boiler.

b. Match the unit to the OTAG data and assign the major SCC.

c. Assign default SCCs based on prime mover, fuel type, and (in the case of steam units) boiler bottom and firing types.

Step 3. Stack Parameters

The methodology for obtaining stack parameters is as follows:

a. Match the unit to the NET 1995 or 1990 inventory and use the NET stack data.

b. Match the unit to the OTAG data base and use the OTAG stack data.

c. Assign default stack parameters, based on prime mover and fuel type, that were originally developed for the Regional Oxidant Model (ROM). (Note that since stack parameters in IPM were originally developed by matching with the OTAG and NET inventories, followed by defaults, any stack parameters obtained from IPM are likely to be default parameters.)

B. 2007 Base Case

The 2007 base case summer season emissions were determined using the IPM. Note that no changes were made as a result of the extended emissions inventory comment period to the data or methods used for the IPM projection of the 2007 base case summer season emissions. The 2007 base case includes all applicable controls required by the CAAA. Applicable controls required for EGUs include Title IV Acid Rain controls and NO_x RACT. Details regarding the IPM model and the method can be found in the Regulatory Impact Analysis (RIA) of the final SIP call (EPA, 1998c). Appendix A presents the EGU source controls included in the 2007 base case.

The growth factors used in the 2007 base case were obtained from the IPM projections. The growth factors are at the State-level (i.e., there was a single growth factor for each State that was applied to all units in that State). The estimates were interpolated to 2007 using the average annual growth of each State as forecasted by EPA using the IPM and EPA's baseline electric generation forecast. In calculating the average annual growth, EPA relied on unit-specific summer energy use from 2000 to 2010 as forecasted by the IPM. The growth factors are shown in Table II-1.

C. 2007 Budget Case

The 2007 budget case was developed by unit by applying IPM growth factors and an emission rate to the 1995/1996 base year heat input. Units greater than 25 MWe in each of the SIP call States had a uniform emission rate of 0.15 lb NO_x/MMBtu applied to them. Units 25MWe or smaller were left at their 2007 base case NO_x emission rate. A description of the data file structure for EGU sources including emissions, growth, and control information used to estimate the 2007 EGU budget is provided in Appendix C of this document.

The growth factors were applied to the 1995/1996 heat input to get 2007 projected heat input. Emissions of NO_x were then calculated by multiplying the 2007 projected heat input by the

2007 budget-applicable NO_x rate.

D. EGU Emission Summary

Table II-2 is a State-level summary of the EGU data. It contains seasonal NOx emissions for the 2007 base and budget cases.

Table II-1
IPM Growth Factors

State	1996-2007 Growth Factor
Alabama	1.10
Connecticut	0.60
District of Columbia	1.36
Delaware	1.27
Georgia	1.13
Illinois	1.08
Indiana	1.17
Kentucky	1.16
Massachusetts	1.59
Maryland	1.35
Michigan	1.13
Missouri	1.09
North Carolina	1.21
New Jersey	1.29
New York	1.05
Ohio	1.07
Pennsylvania	1.15
Rhode Island	0.47
South Carolina	1.43
Tennessee	1.21
Virginia	1.32
Wisconsin	1.12
West Virginia	1.03

Table II-2
2007 Seasonal Base and Budget NO_x Emissions for EGUs

State	2007 Base	2007 Budget
Alabama	76,926	29,022
Connecticut	5,636	2,652
Delaware	5,838	5,250
District of Columbia	3	207
Georgia	86,455	30,402
Illinois	119,311	32,373
Indiana	136,773	47,731
Kentucky	107,829	36,503
Maryland	32,603	14,656
Massachusetts	16,479	15,145
Michigan	86,600	32,467
Missouri	82,097	24,194
New Jersey	18,352	10,384
New York	39,199	31,009
North Carolina	84,815	31,840
Ohio	163,132	49,266
Pennsylvania	123,102	48,311
Rhode Island	1,082	997
South Carolina	36,299	16,772
Tennessee	70,908	25,814
Virginia	40,884	17,187
West Virginia	115,490	26,624
Wisconsin	51,962	17,375
Total *	**1,501,775**	**546,181**

* Totals may not sum due to rounding.

Chapter III
Non-EGU Point Source Emissions

A. Development of 1995 Base Year Emissions

The non-EGU point source emissions were based on data sets originating with the OTAG 1990 base year inventory. The OTAG prepared these base year inventories with 1990 State ozone nonattainment SIP emission inventories. These data were supplemented with either other State inventory data, if available, or EPA's NET data, if State data were not available.

The non-EGU point source emissions for 1990 were then grown to 1995 using Bureau of Economic Analysis (BEA) historical growth estimates of industrial earnings at the State 2-digit Standard Industrial Classification (SIC) applied to emissions at the Source Classification Code (SCC) level. These emissions were grown to 1995 for the purposes of modeling and to maintain a consistent base year inventory with the EGU data.

NO_x RACT controls were applied to major sources in ozone nonattainment areas (NAA) and the Ozone Transport Region (OTR) unless the area received a NO_x waiver. Information on the application of NO_x RACT came from the OTAG data base which was developed by surveying applicable States on their implementation of NO_x RACT (Pechan, 1997b). These data include unit specific NO_x RACT control efficiencies for many units. For units without specific control information either ozone nonattainment area/SCC NO_x RACT efficiencies collected from the States or national/SCC NO_x RACT default efficiencies were applied. Table III-1 presents the national/SCC NO_x RACT default efficiencies used in the base calculation.

B. 2007 Base Case

To obtain the 2007 Base Case emissions, the 1995 data were projected to 2007 using BEA projections of Gross State Product (GSP) at the 2-digit SIC level and supplemented with State, local, and industry provided growth factors. Where SICs were not provided, an SIC-SCC cross-reference file was used to apply these factors.

In addition to NO_x RACT, Maximum Achievable Control Technology (MACT) control assumptions were applied to large municipal waste combustors (MWC) in the base case. A 30 percent NO_x reduction was assumed for sources identified by the MACT rule (EPA, 1998b). Appendix A presents the non-EGU point source controls included in the 2007 base case.

Seasonal 2007 base case emissions were calculated by multiplying the seasonal 1995 base year emissions by the applicable growth rate and emission controls applicable for 2007.

C. 2007 Budget Case

Budget controls were applied to large sources in the following non-EGU categories: boilers, turbines, and cement manufacturing plants. To determine control efficiencies for these sources for purposes of calculating the budget, emissions were first totaled at each source to a primary fuel (SCC). For sources using more than one fuel, a primary fuel was assigned based on the emission segment with the largest heat input or NO_x emissions from the base year inventory. This was done to prevent the application of multiple control strategies to units firing multiple fuels. A control category was then assigned to this primary fuel from which NO_x controls were selected for application to the source. Appendix B presents a list of these control categories.

For each of the categories to which budget level controls were applied, an additional distinction was needed between large and small units for non-EGU point sources. For the following affected categories, the characteristics shown below were used to determine if the sources were considered large.

Category	**Large Size Determinant**
Boilers	> 250 MMBtu/hr
Turbines	> 250 MMBtu/hr
Cement Manufacturing Plants	> 1 ton NO_x / typical ozone season day
Internal Combustion Engines	> 1 ton NO_x / typical ozone season day

1. Boilers and Turbines

If heat input capacity data were available for a unit, these data were used in determining the source's size. However, a majority of the non-EGU point source units in the inventory did not include boiler capacity data. For these cases, data from the NET inventory were used to determine whether a non-EGU boiler or turbine was assumed as a large or small source.

Using data from the NET data base, a default boiler capacity file that contained the mean and median boiler capacities by the first 6-digits of SCCs was developed. For each 6-digit SCC, the file also contained the average daily NO_x emissions for units with boiler capacities closest to 250 MMBtu/hr. These data are listed in Table III-2.

As an example, for the 6-digit SCC "202001", the boiler capacity closest to 250 MMBtu/hr is listed in Table III-2 as 276 MMBtu/hr. If there was only one unit with a boiler capacity of 276 MMBtu/hr, the daily NO_x emissions from that unit were used. If more than one unit had a boiler capacity of 276 MMBtu/hr, the mean daily emissions of those units was used. Each non-EGU unit in the inventory was matched to the default file described above based on the first 6-digits of its SCC.

The following rules were then used to determine if a unit's boiler capacity was considered greater than, equal to, or less than 250 MMBtu/hr. For each unit:

a. If boiler capacity data were provided for the unit, size determination was made based on those data.

b. If both the mean and median boiler capacity in the file were greater than 300 MMBtu/hr, it was assumed that the unit's boiler capacity was greater than 250 MMBtu/hr.

c. If either the mean or median boiler capacity was between 200 and 300 MMBtu/hr, then the daily NO_x emissions were used to determine the boiler size. If the daily NO_x emissions were greater than the average daily NO_x emissions in the default boiler capacity file, it was assumed that the boiler capacity was greater than 250 MMBtu/hr. If the daily NO_x emissions were less than the average daily NO_x emissions in the default boiler capacity file, it was assumed that the boiler capacity was less than 250 MMBtu/hr.

d. If both the mean and median boiler capacity in the file were less than 200 MMBtu/hr, it was assumed that the boiler capacity was less than 250 MMBtu/hr.

e. If the boiler could not be matched to the default boiler capacity file, it was assumed that the boiler capacity was less than 250 MMBtu/hr.

Units for which the boiler capacity was estimated to be greater than 250 MMBtu/hr were categorized as large sources.

2. Cement Manufacturing Plants and Internal Combustion Engines

For cement manufacturing plants and internal combustion engines, boiler capacity was not used to determine source size. Instead 1995 typical ozone season daily emissions were used as a determinant. If the 1995 point-level emissions were more than 1 ton/day, the unit was categorized as a large source. Otherwise the unit was categorized as a small source.

3. Calculation of Reductions

Emissions reductions for the budgets were calculated only for large sources in the specific source categories listed in Table III-3. Sources not meeting the large source requirements from these affected categories were considered small and not subject to additional budget control. Emissions from sources smaller than the heat input capacity cutoff level, and that emit less than 1 ton of NO_x per typical ozone season day are included in the budget inventory at their 2007 base case level. Additionally, those sources without adequate information to determine potentially applicable control techniques are included in the budget at 2007 base case levels.

Emissions reductions for the budget case were estimated from first calculating 2007 uncontrolled emission levels by removing base case control efficiency and rule effectiveness values. The new budget control efficiency and 2007 base rule effectiveness were then applied to the 2007 uncontrolled emissions as in the 2007 base case. As noted above, no additional reductions (beyond those in the base case) were applied to small sources.

It should be noted that the budget reductions were applied to all applicable sources even if these reductions were less stringent than the existing 2007 base case controls. Although uncommon, this resulted in an increase in emissions from the 2007 base case to the 2007 budget case for some sources. This method is consistent with the EGU budget calculation. The description of the data file structure for non-EGU sources including NO_x emissions, growth, and control information is provided in Appendix D of this document.

D. Non-EGU Emissions Summary

Table III-4 is a State-level summary of the seasonal non-EGU emissions data. It contains five month ozone season NO_x emissions for the 2007 base case and the 2007 budget case.

Table III-1
Default NO_x RACT Control Assumptions

SCC	NO_x RACT Control Group	Default NO_x RACT Control Efficiency (Percent)
10200101	Industrial Boiler - PC	50
10200104	Industrial Boiler - Stoker - Overfeed	55
10200201	Industrial Boiler - PC - Wet	50
10200202	Industrial Boiler - PC - Dry	50
10200203	Industrial Boiler - Cyclone	53
10200204	Industrial Boiler - Stoker - Spreader	55
10200205	Industrial Boiler - Stoker - Overfeed	55
10200206	Industrial Boiler - Stoker	55
10200210	Industrial Boiler - Stoker - Overfeed	55
10200212	Industrial Boiler - PC - Dry	50
10200213	Industrial Boiler - PC - Wet	50
10200217	Industrial Boiler - PC	50
10200219	Cogeneration - Coal	50
10200222	Industrial Boiler - PC - Dry	50
10200223	Industrial Boiler - Cyclone	53
10200224	Industrial Boiler - Stoker - Spreader	55
10200225	Industrial Boiler - Stoker - Overfeed	55
10200229	Cogeneration - Coal	50
10200301	Industrial Boiler - PC	50
10200306	Industrial Boiler - Stoker - Spreader	55
10200401	Industrial Boiler - Residual Oil	50
10200402	Industrial Boiler - Residual Oil	50
10200403	Industrial Boiler - Residual Oil	50
10200404	Industrial Boiler - Residual Oil	50
10200405	Cogeneration - Oil Turbines	68
10200501	Industrial Boiler - Distillate Oil	50
10200502	Industrial Boiler - Distillate Oil	50
10200503	Industrial Boiler - Distillate Oil	50
10200504	Industrial Boiler - Distillate Oil	50
10200505	Cogeneration - Oil Turbines	68
10200601	Industrial Boiler - Natural Gas	50

Table III-1
Default NO_x RACT Control Assumptions

SCC	NO_x RACT Control Group	Default NO_x RACT Control Efficiency (Percent)
10200602	Industrial Boiler - Natural Gas	50
10200603	Industrial Boiler - Natural Gas	50
10200604	Cogeneration - Natural Gas Turbines	84
10200699	Industrial Boiler - Natural Gas	50
10200701	Industrial Boiler - Natural Gas	50
10200704	Industrial Boiler - Natural Gas	50
10200707	Industrial Boiler - Natural Gas	50
10200710	Cogeneration - Natural Gas Turbines	84
10200799	Industrial Boiler - Natural Gas	50
10200802	Industrial Boiler - PC	50
10200804	Cogeneration - Coal	50
10201001	Industrial Boiler - Natural Gas	50
10201002	Industrial Boiler - Natural Gas	50
10201402	Cogeneration - Coal	50
10300101	Industrial Boiler - PC	50
10300102	Industrial Boiler - Stoker - Overfeed	55
10300103	Industrial Boiler - PC	50
10300205	Industrial Boiler - PC - Wet	50
10300206	Industrial Boiler - PC - Dry	50
10300207	Industrial Boiler - Stoker - Overfeed	55
10300208	Industrial Boiler - Stoker	55
10300209	Industrial Boiler - Stoker - Spreader	55
10300211	Industrial Boiler - Stoker - Overfeed	55
10300217	Industrial Boiler - PC	50
10300221	Industrial Boiler - PC - Wet	50
10300222	Industrial Boiler - PC - Dry	50
10300224	Industrial Boiler - Stoker - Spreader	55
10300225	Industrial Boiler - Stoker - Overfeed	55
10300309	Industrial Boiler - Stoker - Spreader	55
10300401	Industrial Boiler - Residual Oil	50
10300402	Industrial Boiler - Residual Oil	50

Table III-1
Default NO_x RACT Control Assumptions

SCC	NO_x RACT Control Group	Default NO_x RACT Control Efficiency (Percent)
10300404	Industrial Boiler - Residual Oil	50
10300501	Industrial Boiler - Distillate Oil	50
10300502	Industrial Boiler - Distillate Oil	50
10300503	Industrial Boiler - Distillate Oil	50
10300504	Industrial Boiler - Distillate Oil	50
10300601	Industrial Boiler - Natural Gas	50
10300602	Industrial Boiler - Natural Gas	50
10300603	Industrial Boiler - Natural Gas	50
10300701	Industrial Boiler - Natural Gas	50
10300799	Industrial Boiler - Natural Gas	50
10301001	Industrial Boiler - Natural Gas	50
10301002	Industrial Boiler - Natural Gas	50
10500205	Process Heaters - Distillate Oil	74
10500206	Process Heaters - Natural Gas	75
10500210	Process Heaters - Other	74
20100101	Gas Turbines - Oil	68
20100102	IC Engines - Oil - Reciprocating	25
20100201	Gas Turbines - Natural Gas	84
20100202	IC Engines - Natural Gas - Reciprocating	30
20100702	Industrial Boiler - Other	50
20100801	Industrial Boiler - Other	50
20100802	Industrial Boiler - Other	50
20100901	Industrial Boiler - Other	50
20200101	Gas Turbines - Oil	68
20200102	IC Engines - Oil - Reciprocating	25
20200103	Cogeneration - Oil Turbines	68
20200104	Cogeneration - Oil Turbines	68
20200201	Gas Turbines - Natural Gas	84
20200202	IC Engines - Natural Gas - Reciprocating	30
20200203	Cogeneration - Natural Gas Turbines	84
20200204	Industrial Cogeneration - Nat. Gas	50

Table III-1
Default NO_x RACT Control Assumptions

SCC	NO_x RACT Control Group	Default NO_x RACT Control Efficiency (Percent)
20200301	Industrial Boiler - Other	50
20200401	Industrial Boiler - Other	50
20200402	Industrial Boiler - Other	50
20200403	Cogeneration - Oil Turbines	68
20200501	IC Engines - Oil - Reciprocating	25
20200901	Industrial Boiler - Other	50
20200902	Industrial Boiler - Other	50
20201001	IC Engines - Natural Gas - Reciprocating	30
20201002	IC Engines - Natural Gas - Reciprocating	30
20300101	IC Engines - Oil - Reciprocating	25
20300102	Gas Turbines - Oil	68
20300201	IC Engines - Natural Gas - Reciprocating	30
20300202	Gas Turbines - Natural Gas	84
20300203	Cogeneration - Natural Gas Turbines	84
20300204	Cogeneration - Natural Gas Turbines	84
20300301	Industrial Boiler - Other	50
20301001	IC Engines - Natural Gas - Reciprocating	30
20400301	Gas Turbines - Natural Gas	84
20400302	Gas Turbines - Oil	68
20400401	IC Engines - Oil - Reciprocating	25
20400402	IC Engines - Oil - Reciprocating	25
30100101	Adipic Acid Manufacturing Plant	81
30101301	Nitric Acid Manufacturing Plant	95
30101302	Nitric Acid Manufacturing Plant	95
30190003	Process Heaters - Natural Gas	75
30190004	Process Heaters - Natural Gas	75
30390001	Process Heaters - Distillate Oil	74
30390003	Process Heaters - Natural Gas	75
30390004	Process Heaters - Other	74
30490001	Process Heaters - Distillate Oil	74
30490003	Process Heaters - Natural Gas	75

Table III-1
Default NO_x RACT Control Assumptions

SCC	NO_x RACT Control Group	Default NO_x RACT Control Efficiency (Percent)
30490004	Process Heaters - Other	74
30590001	Process Heaters - Distillate Oil	74
30590002	Process Heaters - Residual Oil	73
30590003	Process Heaters - Natural Gas	75
30600101	Process Heaters - Distillate Oil	74
30600102	Process Heaters - Natural Gas	75
30600103	Process Heaters - Distillate Oil	74
30600104	Process Heaters - Natural Gas	75
30600105	Process Heaters - Natural Gas	75
30600106	Process Heaters - Natural Gas	75
30600107	Process Heaters - Natural Gas	75
30600111	Process Heaters - Residual Oil	73
30600199	Process Heaters - Other	74
30790001	Process Heaters - Distillate Oil	74
30790002	Process Heaters - Residual Oil	73
30790003	Process Heaters - Natural Gas	75
30890003	Process Heaters - Natural Gas	75
30990001	Process Heaters - Distillate Oil	74
30990002	Process Heaters - Residual Oil	73
30990003	Process Heaters - Natural Gas	75
31000401	Process Heaters - Distillate Oil	74
31000403	Process Heaters - Residual Oil	73
31000404	Process Heaters - Natural Gas	75
31000405	Process Heaters - Natural Gas	75
31390003	Process Heaters - Natural Gas	75
39990001	Process Heaters - Distillate Oil	74
39990002	Process Heaters - Residual Oil	73
39990003	Process Heaters - Natural Gas	75
39990004	Process Heaters - Natural Gas	75
40201001	Process Heaters - Natural Gas	75
40201002	Process Heaters - Distillate Oil	74

Table III-1
Default NO_x RACT Control Assumptions

SCC	NO_x RACT Control Group	Default NO_x RACT Control Efficiency (Percent)
40201003	Process Heaters - Residual Oil	73
40201004	Process Heaters - Natural Gas	75

Table III-2
Default Boiler Capacity Data From the NET

6-Digit SCC	Mean Boiler Capacity (MMBtu/hr)	Median Boiler Capacity (MMBtu/hr)	Boiler Capacity Closest to 250 MMBtu/hr	Daily NO_x (tpd) of Boiler with Capacity Closest to 250 MMBtu/hr
102001	75.97	55	264	2.6597
102002	236.65	150	250	0.7282
102003	150.44	58	87	0.4796
102004	393.35	73	250	0.3292
102005	299.63	80	250	0.1365
102006	251.96	86	250	0.2127
102007	268.49	198	250	0.1313
102008	515.30	420	241	1.0534
102009	348.64	132	250	0.2103
102010	123.57	45	224	0.0848
102011	193.00	193	193	0.1606
102012	252.00	180	246	0.4668
102013	194.81	172	250	0.0351
102014	287.62	297	267	0.1636
103001	49.45	43	137	0.2052
103002	90.28	74	248	1.1403
103003	85.00	93	101	0.1194
103004	113.01	59	245	0.0417
103005	89.05	71	249	0.0468
103006	152.38	97	249	0.0468
103007	211.00	197	197	0.7150
103009	65.18	66	166	0.0132
103010	138.00	138	138	0.0179
103012	240.33	75	200	0.5335
103013	93.45	59	250	0.5194
202001	228.87	62	276	1.2046
202002	294.62	9	271	0.5596
202005	62.00	62	62	0.1882
202009	70.00	70	70	0.3557
203001	75.00	35	256	8.0303
203002	29.47	8	197	0.7150

Table III-3
Budget Reduction Levels From Uncontrolled Emissions

Source Category	**Budget Reduction Percentage**
ICI Boilers* - Coal/Wall	60
ICI Boilers - Coal/FBC	60
ICI Boilers - Coal/Stoker	60
ICI Boilers - Coal/Cyclone	60
ICI Boilers - Residual Oil	60
ICI Boilers - Distillate Oil	60
ICI Boilers - Natural Gas	60
ICI Boilers - Process Gas	60
ICI Boilers - LPG	60
ICI Boilers - Coke	60
Gas Turbines - Oil	60
Gas Turbines - Natural Gas	60
Gas Turbines - Jet Fuel	60
Internal Combustion Engines - Oil	90
Internal Combustion Engines - Gas	90
Internal Combustion Engines - Gas, Diesel, LPG	90
Cement Manufacturing - Dry	30
Cement Manufacturing - Wet	30
In-Process; Bituminous Coal; Cement Kiln	30

* Industrial/Commercial/Institutional Boilers

Table III-4
Base and Budget Ozone Season NO_x Emissions
Non-EGU Point Sources

State	1995 Base	2007 Base	2007 Budget	Reduction
Alabama	48,752	58,791	41,865	29%
Connecticut	5,576	5,124	4,970	3%
Delaware	2,050	2,370	2,235	6%
District of Columbia	398	300	282	6%
Georgia	28,829	36,827	29,024	21%
Illinois	72,672	72,183	58,670	19%
Indiana	68,011	80,884	53,463	34%
Kentucky	24,304	29,328	17,861	39%
Maryland	14,944	15,554	11,568	26%
Massachusetts	11,750	11,229	10,296	8%
Michigan	53,352	62,988	53,703	15%
Missouri	23,987	26,870	23,182	14%
New Jersey	15,909	18,345	17,863	3%
New York	26,017	28,281	22,935	19%
North Carolina	27,964	34,888	27,635	21%
Ohio	45,255	53,074	39,453	26%
Pennsylvania	77,058	82,270	67,602	18%
Rhode Island	1,611	2,031	2,031	0%
South Carolina	27,562	37,495	27,768	26%
Tennessee	40,470	53,198	37,994	29%
Virginia	45,390	54,414	38,617	29%
West Virginia	28,964	32,235	27,369	15%
Wisconsin	17,937	22,886	18,584	19%
Total *	**708,762**	**821,563**	**634,970**	**23%**

* Totals may not sum due to rounding.

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Chapter IV
Stationary Area and Nonroad Source Emissions

A. Development of 1995 Base Year Emissions

The stationary area and nonroad mobile source emissions were derived from data sets originating with the OTAG 1990 base year inventory. These base year inventories were prepared with 1990 State ozone nonattainment SIP emission inventories supplemented with either other State inventory data, if available, or the NET data, if State data were not available. The OTAG 1990 nonroad emission inventories were based primarily on estimates of 1990 nonroad emissions found in the 1995 NET. The area and nonroad mobile source inventory data for 1990 were then grown to 1995 using BEA historical growth estimates of industrial earnings at the State 2-digit SIC level.

The initial starting set of 1995 base year emission estimates were in the form of typical ozone season daily emission estimates. Base year seasonal emissions were developed by multiplying these typical ozone season daily emissions by the 153 days in the season.

B. 2007 Base Case

The 1995 area and nonroad emissions were projected to 2007 using BEA projections of GSP at the 2-digit SIC level and supplemented with growth rates provided by State and local agencies. Because these source categories do not generally report SICs, an SIC-SCC cross-reference file was used to apply these factors.

Emissions reductions from certain nonroad mobile controls were included in the 2007 base case. These control programs include the Federal Small Engine Standards, Phase II; Federal Marine Engine Standards (for diesel engines of greater than 50 horsepower); Federal Locomotive Standards; and the Nonroad Diesel Engine Standards. Appendix A presents the stationary area and nonroad mobile control measures included in the 2007 base case.

Seasonal 2007 base case emissions were calculated by multiplying the 1995 seasonal base year emissions by the applicable growth rate and emission reductions for 2007. A description of the file structure for the county-level stationary area and nonroad mobile source emissions and growth is provided in Appendices E and F of this document.

C. 2007 Budget Case

For stationary area and nonroad mobile sources, 2007 base case emissions were used for the budget case. No additional emissions reductions (beyond those in the 2007 base case) were applied to these sources.

D. Stationary Area and Nonroad Emission Summary

Table IV-1 is a State-level summary of the seasonal stationary area and nonroad mobile data. It contains five month ozone season NO_x emissions for the 1995 base year and 2007 base and budget cases (which are the same for these sources).

Table IV-1
Base and Budget Ozone Season NO_x Emissions (Tons)
Stationary Area and Nonroad Mobile

State	1995 Stationary Area	1995 Nonroad Mobile	2007 Stationary Area	2007 Nonroad Mobile
Alabama	24,247	29,497	28,762	20,186
Connecticut	4,258	13,101	4,821	10,736
Delaware	1,728	5,334	1,129	5,651
District of Columbia	838	1,924	830	3,138
Georgia	10,694	37,007	13,212	26,497
Illinois	9,845	78,783	9,369	57,033
Indiana	18,009	44,942	29,070	26,536
Kentucky	25,711	20,001	31,807	15,042
Maryland	4,055	20,463	4,448	20,121
Massachusetts	9,984	25,662	11,048	20,166
Michigan	22,289	35,899	31,721	26,940
Missouri	6,540	36,256	7,341	20,875
New Jersey	10,602	30,629	12,431	23,565
New York	17,294	48,675	17,423	42,091
North Carolina	9,330	30,744	11,067	22,045
Ohio	16,899	62,715	21,860	43,780
Pennsylvania	15,002	50,303	17,842	30,635
Rhode Island	373	3,076	448	2,455
South Carolina	6,748	18,829	9,415	14,670
Tennessee	9,881	66,783	13,333	52,985
Virginia	21,301	35,786	27,738	27,867
West Virginia	5,358	15,471	5,459	10,438
Wisconsin	9,111	25,772	11,253	17,975
Total	**260,097**	**737,652**	**321,826**	**541,428**

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Chapter V
Highway Vehicle Source Emissions

A. Development of 1995 Base Year Emissions

The 1995 base year highway vehicle emissions inventory was developed from data sets originating with annual 1995 VMT levels from the Federal Highway Administrations (FHWA) Highway Performance Monitoring System (HPMS). These data are specified by State, HPMS vehicle type, and roadway type. The VMT data were then supplemented with data provided by the States. These data were distributed from a statewide level to a county level using population data from the 1990 census. The data were then apportioned from the HPMS vehicle categories to EPA vehicle types using data provided by EPA's Office of Mobile Sources.

The 1995 emissions inventories reflect the type and extent of inspection and maintenance programs (I/M) in effect as of that year and the extent of the Federal reformulated gasoline program. The 1995 highway vehicle emission factors were based on EPA's MOBILE5b emission factor model with corrected default inputs. The 1995 highway vehicle emissions were calculated at the county level using the 1995 VMT and applicable emissions factors.

Highway vehicle emission factors were modeled for each month in the ozone season (May-September) for each unique type of mobile source control area within a State. The file XREFV5, listed in Appendix H, provides the MOBILE5b file used for each county. This file also indicates the files used to determine vehicle speed input to MOBILE5b for each county. A blank in the column SPEEDSCC denotes the use of the EPA default speeds. These default speeds can be found in Table V-1. Additional columns in XREFV5 show the RVP modeled, I/M flags and files, RFG (2=yes, 1=no), and other relevant data input to MOBILE5b for each county.

State-specific monthly average minimum and maximum daily temperatures were used in calculating highway vehicle emissions factors. Temperature data over the period from 1970 to 1997 were used in calculating the average temperatures. These temperature data were obtained from the National Climatic Data Center. Table V-2 presents the monthly temperatures by State.

The 1995 base year emissions include the effects of so-called "defeat devices" on highway heavy-duty diesel engines. These devices cause engines to function differently when in actual use than they do when being tested for emissions according to the Federal Test Procedure. Under certain operating conditions typical of actual use, the computer software in these engines cause them to function in a way that reduces the effectiveness of the engines' emission control systems compared to how the engines operate when being tested for emissions according to the Federal Test Procedure. In essence, the computer software alters the fuel injection timing when the engine operates in certain modes (such as highway driving), causing the engine to emit higher levels of NO_x than suggested by their certification standards or by EPA's existing emission models.

At the time of proposal of the NO_x SIP Call, EPA had not yet completed its evaluation of the impact of these defeat devices on NO_x emissions. As a result, EPA did not include the excess emissions from their use in the SIP Call emissions inventories. Since that time, EPA has completed its evaluation and entered into proposed consent decrees with the manufacturers of diesel engines equipped with these devices. The effects of the heavy duty excess are included in the emissions inventories by applying correction factors to the MOBILE5b highway vehicle emissions factors. Additional information regarding the defeat device consent decrees can be found at 63 FR 59330-59334 (November 3, 1998, Notices of Filing of Consent Decree under the Clean Air Act).

B. 2007 Base Case

The EPA used the growth methods developed by OTAG for the purpose of projecting VMT growth from 1995 and 2007. VMT growth factors were developed using data from the MOBILE4.1 Fuel Consumption Model. This model estimates national VMT by vehicle type through the year 2020. To calculate the VMT growth factors, the 1995 and 2007 Fuel Consumption Model VMT were first allocated to MSAs and "rest-of-state" areas using 1995 population and projected 2007 population estimates, respectively. The VMT growth factors were calculated by vehicle type as the ratio of the 2007 VMT to the 1995 VMT for each MSA and rest-of-state area.

The 1995 county annual VMT were projected to 2007 using the VMT growth factors. These annual projections were allocated to each for the four seasons using seasonal temporal factors. Monthly VMT data were then obtained using a ratio between the number of days in a month and the number of days in the corresponding season. The VMT for the months of May, June, July, August, and September were then summed to determine the ozone season total VMT.

The 2007 highway vehicle emissions were calculated by multiplying the county-specific 2007 monthly VMT by MOBILE5b emissions factors calculated for 2007.

Highway vehicle controls included county-specific I/M programs, reformulated gasoline in mandated and opt-in areas, Phase 2 RVP elsewhere, the new heavy duty engine standard, and National Low Emission Vehicle (NLEV)program. The NLEV implementation schedule modeled for each county is found in XREFV5. Areas with NO_x waivers that have a high enhanced I/M programs were modeled without a NO_x cutpoint in their I/M program (i.e., the NO_x cutpoint was modeled as 999). Appendix A presents the highway vehicle control measures included in the 2007 base case.

The effects on emissions of the heavy-duty vehicle defeat devices peaks in the late 1990s and then declines rapidly as newer engines that would not be equipped with defeat devices replace defeat device-equipped engines and as manufacturers undertake the mitigation commitments required under the proposed consent decrees. The 2007 base case emissions include the effects of defeat devices and the commitments made by diesel engine manufacturers in the settlement to introduce diesel engines meeting the 2004 standards prior to 2004. Table V-3 presents the defeat device correction factors used in the 2007 base case calculation.

A description of the file structure for monthly 2007 base county-level highway vehicle

VMT and emissions is provided in Appendix G of this document.

C. 2007 Budget Case

Highway vehicle emissions from the 2007 base case were used in the budget case inventory. No additional reductions (beyond those in the 2007 base case) were applied to the budget highway vehicle emissions.

D. Highway Vehicle Emission Summary

Table V-4 is a State-level summary of the seasonal highway vehicle data. It contains five month ozone season VMT and NO_x emissions for the 2007 base and the budget case with the heavy duty diesel excess emissions.

Table V-1
Average Speeds by Road Type and Vehicle Type

Rural Road Speeds (MPH)

Vehicle Type*	Interstate	Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local
LDV	60	45	40	35	30	30
LDT	55	45	40	25	30	30
HDV	40	35	30	25	25	25

Urban Road Speeds (MPH)

Vehicle Type*	Interstate	Principle Arterial	Minor Arterial	Major Collector	Minor Collector	Local
LDV	45	45	20	20	20	20
LDT	45	45	20	20	20	20
HDV	35	35	15	15	15	15

***Vehicle Type: LDV - light duty vehicles; LDT - light duty trucks; HDV - heavy duty vehicles.**

Table V-2
Historical Statewide Average Monthly Minimum and Maximum Temperatures
(Degrees Fahrenheit)

State	May Max	May Min	June Max	June Min	July Max	July Min	August Max	August Min	September Max	September Min
Alabama	80.8	57.9	87.4	65.7	90.5	70.0	89.8	69.2	84.5	63.3
Connecticut	71.9	49.0	80.0	57.0	85.0	62.6	82.7	60.8	74.3	52.1
Delaware	74.9	53.3	83.0	61.9	87.5	67.5	85.9	66.1	79.7	59.2
DC	75.9	56.4	84.5	65.9	88.7	71.1	86.7	69.4	80.0	62.7
Georgia	79.9	59.3	86.4	66.9	89.3	70.6	87.7	69.9	82.4	64.5
Illinois	74.6	52.5	83.8	61.9	87.0	66.0	84.7	64.0	78.3	55.6
Indiana	73.4	51.9	82.2	61.4	85.6	65.5	83.8	63.6	77.3	55.6
Kentucky	76.0	55.3	84.1	64.3	87.8	68.6	86.4	67.2	79.8	60.0
Maryland	74.2	52.8	83.1	62.1	87.5	67.5	85.6	65.9	78.7	59.0
Massachusetts	66.8	50.2	76.7	59.4	82.3	65.5	80.3	64.6	72.5	56.8
Michigan	69.8	50.1	78.8	59.8	83.3	65.2	81.0	63.5	73.3	56.1
Missouri	75.3	53.5	84.3	62.3	89.4	66.9	88.7	65.7	80.0	57.9
New Jersey	72.6	54.1	81.4	63.6	86.3	69.4	84.6	68.0	76.9	60.1
New York	70.4	54.1	79.2	63.6	84.5	69.4	82.9	68.6	75.1	61.4
North Carolina	76.8	54.6	83.8	63.3	87.7	67.9	85.6	66.5	79.6	60.2
Ohio	72.4	50.5	80.8	59.5	84.5	64.0	83.0	62.5	76.1	55.3
Pennsylvania	72.4	51.6	80.9	60.9	85.7	66.2	83.8	64.7	75.9	56.9
Rhode Island	68.4	48.7	77.2	57.8	82.5	64.3	81.0	62.8	73.3	54.4
South Carolina	83.5	58.4	89.2	66.4	92.5	70.7	90.2	69.7	85.5	64.0
Tennessee	78.4	56.6	86.0	65.0	89.6	69.4	88.5	68.2	82.3	61.5
Virginia	77.7	54.6	85.4	63.2	89.2	68.4	87.2	66.8	81.3	60.0
West Virginia	75.0	51.8	81.8	60.0	85.9	65.5	84.3	63.6	77.9	56.8
Wisconsin	65.1	45.8	75.5	56.3	80.5	62.8	78.5	62.0	70.9	54.0

Table V-3
Adjustment Factor for MOBILE5 Emission Factors to Account for Defeat Devices and the Pull-Ahead of the 2 g/bhp-hr Standard

		Speed												
Facility	**Description**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**
Interstate	Rural Interstate	1.1219	1.2325	1.3385	1.4312	1.5021	1.5442	1.5531	1.5280	1.4714	1.3891	1.2889	1.1796	1.0697
Interstate	Rural Other Prin Arterial	1.1220	1.2326	1.3387	1.4314	1.5022	1.5443	1.5532	1.5281	1.4715	1.3892	1.2890	1.1797	1.0697
Interstate	Urban Interstate	1.1232	1.2345	1.3413	1.4346	1.5059	1.5483	1.5573	1.5320	1.4750	1.3921	1.2913	1.1813	1.0706
Interstate	Urban Other Freeways	1.1224	1.2333	1.3396	1.4325	1.5035	1.5457	1.5546	1.5295	1.4727	1.3902	1.2898	1.1802	1.0700
Arterial	Rural Minor Arterial	0.9895	1.0202	1.0495	1.0752	1.0948	1.1064	1.1089	1.1019	1.0863	1.0635	1.0358	1.0055	0.9751
Arterial	Rural Major Collector	0.9895	1.0201	1.0494	1.0750	1.0946	1.1062	1.1087	1.1017	1.0861	1.0633	1.0356	1.0054	0.9750
Arterial	Rural Minor Collector	0.9887	1.0189	1.0478	1.0730	1.0923	1.1038	1.1062	1.0994	1.0840	1.0615	1.0342	1.0045	0.9745
Arterial	Rural Local	0.9897	1.0204	1.0499	1.0756	1.0953	1.1070	1.1095	1.1025	1.0868	1.0639	1.0361	1.0057	0.9752
Urban	Urban Other Prin Arterial	0.9445	0.9463	0.9480	0.9494	0.9506	0.9513	0.9514	0.9510	0.9501	0.9488	0.9472	0.9454	0.9437
Urban	Urban Minor Arterial	0.9445	.09463	0.9480	0.9494	0.9506	0.9512	0.9514	0.9510	0.9501	0.9488	0.9472	0.9454	0.9437
Urban	Urban Collector	0.9445	.09463	0.9481	0.9496	0.9507	0.9514	0.9515	0.9511	0.9502	0.9489	0.9472	0.9455	0.9437
Urban	Urban Local	0.9445	.09463	0.9480	0.9495	0.9506	0.9513	0.9514	0.9510	0.9501	0.9488	0.9472	0.9454	0.9437

Table V-4
VMT and 2007 Budget Ozone Season NO_x Emissions
Highway Vehicle

State	Seasonal 2007 VMT (thousands)	Final Budget With HDD Excess (tons/season)
Alabama	23,642	52,202
Connecticut	14,960	19,902
Delaware	4,207	8,524
District of Columbia	1,944	2,215
Georgia	49,822	90,499
Illinois	52,897	117,354
Indiana	33,843	82,170
Kentucky	24,590	54,406
Maryland	24,840	30,832
Massachusetts	23,207	28,641
Michigan	40,187	79,751
Missouri	31,772	52,554
New Jersey	32,442	35,890
New York	68,689	126,664
North Carolina	42,240	75,785
Ohio	52,640	96,572
Pennsylvania	47,953	93,052
Rhode Island	3,614	3,879
South Carolina	22,025	55,585
Tennessee	31,546	67,538
Virginia	38,787	73,619
West Virginia	9,161	21,325
Wisconsin	28,561	70,987
Total *	**703,569**	**1,339,945**

* Totals may not sum due to rounding.

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Chapter VI
Statewide NOx Budgets

The Statewide base case and budget emissions were calculated by summing the individual base case and budget emissions components. Table VI-1 shows the seasonal Statewide base case and budget NO_x emissions and the percent reduction between the base case and the budget. Table VI-2 presents the base and budget cases by major source category component.

Table VI-1
Seasonal Statewide NO_x Base and Budgets
(Tons/Season)

State	Final Base	Final Budget	Reduction
Alabama	236,867	172,037	27%
Connecticut	46,220	43,081	7%
Delaware	23,512	22,789	3%
District of Columbia	6,485	6,672	-3%
Georgia	253,489	189,634	25%
Illinois	375,250	274,799	27%
Indiana	355,433	238,970	33%
Kentucky	238,412	155,619	35%
Maryland	103,558	81,625	21%
Massachusetts	87,563	85,296	3%
Michigan	288,000	224,582	22%
Missouri	189,737	128,146	32%
New Jersey	108,584	100,133	8%
New York	253,659	240,123	5%
North Carolina	228,600	168,373	26%
Ohio	378,418	250,930	34%
Pennsylvania	346,900	257,441	26%
Rhode Island	9,895	9,810	1%
South Carolina	153,465	124,211	19%
Tennessee	257,962	197,664	23%
Virginia	224,521	185,027	18%
West Virginia	184,947	91,216	51%
Wisconsin	175,061	136,172	22%
Total	**4,526,538**	**3,384,350**	**25%**

Table VI-2
Seasonal Statewide NO_x Base and Budgets by Major Source Category
(Tons/Season)

	2007 Base NOx Emissions (tons/season)						2007 Budget NOx Emissions (tons/season)					
State	**EGU**	**Non-EGU**	**Area**	**Nonroad**	**Highway**	**Total**	**EGU**	**Non-EGU**	**Area**	**Nonroad**	**Highway**	**Total**
Alabama	76,926	58,791	28,762	20,186	52,202	236,867	29,022	41,865	28,762	20,186	52,202	172,037
Connecticut	5,636	5,124	4,821	10,736	19,902	46,220	2,652	4,970	4,821	10,736	19,902	43,081
Delaware	5,838	2,370	1,129	5,651	8,524	23,512	5,250	2,235	1,129	5,651	8,524	22,789
District of Columbia	3	300	830	3,138	2,215	6,485	207	282	830	3,138	2,215	6,672
Georgia	86,455	36,827	13,212	26,497	90,499	253,489	30,402	29,024	13,212	26,497	90,499	189,634
Illinois	119,311	72,183	9,369	57,033	117,354	375,250	32,373	58,670	9,369	57,033	117,354	274,799
Indiana	136,773	80,884	29,070	26,536	82,170	355,433	47,731	53,463	29,070	26,536	82,170	238,970
Kentucky	107,829	29,328	31,807	15,042	54,406	238,412	36,503	17,861	31,807	15,042	54,406	155,619
Maryland	32,603	15,554	4,448	20,121	30,832	103,558	14,656	11,568	4,448	20,121	30,832	81,625
Massachusetts	16,479	11,229	11,048	20,166	28,641	87,563	15,145	10,296	11,048	20,166	28,641	85,296
Michigan	86,600	62,988	31,721	26,940	79,751	288,000	32,467	53,703	31,721	26,940	79,751	224,582
Missouri	82,097	26,870	7,341	20,875	52,554	189,737	24,194	23,182	7,341	20,875	52,554	128,146
New Jersey	18,352	18,345	12,431	23,565	35,890	108,584	10,384	17,863	12,431	23,565	35,890	100,133
New York	39,199	28,281	17,423	42,091	126,664	253,659	31,009	22,935	17,423	42,091	126,664	240,123
North Carolina	84,815	34,888	11,067	22,045	75,785	228,600	31,840	27,635	11,067	22,045	75,785	168,373
Ohio	163,132	53,074	21,860	43,780	96,572	378,418	49,266	39,453	21,860	43,780	96,572	250,930
Pennsylvania	123,102	82,270	17,842	30,635	93,052	346,900	48,311	67,602	17,842	30,635	93,052	257,441
Rhode Island	1,082	2,031	448	2,455	3,879	9,895	997	2,031	448	2,455	3,879	9,810
South Carolina	36,299	37,495	9,415	14,670	55,585	153,465	16,772	27,768	9,415	14,670	55,585	124,211
Tennessee	70,908	53,198	13,333	52,985	67,538	257,962	25,814	37,994	13,333	52,985	67,538	197,664
Virginia	40,884	54,414	27,738	27,867	73,619	224,521	17,187	38,617	27,738	27,867	73,619	185,027
West Virginia	115,490	32,235	5,459	10,438	21,325	184,947	26,624	27,369	5,459	10,438	21,325	91,216
Wisconsin	51,962	22,886	11,253	17,975	70,984	175,061	17,375	18,584	11,253	17,975	70,984	136,172
Total	**1,501,775**	**821,563**	**321,826**	**541,428**	**1,339,945**	**4,526,538**	**546,181**	**634,970**	**321,826**	**541,428**	**1,339,945**	**3,384,350**

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APPENDIX A
2007 BASE CASE CONTROLS

Table A-1
2007 Base Case Controls

EGU	- Title IV Controls [phase 1 & 2] - 250 Ton PSD and NSPS - RACT & NSR in non-waived NAAs
Non-EGU Point	- NO_x RACT on major sources in non-waived NAAs - CTG & Non-CTG VOC RACT at major sources in NAAs & OTR - NO_x MACT standards to municipal waste combustors (MWCs)
Stationary Area	- Two Phases of VOC Consumer and Commercial Products & One Phase of Architectural Coatings controls - VOC Stage 1 & 2 Petroleum Distribution Controls in NAAs - VOC Autobody, Degreasing & Dry Cleaning controls in NAAs
Nonroad Mobile	- Fed Phase II Small Eng. Stds - Fed Marine Eng. Stds. - Fed Nonroad Heavy-Duty (>=50 hp) Engine Stds - Phase 1 - Fed RFG II (statutory and opt-in areas) - 9.0 RVP maximum elsewhere in OTAG domain - Fed Locomotive Stds (not including rebuilds) - Fed Nonroad Diesel Engine Stds - Phases 2 & 3 - On-board vapor recovery
Highway Vehicles	- National LEV - Fed RFG II (statutory and opt-in areas) - Phase II RVP limits elsewhere in OTAG domain - High Enhanced, Low Enhanced, or Basic I/M in areas specified by State - Clean Fuel Fleets (mandated NAAs) - HDV 2 gm std

APPENDIX B
NON-EGU POINT SOURCE CONTROL CATEGORY CODES

Table B-1
Non-EGU Point Source Category Codes and Descriptions

POD[*]	Source Category
0	No Match
11	ICI Boilers - Coal/Wall
12	ICI Boilers - Coal/FBC
13	ICI Boilers - Coal/Stoker
14	ICI Boilers - Coal/Cyclone
15	ICI Boilers - Residual Oil
16	ICI Boilers - Distillate Oil
17	ICI Boilers - Natural Gas
18	ICI Boilers - Wood/Bark/Stoker
19	ICI Boilers - Wood/Bark/FBC
20	ICI Boilers - MSW/Stoker
21	Internal Combustion Engines - Oil
22	Internal Combustion Engines - Gas
23	Gas Turbines - Oil
24	Gas Turbines - Natural Gas
25	Process Heaters - Distillate Oil
26	Process Heaters - Residual Oil
27	Process Heaters - Natural Gas
28	Adipic Acid Manufacturing
29	Nitric Acid Manufacturing
30	Glass Manufacturing - Container
31	Glass Manufacturing - Flat
32	Glass Manufacturing - Pressed
33	Cement Manufacturing - Dry
34	Cement Manufacturing - Wet
35	Iron & Steel Mills - Reheating
36	Iron & Steel Mills - Annealing
37	Iron & Steel Mills - Galvanizing
38	Municipal Waste Combustors
39	Medical Waste Incinerators
40	Open Burning
41	ICI Boilers - Process Gas
42	ICI Boilers - Coke
43	ICI Boilers - LPG
44	ICI Boilers - Bagasse
45	ICI Boilers - Liquid Waste
46	IC Engines - Gas, Diesel, LPG
47	Process Heaters - Process Gas
48	Process Heaters - LPG
49	Process Heaters - Other Fuel
50	Gas Turbines - Jet Fuel
51	Engine Testing - Natural Gas
52	Engine Testing - Diesel GT

Table B-1
Non-EGU Point Source Category Codes and Descriptions

POD*	Source Category
53	Engine Testing - Oil IC
54	Space Heaters - Distillate Oil
55	Space Heaters - Natural Gas
56	Ammonia - NG-Fired Reformers
57	Ammonia - Oil-Fired Reformers
58	Lime Kilns
59	Comm./Inst. Incinerators
60	Indust. Incinerators
61	Sulfate Pulping - Recovery Furnaces
62	Ammonia Prod; Feedstock Desulfurization
63	Plastics Prod-Specific; (ABS) Resin
64	Starch Mfg; Combined Operations
65	By-Product Coke Mfg; Oven Underfiring
66	Pri Cop Smel; Reverb Smelt Furn
67	Iron Prod; Blast Furn; Blast Htg Stoves
68	Steel Prod; Soaking Pits
69	Fuel Fired Equip; Process Htrs; Pro Gas
70	Sec Alum Prod; Smelting Furn/Reverb
71	Steel Foundries; Heat Treating Furn
72	Fuel Fired Equip; Furnaces; Natural Gas
73	Asphaltic Conc; Rotary Dryer; Conv Plant
74	Ceramic Clay Mfg; Drying
75	Coal Cleaning-Thrml Dryer; Fluidized Bed
76	Fbrglass Mfg; Txtle-Type Fbr; Recup Furn
77	Sand/Gravel; Dryer
78	Fluid Cat Cracking Units; Cracking Unit
79	Conv Coating of Prod; Acid Cleaning Bath
80	Natural Gas Prod; Compressors
81	In-Process; Bituminous Coal; Cement Kiln
82	In-Process; Bituminous Coal; Lime Kiln
83	In-Process Fuel Use;Bituminous Coal; Gen
84	In-Process Fuel Use; Residual Oil; Gen
85	In-Process Fuel Use; Natural Gas; Gen
86	In-Proc;Process Gas;Coke Oven/Blast Furn
87	In-Process; Process Gas; Coke Oven Gas
88	Surf Coat Oper;Coating Oven Htr;Nat Gas
89	Solid Waste Disp;Gov;Other Incin;Sludge

* A POD is an grouping of sources categories for which a common control technology is applicable.

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APPENDIX C
SOURCE SPECIFIC EGU BUDGET
EMISSIONS FILE

Table C-1
Source Specific EGU Budget Emissions File

Filename: EGUFINAL
Description: Regional NOx SIP Call Budget Determination EGU Point Source File

Variable	Type	Length	Decimal	Description
ST	C	2	0	State Abbreviation
PLANT	C	45	0	Plant Name
PLANT_ID	C	15	0	Plant ID Code
POINT_ID	C	15	0	Point ID Code
FIPS_CNTY	C	3	0	FIPS County Code
NAMEPL_CAP	N	8	2	Capacity (MW) of Largest Generator the Unit Serves
FSIP_HEAT_INP	N	15	4	Final Heat Input (mmBtu) Used to Calculate Budget (Based on Year to Use)
F95_HEAT_INP	N	15	4	1995 Ozone Season Heat Input (mmBtu)
F96_HEAT_INP	N	15	4	1996 Ozone Season Heat Input (mmBtu)
FSIPNOX_RT	N	8	4	NOx Rate Used to Calculate Budget
FSIPHEAT_YR	N	4	0	Year to Use for Heat Input to Calculate Individual State Budget
F95_NOX_RT	N	8	4	1995 NOx Emission Rate (lbs/mmBtu)
F96_NOX_RT	N	8	4	1996 NOx Emission Rate (lbs/mmBtu)
NOX_MASS	N	15	4	2007 Ozone Season Budget NOx Emissions (pounds)

APPENDIX D
SOURCE SPECIFIC NON-EGU POINT SOURCE BASE AND BUDGET EMISSIONS FILE

Table D-1
Source Specific Non-EGU Point Source Base and Budget Emissions File

Filename: NFRPT2
Description: Regional NOx SIP Call Non-EGU Point Source File

Variable	Type	Length	Decimal	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
PLANTID	C	15	0	Plant ID Code
PLANT	C	40	0	Plant Name
SIC	N	4	0	Standard Industrial Classification Code
POINTID	C	15	0	Point ID Code
STACKID	C	15	0	Stack ID Code
SEGMENT	C	15	0	Segment ID
SCC	C	10	0	Source Classification Code
POD	C	3	0	Source Category Association
SIZE	C	1	0	Budget Size
BOILCAP	N	8	0	Boiler Design Capacity (MMBtu/hr)
STKHGT	N	4	0	Stack Height (ft)
STKDIAM	N	6	2	Stack Diameter (ft)
STKTEMP	N	4	0	Stack Temperature (degrees F)
STKFLOW	N	10	2	Stack Flow (cu. ft./min)
STKVEL	N	9	2	Stack Velocity (ft/sec)
WINTHRU	N	3	0	Winter Throughput Percentage
SPRTHRU	N	3	0	Spring Throughput Percentage
SUMTHRU	N	3	0	Summer Throughput Percentage
FALTHRU	N	3	0	Fall Throughput Percentage
HOURS	N	2	0	Operating Hours/Day
DAYS	N	1	0	Operating Days/Weeks
WEEKS	N	2	0	Operating Weeks/Year
LATC	N	9	4	Latitude (degrees)
LONC	N	9	4	Longitiude (degrees)
NOXCE95	N	5	2	1995 NOx Control Efficiency
NOXRE95	N	5	2	1995 NOx Rule Effectiveness
DNOX95	N	16	4	1995 Typical Ozone Season Daily NOx Emissions (tons)
SNOX95	N	16	4	1995 Ozone Season NOx Emissions (tons)
GF9507	N	7	2	1995 - 2007 Growth Factor
NOXCE07	N	5	2	2007 Base NOx Control Efficiency
NOXRE07	N	5	2	2007 NOx Rule Effectiveness
DNOX07	N	16	4	2007 Typical Ozone Season Daily NOx Emissions (tons)
SNOX07	N	16	4	2007 Ozone Season Base NOx Emissions (tons)
NOXCE07B	N	5	2	2007 Budget NOx Control Efficiency
DBNOX	N	16	4	2007 Typical Ozone Season Daily Budget NOx Emissions (tons)
SBNOX	N	16	4	2007 Ozone Season Budget NOx Emissions (tons)

APPENDIX E
COUNTY LEVEL STATIONARY AREA BASE AND BUDGET EMISSIONS FILE

Table E-1
County Level Stationary Area Base and Budget Emissions File

Filename: NFRAR2
Description: Regional NOx SIP Call Stationary Area Source File

Variable	Type	Length	Decimal	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
SCC	C	10	0	Source Classification Code
DNOX95	N	10	4	1995 Typical Ozone Season Daily NOx Emissions (tons)
SNOX95	N	10	4	1995 Ozone Season NOx Emissions (tons)
GR9507	N	7	2	1995 - 2007 Growth Factor
NOXCE07	N	5	2	2007 Base NOx Control Efficiency
NOXCRE07	N	5	2	2007 NOx Rule Effectiveness
NOXRP07	N	5	2	2007 NOx Rule Penetration
PUGR	N	7	3	2007 Process Units Growth Rate
DNOX07	N	10	4	2007 Typical Ozone Season Daily NOx Emissions (tons)
SNOX07	N	10	4	2007 Ozone Season NOx Emissions (tons)

APPENDIX F
COUNTY LEVEL NONROAD MOBILE BASE AND BUDGET EMISSIONS FILE

Table E-1
County Level Nonroad Mobile Base and Budget Emissions File

Filename: NFRNR2
Description: Regional NOx SIP Call Nonroad Mobile Source File

Variable	Type	Length	Decimal	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
SCC	C	10	0	Source Classification Code
DNOX95	N	10	4	1995 Typical Ozone Season Daily NOx Emissions (tons)
SNOX95	N	10	4	1995 Ozone Season NOx Emissions (tons)
GR9507	N	7	2	1995 - 2007 Growth Factor
NOXCE07	N	5	2	2007 Base NOx Control Efficiency
NOXCRE07	N	5	2	2007 NOx Rule Effectiveness
NOXRP07	N	5	2	2007 NOx Rule Penetration
PUGR	N	7	3	2007 Process Units Growth Rate
DNOX07	N	10	4	2007 Typical Ozone Season Daily NOx Emissions (tons)
SNOX07	N	10	4	2007 Ozone Season NOx Emissions (tons)

APPENDIX G
COUNTY LEVEL HIGHWAY VEHICLE BASE AND BUDGET EMISSIONS FILE

Table G-1
County Level Highway Vehicle Base and Budget Emissions File

Filename: NFRMB2
Description: Regional NOx SIP Call Highway Vehicle File

Variable	Type	Length	Decimal	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
SCC	C	10	0	Source Classification Code
V_TYPE	C	5	0	Vehicle Type
VOC07_SEAS	N	13	6	2007 Ozone Season VOC Emissions (tons)
NOX07_SEAS	N	13	6	2007 Ozone Season NOx Emissions (tons)
CO07_SEAS	N	13	6	2007 Ozone Season CO Emissions (tons)
VOC07MAY	N	13	6	2007 May VOC Emissions (tons)
VOC07JUN	N	13	6	2007 June VOC Emissions (tons)
VOC07JUL	N	13	6	2007 July VOC Emissions (tons)
VOC07AUG	N	13	6	2007 August VOC Emissions (tons)
VOC07SEP	N	13	6	2007 September VOC Emissions (tons)
NOX07MAY	N	13	6	2007 May NOx Emissions (tons)
NOX07JUN	N	13	6	2007 June NOx Emissions (tons)
NOX07JUL	N	13	6	2007 July NOx Emissions (tons)
NOX07AUG	N	13	6	2007 August NOx Emissions (tons)
NOX07SEP	N	13	6	2007 September NOx Emissions (tons)
CO07MAY	N	13	6	2007 May CO Emissions (tons)
CO07JUN	N	13	6	2007 June CO Emissions (tons)
CO07JUL	N	13	6	2007 July CO Emissions (tons)
CO07AUG	N	13	6	2007 August CO Emissions (tons)
CO07SEP	N	13	6	2007 September CO Emissions (tons)
VMT07MAY	N	16	3	2007 May VMT
VMT07JUN	N	16	3	2007 June VMT
VMT07JUL	N	16	3	2007 July VMT
VMT07AUG	N	16	3	2007 August VMT
VMT07SEP	N	16	3	2007 September VMT
VMT07_SEAS	N	16	3	2007 Ozone Season VMT

APPENDIX H
MOBILE MODEL HIGHWAY VEHICLE COUNTY CORRESPONDENCE FILE

Table H-1
Regional NOx SIP Call MOBILE Model Highway Vehicle County Correspondence File Format

Filename: XREFV5.DBF
Description: Regional NOx SIP Call Highway Mobile Source File

Variable	Type	Length	Decimal	Description
FIPSST	C	2		FIPS State code
FIPSCNTY	C	3		FIPS county code
STATECD	C	2		State abbreviation
COUNTYNAME	C	30		County name
M5BFILE	C	12		Name of MOBILE5b input file used to model county emission factors
ASTM	C	1		Fuel ASTM class (only needed when reformulated gasoline is modeled)
SPDFLG	C	1		Flag indicating whether user-supplied trip length distributions were modeled (1=MOBILE5b defaults, 3 or 4=user-supplied trip length distributions)
MYMRFG	C	1		Flag indicating whether user-supplied registration distributions and/or mileage accumulation rates were modeled (1=MOBILE5b defaults, 3=user-supplied registration distributions, 4=user-supplied registration distributions and mileage accumulation rates)
IMFLAG	C	1		Flag indicating whether I/M program modeled in county (1=no I/M, all other flag values indicate I/M program modeled)
ATPFLG	C	1		Flag indicating whether ATP, pressure, or purge tests were modeled for this county (1=no ATP, pressure, or purge, 2=ATP modeled, 5=ATP and pressure test modeled, 8=ATP, pressure, and purge tests modeled)
SPDFILE	C	10		Name of file containing trip length distribution modeled for this county
MYMRFILE	C	10		Name of file containing registration distributions and/or mileage accumulation rates modeled for this county
IMATPFILE	C	8		Name of file with I/M, ATP,pressure, and purge program inputs modeled in this county (EPA high enhanced performance standard = HEIMPS and NHEIMPS, EPA low enhanced performance standard = LEIMPS and NLEIMPS, EPA basic I/M performance standard = BSIMPS, NBS
OPMODE	C	16		Operating mode fractions (default = " 20.6 27.3 20.6 ")
RVP_JUL	N	4	1	Fuel RVP value modeled (psi)
REFORMFLG	C	1		Reformulated gasoline flag: 1=no RFG, 2=RFG
OXYDAT	C	21		Oxygenated/alcohol fuel data for county: ether blend market share, alcohol blend market share, oxygen content of ether blends, oxygen content of alcohol blends, RVP waiver switch (1=no RVP waiver, 2=1 psi RVP waiver)
LEV_MINMAX	C	1		Flag indicating whether minimum (1) or maximum (2) LEV credits were applied in this county
LEV_START	C	2		Start year of LEV program in this county
LEVIMPFILE	C	12		LEV implementation schedule file used to run MOBILE5b for this county
SPEEDSCC	C	12		Name of file containing vehicle speeds modeled in this county (default file is SCCSPD.DBF)