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Procedures for Developing Base Year and Future Year Mass and Modeling Inventories for the Tier 2 Final Rulemaking

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Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency

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ACRONYMS AND ABBREVIATIONS

AAMA	American Automobile Manufacturers Association
APUs	Aircraft and Auxiliary Power Units
ASTM	American Society for Testing and Materials
BEA	Bureau of Economic Analysis
CAA	Clean Air Act
CAAA	CAA Amendments of 1990
CI	compression-ignition
CNG	compressed natural gas
CO	carbon monoxide
DOE	U.S. Department of Energy
DR	deterioration rate
E-GAS	Economic Growth Analysis System
EGU	electric generating unit
EIA	Energy Information Administration
EMS	Emissions Modeling System
EPA	U.S. Environmental Protection Agency
EPCD	Engine Programs and Compliance Division
EPS	Emissions Preprocessor System
F	Fahrenheit
FAA	Federal Aviation Administration
FCM	Fuel Consumption Model
FIPS	Federal Information Processing Standard
ft	feet
ft/min	feet per minute
g/bhp-hr	grams per brake horsepower-hour
GSP	Gross State Product
HC	hydrocarbon
HDDV	Heavy-Duty Diesel Vehicle
HON	Hazardous Organic NESHAP
hp	horsepower
HPMS	Highway Performance Monitoring System
I/M	Inspection and Maintenance
IPM	Integrated Planning Model
LDDT	Light-Duty Diesel Truck
LDDV	Light-Duty Diesel Vehicle
LEV	Low-Emission Vehicle
LNB	low-NO_x burner
LPG	liquid petroleum gas
LTOs	Landing-Takeoff Operations
m	meter
MACT	maximum achievable control technology
MMBtu	million British thermal units
NAAQS	National Ambient Air Quality Standards

ACRONYMS AND ABBREVIATIONS (continued)

NERC	North American Electric Reliability Council
NESHAP	National Emission Standards for Hazardous Air Pollutants
NET	National Emission Trends
NH_3	ammonia
NLEV	National Low Emission Vehicle
NMHC	nonmethane hydrocarbon
NMOG	Nonmethane Organic Gas
NO_x	oxides of nitrogen
OBD	on-board diagnostic
OMS	Office of Mobile Sources
OTAG	Ozone Transport Assessment Group
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
PM	particulate matter
PM_{10}	primary particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
$PM_{2.5}$	primary particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
POTWs	Publicly-Owned Treatment Works
ppm	parts per million
psi	pounds per square inch
RACT	reasonably available control technology
REMSAD	Regulatory Modeling System for Aerosols and Deposition
RFG	reformulated gasoline
RSD	Regulatory Support Document
RVP	Reid vapor pressure
SCCs	Source Classification Codes
SCR	selective catalytic reduction
SI	spark-ignition
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SMOKE	Sparse Matrix Operator Kernel Emissions
SNCR	Selective Noncatalytic Reduction
SO_2	sulfur dioxide
SOA	secondary organic aerosols
SOCMI	Synthetic Organic Chemical Manufacturing Industry
SO_x	oxides of sulfur
SSD	summer season daily
TLEV	transitional LEV
tpd	tons per day
tpy	tons per year
TSDFs	treatment, storage, and disposal facilities
UAM-V	Urban Airshed Model

ACRONYMS AND ABBREVIATIONS (continued)

ULEV	Ultra-Low Emission Vehicle
USDA	U.S. Department of Agriculture
UTM	Universal Transverse Mercator
VMT	vehicle miles traveled
VOC	volatile organic compound
ZML	zero-mile level

CHAPTER I
BACKGROUND

To assist future State and Federal implementation of the Tier 2 mobile source emission standards, the United States (U.S.) Environmental Protection Agency (EPA) is developing national annual and temporal emission inventories and applying the Urban Airshed Model (UAM-V) and Regulatory Modeling System for Aerosols and Deposition (REMSAD) to examine the regional ozone and particulate matter (PM) concentration response to a series of emission control strategies. The purpose of this report is to describe the procedures and assumptions used to develop the mass emissions inventories and the emissions input files for the Emissions Modeling System (EMS-95)/Sparse Matrix Operator Kernel Emissions (SMOKE) and Emissions Preprocessor System (EPS-2.5) air quality model preprocessors.

The emission inventories developed to support the Tier 2 final rulemaking include the following:

- 1996 Base Year;
- 2007 Base Case;
- 2007 Control Case;
- 2030 Base Case; and
- 2030 Control Case.

These national inventories are prepared at the county-level for on-highway mobile, electric generating unit (EGU), non-EGU point, stationary area, and nonroad sources. The inventories contain annual and summer season daily (SSD) emissions for the following pollutants: oxides of nitrogen (NO_x), volatile organic compounds (VOC), carbon monoxide (CO), oxides of sulfur (SO_x), primary particulate matter with an aerodynamic diameter less than or equal to 10 micrometers and 2.5 micrometers (PM_{10} and $PM_{2.5}$), ammonia (NH_3), and secondary organic aerosols (SOA). The 2007 and 2030 Base Case inventories are prepared by applying growth and control assumptions to the 1996 Base Year inventory. The 2007 and 2030 Control Case inventories are developed from the 2007 and 2030 Base Case inventories, respectively, by applying Tier 2 control assumptions to the on-highway vehicle and nonroad emission source sectors. The growth and control assumptions used to prepare the 2007 and 2030 inventories are documented in this report.

Chapters II through VII of this report document the inventories for the EGU, non-EGU point, stationary area, nonroad, and on-highway vehicle source sectors. The chapter for each emission sector documents the procedures and assumptions applied to prepare the mass emissions inventories for the 1996 Base Year, 2007 and 2030 Base Cases, and 2007 and 2030 Control Cases. Each chapter also discusses the procedures and assumptions applied to prepare the emissions input files for the EMS-95/SMOKE and EPS-2.5 air quality model preprocessors. Chapter VII provides emissions summaries and density maps for the emissions inventories.

CHAPTER II
ELECTRICITY GENERATING UNITS (EGUs)

A. 1996 BASE YEAR MASS EMISSIONS INVENTORY

The 1996 base year mass emissions inventory for EGUs is the 1996 National Emission Trends (NET) inventory (EPA, 1998a). Inventory records with Source Classification Codes (SCCs) of 101xxx and 201xxx were extracted to develop the EGU inventory.

B. 2007 AND 2030 FUTURE YEAR MASS EMISSIONS INVENTORIES

Projection year unit-level files were provided to Pechan-Avanti by EPA for the EGU sector. These files, developed based on output from the Integrated Planning Model (IPM), include heat input, sulfur dioxide (SO_2) emissions, NO_x emissions, and unit characteristics such as prime mover (boiler, gas turbine), primary fuel, bottom type, and firing type. This section focuses on the steps used to supplement these data by adding emissions of VOCs, CO, PM_{10}, $PM_{2.5}$, NH_3, and SOA, as well as adding data elements needed for modeling (e.g., location and stack parameters).

The data elements included in the IPM parsed data sets are shown in Table II-1. The data sets include unit level information for all existing or known planned units. For new units (additional capacity needed to meet generation demands), State level estimates by plant type (prime mover) and fuel type are provided. Processing of new capacity is discussed separately below.

1. County Identifiers

For those units with no county identifiers, counties available in cross-reference files developed for the NO_x State Implementation Plan (SIP) Call EGU file and other prior analyses were utilized to incorporate the county code. Plants were matched to other inventories by State and plant name in some cases. Others were matched to Energy Information Administration (EIA)-860 planned unit files to identify the county or to North American Electric Reliability Council (NERC) reports.

2. Latitude and Longitude

Latitude and longitude coordinates from other inventories, including the NET inventory and the Ozone Transport Assessment Group (OTAG) inventory, were used where units were matched to these inventories at the boiler or plant level. For all other units, county centroids were assigned.

Table II-1
Data Elements Provided in EGU Projection Files
IPM Parsed Data Sets

Data Elements	Description
Plant Name	Plant name
Plant Type	Combined cycle, coal steam, oil/gas steam, turbine, other
State Name	State name
State Code	Federal Information Processing Standard (FIPS) State code
County Name	County name (sometimes missing)
County Code	FIPS county code (sometimes missing)
ORIS Code	ORIS plant code for those units assigned codes, IPM plant code otherwise
Blr	ORIS boiler or unit code where available, otherwise IPM unit code
Capacity	Boiler/unit capacity (MW)
July Day Heat	July day heat input (BBtu/day)
Fuel Type	Primary fuel burned: coal, gas, natural gas, none, refuse, waste coal, wood waste
Bottom	Boiler bottom type: dry, wet, other, unknown, or blank
Firing	Firing type: cell, cyclone, tangential, vertical, well, wet, other, or unknown
Existing SO_2/NO_x Controls	Existing control for SO_2 and/or NO_x - scrubbed, unscrubbed, or blank
Retrofit SO_2/NO_x Controls	Coal to combined cycle, gas reburn, oil/gas selective noncatalytic reduction (SNCR), oil/gas to combined cycle, retirement, coal selective catalytic reduction (SCR), coal scrubber, coal SNCR, or blank
Typical July Day NO_x	Typical July day NO_x emissions (tons/day)
Ash Content	Coal ash content (for fuel type - coal only)
Fuel Sum	5 month summer fuel use or heat input (TBtu)
Fuel Tot	Annual fuel use or heat input (TBtu)
NO_x Sum	5 month NO_x emissions (MTon)
NO_x Tot	Annual NO_x emissions (MTon)
SO_2 Tot	Annual SO_2 emissions (MTon)

3. SCC

The SCC is needed to determine the appropriate emission rates to use for the additional pollutants and to incorporate stack parameters for units which do not match to existing inventories. SCCs were assigned by first matching to existing inventories and then by assigning SCCs based on the unit, fuel, firing, and bottom types. In cases where SCCs taken from other inventories indicate a fuel other than that specified in the IPM unit-level file, SCCs were updated based on the indicated fuel, unit, bottom, and firing types.

4. Stack Parameters

Stack parameters were also added to the EGU file by matching to other inventories. For units where matches to other inventories could not be made, default parameters by SCC were assigned. These default parameters are shown in Table II-2. Stack flow rate and velocity were quality assured to ensure consistency between the two data elements and that the velocities were within acceptable modeling ranges (below 650 feet per second).

5. Emissions

Emissions of VOC, CO, PM_{10}, $PM_{2.5}$, NH_3, and SOA were added to the inventory. AP-42 (or updated) rates were applied to the reported heat input for each unit to calculate these emissions. For PM_{10} and $PM_{2.5}$, the reported ash content was also utilized along with control efficiency data obtained from other inventories. A default PM efficiency of 80 percent was applied to all coal-fired units which did not match to other inventories. The emission rates used in this analysis are also shown in Table II-2.

6. New Units

The IPM data set provides projected heat input from new units, by prime mover and fuel type. This projected heat input is divided into individual new units based on the model plant parameters shown in Table II-3. New units are then allocated to existing unit sites based on a hierarchy that avoids ozone nonattainment areas (Pechan-Avanti, 1997a). After siting the units, SCCs were assigned based on prime mover and fuel type. Default stack parameters and emissions were added using the same methods applied for existing units.

C. MASS EMISSIONS INVENTORY AND PREPROCESSOR INPUT FILES

After adding the additional parameters to the IPM unit-level file, the final mass and modeling inventories were prepared. June and August daily heat input and emissions were added to the file for ozone modeling (the IPM file contains July heat input and emissions). This was based on monthly percentage profiles by State, prime mover, and fuel provided by EPA (Stella, 1999). The 5-month (May through September) heat input was allocated to the month and then divided by the number of days in the month. Summer season day emissions were allocated using the same procedure, assuming that the emission rate remained the same across these five months. The June and August daily heat input and emissions were incorporated into the mass and EMS-95 files. Table II-4 documents the names of the EGU mass and modeling files.

Table II-2
Default Parameters for Utility Boilers

Unit Type	Primary Fuel	Bottom Type	Firing Type	Ash Content (%)	SCC	PM_{10} Rate (lbs/MMBtu)	CO Rate (lbs/MMBtu)	VOC Rate (lbs/MMBtu)	Stack Temp. (degrees F)	Stack Height (feet)	Stack Diameter (feet)	Stack Flow (ft^3/sec)
AB	Coal			all	10100217	0.3000	0.6923	0.0019	175	570	24	16286
CC	Gas			---	20100201	0.0133	0.1095	0.0120	300	280	12	2601
CT	Gas			---	20100201	0.0133	0.1095	0.0120	300	280	12	2601
ST	Gas			---	10100601	0.0029	0.0381	0.0013	300	280	12	2601
ST	Coal			5.46	10100202	0.4830	0.0192	0.0023	175	570	24	16286
ST	Coal	DRY	FRONT	5.92	10100202	0.5237	0.0192	0.0023	175	570	24	16286
ST	Coal	DRY	FRONT	6.22	10100202	0.5502	0.0192	0.0023	175	570	24	16286
ST	Coal	DRY	FRONT	9.58	10100202	0.8475	0.0192	0.0023	175	570	24	16286
ST	Coal	DRY	OPPOSED	9.85	10100202	0.8713	0.0192	0.0023	175	570	24	16286
ST	Coal	DRY	OPPOSED/CELL	9.32	10100202	0.8245	0.0192	0.0023	175	570	24	16286
ST	Coal	WET	CYCLONE	7.03	10100203	0.0703	0.0192	0.0042	175	570	24	16286
ST	Coal	WET	CYCLONE	10.21	10100203	0.1021	0.0192	0.0042	175	570	24	16286
ST	Coal	DRY	TANGENTIAL	9.92	10100212	0.8775	0.0192	0.0023	175	570	24	16286
ST	Coal	DRY	TANGENTIAL	16.63	10100212	1.4711	0.0192	0.0023	175	570	24	16286
ST	Coal	DRY	TANGENTIAL	21.18	10100212	1.8736	0.0192	0.0023	175	570	24	16286
ST	Oil			---	10100401	0.0190	0.0333	0.0051	300	290	12	3619
ST	Gas			---	10100601	0.0029	0.0381	0.0013	300	280	12	2601

Table II-3
Model Plant Parameters for Projected New Utility Units

Plant Parameters	Combined Cycle	Gas Turbine	Coal
Fuel Type	Natural Gas	Natural Gas	Coal
Unit Capacity (megawatts)	225	80	500
SCC	20100201	20100201	10100201
Stack Height [feet (ft)]	280	280	570
Stack Diameter (ft)	12	12	24
Stack Temperature (F)	300	300	175
Exhaust Gas Flow Rate (ft^3/sec)	2,601	2,601	16,286
Stack Gas Velocity (ft/sec)	23	23	36

Table II-4
EGU Mass and Preprocessor Input Files

Year	Mass	EPS2.5	EMS95	Comments
1996	EG96MSB.DBF	EG96EPSB.TXT	EG696EME.TGZ	For EMS95, June day
			EG796EME.TGZ	For EMS95, July day
			EG896EME.TGZ	For EMS95, August day
2007	EG07MS.DBF	EG07EPS.TXT	EG607EME.TGZ	For EMS95, June day
			EG707EME.TGZ	For EMS95, July day
			EG807EME.TGZ	For EMS95, August day
2030	EG30MS.DBF	EG30EPS.TXT	EG630EME.TGZ	For EMS95, June day
			EG730EME.TGZ	For EMS95, July day
			EG830EME.TGZ	For EMS95, August day

1. Mass Emission Inventory

The structure for the base year and projection year mass emission inventories is shown in Tables II-5 and II-6. The structures differ since the base year inventory was taken directly from the NET, while the projection year inventory was based on the IPM data set, which provides different information in some cases.

2. EPS-2.5 Files

The EPS-2.5 input files were derived directly from the mass emission files, utilizing the annual emissions. The structures for the base year and projection year files are shown in Tables II-7 and II-8.

3. EMS-95/SMOKE Files

The structure for the EGU EMS-95 input files is identical to the non-EGU point source files as shown in Chapter III. Also, the structures for the EMS-95 and SMOKE emissions preprocessor files are the same. In order to eliminate potential duplicate identifiers, the letter "e" was added to all stack and segment IDs in the EGU EMS-95 input files.

A weekly profile code of 8 was utilized for all EGU sources, consistent with files prepared for the NO_x SIP Call analysis. This assumes operation 7 days a week, with slightly lower utilization on the weekends.

Daily profile codes of 31 through 36 were applied based on a plant-level match file developed for the NO_x SIP Call analysis (Solomon, 1999). A default profile of 33 was applied to units which did not match to this cross-reference.

Table II-5
Structure for 1996 EGU Mass Emissions File

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
PLANTID	C	15	0	State Plant ID
PLANTID5	C	5	0	State Plant ID (5 Digit)
POINTID	C	15	0	Point ID
POINTID5	C	5	0	Point ID (5 Digit)
STACKID	C	12	0	Stack ID
STACKID3	C	3	0	Stack ID (3 Digit)
ORISID	C	6	0	U.S. Department of Energy (DOE) Plant ID
BLRID	C	6	0	Boiler ID
SEGMENT	C	2	0	Segment ID
PLANT	C	40	0	Plant Name
SCC	C	10	0	SCC
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 Rate (cubic feet per second)
STKVEL	N	9	2	Stack Velocity (ft/sec)
BOILCAP	N	8	2	Boiler Design Capacity
CAP_UNITS	C	1	0	Capacity Unit Code
WINTHRU	N	3	0	Winter Thruput (%)
SPRTHRU	N	3	0	Spring Thruput (%)
SUMTHRU	N	3	0	Summer Thruput (%)
FALTHRU	N	3	0	Fall Thruput (%)
HOURS	N	2	0	Hours per Day
START_HR	N	2	0	Hourly Start Time
DAYS	N	1	0	Days per Week
WEEKS	N	2	0	Weeks per Year
THRUPUT	N	11	1	Throughput Rate (SCC units/year)
MAXRATE	N	12	3	Maximum Ozone Season Rate (units/day)
HEATCON	N	8	2	Heat Content (MMBtu/SCC unit)
SULFCON	N	5	2	Sulfur Content (mass percent)
ASHCON	N	5	2	Ash Content (mass percent)
NETDC	N	9	3	Maximum Nameplate Capacity (MW)
SIC	N	4	0	Standard Industrial Classification (SIC) Code
LATC	N	9	4	Latitude (degrees)
LONC	N	9	4	Longitude (degrees)
VOC_EMF	N	11	4	VOC Emission Factor (SCC units)
NOX_EMF	N	11	4	NO_x Emission Factor (SCC units)

Table II-5 (continued)

Variable	Type	Length	Decimals	Description
CO_EMF	N	11	4	CO Emission Factor (SCC units)
SO2_EMF	N	11	4	SO_2 Emission Factor (SCC units)
PM10_EMF	N	11	4	PM_{10} Emission Factor (SCC units)
PM25_EMF	N	11	4	$PM_{2.5}$ Emission Factor (SCC units)
NH3_EMF	N	11	4	NH_3 Emission Factor (SCC units)
VOC_CE	N	7	2	VOC Control Efficiency (%)
NOX_CE	N	7	2	NO_x Control Efficiency (%)
CO_CE	N	7	2	CO Control Efficiency (%)
SO2_CE	N	7	2	SO_2 Control Efficiency (%)
PM10_CE	N	7	2	PM_{10} Control Efficiency (%)
PM25_CE	N	7	2	$PM_{2.5}$ Control Efficiency (%)
NH3_CE	N	7	2	NH_3 Control Efficiency (%)
VOC_CPRI	N	3	0	VOC Primary Control Equipment Code
NOX_CPRI	N	3	0	NO_x Primary Control Equipment Code
CO_CPRI	N	3	0	CO Primary Control Equipment Code
SO2_CPRI	N	3	0	SO_2 Primary Control Equipment Code
PM10_CPRI	N	3	0	PM_{10} Primary Control Equipment Code
PM25_CPRI	N	3	0	$PM_{2.5}$ Primary Control Equipment Code
NH3_CPRI	N	3	0	NH_3 Primary Control Equipment Code
VOC_CSEC	N	3	0	VOC Secondary Control Equipment Code
NOX_CSEC	N	3	0	NO_x Secondary Control Equipment Code
CO_CSEC	N	3	0	CO Secondary Control Equipment Code
SO2_CSEC	N	3	0	SO_2 Secondary Control Equipment Code
PM10_CSEC	N	3	0	PM_{10} Secondary Control Equipment Code
PM25_CSEC	N	3	0	$PM_{2.5}$ Secondary Control Equipment Code
NH3_CSEC	N	3	0	NH_3 Secondary Control Equipment Code
VOC_ANN	N	13	4	Annual VOC (tons)
NOX_ANN	N	13	4	Annual NO_x (tons)
CO_ANN	N	13	4	Annual CO (tons)
SO2_ANN	N	13	4	Annual SO_2 (tons)
PM10_ANN	N	13	4	Annual PM_{10} (tons)
PM25_ANN	N	13	4	Annual $PM_{2.5}$ (tons)
SOA_ANN	N	13	4	Annual SOA (tons)
NH3_ANN	N	13	4	Annual NH_3 (tons)
VOC_OSD06	N	13	4	June Day VOC (tons)
NOX_OSD06	N	13	4	June Day NO_x (tons)
CO_OSD06	N	13	4	June Day CO (tons)
SO2_OSD06	N	13	4	June Day SO_2 (tons)
PM10_OSD06	N	13	4	June Day PM_{10} (tons)
PM25_OSD06	N	13	4	June Day $PM_{2.5}$ (tons)

Table II-5 (continued)

Variable	Type	Length	Decimals	Description
SOA_OSD06	N	13	4	June Day SOA (tons)
NH3_OSD06	N	13	4	June Day NH_3 (tons)
VOC_OSD07	N	13	4	July Day VOC (tons)
NOX_OSD07	N	13	4	July Day NO_x (tons)
CO_OSD07	N	13	4	July Day CO (tons)
SO2_OSD07	N	13	4	July Day SO_2 (tons)
PM10_OSD07	N	13	4	July Day PM_{10} (tons)
PM25_OSD07	N	13	4	July Day $PM_{2.5}$ (tons)
SOA_OSD07	N	13	4	July Day SOA (tons)
NH3_OSD07	N	13	4	July Day NH_3 (tons)
VOC_OSD08	N	13	4	August Day VOC (tons)
NOX_OSD08	N	13	4	August Day NO_x (tons)
CO_OSD08	N	13	4	August Day CO (tons)
SO2_OSD08	N	13	4	August Day SO_2 (tons)
PM10_OSD08	N	13	4	August Day PM_{10} (tons)
PM25_OSD08	N	13	4	August Day $PM_{2.5}$ (tons)
SOA_OSD08	N	13	4	August Day SOA (tons)
NH3_OSD08	N	13	4	August Day NH_3 (tons)
VOC_RE	N	3	0	VOC Rule Effectiveness (%)
NOX_RE	N	3	0	NO_x Rule Effectiveness (%)
CO_RE	N	3	0	CO Rule Effectiveness (%)
SO2_RE	N	3	0	SO_2 Rule Effectiveness (%)
PM10_RE	N	3	0	PM_{10} Rule Effectiveness (%)
PM25_RE	N	3	0	$PM_{2.5}$ Rule Effectiveness (%)
NH3_RE	N	3	0	NH_3 Rule Effectiveness (%)

Table II-6
Structure for 2007 and 2030 EGU Mass Emissions Files

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
PLANTID	C	15	0	State Plant ID
POINTID	C	15	0	Point ID
STACKID	C	12	0	Stack ID
SEGMENT	C	2	0	Segment ID
PLANT	C	40	0	Plant Name
SCC	C	10	0	SCC
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 Rate (cubic feet per second)
STKVEL	N	9	2	Stack Velocity (ft/sec)
BOILCAP	N	8	2	Boiler Design Capacity
LAT	N	9	4	Latitude (degrees)
LON	N	9	4	Longitude (degrees)
ANNHEAT	N	9	0	Annual Heat Input (MMBtu)
WINHEAT	N	9	0	7 Month Winter Heat Input (MMBtu)
SUMHEAT	N	9	0	5 Month Summer Heat Input (MMBtu)
JUNDHEAT	N	9	0	June Daily Heat Input (MMBtu)
JULDHEAT	N	9	0	July Daily Heat Input (MMBtu)
AUGDHEAT	N	9	0	August Daily Heat Input (MMBtu)
VOC_ANN	N	10	4	Annual VOC (tons)
VOC_WIN	N	10	4	7 Month Winter VOC (tons)
VOC_SUM	N	10	4	5 Month Summer VOC (tons)
VOC_OSD06	N	10	4	June Day VOC (tons)
VOC_OSD07	N	10	4	July Day VOC (tons)
VOC_OSD08	N	10	4	August Day VOC (tons)
NOX_ANN	N	10	4	Annual NO_x (tons)
NOX_WIN	N	10	4	7 Month Winter NO_x (tons)
NOX_SUM	N	10	4	5 Month Summer NO_x (tons)
NOX_OSD06	N	10	4	June Day NO_x (tons)
NOX_OSD07	N	10	4	July Day NO_x (tons)
NOX_OSD08	N	10	4	August Day NO_x (tons)
CO_ANN	N	10	4	Annual CO (tons)
CO_WIN	N	10	4	7 Month Winter CO (tons)
CO_SUM	N	10	4	5 Month Summer CO (tons)
CO_OSD06	N	10	4	June Day CO (tons)
CO_OSD07	N	10	4	July Day CO (tons)

Table II-6 (continued)

Variable	Type	Length	Decimals	Description
CO_OSD08	N	10	4	August Day CO (tons)
SO2_ANN	N	10	4	Annual SO_2 (tons)
SO2_WIN	N	10	4	7 Month Winter SO_2 (tons)
SO2_SUM	N	10	4	5 Month Summer SO_2 (tons)
SO2_OSD06	N	10	4	June Day SO_2 (tons)
SO2_OSD07	N	10	4	July Day SO_2 (tons)
SO2_OSD08	N	10	4	August Day SO_2 (tons)
PM10_ANN	N	10	4	Annual PM_{10} (tons)
PM10_WIN	N	10	4	7 Month Winter PM_{10} (tons)
PM10_SUM	N	10	4	5 Month Summer PM_{10} (tons)
PM10_OSD06	N	10	4	June Day PM_{10} (tons)
PM10_OSD07	N	10	4	July Day PM_{10} (tons)
PM10_OSD08	N	10	4	August Day PM_{10} (tons)
PM25_ANN	N	10	4	Annual $PM_{2.5}$ (tons)
PM25_WIN	N	10	4	7 Month Winter $PM_{2.5}$ (tons)
PM25_SUM	N	10	4	5 Month Summer $PM_{2.5}$ (tons)
PM25_OSD06	N	10	4	June Day $PM_{2.5}$ (tons)
PM25_OSD07	N	10	4	July Day $PM_{2.5}$ (tons)
PM25_OSD08	N	10	4	August Day $PM_{2.5}$ (tons)
NH3_ANN	N	10	4	Annual NH_3 (tons)
NH3_WIN	N	10	4	7 Month Winter NH_3 (tons)
NH3_SUM	N	10	4	5 Month Summer NH_3 (tons)
NH3_OSD06	N	10	4	June Day NH_3 (tons)
NH3_OSD07	N	10	4	July Day NH_3 (tons)
NH3_OSD08	N	10	4	August Day NH_3 (tons)
SOA_ANN	N	10	4	Annual SOA (tons)
SOA_WIN	N	10	4	7 Month Winter SOA (tons)
SOA_SUM	N	10	4	5 Month Summer SOA (tons)
SOA_OSD06	N	10	4	June Day SOA (tons)
SOA_OSD07	N	10	4	July Day SOA (tons)
SOA_OSD08	N	10	4	August Day SOA (tons)

Table II-7
1996 EGU EPS-2.5 Input File Structure

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
PLANTID	C	5	0	State Plant ID
POINTID	C	5	0	Point ID
SIC	N	4	0	SIC Code
STACKID	C	3	0	Stack ID
SEGMENT	C	2	0	Segment ID
SCC	C	8	0	SCC
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 Rate (cubic feet per second)
WINTHRU	N	3	0	Winter Thruput (%)
SPRTHRU	N	3	0	Spring Thruput (%)
SUMTHRU	N	3	0	Summer Thruput (%)
FALTHRU	N	3	0	Fall Thruput (%)
HOURS	N	2	0	Hours per Day
DAYS	N	1	0	Days per Week
WEEKS	N	2	0	Weeks per Year
LATC	N	9	4	Latitude (degrees)
LONC	N	9	4	Longitude (degrees)
VOC	N	9	3	Annual VOC (tons)
NOX	N	9	3	Annual NO_x (tons)
CO	N	9	3	Annual CO (tons)
SO2	N	9	3	Annual SO_2 (tons)
PM10	N	9	3	Annual PM_{10} (tons)
PM25	N	9	3	Annual $PM_{2.5}$ (tons)
SOA	N	9	3	Annual SOA (tons)
NH3	N	9	3	Annual NH_3 (tons)

Table II-8
2007 and 2030 EGU EPS-2.5 Input File Structure

Variable	Type	Length	Decimals	Description
ORISID	C	6		ORIS Plant ID
BLRID	C	6		ORIS Boiler ID
SEGMENT	C	2		Segment ID
STACKID	C	6		Stack ID
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 Rate (cubic feet per second)
IPMCAP	N	9	1	IPM Boiler Capacity (MW)
SCC	C	8		SCC
FIPSST	C	2		FIPS State Code
FIPSCNTY	C	3		FIPS County Code
LATC	N	9	4	Latitude (degrees)
LONC	N	9	4	Longitude (degrees)
WINHEAT	N	9	3	Winter Heat Input (trillion Btu/7 months)
SUMHEAT	N	9	3	Summer Heat Input (trillion Btu/5 months)
WINVOC	N	9	3	Winter VOC (tons)
SUMVOC	N	9	3	Summer VOC (tons)
WINNOX	N	9	3	Winter NO_x (tons)
SUMNOX	N	9	3	Summer NO_x
WINCO	N	9	3	Winter CO
SUMCO	N	9	3	Summer CO
WINSO2	N	9	3	Winter SO_2
SUMSO2	N	9	3	Summer SO_2
WINPM10	N	9	3	Winter PM_{10}
SUMPM10	N	9	3	Summer PM_{10}
WINPM2.5	N	9	3	Winter $PM_{2.5}$
SUMPM2.5	N	9	3	Summer $PM_{2.5}$
WINNH3	N	9	3	Winter NH_3
SUMNH3	N	9	3	Summer NH_3
WINSOA	N	9	3	Winter SOA
SUMSOA	N	9	3	Summer SOA
PNAME	C	30		Plant Name

CHAPTER III
NON-EGU POINT SOURCES

A. 1996 BASE YEAR MASS EMISSIONS INVENTORY

The 1996 NET inventory was utilized for non-EGU point sources. This inventory includes both annual and SSD emissions. Units with SCCs of 101xxx or 201xxx were excluded from the non-EGU inventory because they are included in the EGU inventory.

SOA emissions were added to the inventory. SOA emissions were calculated using fractional aerosol coefficients based on speciation of the VOC emissions (Grosjean and Seinfeld, 1989). Several updates to the 1996 NET inventory were also incorporated into the 1996 base year emissions inventory. Latitude and longitude coordinates for some sources were corrected. Stack parameters were also corrected for several sources.

For some sources, multiple SCCs were listed under a single point, stack, and segment. New non-duplicate segment IDs were created for the emissions file, so that each record had a unique identification code for inclusion in the emissions preprocessor input files.

B. 2007 AND 2030 FUTURE YEAR MASS EMISSIONS INVENTORIES

To calculate emission projections, emissions were grown from the 1996 base year mass emission inventory to 2007 and 2030 utilizing Bureau of Economic Analysis (BEA) gross state product (GSP) growth factors at the State level by 2-digit Standard Industrial Classification (SIC) code. Control measures reflecting Clean Air Act (CAA) requirements were then incorporated. Two separate mass inventories were created for each year to reflect emissions without and with NO_x SIP Call control requirements. The air quality modelers will then select the appropriate file depending on the season which they are modeling.

1. Growth Assumptions

The 1995 BEA GSP projections by 2-digit SIC code were applied to estimate changes in activity between 1996 and 2007 and 2030 for the point source sector. Growth for the point source sector was distributed among existing sources according to their base year uncontrolled emissions. After applying the changes in activity, additional controls were added to reflect the alternative scenarios.

EPA guidance for projecting emissions (EPA, 1991) lists the following economic variables (in order of preference) for projecting emissions:

- product output;
- value added;

- earnings; and
- employment.

In the absence of product output projections, EPA guidance recommends value added projections. *Value added* is the difference between the value of industry outputs and inputs. BEA GSP projections represent a measure of value added, and are a fuller measure of growth than BEA's earnings projections because earnings represents only one component of GSP. GSP measures reflect the value added to revenue from selling a product minus the amounts paid for inputs from other firms. By incorporating inputs to production, GSP reflects future changes in production processes, efficiency, and technological changes. A comparison of BEA's 1995 GSP projections and BEA's 1990 earnings projections indicates that GSP growth factors are slightly higher than the earnings data. This is most often true for capital-intensive industries (e.g., manufacturing) than for labor-intensive industries (e.g., services). Components of GSP include payments to capital. This is an important distinction to make because it implicitly reflects the effect of factor substitution in production. As discussed in EPA's projections guidance, factor substitution should be included in growth projections, making value added data preferable to earnings data for projecting emissions.

The 1995 BEA industry GSP projections by State (BEA, 1995) are available at the 2-digit SIC code level. For each record in the industrial point source component of the base year inventory, a link was established between the State code, the SIC code field, and the BEA GSP growth factors. National BEA GSP growth factors by industry are listed in Table III-1.

For fuel combustion sources, energy adjustment factors were also applied to the baseline projections. These factors, developed from the U.S. Department of Energy (DOE) publication *Annual Energy Outlook 1997*, account for increases in fuel and process efficiency in future years. Basically, less fuel will be needed to provide the same amount of energy (generally in the form of steam) to an industrial process and the amount of energy needed per unit output will also decrease as processes become more efficient. These adjustments were based on those used in the NET projections (EPA, 1998a).

2. Control Assumptions

Since the base year inventory for this effort is 1996, reasonably available control technology (RACT) requirements were assumed to have already been implemented. So, for stationary sources, CAA controls include Federal initiatives as shown in Table III-2 for point sources. Maximum achievable control technology (MACT) controls were also included as shown in Tables III-3 and III-4.

NO_x emissions for the 23 States (22 States plus the District of Columbia) covered by the NO_x SIP Call were also reduced to reflect the NO_x SIP Call requirements. The NO_x SIP Call controls were applied to the 2007 projection inventory. For the 2030 projection, sources affected by the NO_x SIP Call were capped at 2007 emission levels.

The NO_x SIP Call was modeled by first identifying the sources in the inventory which are large, and are within the source categories covered under the SIP Call. Where boiler capacities are provided in the inventory, these were used to identify large sources for

Table III-1
BEA National GSP Growth Forecasts

Industry (SIC Code)	Annual Growth (% per year) 1996 to 2007	Annual Growth (% per year) 1996 to 2030
All-Industry Total		
Farm (01)	2.0	2.2
Nonfarm (02)	2.0	2.2
Agricultural services (07, 08, 09)	4.6	6.2
Mining (10, 12, 13, 14)		
Metal mining (10)	3.8	4.8
Coal mining (12)	3.0	3.3
Oil and gas extraction (13)	0.1	0.3
Nonmetallic minerals (14)	1.4	2.0
Construction (15, 16, 17)	1.3	1.6
Manufacturing (20 - 39)	1.3	1.9
Durable goods	1.6	2.2
Lumber and wood products (24)	0.6	1.1
Furniture and fixtures (25)	1.8	2.4
Stone, clay, and glass products (32)	0.9	1.5
Primary metals (33)	0.4	0.7
Fabricated metals (34)	0.7	1.2
Industrial machinery (35)	3.9	4.2
Electronic equipment (36)	2.4	2.9
Motor vehicles and equipment (371)	1.1	1.6
Other transportation equipment (37)	2.6	3.5
Instruments and related products (38)	1.4	2.4
Miscellaneous manufacturing (39)	1.9	2.6
Nondurable goods	1.0	1.6
Food and kindred products (20)	1.3	2.0
Tobacco products (21)	-2.7	-2.2
Textile mill products (22)	1.2	1.7
Apparel and other textile products (23)	1.8	2.1
Paper products (26)	2.2	3.0
Printing and publishing (27)	0.6	1.0
Chemicals and allied products (28)	1.5	2.3
Petroleum and coal products (29)	1.2	1.9
Rubber and plastics products (30)	3.4	4.7
Leather and leather products (31)	-0.1	-0.1

Table III-1 (continued)

Industry (SIC Code)	Annual Growth (% per year) 1996 to 2007	Annual Growth (% per year) 1996 to 2030
Transportation and Public Utilities (40 - 49)		
Railroad transportation (40)	3.5	4.1
Local and interurban transit (41)	1.8	2.2
Trucking and warehousing (42)	2.3	3.1
Water transportation (44)	0.1	0.5
Transportation by air (45)	4.0	5.2
Pipelines (46)	1.0	1.3
Transportation services (47)	3.4	4.1
Communications (48)	3.2	4.3
Utilities (49)	2.1	2.8
Wholesale and Retail Trade (50 - 59)		
Wholesale trade (50, 51)	2.7	3.5
Retail trade (52 - 59)	2.3	3.1
Finance, Insurance, and Real Estate (60 - 67)		
Banks and investment (60, 61, 62, 67)	3.2	4.1
Insurance (63, 64)	2.1	3.1
Real estate (65)	2.2	3.1
Services (70 - 89)		
Hotels and other lodging (70)	2.3	3.2
Personal services (72)	1.1	1.6
Business services (73)	3.3	4.1
Auto repair and parking (75)	1.8	2.3
Amusement (79)	3.3	4.2
Health services (80)	2.6	3.4
Legal services (81)	1.6	2.1
Educational services (82)	2.0	2.7
Social services (83)	3.2	4.1
Private households (88)	1.0	1.4
Other services (84, 86, 89)	3.1	4.1
Government		
Federal, civilian	0.3	0.8
Federal, military	-0.1	0.6
State and local	1.5	2.0
Population	1.0	1.3

SOURCE: Developed from BEA, 1995.

Table III-2
Point Source CAA Baseline Control Assumptions

Source Category	Pollutant	Control Efficiency (%)*
National Rules		
Marine vessel loading: petroleum liquids	VOC	80
Treatment, storage, and disposal facilities (TSDFs)	VOC	96
Municipal solid waste landfills	VOC	82

NOTE: *From uncontrolled levels.

Table III-3
Point Source MACT Control Assumptions

Source Category	VOC Control Efficiency (%)*
Benzene National Emission Standards for Hazardous Air Pollutants (NESHAP) (national)	
By-product coke mfg	85
By-product coke - flushing-liquor circulation tank	95
By-product coke - excess-NH_3 liquor tank	98
By-product coke mfg. - tar storage	98
By-product coke mfg. - light oil sump	98
By-product coke mfg. - light oil dec/cond vents	98
By-product coke mfg. - tar bottom final cooler	81
By-product coke mfg. - naphthalene processing	100
By-product coke mfg. - equipment leaks	83
By-product coke manufacture - other	94
By-product coke manufacture - oven charging	94
Coke ovens - door and topside leaks	94
Coke oven by-product plants	94
2-Year MACT (national)	
Synthetic Organic Chemical Manufacturing Industry (SOCMI) Hazardous Organic NESHAP (HON)	
-- SOCMI processes	79
-- Volatile organic liquid storage	95
-- SOCMI fugitives (equipment leak detection and repair)	60
-- SOCMI wastewater	0
-- Ethylene oxide manufacture	98
-- Phenol manufacture	98
-- Acrylonitrile manufacture	98
-- Polypropylene manufacture	98
-- Polyethylene manufacture	98
-- Ethylene manufacture	98
Dry Cleaning	
-- Perchloroethylene	95
-- Other	70
4-Year MACT (national)	
TSDFs (offsite waste operations)	96
Shipbuilding and repair	24
Polymers and resins II	78
Polymers and resins IV	70
Styrene-butadiene rubber manufacture (polymers & resins group I)	70
Wood furniture surface coating	30
Aircraft surface coating (aerospace)	60
Petroleum Refineries: other sources	
-- Fixed roof petroleum product tanks	98
-- Fixed roof gasoline tanks	96
-- External floating roof petroleum product tanks	90
-- External floating roof gasoline tanks	95
-- Petroleum refinery wastewater treatment	72
-- Petroleum refinery fugitives	72
-- Petroleum refineries - Blowdown w/o control	78
-- Vacuum distillation	72

Table III-3 (continued)

Source Category	VOC Control Efficiency (%)*
Halogenated Solvent Cleaners	
-- Open top degreasing - halogenated	63
-- In-line (conveyorized) degreasing - halogenated	39
Printing	
-- Flexographic	32
-- Gravure	27
Gasoline Marketing	
-- Storage	5
-- Splash loading	99
-- Balanced loading	87
-- Submerged loading	99
-- Transit	5
-- Leaks	39
7/10-Year MACT (national)	
Paint and varnish manufacture	35
Rubber tire manufacture	70
Green tire spray	90
Automobile surface coating	79
Beverage can surface coating	57
Paper surface coating	78
Flatwood surface coating	90
Fabric printing	80
Metal surface coating	90
Plastic parts surface coating	45
Pulp and paper production	70
Agricultural chemical production	79
Pharmaceutical production	79
Polyesters	70
Fabric coating	70
Petroleum refineries - fluid catalytic cracking	70
Oil and natural gas production	90
Explosives	70
Plywood/particle board	70
Reinforced plastics	70
Publicly-Owned Treatment Works (POTWs)	70
Phthalate plasticizers	70
Polymers and resins III	78
Rayon production	70
Polyvinyl chloride	70
Spandex production	70
Nylon 6 production	70
Alkyd resins	70
Polyester resins	70
Chelating agents	70

NOTE: *From uncontrolled levels.

Table III-4
Non-VOC Related MACT Assumptions

Source Category	Pollutant	Percentage Reduction (%)*
Municipal Waste Combustors	PM	30
	SO_2	50
Cement Manufacturing	PM	90
Secondary Aluminum	PM	90
Medical Waste Incineration	PM	88
	NO_x	20
	SO_2	20
Hazardous Waste Incineration	PM	36

NOTE: *From uncontrolled levels.

boilers and gas turbines. If boiler capacities were not provided, the default SCC/emission crosswalk utilized in the NO_x SIP Call was applied to determine sources where the boiler capacity is expected to be above 250 million British thermal units (MMBtu) per hour. For internal combustion engines and cement manufacturing, any source which is greater than 1 ton per day (tpd) was designated as large. Once the assignments were completed based on this procedure, a State-by-State comparison of large source emissions was made between the NET inventory and the NO_x SIP Call inventory to identify major differences. Where major differences occurred, emissions were compared at the county level and adjustments were made to align the two data sets better. For some States, the data sets did not align well on a unit basis, so these adjustments were based solely on attempting to adjust the emissions for the large sources, so that the State emissions totals match, to the extent possible. For States where the plant and unit IDs align between the two data sets, designation of large was based on the NO_x SIP Call inventory.

Once the large sources were determined, the following percentages were applied according to the source category affected:

Industrial Boilers	60%
Gas Turbines	60%
Internal Combustion Engines	90%
Cement Manufacturing	30%

NO_x SIP Call controls were applied on an annual basis in this analysis. To truly reflect the effect of NO_x SIP Call requirements, the affected sources should only be controlled during the 5-month ozone season, with no NO_x SIP Call controls in operation during the 7-month winter season. Two files were prepared for the modelers – one without NO_x SIP Call controls and one with NO_x SIP Call controls. The modelers will select the appropriate file depending on what season they are modeling. A third file, which combines the NO_x emissions of the SIP Call and No SIP Call scenarios, was prepared to estimate annual emissions for PM Air Quality modeling. The methodology that was developed applies annual NO_x emission reductions for point sources with controls expected to operate for 12 months/year. Five month reductions were applied to source types with controls expected to operate only during the ozone season. This is necessary to estimate accurate annual emissions since controls such as low NO_x burners can not be turned off in the winter. Below is a listing of the source types and major control technology assumed for each category.

Annual Controls
Industrial boilers (except coal-fired) - low-NO_x burners (LNB), and LNB plus flue-gas recirculation
Turbines - LNB plus water injection
Cement kilns (wet) - mid-kiln firing
Reciprocating internal combustion engines - selective catalytic reduction (SCR)

Seasonal Controls
Industrial boilers (coal-fired) - SCR or SNCR
Cement kilns (wet and coal)- SCR or SNCR

C. MASS EMISSIONS INVENTORY AND PREPROCESSOR INPUT FILES

Three new variables were added to the structures of the mass emissions inventories. Unique 5 character IDs for plant and point, and unique 3 character IDs for stack were added to facilitate the transition from mass to preprocessor input files. Table III-5 documents the names of the non-EGU mass and preprocessor input files.

Table III-5
Non-EGU Point Source Mass and Preprocessor Input Files

Year	Mass	EPS-2.5	EMS-95	Comments
1996	PT96MS.DBF	PT96EPS.TXT	PT96EM.TGZ	
2007	PT07MSA.DBF PT07MSB.DBF PT07MSC.DBF	PT07EPA.TXT PT07EPB.TXT	PT07EMB.TGZ	Files ending in "A" exclude NO_x SIP Call controls. Files ending in "B" include NO_x SIP Call controls. Files ending in "C" include annual emissions estimates.
2030	PT30MSA.DBF PT30MSB.DBF PT30MSC.DBF	PT30EPA.TXT PT30EPB.TXT	PT30EMB.TGZ	Files ending in "A" exclude NO_x SIP Call controls. Files ending in "B" include NO_x SIP Call controls. Files ending in "C" include annual emissions estimates.

1. Mass Emission Inventories

The structures for the mass emission inventories are detailed in Tables III-6 and III-7, as the base year and future year inventories differed. Data elements included in the base year file and excluded from the future year files include the pollutant emission factor (-EMF), primary control equipment code (-CPRI), and secondary control equipment code (-CSEC).

2. EPS-2.5 Input Files

Input files for EPS-2.5 limit the width of plant and point IDs to 5 characters, so the unique 5-character IDs were used in the EPS-2.5 mass files. The unique 3-character IDs for stack were also used because of limitations on the data field width for stack ID. The structure for the EPS-2.5 input files is detailed in Table III-8.

Table III-6
Structure for 1996 Base Year Non-EGU Mass Emissions File

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
PLANTID	C	15	0	State Plant ID
PLANTID5	C	5	0	State Plant ID (5 Digit)
POINTID	C	15	0	Point ID
POINTID5	C	5	0	Point ID (5 Digit)
STACKID	C	12	0	Stack ID
STACKID3	C	3	0	Stack ID (3 Digit)
ORISID	C	6	0	DOE Plant ID
BLRID	C	6	0	Boiler ID
SEGMENT	C	2	0	Segment ID
PLANT	C	40	0	Plant Name
SCC	C	10	0	SCC
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 Rate (cubic feet per second)
STKVEL	N	9	2	Stack Velocity (ft/sec)
BOILCAP	N	8	2	Boiler Design Capacity
CAP_UNITS	C	1	0	Capacity Unit Code
WINTHRU	N	3	0	Winter Thruput (%)
SPRTHRU	N	3	0	Spring Thruput (%)
SUMTHRU	N	3	0	Summer Thruput (%)
FALTHRU	N	3	0	Fall Thruput (%)
HOURS	N	2	0	Hours per Day
START_HR	N	2	0	Hourly Start Time
DAYS	N	1	0	Days per Week
WEEKS	N	2	0	Weeks per Year
THRUPUT	N	11	1	Throughput Rate (SCC units/year)
MAXRATE	N	12	3	Maximum Ozone Season Rate (units/day)
HEATCON	N	8	2	Heat Content (MMBtu/SCC unit)
SULFCON	N	5	2	Sulfur Content (mass percent)
ASHCON	N	5	2	Ash Content (mass percent)
NETDC	N	9	3	Maximum Nameplate Capacity (MW)
SIC	N	4	0	SIC Code
LATC	N	9	4	Latitude (degrees)
LONC	N	9	4	Longitude (degrees)
VOC_EMF	N	11	4	VOC Emission Factor (SCC units)
NOX_EMF	N	11	4	NO_x Emission Factor (SCC units)
CO_EMF	N	11	4	CO Emission Factor (SCC units)
SO2_EMF	N	11	4	SO_2 Emission Factor (SCC units)
PM10_EMF	N	11	4	PM_{10} Emission Factor (SCC units)
PM25_EMF	N	11	4	$PM_{2.5}$ Emission Factor (SCC units)
NH3_EMF	N	11	4	NH_3 Emission Factor (SCC units)
VOC_CE	N	7	2	VOC Control Efficiency (%)
NOX_CE	N	7	2	NO_x Control Efficiency (%)

Table III-6 (continued)

Variable	Type	Length	Decimals	Description
CO_CE	N	7	2	CO Control Efficiency (%)
SO2_CE	N	7	2	SO_2 Control Efficiency (%)
PM10_CE	N	7	2	PM_{10} Control Efficiency (%)
PM25_CE	N	7	2	$PM_{2.5}$ Control Efficiency (%)
NH3_CE	N	7	2	NH_3 Control Efficiency (%)
VOC_CPRI	N	3	0	VOC Primary Control Equipment Code
NOX_CPRI	N	3	0	NO_x Primary Control Equipment Code
CO_CPRI	N	3	0	CO Primary Control Equipment Code
SO2_CPRI	N	3	0	SO_2 Primary Control Equipment Code
PM10_CPRI	N	3	0	PM_{10} Primary Control Equipment Code
PM25_CPRI	N	3	0	$PM_{2.5}$ Primary Control Equipment Code
NH3_CPRI	N	3	0	NH_3 Primary Control Equipment Code
VOC_CSEC	N	3	0	VOC Secondary Control Equipment Code
NOX_CSEC	N	3	0	NO_x Secondary Control Equipment Code
CO_CSEC	N	3	0	CO Secondary Control Equipment Code
SO2_CSEC	N	3	0	SO_2 Secondary Control Equipment Code
PM10_CSEC	N	3	0	PM_{10} Secondary Control Equipment Code
PM25_CSEC	N	3	0	$PM_{2.5}$ Secondary Control Equipment Code
NH3_CSEC	N	3	0	NH_3 Secondary Control Equipment Code
VOC_ANN	N	13	4	Annual VOC (tons)
NOX_ANN	N	13	4	Annual NO_x (tons)
CO_ANN	N	13	4	Annual CO (tons)
SO2_ANN	N	13	4	Annual SO_2 (tons)
PM10_ANN	N	13	4	Annual PM_{10} (tons)
PM25_ANN	N	13	4	Annual $PM_{2.5}$ (tons)
SOA_ANN	N	13	4	Annual SOA (tons)
NH3_ANN	N	13	4	Annual NH_3 (tons)
VOC_OSD	N	13	4	Summer Season Daily VOC (tons)
NOX_OSD	N	13	4	Summer Season Daily NO_x (tons)
CO_OSD	N	13	4	Summer Season Daily CO (tons)
SO2_OSD	N	13	4	Summer Season Daily SO_2 (tons)
PM10_OSD	N	13	4	Summer Season Daily PM_{10} (tons)
PM25_OSD	N	13	4	Summer Season Daily $PM_{2.5}$ (tons)
SOA_OSD	N	13	4	Summer Season Daily SOA (tons)
NH3_OSD	N	13	4	Summer Season Daily NH_3 (tons)
VOC_RE	N	3	0	VOC Rule Effectiveness (%)
NOX_RE	N	3	0	NO_x Rule Effectiveness (%)
CO_RE	N	3	0	CO Rule Effectiveness (%)
SO2_RE	N	3	0	SO_2 Rule Effectiveness (%)
PM10_RE	N	3	0	PM_{10} Rule Effectiveness (%)
PM25_RE	N	3	0	$PM_{2.5}$ Rule Effectiveness (%)
NH3_RE	N	3	0	NH_3 Rule Effectiveness (%)

Table III-7
Structure for 2007 and 2030 Future Year Non-EGU Mass Emissions Files

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
PLANTID	C	15	0	State Plant ID
PLANTID5	C	5	0	State Plant ID (5 Digit)
POINTID	C	15	0	Point ID
POINTID5	C	5	0	Point ID (5 Digit)
STACKID	C	12	0	Stack ID
STACKID3	C	3	0	Stack ID (3 Digit)
ORISID	C	6	0	DOE Plant ID
BLRID	C	6	0	Boiler ID
SEGMENT	C	2	0	Segment ID
PLANT	C	40	0	Plant Name
SCC	C	10	0	SCC
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 Rate (cubic feet per second)
STKVEL	N	9	2	Stack Velocity (ft/sec)
BOILCAP	N	8	2	Boiler Design Capacity
CAP_UNITS	C	1	0	Capacity Unit Code
WINTHRU	N	3	0	Winter Thruput (%)
SPRTHRU	N	3	0	Spring Thruput (%)
SUMTHRU	N	3	0	Summer Thruput (%)
FALTHRU	N	3	0	Fall Thruput (%)
HOURS	N	2	0	Hours per Day
START_HR	N	2	0	Hourly Start Time
DAYS	N	1	0	Days per Week
WEEKS	N	2	0	Weeks per Year
THRUPUT	N	11	1	Throughput Rate (SCC units/year)
MAXRATE	N	12	3	Maximum Ozone Season Rate (units/day)
HEATCON	N	8	2	Heat Content (MMBtu/SCC unit)
SULFCON	N	5	2	Sulfur Content (mass percent)
ASHCON	N	5	2	Ash Content (mass percent)
NETDC	N	9	3	Maximum Nameplate Capacity (MW)
SIC	N	4	0	SIC Code
LATC	N	9	4	Latitude (degrees)
LONC	N	9	4	Longitude (degrees)
VOC_CE	N	7	2	VOC Control Efficiency (%)
NOX_CE	N	7	2	NO_x Control Efficiency (%)
CO_CE	N	7	2	CO Control Efficiency (%)
SO2_CE	N	7	2	SO_2 Control Efficiency (%)
PM10_CE	N	7	2	PM_{10} Control Efficiency (%)
PM25_CE	N	7	2	$PM_{2.5}$ Control Efficiency (%)

Table III-7 (continued)

Variable	Type	Length	Decimals	Description
NH3_CE	N	7	2	NH_3 Control Efficiency (%)
VOC_ANN	N	13	4	Annual VOC (tons)
NOX_ANN	N	13	4	Annual NO_x (tons)
CO_ANN	N	13	4	Annual CO (tons)
SO2_ANN	N	13	4	Annual SO_2 (tons)
PM10_ANN	N	13	4	Annual PM_{10} (tons)
PM25_ANN	N	13	4	Annual $PM_{2.5}$ (tons)
SOA_ANN	N	13	4	Annual SOA (tons)
NH3_ANN	N	13	4	Annual NH_3 (tons)
VOC_OSD	N	13	4	Summer Season Daily VOC (tons)
NOX_OSD	N	13	4	Summer Season Daily NO_x (tons)
CO_OSD	N	13	4	Summer Season Daily CO (tons)
SO2_OSD	N	13	4	Summer Season Daily SO_2 (tons)
PM10_OSD	N	13	4	Summer Season Daily PM_{10} (tons)
PM25_OSD	N	13	4	Summer Season Daily $PM_{2.5}$ (tons)
SOA_OSD	N	13	4	Summer Season Daily SOA (tons)
NH3_OSD	N	13	4	Summer Season Daily NH_3 (tons)
VOC_RE	N	3	0	VOC Rule Effectiveness (%)
NOX_RE	N	3	0	NO_x Rule Effectiveness (%)
CO_RE	N	3	0	CO Rule Effectiveness (%)
SO2_RE	N	3	0	SO_2 Rule Effectiveness (%)
PM10_RE	N	3	0	PM_{10} Rule Effectiveness (%)
PM25_RE	N	3	0	$PM_{2.5}$ Rule Effectiveness (%)
NH3_RE	N	3	0	NH_3 Rule Effectiveness (%)

Table III-8
Non-EGU EPS-2.5 Input File Structure

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
PLANTID	C	5	0	State Plant ID (5 digit)
POINTID	C	5	0	Point ID (5 digit)
SIC	N	4	0	SIC Code
STACKID	C	3	0	Stack ID (3 digit)
SEGMENT	C	2	0	Segment ID
SCC	C	8	0	SCC
STKHGT	N	4	0	Stack Height (ft)
STKDIAM	N	6	2	Stack Diameter (ft)
STKTEMP	N	4	0	Stack Temperature (F)
STKFLOW	N	10	2	Stack Flow Rate (cubic ft per second)
WINTHRU	N	3	0	Winter Thruput (%)
SPRTHRU	N	3	0	Spring Thruput (%)
SUMTHRU	N	3	0	Summer Thruput (%)
FALTHRU	N	3	0	Fall Thruput (%)
HOURS	N	2	0	Hours per Day
DAYS	N	1	0	Days per Week
WEEKS	N	2	0	Weeks per Year
LATC	N	9	4	Latitude (degrees)
LONC	N	9	4	Longitude (degrees)
VOC	N	9	3	Annual VOC (tons)
NOX	N	9	3	Annual NO_x (tons)
CO	N	9	3	Annual CO (tons)
SO2	N	9	3	Annual SO_2 (tons)
PM10	N	9	3	Annual PM_{10} (tons)
PM25	N	9	3	Annual $PM_{2.5}$ (tons)
SOA	N	9	3	Annual SOA (tons)
NH3	N	9	3	Annual NH_3 (tons)

3. EMS-95/SMOKE Input Files

The structures for the EMS-95 and SMOKE emissions preprocessor input files are the same. Universal Transverse Mercator (UTM) coordinates were added to the EMS-95/ SMOKE input file, as latitude and longitude coordinates are not accepted. For the future year emission files, the only file modeled for each year contained NO_x SIP Call controls since only SSD emissions are provided in the EMS-95 input files. The structures for the EMS-95 input files is detailed in Table III-9.

A weekly profile code of 8 was utilized for all non-EGU sources, consistent with files prepared for the NO_x SIP Call analysis. This assumes operation 7 days a week, with slightly lower utilization on the weekends.

Table III-9
Non-EGU EMS-95 Input File Structure

Field	Type	Length	Description
Facility File:			
STID	N	2.	FIPS state code
CYID	N	3.	FIPS county code
FCID	C	15.	facility ID
SIC	C	4.	standard industrial classification
UTMX	N	9.1	UTM easting (m)
UTMY	N	9.1	UTM northing (m)
UTMZ	N	2.	UTM zone
NAME	C	40.	facility name
Stack File:			
STID	N	2.	FIPS state code
CYID	N	3.	FIPS county code
FCID	C	15.	facility ID
STKID	C	12.	stack ID
DIAM	N	8.4	inside stack diameter (ft)
HEIT	N	7.2	stack height above ground surface (ft)
TEMP	N	7.2	stack exit temperature (F)
VELOC	N	7.2	stack exit velocity (ft/sec)
FLOW	N	10.2	stack exit flow rate (actual cubic ft/min)
UTMX	N	9.1	UTM easting (m)
UTMY	N	9.1	UTM northing (m)
ELEV	N	9.1	elevation of stack base from mean sea level (ft)
Device File:			
STID	N	2.	FIPS state code
CYID	N	3.	FIPS county code
FCID	C	15.	facility ID
STKID	C	12.	stack ID
DVID	C	12.	device ID
SIC	C	4.	standard industrial classification
DEC	N	5.3	fractional December throughput
JAN	N	5.3	fractional January throughput
FEB	N	5.3	fractional February throughput
MAR	N	5.3	fractional March throughput
APR	N	5.3	fractional April throughput
MAY	N	5.3	fractional May throughput
JUN	N	5.3	fractional June throughput
JUL	N	5.3	fractional July throughput
AUG	N	5.3	fractional August throughput
SEP	N	5.3	fractional September throughput
OCT	N	5.3	fractional October throughput
NOV	N	5.3	fractional November throughput
WIN	N	3.	winter throughput (Dec - Feb) (%)
SPR	N	3.	spring throughput (Mar - May) (%)

Table III-9 (continued)

Field	Type	Length	Description
SUM	N	3.	summer throughput (Jun - Aug) (%)
FAL	N	3.	fall throughput (Sep - Nov) (%)
HOURS	N	2.	hours of operation per day (hours/day)
DAYS	N	2.	days of operation per week (days/week)
WEEKS	N	2.	weeks of operation per year (weeks/year)
DAYYEAR	N	3.	days of operation per year (days/year)
HOURYEAR	N	4.	hours of operation per year (hours/year)
Process File:			
STID	N	2.	FIPS state code
CYID	N	3.	FIPS county code
FCID	C	15.	facility ID
STKID	C	12.	stack ID
DVID	C	12.	device ID
PRID	C	12.	process ID
SCC	C	8.	source classification code
PRRT	N	13.	annual process rate (SCC units/year)
PRUN	C	15.	optional process rate units if different from SCC
Emissions File:			
STID	N	2.	FIPS state code
CYID	N	3.	FIPS county code
FCID	C	15.	facility ID
STKID	C	12.	stack ID
DVID	C	12.	device ID
PRID	C	12.	process ID
POLID	C	5.	pollutant ID
ACEF	N	13.	actual emission factor (tons/SCC units)
ALEF	N	13.	allowable emission factor (tons/SCC units)
ACEE	N	13.	actual emissions (tons)
ALEE	N	13.	allowable emissions (tons)
ESTT	C	2.	temporal basis (AA, AD, or DS)
PCEC	C	5.	primary control equipment
SCEC	C	5.	secondary control equipment
CEEF	N	7.4	control equipment efficiency (%)

CHAPTER IV
STATIONARY AREA SOURCES

A. 1996 BASE YEAR EMISSIONS

The 1996 NET inventory was selected as the base year inventory for area sources (EPA, 1998a).

The only adjustment made to the 1996 NET inventory for the purposes of this modeling effort is related to agricultural livestock emission sources, which include animal feedlots (e.g., beef cattle feedlots). Feedlot emissions in the 1996 NET inventory (the version utilized in this effort) are based on projecting 1992 emissions forward to 1996 using historic BEA GSP projections. For 1992, actual head (e.g., head of cattle) data from the Census of Agriculture are used to estimate emissions. The BEA GSP indicates a decline between 1992 and 1996 for this category; however, it is unlikely that the actual head count is decreasing. Because updated Census of Agriculture data were not available in time for the study, the 1992 data were used to represent 1996.

B. 2007 AND 2030 FUTURE YEAR EMISSIONS

Projection year emissions are a function of projected changes (growth or decline) in activity as well as changes in control levels. The following sections describe the growth and control assumptions utilized for this analysis.

1. Growth Assumptions

The BEA GSP growth, including population and combinations of industries (e.g., durable goods manufacturing, total manufacturing) were used to project emissions from 1996 to 2007 and 2030 for the area source sector. The surrogates used for each category were based on the same cross-reference list used in the Ozone/PM National Ambient Air Quality Standard (NAAQS) analysis (Pechan-Avanti, 1997b). Updated factors were applied to prescribed burning (projections of acres of public land burned from EPA and Federal land managers), agricultural sources (acres planted projections), and unpaved road emissions based on work completed for EPA's Section 812 Prospective Analysis (Pechan-Avanti, 1998). Livestock emissions growth was also updated for this analysis, utilizing extrapolations of historical Census of Agriculture data.

Pechan-Avanti matched area source categories with surrogate activity indicators (e.g., GSP by industry, population, or broader BEA categories) in order to utilize the BEA data. The variable chosen as a proxy for emissions growth is shown by source category in Table IV-1. For broad industrial categories such as Industrial Fuel Combustion and Miscellaneous Industrial Processes, BEA GSP growth for the manufacturing sector represents the activity level for projecting emissions. Population was used as a surrogate

Table IV-1
BEA Growth Categories Assigned by Major Source Category: Area Sources

Source Category	BEA Growth Category*
Stationary Source Fuel Combustion:	
Industrial	Total Manufacturing
Commercial/Institutional	Government and Government Enterprises
Residential	Population
Industrial Processes:	
Process Emissions: Synthetic Fiber	Textile Mill Products (SIC 22)
Process Emissions: Pharmaceuticals	Chemicals and Allied Products (SIC 28)
SOCMI Fugitives	Chemicals and Allied Products (SIC 28)
Food & Kindred Products - Bakeries	Food and Kindred Products (SIC 20)
Petroleum Refining	Petroleum and Coal Products (SIC 29)
Oil & Gas Production	Oil and Gas Extraction (SIC 13)
Miscellaneous Industrial Processes	Total Manufacturing
Surface Coating:	
Architectural	Construction (SIC 15, 16, and 17)
Auto Refinishing	Auto Repair, Services, and Garages (SIC 75)
Traffic Markings	Construction (SIC 15, 16, and 17)
Flat Wood Coating	Lumber and Wood Products (SIC 24)
Wood and Metal Furniture	Furniture and Fixtures (SIC 25)
Paper Coating	Printing and Publishing (SIC 27)
Metal Can & Coating	Fabricated Metal Products (SIC 34)
Electrical Insulation	Machinery, except Electrical (SIC 35)
Appliances	Fabricated Metal Products (SIC 34)
Machinery	Electric and Electronic Equipment (SIC 36)
Motor Vehicles (New)	Motor Vehicles and Equipment (SIC 371)
Aircraft Coating	Transportation Equipment, excl. Motor Vehicles (SIC 37)
Marine Paints	Transportation Equipment, excl. Motor Vehicles (SIC 37)
Rail Equipment Coating	Transportation Equipment, excl. Motor Vehicles (SIC 37)
Miscellaneous Manufacturing	Misc. Manufacturing Industries (SIC 39)
Industrial Maintenance	Misc. Manufacturing Industries (SIC 39)
Aerosols, Specific Purpose	Misc. Manufacturing Industries (SIC 39)
Degreasing (Vapor and Cold Cleaning):	
Furniture	Manufacturing - Durable Goods
Metallurgical Process	Manufacturing - Durable Goods
Fabricated Metals	Manufacturing - Durable Goods
Industrial Machinery	Manufacturing - Durable Goods
Electrical Equipment	Manufacturing - Durable Goods
Transportation Equipment	Manufacturing - Durable Goods
Instrument Manufacturing	Manufacturing - Durable Goods
Miscellaneous Manufacturing	Manufacturing - Durable Goods
Automobile Dealers & Repair	Manufacturing - Durable Goods
Other Degreasing Sources	Manufacturing - Durable Goods

Table IV-1 (continued)

Source Category	BEA Growth Category*
Solvent Use:	
Dry Cleaning (all types)	Population
Graphic Arts	Printing and Publishing (SIC 27)
Rubber and Plastics	Rubber and Misc. Plastics Products (SIC 30)
Industrial Adhesives	Total Manufacturing
Cutback Asphalt	Local/Interurban Passenger Transit (SIC 41)
Pesticides - Farm	Population
Personal, Household and Automotive Products	Population
Commercial Adhesives	Population
Petroleum & Petroleum Product Storage & Transport:	
Bulk Stations/Terminals	Trucking and Warehousing (SIC 42)
Gasoline Service Stations (Stage I and II)	Gasoline Consumption**
Gasoline Service Stations (Underground Tank)	Gasoline Consumption**
Waste Disposal, Treatment, & Recovery:	
On-Site Incineration - Industrial	Total Manufacturing
On-Site Incineration - Commercial/Institutional	Government and Government Enterprises
On-Site Incineration - Residential	Population
Open Burning - Industrial	Total Manufacturing
Open Burning - Commercial/Institutional	Government and Government Enterprises
Open Burning - Residential	Population
Wastewater Treatment - Public Owned	Electric, Gas, and Sanitary Services (SIC 49)
TSDFs	Total Manufacturing
Miscellaneous Area Sources:	
Agriculture Production (field burning, tilling)	USDA - Agricultural Baseline Projections
Agricultural Livestock	Extrapolated from historical Census of Agriculture data
Prescribed burning	Reflects expected increases in Federal prescribed burning activity on public lands
Wildfires	Zero Growth
Unpaved Roads	Extrapolated from 1984 to 1996 trend in unpaved road mileage
Paved Roads	Vehicle miles traveled (VMT) from MOBILE4.1 Fuel Consumption Model (FCM)

NOTES: *BEA growth category refers to GSP projections for each industry, unless "Population" is indicated.
**Gasoline consumption projections are from the MOBILE FCM.

growth indicator for area source categories such as Dry Cleaning, Household Solvent Use, and Residential Fuel Combustion. Projected emissions for each State/area source SCC combination were calculated by multiplying base year emissions by the growth factor for the BEA growth indicator.

The U.S. Department of Agriculture (USDA) has developed baseline projections of farm acres planted (USDA, 1998). These data, combined with historical data back to 1990, for eight major crop types shows an average annual growth of only 0.38 percent per year from 1990 to 2007. The BEA GSP projections for *farm* result in an annual average growth of 2.0 percent per year. Projections of acres planted represent better predictors of future activity than GSP for agricultural tilling, so they were used in this projection. Levels of acres planted were assumed to remain constant between 2010 and 2030.

During an interagency (Department of the Interior/USDA) satellite conference held in April 1998, public forest land managers discussed an annual prescribed burning target of five million acres for 2010, although specific areas for burning were not identified. Using this target figure, public land activity levels were projected to arrive at 2010 public land activity estimates. For private forest lands, it is estimated that the level of prescribed burning activity remains constant at base year levels. Estimates for 2030 were assumed to be the same as 2010. For 2007, data were extrapolated between 2000 and 2010.

Unpaved road emission projections reflect the historical downward trend in miles of unpaved roads. The States were divided into three geographic groups: East, Central, and West. East was defined as EPA Regions 1 through 4, Central as EPA Regions 5 through 8, and West as EPA Regions 9 and 10. Alaska and Hawaii were excluded, since these States are not included in the Prospective emission projections (Pechan-Avanti, 1998). Linear regression was used to estimate the continued decline in unpaved road miles to 2030. For the emission projections, 2007 and 2030 unpaved road emissions were estimated by applying the average annual change between 1984 and 1996 out to the projection year.

For fuel combustion sources, energy adjustment factors were also applied to the baseline projections. These factors, developed from the DOE publication *Annual Energy Outlook 1997*, account for increases in fuel and process efficiency in future years. Basically, less fuel will be needed to provide the same amount of energy (generally in the form of steam) to an industrial process and the amount of energy needed per unit output will also decrease as processes become more efficient. These adjustments are based on those used in the NET projections (EPA, 1998a).

For the seven animal husbandry SCCs displayed in Table IV-2, an alternative method was used to project emissions growth. For these SCCs, emissions growth was based on projections of the number of animals in each category that were developed based on national data from the 1987, 1992, and 1997 Census of Agriculture (USDA, 1997). Growth factors for each SCC were specifically based on the growth in the number of animals between the base year and 2007 and 2030 as estimated from linear extrapolations of the Census data. Because linear extrapolation of the Census' number of sheep and lambs yielded negative growth factors believed to be unrealistic, the number of these animals was projected using an exponential trend function that provided more realistic growth factors. The growth factor for total livestock production (SCC 2805000000) was computed as the median of the growth factors for the individual SCCs that comprise this total category.

Table IV-2
Animal Husbandry Categories and Growth Assumptions

Source Classification Code (SCC)	SCC Description	Growth Function
2710020030	Natural Sources Biogenic Horses and Ponies	Linear extrapolation
2805000000	Misc. Area Sources Agric. Prod.-Livestock Total	Median of growth factors from individual SCCs below
2805001000	Misc. Area Sources Agric. Prod. - Livestock Beef Cattle Feedlots Total	Linear extrapolation
2805020000	Misc. Area Sources Agric. Prod. - Animal Husbandry Cattle and Calves Composite	Linear extrapolation
2805025000	Misc. Area Sources Agric. Prod. - Animal Husbandry Hogs and Pigs Composite	Linear extrapolation
2805030000	Misc. Area Sources Agric. Prod. - Animal Husbandry Poultry -Chickens Composite	Linear extrapolation
2805040000	Misc. Area Sources Agric. Prod. - Animal Husbandry Sheep and Lambs Composite	Exponential extrapolation
2805045001	Misc. Area Sources Agric. Prod. - Animal Husbandry Goats Composite	Linear extrapolation

Reference: USDA, 1997

2. Control Assumptions

Since the base year inventory for this effort is 1996, RACT requirements were assumed to have already been implemented. So, for stationary sources, CAA controls under the include any Federal initiatives, such as VOC content limits for consumer solvents. These controls are listed in Table IV-3 for area sources.

MACT assumptions from the Ozone/PM NAAQS analysis were utilized in this analysis for area sources (Pechan-Avanti, 1997b). These assumptions are shown in Table IV-4.

Table IV-3
Area Source Federal Control Measure Assumptions

Source Category	Pollutant	Control Efficiency (%)
National Rules		
TSDFs	VOC	96
Consumer solvents	VOC	20
Architectural and industrial maintenance coatings	VOC	20
Onboard refueling vapor recovery systems	VOC	*
Municipal solid waste landfills	VOC	82
Residential wood combustion	VOC, PM	60

NOTE: *The efficiency of onboard vapor recovery systems varies depending on whether stage II vapor recovery systems are in place. It is determined based on MOBILE5b emission factors.

Table IV-4
Area Source MACT Control Assumptions

Control Measure	VOC Percentage Reduction
Title III MACT (National)	
Wood Furniture Surface Coating	30
Aerospace Surface Coating	60
Marine Vessel Surface Coating (Shipbuilding)	24
Halogenated Solvent Cleaners (Cold Cleaning)	63
Autobody Refinishing	37
Perchloroethylene Dry Cleaning	44
Petroleum Refinery Fugitives	78
SOCMI Fugitives (SOCMI HON)	60
Synthetic Fiber Manufacture	54
Pharmaceutical Manufacture	37
Petroleum Dry Cleaning	44
Bulk Terminals (Gasoline Distribution)	51
Paper Surface Coating	78
Service Stations - Stage I (Gasoline Distribution)	95
Motor Vehicle Surface Coating	36
Metal Product Surface Coating	36
Wood Product Surface Coating	36
Open Top & Conveyorized Degreasing	31
POTWs	80
Metal Furniture & Appliances Surface Coating	36
Machinery, Railroad Surface Coating	36
Electronic Coating	36

C. MASS EMISSIONS INVENTORY AND PREPROCESSOR INPUT FILES

Table IV-5 shows the mass and modeling files prepared for the Tier 2 analysis. Note that nonroad emissions (discussed in Chapter V) are also included in these inventory files. The Tier 2 control scenario only affects nonroad sourcesin these files, as discussed in Chapter V.

The structure for the mass emission inventory files is shown in Table IV-6. Several of the data elements are included only in the base year inventory as indicated in the table.

The modeling files were derived from the mass emission inventories. The only change to emissions is the application of the crustal PM factor. This factor accounts for the fact that only a portion of the crustal PM emissions are transportable. For the modeling inventories, a factor of 25 percent was applied to PM_{10} and $PM_{2.5}$ emissions in the following tier 3 categories to simulate the transportable component of these emissions:

Miscellaneous: Agriculture & Forestry: agricultural crops
Miscellaneous: Agriculture & Forestry: agricultural livestock
Miscellaneous: Fugitive Dust: unpaved roads
Miscellaneous: Fugitive Dust: paved roads
Miscellaneous: Fugitive Dust: construction

In addition, PM_{10} and $PM_{2.5}$ emissions from wind erosion (SCCs 2730100000 and 2730100001) were excluded from the modeling files.

1. EMS-95/SMOKE Modeling Files

The EMS-95/SMOKE input files were prepared for ozone modeling, incorporating SSD VOC, NO_x, and CO emissions. The structure for the area source EMS-95/SMOKE files is given in Table IV-7. Two sets of EMS-95 files were provided as shown in Table IV-5. The second set aggregates the nonroad emissions to the 7-digit SCC detail.

2. EPS-2.5 Modeling Files

Annual emission estimates are provided in the EPS-2.5 input files. An ASCII text file format is used to provide the emissions data to the modelers. The file format is given in Table IV-8.

Table IV-5
Area/Nonroad Mass and Preprocessor Input Files

Year	Scenario	Mass	EMS-95	EPS-2.5
1996	Base	AN96MS.DBF	AN96EM.TGZ AN96EM7.TGZ*	AN96EPS.TXT
2007	Base	AN07MSB.DBF	AN07EMB.TGZ AN07EMB7.TGZ*	AN07EPB.TXT
2007	Control (with Tier 2)	AN07MSC.DBF	AN07EMC.TGZ AN07EMC7.TGZ*	AN07EPC.TXT
2030	Base	AN30MSB.DBF	AN30EMB.TGZ AN30EMB7.TGZ*	AN30EPB.TXT
2030	Control (with Tier 2)	AN30MSC.DBF	AN30EMC.TGZ AN30EMC7.TGZ*	AN30EPC.TXT

NOTE: *Uses 7-digit SCC detail for nonroad (e.g., 2265001000 versus 2265001001, 2265001002, . . .)

Table IV-6
Area/Nonroad Mass Emissions Inventory File Structure

Field_name	Field_type	Field_len	Field_dec	Description
FIPSST	C	2	0	FIPS State code
FIPSCNTY	C	3	0	FIPS County code
SCC	C	10	0	SCC
VOC_ANN	N	10	4	Annual VOC [tons per year (tpy)]
NOX_ANN	N	10	4	Annual NO_x (tpy)
CO_ANN	N	10	4	Annual CO (tpy)
SO2_ANN	N	10	4	Annual SO_2 (tpy)
PM10_ANN	N	10	4	Annual PM_{10} (tpy)
PM25_ANN	N	10	4	Annual $PM_{2.5}$ (tpy)
NH3_ANN	N	10	4	Annual NH_3 (tpy)
SOA_ANN	N	10	4	Annual SOA (tpy)
VOC_OSD	N	10	4	Summer Season Day (SSD) VOC (tpd)
NOX_OSD	N	10	4	SSD NO_x (tpd)
CO_OSD	N	10	4	SSD CO (tpd)
SO2_OSD	N	10	4	SSD SO_2 (tpd)
PM10_OSD	N	10	4	SSD PM_{10} (tpd)
PM25_OSD	N	10	4	SSD $PM_{2.5}$ (tpd)
NH3_OSD	N	10	6	SSD NH_3 (tpd)
SOA_OSD	N	10	6	SSD SOA (tpd)
VOC_EMF*	N	11	4	VOC Emission Factor
NOX_EMF*	N	11	4	NO_x Emission Factor
CO_EMF*	N	11	4	CO Emission Factor
SO2_EMF*	N	11	4	SO_2 Emission Factor
PM10_EMF*	N	11	4	PM_{10} Emission Factor
PM25_EMF*	N	11	4	$PM_{2.5}$ Emission Factor
NH3_EMF*	N	11	4	NH_3 Emission Factor
VOC_CE	N	7	2	VOC Control Efficiency
NOX_CE	N	7	2	NO_x Control Efficiency
CO_CE	N	7	2	CO Control Efficiency
SO2_CE	N	7	2	SO_2 Control Efficiency
PM10_CE	N	7	2	PM_{10} Control Efficiency
PM25_CE	N	7	2	$PM_{2.5}$ Control Efficiency
NH3_CE	N	7	2	NH_3 Control Efficiency
VOC_RE	N	3	0	VOC Rule Effectiveness

Table IV-6 (continued)

Field_name	Field_type	Field_len	Field_dec	Description
NOX_RE	N	3	0	NO_x Rule Effectiveness
CO_RE	N	3	0	CO Rule Effectiveness
SO2_RE	N	3	0	SO_2 Rule Effectiveness
PM10_RE	N	3	0	PM_{10} Rule Effectiveness
PM25_RE	N	3	0	$PM_{2.5}$ Rule Effectiveness
NH3_RE	N	3	0	NH_3 Rule Effectiveness
VOC_RP	N	6	2	VOC Rule Penetration
NOX_RP	N	6	2	NO_x Rule Penetration
CO_RP	N	6	2	CO Rule Penetration
SO2_RP	N	6	2	SO_2 Rule Penetration
PM10_RP	N	6	2	PM_{10} Rule Penetration
PM25_RP	N	6	2	$PM_{2.5}$ Rule Penetration
NH3_RP	N	6	2	NH_3 Rule Penetration

NOTE: *Not included in 2007 and 2030 files.

Table IV-7
Area/Nonroad EMS-95 Input File Structure

Field	Type	Length	Description
Areatprl File:			
STID	N	2.	FIPS state code
CYID	N	3.	FIPS county code
ASCT	C	15.	area source category
PRRT	N	13.	annual process rate (process units/year)
ACUN	C	15.	activity units
DEC	N	5.3	fractional December throughput
JAN	N	5.3	fractional January throughput
FEB	N	5.3	fractional February throughput
MAR	N	5.3	fractional March throughput
APR	N	5.3	fractional April throughput
MAY	N	5.3	fractional May throughput
JUN	N	5.3	fractional June throughput
JUL	N	5.3	fractional July throughput
AUG	N	5.3	fractional August throughput
SEP	N	5.3	fractional September throughput
OCT	N	5.3	fractional October throughput
NOV	N	5.3	fractional November throughput
WIN	N	3.	winter throughput (Dec - Feb) (%)
SPR	N	3.	spring throughput (Mar - May) (%)
SUM	N	3.	summer throughput (Jun - Aug) (%)
FAL	N	3.	fall throughput (Sep - Nov) (%)
HOURS	N	2.	code value for hourly operation
DAYS	N	2.	code value for daily operation
WEEKS	N	2.	weeks of operation per year (weeks/year)
DAYYEAR	N	3.	days of operation per year (days/year)
HOURYEAR	N	4.	hours of operation per year (hours/year)
Area File:			
STID	N	2.	FIPS state code
CYID	N	3.	FIPS county code
ASCT	C	15.	area source category
POLID	C	5.	pollutant ID
ACEF	N	13.	actual emission factor (tons/process unit)
ALEF	N	13.	allowable emission factor (tons/process unit)
ACEE	N	13.	actual emissions (tons)
ALEE	N	13.	allowable emissions (tons)
PCEC	C	5.	primary control equipment
SCEC	C	5.	secondary control equipment
CEEF	N	7.4	control equipment efficiency (%)
ESTT	C	2.	temporal basis (AA or AD)

Table IV-8
Area/Nonroad EPS-2.5 Input File Structure

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
SCC	C	10	0	AMS Source Category Code
VOC	N	12	4	Annual VOC Emissions (tpy)
NOX	N	12	4	Annual NO_x Emissions (tpy)
CO	N	12	4	Annual CO Emissions (tpy)
SO2	N	12	4	Annual SO_2 Emissions (tpy)
PM10	N	12	4	Annual PM_{10} Emissions (tpy)
PM25	N	12	4	Annual $PM_{2.5}$ Emissions (tpy)
SOA	N	12	4	Annual SOA Emissions (tpy)
NH3	N	12	4	Annual NH_3 Emissions (tpy)

CHAPTER V
NONROAD SOURCES

A. 1996 BASE YEAR MASS EMISSIONS INVENTORY

County-level emission estimates for 1996 for the majority of nonroad sources were derived from EPA's April 1999 draft version of the NONROAD model. Emission estimates for VOC, NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$ are available from the model. NONROAD does not estimate NH_3 and SOA emissions; therefore, these emissions were calculated outside the model. Aircraft, commercial marine, and locomotives are not presently included in the NONROAD model, and the procedures to develop emission estimates for these categories are discussed in a separate section.

1. NONROAD Model Equipment Categories

The NONROAD model estimates pollutant emissions for the following general equipment categories: (1) agricultural; (2) airport service; (3) light commercial; (4) construction and mining; (5) industrial; (6) lawn and garden; (7) logging; (8) pleasure craft; (9) railway maintenance; and (10) recreational equipment. These applications are further classified according to fuel and engine type [diesel, gasoline 2-stroke, gasoline 4-stroke, compressed natural gas (CNG), and liquid petroleum gas (LPG)]. NONROAD model input files were prepared for each State to account for the average statewide temperatures and Reid vapor pressure (RVP) for four seasons, including summer, fall, winter, and spring. Input files were also generated to account for county-level differences in RVP, fuel characteristics due to reformulated gasoline (RFG) and oxygenated fuel programs, and Stage II controls.

The statewide seasonal default RVP values used as input to the NONROAD model are presented in Table V-1. For areas subject to Phase 1 of the Federal RFG program, separate RVP values were modeled in the 1996 NONROAD inputs for May through September. Oxygenated fuel was also modeled in the areas participating in this program in 1996. Areas participating in the RFG program and oxygenated fuels program are consistent with the areas as presented in Chapter 6 of this report, "On-Highway Vehicle Sources."

Emissions calculated for counties with fuel characteristic and control data that varied from statewide average values replaced emissions for these same counties generated by running the default input files. Summer season daily emissions were estimated by dividing summer season (June through August) emissions by 92 days.

Table V-1
Seasonal RVP Values Modeled for 1996 NONROAD Model Runs

State	Applicable Counties	Winter	Spring	Summer	Autumn
AL	Entire State	12.4	8.9	7.8	8.9
AK	Entire State	14.1	13.7	13.0	13.7
AZ	Entire State	8.2	7.1	6.8	6.9
AR	Entire State	13.7	8.9	7.1	10.2
CA	Los Angeles Region	11.9	9.3	6.9	7.6
CA	San Francisco Region	11.7	10.8	6.9	7.6
CO	Entire State	12.5	10.1	7.8	9.4
CT	Entire State	13.0	10.1	8.6	10.1
DE	Entire State	13.5	10.2	8.5	9.2
DC	Entire State	12.0	8.3	7.5	8.3
FL	Entire State	11.8	7.4	7.4	7.4
GA	Entire State	12.4	8.8	7.6	8.8
HI	Entire State	10.0	10.0	9.8	10.0
ID	Entire State	12.8	10.4	8.6	9.1
IL	Madison, Monroe, St. Clair	14.1	10.0	7.1	8.8
IL	Rest of State	14.1	10.4	8.4	9.2
IN	Entire State	14.5	11.0	9.0	9.9
IA	Entire State	14.9	11.2	9.0	11.2
KS	Entire State	12.7	8.8	7.4	8.2
KY	Boone, Campbell, Kenton	13.4	9.8	9.3	9.8
KY	Rest of State	13.4	9.6	8.6	9.6
LA	Entire State	12.4	8.8	7.3	8.8
ME	Entire State	13.2	10.2	8.6	10.2
MD	Entire State	13.2	9.8	7.8	8.7
MA	Entire State	12.9	10.0	8.6	10.0
MI	Entire State	14.1	10.4	8.9	10.4
MN	Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington, Wright	14.9	11.5	9.3	10.5
MN	Rest of State	14.9	11.4	9.0	10.4
MS	Entire State	13.7	8.9	7.1	8.9
MO	Franklin, Jefferson, St. Charles, St. Louis, St. Louis City	12.6	9.4	7.1	9.4
MO	Rest of State	12.6	9.5	7.3	9.5
MT	Entire State	13.8	10.4	8.7	10.4
NE	Entire State	13.9	10.5	8.4	9.1
NV	Entire State	9.6	8.0	7.6	7.8
NH	Entire State	12.9	10.0	8.6	10.0
NJ	Entire State	13.7	10.4	8.6	10.4
NM	Entire State	11.7	9.2	7.8	9.0
NY	Entire State	14.3	10.8	8.7	10.8
NC	Entire State	12.4	9.8	7.6	9.8

Table V-1 (continued)

State	Applicable Counties	Winter	Spring	Summer	Autumn
ND	Entire State	14.9	11.9	9.0	11.2
OH	Butler, Cuyahoga, Hamilton, Lake, Lorain	14.6	11.2	9.3	10.0
OH	Rest of State	14.6	11.1	9.0	9.9
OK	Entire State	13.9	9.2	7.4	8.2
OR	Entire State	12.3	9.8	7.7	8.7
PA	Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango, Warren	14.4	11.1	9.3	11.1
PA	Rest of State	14.4	10.8	8.5	10.8
RI	Entire State	12.9	10.0	8.6	10.0
SC	Entire State	12.4	9.8	7.6	9.8
SD	Entire State	14.4	11.2	9.0	9.9
TN	Entire State	12.7	9.9	7.5	9.9
TX	El Paso	12.2	9.4	8.2	8.8
TX	Hardin, Harris, Jefferson, Orange	12.2	9.1	7.4	8.6
TX	Rest of State	12.2	9.2	7.7	8.7
UT	Entire State	12.5	10.6	7.8	9.4
VT	Entire State	14.9	11.4	9.0	11.4
VA	Entire State	11.8	8.3	7.5	8.3
WA	Entire State	14.0	10.6	8.5	9.5
WV	Entire State	14.6	11.0	8.8	9.9
WI	Entire State	14.6	11.1	9.0	10.1
WY	Entire State	13.0	10.4	8.8	9.3

Note: For areas receiving reformulated gasoline, appropriate May through September RVP values were modeled in place of the values shown here.

2. Emission Estimates for Aircraft, Commercial Marine Vessels, and Locomotives

Base year aircraft emissions were taken from the existing 1996 NET inventory (EPA, 1998a). Locomotive emissions for 1996 were also based on existing NET estimates.

Revised VOC, NO_x, CO, and total PM national emission estimates for commercial marine diesel engines were provided by EPA's Office of Mobile Sources (OMS). PM_{10} was assumed to be equivalent to PM, and $PM_{2.5}$ was estimated by multiplying PM_{10} emissions by a factor of 0.92. These new national estimates were distributed to counties using the geographic distribution in the existing 1996 NET data base. It was determined that all States did not report commercial marine emissions under the same SCC. For example, some States reported commercial marine diesel emissions under the SCC 2280000000, which could potentially include other fuel types (e.g., residual, gasoline). Therefore, a distribution was established based on emissions for all commercial marine SCCs. In addition, records for several States had emissions for some pollutants, including SO_2 and PM_{10}, but no VOC, NO_x, or CO emissions. In order to estimate the emissions data for these pollutants, national average ratios of VOC/PM_{10}, NO_x/PM_{10}, and CO/PM_{10} were calculated from the available inventory data. These ratios were then applied to the PM_{10} emissions to estimate the missing VOC, NO_x, and CO emissions.

3. Methodologies for NH_3 and SOA

Ammonia emissions were based on county-level fuel consumption estimates obtained from 1996 NONROAD model runs. Fuel consumption estimates were not available for LPG and CNG-fueled equipment. Emission factors provided by OMS were then applied to these activity data to estimate NH_3 emissions for gasoline equipment (without catalysts) and diesel-fueled equipment. The emission factors were derived primarily from light-duty on-road vehicle emission measurements, and extrapolated to nonroad engines on a fuel consumption basis.

For aircraft, commercial marine, and locomotive categories, national fuel consumption estimates for 1996 were obtained from various sources. Jet fuel and aviation gasoline consumption for general aviation and commercial aircraft were obtained from the "FAA Aviation Forecasts Fiscal Years, 1998-2009," (FAA, 1998a). For aircraft categories, NH_3 emission factors developed for diesel engines were applied to all fuel consumption estimates, since aviation gasoline consumption was determined to be relatively small compared to jet fuel, and the aircraft SCCs are not broken down by fuel type. Diesel consumption estimates for locomotives were obtained from "Locomotive Emission Standards - Regulatory Support Document (RSD)," (EPA, 1997). For commercial marine, data for distillate and residual fuel oil were reported in "Fuel Oil and Kerosene Sales," (EIA, 1996). Table V-2 lists national fuel consumption estimates, as well as NH_3 emissions for all nonroad source categories.

Secondary organic aerosol emissions were calculated by applying the appropriate fractional aerosol coefficient to annual and SSD VOC emissions (Grosjean and Seinfeld, 1989). Default assignments were made to new nonroad SCCs that had not been previously assigned SOA fractions.

Table V-2
1996 Fuel Consumption Estimates and NH_3 Emissions for Nonroad Source Categories

	Fuel Type	Fuel Consumption (million gallons)	NH_3 Emissions[1]
NONROAD Model Categories	Diesel	16,337	2,987
	Gasoline	6,607	1,118
Aircraft	Jet Fuel[2]	18,433	3,370
Commercial Marine	Diesel	2,108	385
	Residual	4,790	876
Locomotives	Diesel	3,948	722
Total			9,458

NOTES: [1]NH_3 emissions were calculated by multiplying diesel fuel consumption by an emission factor of 165.86 milligrams/gallon, NH_3 emissions from gasoline engines were calculated by multiplying gasoline consumption by an emission factor of 153.47 milligrams/gallon.
[2]Also includes minimal consumption of aviation gasoline by aircraft.

B. 2007 AND 2030 FUTURE YEAR MASS EMISSIONS INVENTORIES

The methods for developing base case and control scenario projection year inventories for nonroad sources are described in this section. Table V-3 provides a summary of the growth factors and projection methods used for each nonroad equipment category.

1. Nonroad Model Equipment Categories

For NONROAD model categories, emission estimates for projection years were developed using the following method. First, three seasonal (i.e., summer, winter, and fall/spring combined) NONROAD model runs were performed at the national level. Seasonal runs were performed to account for differences in average seasonal temperature, as well as RVP. Second, year-specific ratios were calculated by dividing national SCC-level emission estimates for 2007 and 2030 by the 1996 national values. County-level estimates were then calculated for 2007 and 2030 by multiplying each ratio times the 1996 county-level emissions inventory. In this manner, the county-level distribution assumed for the 1996 inventory is normalized to the national, SCC-level totals for each projection year. As with the base year, SSD emissions for projection years were estimated by dividing summer season emissions by 92 days.

a. Growth Assumptions

Nonroad category emissions have typically been projected using economic indicators that are believed to correlate to nonroad equipment activity. For example, nonroad agricultural equipment emissions have been grown in the past using BEA GSP projections for SIC code 01, which corresponds to the farm industry. However, instead of using economic indicators to project emissions or nonroad activity, the current version of the NONROAD model predicts future year nonroad equipment populations by extrapolating

Table V-3
Growth Factors/Projection Methods for Nonroad Sources

Nonroad SCC	SCC Description	Growth Factor
2260 2265 2267 2268 2270 2282 2285xxx015	2-stroke gasoline 4-stroke gasoline CNG LPG Diesel Recreational marine Railroad support	Not applicable[1]
2275050, 2275060	General Aviation and Air Taxis	Landing-Takeoff Operations (LTOs) for General Aviation
2275020, 2275070	Commercial Aircraft and Auxiliary Power Units (APUs)	LTOs for Commercial Aviation
2275001	Military Aircraft	LTOs for Military Aviation
2275085	Unpaved Airstrips	SIC 45 - Air Transportation
2275900	Aircraft Refueling	SIC 45 - Air Transportation
2280002	Commercial Marine - Diesel Vessels	SIC 44 - Water Transportation[2]
2280001, 2280003, 2280004	Commercial Marine - Coal, Residual, and Gas-fired Vessels	SIC 44 - Water Transportation
2283	Military Marine Vessels	992 - Federal, Military
2285	Locomotives	No growth[3]

NOTES: [1]Projection year emission estimates were derived from national NONROAD model runs allocated to the county level based on the geographic distribution for the 1996 base year inventory.
[2]SO_2 and NH_3 emissions were projected using growth factor; projection year estimates for all other pollutants provided by OMS.
[3]SO_2 and NH_3 emissions for projection years assumed to remain constant at 1996 uncontrolled levels; controlled projection year estimates for all other pollutants provided by OMS.

from a linear regression of historical equipment populations. Because total activity is never directly measured, the historical trend in population must be used as a surrogate. A time-series analysis using historic equipment populations is believed to better reflect market trends within each sector (e.g., a shift from gasoline-fueled equipment to diesel-fueled equipment). Accurately estimating the relative distribution of different engine types in the future is important since diesel and gasoline engines have distinct emission characteristics. This approach, however, is not likely to be used for all equipment types in the final version of the NONROAD model. Some exceptions include oil field equipment and aircraft ground support equipment, which will rely on BEA GSP data and Federal Aviation Administration (FAA) LTO data, respectively.

b. Control Assumptions

The NONROAD model accounts for the effect of Federal nonroad engine emission standards which are final, or proposed standards soon expected to be final. The emission levels associated with compression-ignition (CI) and spark-ignition (SI) engine standards are incorporated into emission factors, which are then applied to future year nonroad equipment populations. The control programs accounted for by the NONROAD model include: (1) Tier 1, Tier 2 and Tier 3 CI standards for diesel engines greater than 50 horsepower (hp); (2) Tier 1 and Tier 2 CI standards for diesel engines below 50 hp; (3) Phase I and Phase 2 of the SI standards for gasoline engines less than 25 hp; (4) recreational SI marine engine controls.

Base year and controlled steady-state emission factors for various horsepower ranges of CI engines subject to the Tier 1, Tier 2, and Tier 3 standards are presented in Table V-4. Base year and controlled steady-state emission factors for SI engines below 25 hp (19 kilowatts) are presented in Table V-5. Additional details on the control levels reflected in NONROAD for future years for these categories, as well as SI recreational marine engines, are presented in technical reports that serve as supporting documentation for NONROAD model inputs (EPA, 1998b and EPA, 1998c).

The impact of RFG in the appropriate counties is reflected in the 1996 base year county-level inventory, in that the fuel RVP and percent oxygen were adjusted, as described in section V.A.1, for counties subject to RFG and oxygenated fuels requirements. No further adjustments were made to account for the use of RFG in future years.

2. Emission Estimates for Aircraft, Commercial Marine Vessels, and Locomotives

Aircraft emissions for 2007 were based on the existing NET projections, which used FAA LTO data as the growth surrogate for commercial and civil aircraft. Military aircraft were projected from 1996 using BEA GSP corresponding to Federal and military activity. Aircraft estimates for the year 2030 were updated based on commercial and general aviation growth rates from the FAA. Forecasts were only available up to the year 2020 in "Long Range Aviation Forecasts Fiscal Years 2010, 2015, and 2020," (FAA, 1998b). The annual average growth rate for the period 2015 to 2020 was assumed for estimating growth out to the year 2030. Military aviation activity was assumed to remain constant starting in 2010, so 2010 emissions from the NET were used for 2030 estimates for this category. The EPA has promulgated NO_x and CO emission standards for commercial aircraft, but the impacts from these standards are not accounted for in this analysis.

Commercial marine projections were developed similar to the 1996 base year estimates, with national commercial marine diesel emissions for 2007 and 2030 provided by OMS being distributed to the county based on the existing 1996 county-level distribution in the NET. Since the standards are not final, the effect of the proposed commercial marine diesel regulations was not taken into account. Commercial gasoline, commercial coal, and military marine emissions were grown from 1996 using BEA GSP growth factors.

Table V-4
Steady-State Emission Factors for CI Engines in the NONROAD Model

Engine Power (hp)	Model Year	Regulation	Emission Factors (g/hp-hr)			
			HC	CO	NO_x	PM
>0 to 11	88-99	–	1.5	5.0	10.0	1.0
	00-04	Tier 1	1.6	5.6	5.9	0.75
	05-	Tier 2	0.6	5.6	5.0	0.75
>11 to 16	88-99	–	1.5	5.0	10.0	1.0
	00-04	Tier 1	0.7	2.0	5.2	0.6
	05-	Tier 2	0.6	2.0	5.0	0.6
>16 to 25	88-99	–	1.8	5.0	6.9	0.8
	00-04	Tier 1	0.7	2.0	5.2	0.6
	05-	Tier 2	0.6	2.0	5.0	0.6
>25 to 50	88-98	–	1.8	5.0	6.9	0.8
	99-03	Tier 1	0.8	2.5	5.5	0.6
	04-	Tier 2	0.6	2.5	5.0	0.6
>50 to 100	88-97	–	0.99	3.49	8.30	0.72
	98-03	Tier 1	0.7	1.0	6.9	0.72
	04-07	Tier 2	0.4	1.0	5.2	0.72
	08-	Tier 3	0.2	1.0	3.3	Same as Tier 2
>100 to 175	88-96	–	0.68	2.70	8.38	0.40
	97-02	Tier 1	0.4	1.0	6.9	0.40
	03-06	Tier 2	0.4	1.0	4.5	0.40
	07-	Tier 3	0.2	1.0	2.8	Same as Tier 2
>175 to 300	88-95		0.68	2.70	8.38	0.40
	96-02	Tier 1	0.4	1.0	6.9	0.40
	03-05	Tier 2	0.4	1.0	4.5	0.40
	06-	Tier 3	0.2	1.0	2.8	Same as Tier 2
>300 to 600	88-95	–	0.68	2.70	8.38	0.40
	96-00	Tier 1	0.3	1.0	6.9	0.40
	01-05	Tier 2	0.3	1.0	4.5	0.40
	06-	Tier 3	0.2	1.0	2.8	Same as Tier 2
>600 to 750	88-95	–	0.68	2.70	8.38	0.40
	96-01	Tier 1	0.3	1.0	6.9	0.40
	02-05	Tier 2	0.3	1.0	4.5	0.40
	06-	Tier 3	0.2	1.0	2.8	Same as Tier 2
>750	88-99	–	0.68	2.70	8.38	0.40
	00-05	Tier 1	0.3	1.0	6.9	0.40
	06-	Tier 2	0.3	1.0	4.5	0.40

Table V-5
Emission Factors for SI Engines Below 25 hp

Engine Tech Type	HC	CO	NO_x	PM	BSFC
Class III Engine Emissions for New Engines (g/kW-hr)					
Gas 2-stroke handheld Class III, baseline	350	964	1.3	7.7	830
Phase 1	295	805	1.05	7.7	720
Phase 1 with catalyst	295	805	1.05	7.7	720
Phase 2	190	732	1.05	7.7	600
Phase 2 with catalysts	190	732	1.05	7.7	600
Class IV Handheld New Engine Emissions (g/kW-hr)					
Gas 2-stroke handheld Class IV, baseline	350	964	1.26	7.7	830
Phase 1	241	805	0.688	7.7	720
Phase 1 with catalyst	241	805	0.688	7.7	720
Phase 1 4-stroke	37.5	492	3.96	0.06	515
Phase 2	155.7	732	0.688	7.7	600
Phase 2 with catalysts	155.7	732	0.688	7.7	600
Phase 2 4-stroke	37.5	492	3.96	0.06	515
Class V Handheld New Engine Emissions (g/kW-hr)					
Gas 2-stroke handheld Class V, baseline	214	696	1.3	7.7	560
Phase 1	161	603	2.436	7.7	529
Phase 1 with catalyst	161	603	2.436	7.7	529
Phase 2	103	548	2.436	7.7	500
Phase 2 with catalysts	103	548	2.436	7.7	500
Class I Nonhandheld New Engine Emissions (g/kW-hr)					
Gas 2-stroke nonhandheld Class I, baseline	278.8	651.5	0.39	7.7	529
Gas, side-valved, 4-stroke nonhandheld Class I, baseline	52.3	577.8	2.68	0.06	830
Gas, overhead-valved, 4-stroke nonhandheld Class I, baseline	17.96	548.3	2.41	0.06	603
2-stroke, Phase 1	161	603	5.36	7.7	529
Phase 1 side-valved, 4-stroke	11.27	519	4.83	0.06	560
Phase 1 overhead valved 4-stroke	11.27	519	4.34	0.06	475
Phase 1 side-valved, 4-stroke with catalyst	11.27	519	4.83	0.06	560
Phase 2 side-valved	10.63	519	3.18	0.06	560
Phase 2 overhead valved	11.27	519	4.34	0.06	475
Class II Nonhandheld New Engine Emissions (g/kW-hr)					
Gas 2-stroke nonhandheld Class II, baseline	278.8	651.5	0.39	7.7	529
Gas, side-valved, 4-stroke nonhandheld Class II, baseline	12.96	578	2.76	0.06	570
Gas, overhead-valved, 4-stroke nonhandheld Class II, baseline	6.97	681	4.69	0.06	570
Phase 1 side-valved, 4-stroke	7.37	519	6.03	0.06	528
Phase 1 overhead valved 4-stroke	6.97	519	4.69	0.06	450
Phase 2 side-valved	7.37	519	6.03	0.06	528
Phase 2 overhead valved	5.58	519	3.72	0.06	450

Locomotive emission estimates for 2007 and 2030 were based on the Regulatory Support Document for locomotive emission standards for all projection years (EPA, 1997). This report contained emission projections for all criteria pollutants except for SO_2; therefore, SO_2 estimates from the current NET inventory were used. For the rulemaking support analysis, EPA assumed that future year fuel consumption will remain constant at 1996 levels. It was thought that improvements in the fuel efficiency of locomotives will offset the increase in ton-miles of freight hauled; therefore, no growth was assumed. The national emission estimates also accounted for future, phased-in controls that will primarily reduce NO_x and PM emissions. These new national estimates were distributed to the county-level using the existing county allocation in the 1996 NET data base.

3. Tier 2/Low Sulfur Fuel Adjustment Factors

Control case emission inventories were developed for 2007 and 2030 to account for the effects of proposed Tier 2 reductions in gasoline sulfur content. A sulfur correction factor was applied to base case SO_2 emission estimates for those SCCs representing 2-stroke and 4-stroke gasoline-fueled engines. The NONROAD model runs were performed using a default gasoline sulfur content of 339 parts per million (ppm) (i.e., 0.034 percent by weight). EPA has proposed a gasoline sulfur content of 30 ppm for the Tier 2 rule. Therefore, SO_2 emissions from gasoline-fueled nonroad equipment were multiplied by a correction factor of 0.088 (i.e., 30/339 ppm) to estimate the impact of the Tier 2 rule on SO_2 emissions from nonroad gasoline engines.

4. Methodologies for NH_3 and SOA

National diesel and gasoline fuel consumption, as obtained from the NONROAD model for 2007 and 2030, were distributed to the county level using the 1996 county-level distribution. Fuel consumption estimates were then multiplied by the appropriate emission factor to estimate NH_3 emissions for the projection years. For aircraft, commercial marine, and locomotive categories, 1996 base year NH_3 emissions were projected to 2007 and 2030 using the growth factors listed in Table V-3.

SOA emissions were calculated for projection years using the same method used for the base year. Projected VOC emission estimates were multiplied by the appropriate fractional aerosol coefficient for each SCC.

C. MASS EMISSIONS INVENTORY AND PREPROCESSOR INPUT FILES

Nonroad emissions are combined with area sources to produce the final mass and preprocessor input files. Refer to Chapter IV for the preprocessor input file names and structures.

CHAPTER VI
ON-HIGHWAY VEHICLE SOURCES

A. 1996 BASE YEAR MASS EMISSIONS INVENTORY

This section summarizes the inputs and control programs that were modeled and adjustments that were made to the 1996 on-highway vehicle emissions inventory. The starting point for the 1996 on-highway vehicle emission inventory was the 1996 National Emission Trends database created in 1998. The Trends Procedures report provides more detail on the inputs contained in that analysis, but some of the key elements of that inventory are summarized here.

The 1996 VMT data is based on historical 1996 Highway Performance Monitoring System (HPMS) data obtained from the Federal Highway Administration. The HPMS database contains State-level summaries of average annual daily VMT by functional system and by rural, small urban, and individual urban areas. Based on population data from the Bureau of Census, the HPMS data were distributed to counties at the functional system level. A conversion was then made at the national functional system level to convert the national VMT from the HPMS vehicle categories to the MOBILE5b vehicle type categories. This conversion was made based on a breakdown provided by EPA that reconciles the vehicle class categories used in HPMS to those used in MOBILE (Wolcott, 1994).

Speeds modeled in this analysis, both in 1996 and the projection years, were consistent by vehicle class and functional road class throughout the nation. In other words, the same speeds were modeled in all analysis years, and the speeds depended upon the vehicle type and road type. The origin of these speed data is an analysis performed on output from the HPMS impact analysis for 1990 (FHWA, 1990). Speeds from this analysis year were consistent with speeds from earlier analysis years. Table VI-1 shows the speeds modeled.

Vehicle registration distributions used in the 1996 NET include distributions provided by States through OTAG and the NO_x SIP Call. Areas with no specified registration distribution were modeled with registration distributions by vehicle type developed based on national sales and registration data. The same registration distributions used in 1996 were also applied in both projection years.

Temperatures for 1996 were based on the average historical 1996 monthly maximum and minimum daily temperatures reported in a city selected to be representative of temperatures within a given State. Emission factors were calculated at the monthly level using these monthly temperatures. Monthly RVP data were also used in the MOBILE5b inputs. These inputs were based on January and July RVP data from American Automobile Manufacturers Association's (AAMA's) fuel surveys (AAMA, 1996), and then allocated by month and area.

Table VI-1
Average Speeds by Road Type and Vehicle Type
(Miles per Hour)

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

	Urban					
	Interstate	Other Freeways & Expressways	Principal Arterial	Minor Arterial	Collector	Local
LDV	45	45	20	20	20	20
LDT	45	45	20	20	20	20
HDV	35	35	15	15	15	15

In addition to the inputs described above, control programs were modeled in 1996, as discussed below.

1. Inspection and Maintenance (I/M) Programs

Inspection and maintenance (I/M) programs were modeled in areas with such programs in place in 1996. Data on these programs includes the data collected in the OTAG process, as well as State-level I/M program summary information provided by OMS.

2. Reformulated Gasoline (RFG)

Phase 1 of the Federal RFG program was modeled in the 1996 MOBILE5b inputs. The areas and counties that were modeled with RFG are shown in Table VI-2. Data on the RFG coverage was provided by OMS. The summertime RFG benefits were applied from May through September, while the winter RFG benefits were applied in the remaining months. For 1996 only, California was modeled with the benefits of the California RFG program. This program was modeled Statewide, with Phase I benefits applied from January through May and Phase 2 benefits applied from June through December, using the CALI5 model in place of MOBILE5b.

Table VI-2
Counties Modeled with Federal Reformulated Gasoline (RFG)

State (American Society for Testing and Materials (ASTM) Class)/ Nonattainment Area	County
Arizona (B)	
Phoenix	
	Maricopa Co
Connecticut (C)	
Greater Connecticut	
	Hartford Co
	Litchfield Co
	Middlesex Co
	New Haven Co
	New London Co
	Tolland Co
	Windham Co
New York-Northern New Jersey-Long Island	
	Fairfield Co
District of Columbia (B)	
Washington DC	
	Washington
Delaware (C)	
Philadelphia-Wilmington-Trenton	
	Kent Co
	New Castle Co
Sussex County	
	Sussex Co
Illinois (C)	
Chicago-Gary-Lake County	
	Cook Co
	Du Page Co
	Grundy Co
	Kane Co
	Kendall Co
	Lake Co
	McHenry Co
	Will Co
Indiana (C)	
Chicago-Gary-Lake County	
	Lake Co
	Porter Co
Kentucky (C)	
Cincinnati-Hamilton	
	Boone Co
	Campbell Co
	Kenton Co
Louisville	
	Bullitt Co

State (ASTM Class)/ Nonattainment Area	County
Maine (C)	
Knox & Lincoln Counties	
	Knox Co
	Lincoln Co
Lewiston-Auburn	
	Androscoggin Co
	Kennebec Co
Portland	
	Cumberland Co
	Sagadahoc Co
	York Co
Maryland (B)	
Baltimore	
	Anne Arundel Co
	Baltimore
	Baltimore Co
	Carroll Co
	Harford Co
	Howard Co
Kent & Queen Annes Counties	
	Kent Co
	Queen Annes Co
Philadelphia-Wilmington-Trenton	
	Cecil Co
Washington DC	
	Calvert Co
	Charles Co
	Frederick Co
	Montgomery Co
	Prince Georges Co
Massachusetts (C)	
Boston-Lawrence-Worcester-Eastern MA	
	Barnstable Co
	Bristol Co
	Dukes Co
	Essex Co
	Middlesex Co
	Nantucket Co
	Norfolk Co
	Plymouth Co
	Suffolk Co
	Worcester Co
Springfield/Pittsfield-Western MA	
	Berkshire Co

Table VI-2 (continued)

State (American Society for Testing and Materials (ASTM) Class)/ Nonattainment Area	County
	Jefferson Co
	Oldham Co
New Hampshire (C)	
Manchester	
	Hillsborough Co
	Merrimack Co
Portsmouth-Dover-Rochester	
	Rockingham Co
	Strafford Co
New Jersey (C)	
Allentown-Bethlehem-Easton	
	Warren Co
Atlantic City	
	Atlantic Co
	Cape May Co
New York-Northern New Jersey-Long Island	
	Bergen Co
	Essex Co
	Hudson Co
	Hunterdon Co
	Middlesex Co
	Monmouth Co
	Morris Co
	Ocean Co
	Passaic Co
	Somerset Co
	Sussex Co
	Union Co
Philadelphia-Wilmington-Trenton	
	Burlington Co
	Camden Co
	Cumberland Co
	Gloucester Co
	Mercer Co
	Salem Co
New York (C)	
New York-Northern New Jersey-Long Island	
	Bronx Co
	Kings Co
	Nassau Co
	New York Co
	Orange Co
	Queens Co
	Richmond Co
	Rockland Co

State (ASTM Class)/ Nonattainment Area	County
	Franklin Co
	Hampden Co
	Hampshire Co
New York (C)	
Poughkeepsie	
	Dutchess Co
	Putnam Co
Pennsylvania (C)	
Philadelphia-Wilmington-Trenton	
	Bucks Co
	Chester Co
	Delaware Co
	Montgomery Co
	Philadelphia Co
Rhode Island (C)	
Providence	
	Bristol Co
	Kent Co
	Newport Co
	Providence Co
	Washington Co
Texas (B)	
Dallas-Fort Worth	
	Collin Co
	Dallas Co
	Denton Co
	Tarrant Co
Houston-Galveston-Brazoria	
	Brazoria Co
	Chambers Co
	Fort Bend Co
	Galveston Co
	Harris Co
	Liberty Co
	Montgomery Co
	Waller Co
Virginia (B)	
Norfolk-Virginia Beach-Newport News	
	Chesapeake
	Hampton
	James City Co
	Newport News
	Norfolk
	Poquoson
	Portsmouth
	Suffolk

Table VI-2 (continued)

State (American Society for Testing and Materials (ASTM) Class)/ Nonattainment Area	County	State (ASTM Class)/ Nonattainment Area	County
	Suffolk Co		Virginia Beach
	Westchester Co		Williamsburg
			York Co
Virginia (B)		Wisconsin (C)	
Richmond-Petersburg		Milwaukee-Racine	
	Charles City Co		Kenosha Co
	Chesterfield Co		Milwaukee Co
	Colonial Heights		Ozaukee Co
	Hanover Co		Racine Co
	Henrico Co		Washington Co
	Hopewell		Waukesha Co
	Richmond		
Washington DC			
	Alexandria		
	Arlington Co		
	Fairfax		
	Fairfax Co		
	Falls Church		
	Loudoun Co		
	Manassas		
	Manassas Park		
	Prince William Co		
	Stafford Co		

NOTE: California reformulated gasoline was modeled statewide in California.

3. Oxygenated Fuel

Oxygenated fuel was modeled in the areas participating in this program in 1996. A listing of these areas was provided by OMS (Somers, 1997), along with the months that the oxygenated fuel program was in place in these areas and the market share of ether and alcohol blends. The average oxygen content of ether blend fuels was assumed to be 2.7 percent in all oxygenated fuel areas and the average oxygen content of alcohol blend fuels was assumed to be 3.5 percent in all oxygenated fuel areas. Table VI-3 lists the counties modeled with oxygenated fuel and the corresponding fuel parameters.

4. Low Emission Vehicle (LEV) Programs

In the 1996 analysis year, LEV programs were modeled in California, Massachusetts, and New York. The California program was modeled with a 1994 start year, using the CALI5 default LEV schedule. The LEV programs in Massachusetts and New York were modeled with start years of 1995 and 1996, respectively, with 15 percent of 1995 model

Table VI-3
Oxygenated Fuel Modeling Parameters

		Market Shares (%)		Oxygen Content (%)		Oxygenated
State	County	MTBE	Alcohol Blends	MTBE	Alcohol Blends	Fuel Season
Alaska	Anchorage Ed	0	100	2.7	3.5	NOV-FEB (2007 & 2030)
Alaska	Anchorage Ed	0	100	2.7	3.5	NOV-DEC (1996 only)
Arizona	Maricopa Co	80	20	2.7	3.5	OCT-FEB
Colorado	Adams Co	75	25	2.7	3.5	NOV-FEB
Colorado	Arapahoe Co	75	25	2.7	3.5	NOV-FEB
Colorado	Boulder Co	75	25	2.7	3.5	NOV-FEB
Colorado	Douglas Co	75	25	2.7	3.5	NOV-FEB
Colorado	Jefferson Co	75	25	2.7	3.5	NOV-FEB
Colorado	Denver Co	75	25	2.7	3.5	NOV-FEB
Colorado	El Paso Co	75	25	2.7	3.5	NOV-FEB
Colorado	Larimer Co	75	25	2.7	3.5	NOV-FEB
Connecticut	Fairfield Co	90	10	2.7	3.5	NOV-FEB
Minnesota	Anoka Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Carver Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Dakota Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Hennepin Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Ramsey Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Scott Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Washington Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Wright Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Chisago Co	10	90	2.7	3.5	OCT-JAN
Minnesota	Isanti Co	10	90	2.7	3.5	OCT-JAN
Montana	Missoula Co	0	100	2.7	3.5	NOV-FEB
Nevada	Clark Co	0	100	2.7	3.5	OCT-MAR
Nevada	Washoe Co	95	5	2.7	3.5	OCT-JAN
New Jersey	Bergen Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Essex Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Hudson Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Hunterdon Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Mercer Co	95	5	2.7	3.5	JAN-FEB (1996 only)
New Jersey	Middlesex Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Monmouth Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Morris Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Ocean Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Passaic Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Somerset Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Sussex Co	95	5	2.7	3.5	NOV-FEB
New Jersey	Union Co	95	5	2.7	3.5	NOV-FEB
New Mexico	Bernalillo Co	15	85	2.7	3.5	JAN-FEB (1996 only)
New York	Bronx Co	95	5	2.7	3.5	NOV-FEB
New York	Kings Co	95	5	2.7	3.5	NOV-FEB

Table VI-3 (continued)

		Market Shares (%)		Oxygen Content (%)		Oxygenated
State	County	MTBE	Alcohol Blends	MTBE	Alcohol Blends	Fuel Season
New York	Nassau Co	95	5	2.7	3.5	NOV-FEB
New York	New York Co	95	5	2.7	3.5	NOV-FEB
New York	Queens Co	95	5	2.7	3.5	NOV-FEB
New York	Richmond Co	95	5	2.7	3.5	NOV-FEB
New York	Rockland Co	95	5	2.7	3.5	NOV-FEB
New York	Suffolk Co	95	5	2.7	3.5	NOV-FEB
New York	Westchester Co	95	5	2.7	3.5	NOV-FEB
New York	Orange Co	95	5	2.7	3.5	NOV-FEB
New York	Putnam Co	95	5	2.7	3.5	NOV-FEB
Oregon	Clackamas Co	1	99	2.7	3.5	NOV-FEB
Oregon	Jackson Co	1	99	2.7	3.5	NOV-FEB
Oregon	Multnomah Co	1	99	2.7	3.5	NOV-FEB
Oregon	Washington Co	1	99	2.7	3.5	NOV-FEB
Oregon	Josephine Co	1	99	2.7	3.5	NOV-FEB
Oregon	Klamath Co	1	99	2.7	3.5	NOV-FEB
Oregon	Yamhill Co	1	99	2.7	3.5	NOV-FEB
Texas	El Paso Co	15	85	2.7	3.5	NOV-FEB
Utah	Utah Co	20	80	2.7	3.5	NOV-FEB
Washington	Clark Co	1	99	2.7	3.5	NOV-FEB
Washington	King Co	1	99	2.7	3.5	JAN-FEB (1996 only)
Washington	Snohomish Co	1	99	2.7	3.5	JAN-FEB (1996 only)
Washington	Spokane Co	1	99	2.7	3.5	SEP-FEB
Wisconsin	St. Croix Co	10	90	2.7	3.5	OCT-JAN

year new vehicle sales (in Massachusetts only) meeting the intermediate Transitional LEV (TLEV) emission standards, 20 percent of 1996 model year new vehicle sales meeting the TLEV emission standards, and the remaining new vehicle sales meeting the Federal Tier I emission standards.

5. MOBILE5 to MOBILE6 Correction Factors

VOC, NO_x, and CO on-highway vehicle emission factors were calculated using the above inputs and EPA's MOBILE5b emission factor model. Emission factors for on-highway SO_2, PM_{10}, and $PM_{2.5}$ were calculated using EPA's PART5 model and NH_3 emission factors for on-highway vehicles were calculated national vehicle-specific emission factors (Harvey, 1983). Various correction factors were then applied to the MOBILE5b VOC and NO_x emission factors to simulate emission factors that would result from using MOBILE6, as well as accounting for issues not included in MOBILE5b. Each of these adjustments are discussed below. All of the correction factors discussed in these sections were provided by OMS.

a. VOC and NO_x Exhaust Adjustments

Adjustment factors to convert the MOBILE5b emission factors to MOBILE6 emission factors were applied to the VOC exhaust and NO_x MOBILE5b output emission factors. These factors varied by vehicle type (with no corrections applied to HDDVs or motorcycles) and by control combination. The control combination included the following distinctions: conventional gasoline with no I/M, conventional gasoline with I/M, RFG with no I/M, and RFG with I/M. Each county in the nation was assigned one of these four control combinations. The corresponding adjustment factor was then applied to each monthly, vehicle type emission factor for each county in the nation. Table VI-4 lists the exhaust VOC MOBILE5b to MOBILE6 adjustment factors applied in 1996 and Table VI-5 lists the NO_x MOBILE5b to MOBILE6 adjustment factors. Both tables are by vehicle type and control combination.

b. Air Conditioning Usage Factors

An additional adjustment was applied to the NO_x LDGV, LDGT1, and LDGT2 emission factors (already adjusted, as above to MOBILE6 emission rates) in 1996. This adjustment accounted for the additional NO_x emissions that would occur with air conditioning usage that is not included in the MOBILE5 emission factors. The air conditioning usage factors consist of two components: a factor simulating full air conditioning usage and a temperature dependent factor that adjusts the full usage factor for usage at the given temperature. These two factors were multiplied and then added to the MOBILE6-adjusted NO_x emission factors. The full usage factor is dependent upon vehicle type and the same four control combinations listed with the MOBILE6 adjustments. Table VI-6 lists the full usage NO_x air conditioning usage factors. The air conditioning adjustment becomes 0 below temperatures of 68°F. Above temperatures of 109°F, the full usage factor is applied directly. The temperatures used to calculate this adjustment were the ambient temperatures calculated by MOBILE5b and included in the MOBILE5b output files. The temperature dependent equation is as follows:

Temp Adj = -3.631541 + 0.072465 * AMBTEMP - 0.000276 * (AMBTEMP^2)

This temperature adjustment was then multiplied by the corresponding full usage factor and the result was added to the MOBILE6-adjusted NO_x emission factors.

c. Heavy-Duty Diesel Vehicle (HDDV) NO_x Defeat Device Factors

The final adjustment factor applied to the 1996 on-highway vehicle emission inventories is the HDDV NO_x defeat device adjustment factor. This factor applies only to NO_x and only to HDDVs. The factor varies by speed and roadway type, as shown in Table VI-7.

Table VI-4
Exhaust VOC MOBILE5b to MOBILE6 Adjustment Factors

Year	Case	Control Combination	Adjustment Factor by Vehicle Type (unitless)					
			LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT
1996	BASELINE	IM CG	0.724	0.773	0.874	0.899	1.231	1.385
		IM RFG	0.789	0.827	0.927	0.913	1.231	1.385
		NO IM CG	0.681	0.777	0.840	0.899	1.231	1.385
		NO IM RFG	0.744	0.811	0.882	0.913	1.231	1.385
	CONTROL	IM CG	n/a	n/a	n/a	n/a	n/a	n/a
		IM RFG	n/a	n/a	n/a	n/a	n/a	n/a
		NO IM CG	n/a	n/a	n/a	n/a	n/a	n/a
		NO IM RFG	n/a	n/a	n/a	n/a	n/a	n/a
2007	BASELINE	APP IM CG	0.492	0.540	0.502	0.431	1.224	1.345
		APP IM RFG	0.494	0.539	0.502	0.399	1.224	1.345
		IM CG	0.398	0.417	0.502	0.431	1.224	1.345
		IM RFG	0.395	0.413	0.502	0.399	1.224	1.345
		NO IM CG	0.333	0.370	0.461	0.444	1.224	1.345
		NO IM RFG	0.344	0.373	0.461	0.413	1.224	1.345
	CONTROL	APP IM CG	0.424	0.463	0.416	0.383	0.917	0.874
		APP IM RFG	0.457	0.493	0.446	0.377	0.907	0.853
		IM CG	0.343	0.357	0.416	0.383	0.917	0.874
		IM RFG	0.366	0.377	0.446	0.377	0.907	0.853
		NO IM CG	0.298	0.326	0.391	0.396	0.939	0.907
		NO IM RFG	0.325	0.351	0.420	0.391	0.905	0.881
2030	BASELINE	APP IM CG	1.525	1.539	0.445	0.096	0.355	0.779
		APP IM RFG	1.506	1.564	0.433	0.090	0.288	0.609
		IM CG	0.255	0.263	0.445	0.096	0.355	0.779
		IM RFG	0.251	0.267	0.433	0.090	0.288	0.609
		NO IM CG	0.221	0.242	0.313	0.137	0.561	1.018
		NO IM RFG	0.223	0.253	0.319	0.134	0.452	0.818
	CONTROL	APP IM CG	1.222	1.217	0.155	0.080	0.285	0.266
		APP IM RFG	1.321	1.234	0.162	0.078	0.253	0.222
		IM CG	0.204	0.208	0.155	0.080	0.285	0.266
		IM RFG	0.220	0.211	0.162	0.078	0.253	0.222
		NO IM CG	0.195	0.208	0.154	0.122	0.355	0.494
		NO IM RFG	0.209	0.219	0.167	0.122	0.422	0.424

Table VI-5
NO_x MOBILE5b to MOBILE6 Adjustment Factors

Year	Case	Control Combination	Adjustment Factor by Vehicle Type (unitless)					
			LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT
1996	BASELINE	IM CG	0.849	0.823	0.855	1.169	1.104	1.152
		IM RFG	0.861	0.832	0.861	1.171	1.104	1.152
		NO IM CG	0.796	0.761	0.812	1.169	1.104	1.152
		NO IM RFG	0.807	0.769	0.817	1.171	1.104	1.152
	CONTROL	IM CG	n/a	n/a	n/a	n/a	n/a	n/a
		IM RFG	n/a	n/a	n/a	n/a	n/a	n/a
		NO IM CG	n/a	n/a	n/a	n/a	n/a	n/a
		NO IM RFG	n/a	n/a	n/a	n/a	n/a	n/a
2007	BASELINE	APP IM CG	0.883	0.983	0.786	0.897	1.095	1.132
		APP IM RFG	0.809	0.937	0.777	0.848	1.095	1.132
		IM CG	0.720	0.805	0.786	0.897	1.095	1.132
		IM RFG	0.659	0.768	0.777	0.848	1.095	1.132
		NO IM CG	0.651	0.716	0.700	0.902	1.095	1.132
		NO IM RFG	0.602	0.686	0.695	0.866	1.095	1.132
	CONTROL	APP IM CG	0.594	0.703	0.598	0.784	0.740	0.694
		APP IM RFG	0.626	0.732	0.620	0.795	0.739	0.688
		IM CG	0.485	0.575	0.598	0.784	0.740	0.694
		IM RFG	0.511	0.599	0.620	0.795	0.739	0.688
		NO IM CG	0.454	0.524	0.542	0.793	0.741	0.719
		NO IM RFG	0.476	0.547	0.564	0.804	0.740	0.714
2030	BASELINE	APP IM CG	1.997	1.657	0.796	0.313	1.084	1.140
		APP IM RFG	1.614	1.508	0.792	0.284	1.084	1.140
		IM CG	0.624	0.690	0.796	0.313	1.084	1.140
		IM RFG	0.504	0.627	0.792	0.284	1.084	1.140
		NO IM CG	0.600	0.635	0.663	0.328	1.084	1.140
		NO IM RFG	0.490	0.583	0.652	0.335	1.084	1.140
	CONTROL	APP IM CG	0.377	0.321	0.127	0.230	0.118	0.161
		APP IM RFG	0.397	0.341	0.133	0.231	0.116	0.159
		IM CG	0.118	0.134	0.127	0.230	0.118	0.161
		IM RFG	0.124	0.142	0.133	0.231	0.116	0.159
		NO IM CG	0.167	0.190	0.167	0.256	0.219	0.303
		NO IM RFG	0.173	0.199	0.174	0.260	0.210	0.298

Table VI-6
NO_x Full Usage Air Conditioning Adjustment Factors

Year	Case	Control Combination	Adjustment Factor by Vehicle Type (unitless)			
			LDGV	LDGT1	LDGT2	HDGV
1996	BASELINE	IM CG	0.282	0.298	0.334	0.000
		IM RFG	0.282	0.298	0.334	0.000
		NO IM CG	0.301	0.315	0.353	0.000
		NO IM RFG	0.301	0.315	0.353	0.000
	CONTROL	IM CG	n/a	n/a	n/a	n/a
		IM RFG	n/a	n/a	n/a	n/a
		NO IM CG	n/a	n/a	n/a	n/a
		NO IM RFG	n/a	n/a	n/a	n/a
2007	BASELINE	IM CG	0.194	0.161	0.237	0.080
		IM RFG	0.166	0.145	0.223	0.060
		NO IM CG	0.206	0.176	0.258	0.070
		NO IM RFG	0.178	0.159	0.245	0.070
	CONTROL	IM CG	0.141	0.131	0.194	0.050
		IM RFG	0.138	0.129	0.191	0.050
		NO IM CG	0.153	0.145	0.214	0.060
		NO IM RFG	0.150	0.142	0.211	0.050
2030	BASELINE	IM CG	0.083	0.044	0.146	0.197
		IM RFG	0.062	0.036	0.127	0.176
		NO IM CG	0.107	0.070	0.162	0.195
		NO IM RFG	0.081	0.059	0.156	0.174
	CONTROL	IM CG	0.038	0.027	0.033	0.145
		IM RFG	0.037	0.026	0.032	0.145
		NO IM CG	0.052	0.047	0.059	0.145
		NO IM RFG	0.051	0.046	0.058	0.144

Table VI-7
NO_x HDDV Defeat Device Adjustment Factors

			Defeat Device Adjustment Factors by Speed (unitless)												
Year	**Facility**	**Description**	**5 mph**	**10 mph**	**15 mph**	**20 mph**	**25 mph**	**30 mph**	**35 mph**	**40 mph**	**45 mph**	**50 mph**	**55 mph**	**60 mph**	**65 mph**
1996	Interstate	Rural Interstate	1.1058	1.2254	1.3400	1.4402	1.5168	1.5622	1.5719	1.5447	1.4836	1.3946	1.2863	1.1682	1.0494
	Interstate	Rural Other Prin Arterial	1.1059	1.2255	1.3401	1.4403	1.5170	1.5624	1.5721	1.5449	1.4837	1.3948	1.2864	1.1683	1.0494
	Interstate	Urban Interstate	1.1076	1.2278	1.3430	1.4438	1.5208	1.5665	1.5762	1.5489	1.4874	1.3980	1.2891	1.1703	1.0509
	Interstate	Urban Other Freeways	1.1066	1.2264	1.3412	1.4416	1.5183	1.5638	1.5735	1.5463	1.4850	1.3959	1.2874	1.1691	1.0500
	Arterial	Rural Minor Arterial	0.9085	0.9462	0.9823	1.0139	1.0380	1.0524	1.0554	1.0468	1.0276	0.9995	0.9654	0.9282	0.8907
	Arterial	Rural Major Collector	0.9085	0.9462	0.9823	1.0139	1.0380	1.0523	1.0553	1.0468	1.0275	0.9995	0.9654	0.9282	0.8908
	Arterial	Rural Minor Collector	0.9076	0.9448	0.9805	1.0117	1.0355	1.0497	1.0527	1.0442	1.0252	0.9975	0.9638	0.9270	0.8900
	Arterial	Rural Local	0.9081	0.9459	0.9821	1.0138	1.0380	1.0524	1.0554	1.0468	1.0275	0.9994	0.9651	0.9278	0.8902
	Urban	Urban Other Prin Arterial	0.8113	0.8140	0.8166	0.8189	0.8207	0.8217	0.8219	0.8213	0.8199	0.8179	0.8154	0.8127	0.8100
	Urban	Urban Minor Arterial	0.8119	0.8146	0.8172	0.8195	0.8213	0.8223	0.8225	0.8219	0.8205	0.8185	0.8160	0.8133	0.8106
	Urban	Urban Collector	0.8098	0.8126	0.8153	0.8176	0.8193	0.8204	0.8206	0.8200	0.8186	0.8165	0.8140	0.8113	0.8085
	Urban	Urban Local	0.8118	0.8146	0.8172	0.8195	0.8213	0.8223	0.8225	0.8219	0.8205	0.8185	0.8160	0.8133	0.8105
2007	Interstate	Rural Interstate	0.8623	0.9233	0.9818	1.0329	1.0720	1.0952	1.1001	1.0863	1.0550	1.0097	0.9544	0.8941	0.8335
	Interstate	Rural Other Prin Arterial	0.8623	0.9233	0.9818	1.0330	1.0721	1.0953	1.1002	1.0863	1.0551	1.0097	0.9544	0.8942	0.8335
	Interstate	Urban Interstate	0.8626	0.9239	0.9827	1.0341	1.0733	1.0967	1.1016	1.0877	1.0563	1.0107	0.9551	0.8946	0.8336
	Interstate	Urban Other Freeways	0.8624	0.9235	0.9821	1.0333	1.0724	1.0957	1.1006	1.0867	1.0555	1.0100	0.9546	0.8943	0.8335
	Arterial	Rural Minor Arterial	0.8398	0.8583	0.8760	0.8915	0.9034	0.9104	0.9119	0.9077	0.8982	0.8845	0.8677	0.8495	0.8311
	Arterial	Rural Major Collector	0.8399	0.8584	0.8761	0.8916	0.9035	0.9105	0.9120	0.9078	0.8983	0.8846	0.8678	0.8496	0.8312
	Arterial	Rural Minor Collector	0.8406	0.8589	0.8764	0.8917	0.9034	0.9104	0.9118	0.9077	0.8983	0.8847	0.8682	0.8501	0.8320
	Arterial	Rural Local	0.8394	0.8579	0.8757	0.8912	0.9031	0.9102	0.9117	0.9074	0.8980	0.8842	0.8674	0.8491	0.8306
	Urban	Urban Other Prin Arterial	0.8189	0.8199	0.8208	0.8216	0.8222	0.8226	0.8227	0.8225	0.8220	0.8212	0.8204	0.8194	0.8184
	Urban	Urban Minor Arterial	0.8194	0.8204	0.8213	0.8221	0.8227	0.8231	0.8232	0.8230	0.8225	0.8218	0.8209	0.8199	0.8190
	Urban	Urban Collector	0.8170	0.8179	0.8189	0.8197	0.8203	0.8207	0.8208	0.8205	0.8200	0.8193	0.8184	0.8175	0.8165
	Urban	Urban Local	0.8190	0.8199	0.8209	0.8217	0.8223	0.8227	0.8228	0.8225	0.8220	0.8213	0.8204	0.8195	0.8185
2030	Interstate	Rural Interstate	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474
	Interstate	Rural Other Prin Arterial	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474	0.9474
	Interstate	Urban Interstate	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477	0.9477
	Interstate	Urban Other Freeways	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475	0.9475
	Arterial	Rural Minor Arterial	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488
	Arterial	Rural Major Collector	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488	0.9488
	Arterial	Rural Minor Collector	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494	0.9494
	Arterial	Rural Local	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485	0.9485
	Urban	Urban Other Prin Arterial	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375
	Urban	Urban Minor Arterial	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
	Urban	Urban Collector	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358	0.9358
	Urban	Urban Local	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377	0.9377

B. 2007 AND 2030 FUTURE YEAR MASS EMISSIONS INVENTORIES

This section summarizes the growth assumptions made and control programs applied to calculate the 2007 and 2030 on-highway vehicle emission inventories. As discussed above, the registration distributions and speeds modeled in 1996 were also used in the projection years. The temperatures modeled in the projection years represented State-specific average monthly maximum and minimum daily temperatures averaged from 1970 through 1997 using data from the National Climatic Data Center. The same temperatures were modeled in both 2007 and 2030.

1. Growth Assumptions

The VMT used in 2007 and 2030 were projected from 1996, using data supplied by OMS on the fraction of VMT by vehicle type. The data provided by OMS included the VMT fraction for LDGVs, LDGT1s, LDGT2s, light-duty diesel vehicles (LDDVs), and light-duty diesel trucks (LDDTs). The VMT fraction for the remaining vehicle types was calculated to be in the same relative distribution as in the 1996 VMT file. Table VI-8 shows the resulting VMT fractions by vehicle type for 2007 and 2030. Once these fractions were determined, the total VMT by vehicle type was determined using national VMT projections from the 2007 NET and by linearly extrapolating the national VMT totals from the MOBILE4.1 Fuel Consumption Model from 2020 to 2030. The 1996 VMT at the county/vehicle type/roadway type level of detail was then projected to 2007 and 2030 by allocating the VMT for each vehicle type according to population growth factors by metropolitan statistical areas and rest-of-State areas.

Table VI-8
National VMT Fractions by Vehicle Type for Tier 2 Analysis

Vehicle Type	2007 VMT Fractions	2030 VMT Fractions
LDGV	0.396	0.291
LDGT1	0.384	0.450
LDGT2	0.126	0.148
HDGV	0.024	0.028
LDDV	0.000	0.000
LDDT	0.002	0.002
HDDV	0.063	0.075
MC	0.005	0.005
Total	***1.000***	***1.000***

2. Control Assumptions

This section summarizes the control programs that were modeled for highway vehicles in 2007 and 2030. Differences between the Base Case and the Control Case (Tier 2 plus low sulfur fuel) were modeled by applying different adjustment factors. Both cases started with the same unadjusted MOBILE5b (and PART5) emission factors.

a. Inspection and Maintenance (I/M) Programs

I/M program inputs were the same in both of the projection years. The default program parameters for counties expected to have I/M programs in place in the projection years are the EPA performance standard I/M program inputs. The specific inputs modeled for each of the I/M program performance standards are shown in Table VI-9. I/M program coverage by county or area was based on data collected by EPA and Pechan-Avanti for the OTAG and Section 812 emission projections. During this data collection process, each State was contacted to confirm which counties in that State would be implementing an I/M program in the future. Each State was also asked to indicate which of the EPA I/M program types the program would most closely resemble - high enhanced, low enhanced, basic, or Ozone Transport Region (OTR) low enhanced. Responses were collected from each State with a planned CAA I/M program. Any additional I/M-specific information collected during comment periods for EPA's NO_x SIP Call, and accepted by EPA, superseded the default and OTAG I/M data.

b. Reformulated Gasoline (RFG)

Phase II of this Federal RFG program was modeled in 2007 and 2030. Coverage of RFG in the projection years was the same as that in 1996, with the following exceptions: all Maine counties and Orange County, NY were removed from the 1996 list, shown in Table VI-2. In addition, since California was modeled with MOBILE5b for the projection years, the entire State of California was modeled with Federal Phase II RFG (ASTM Class B) in the projection years. Areas not participating in the RFG program were modeled during the ozone season months with Phase II RVP values of either 8.7 pounds per square inch (psi) or 7.8 psi. Areas that provided SIP Call comments documenting the presence of a low RVP program were modeled at that RVP during the ozone season.

c. Oxygenated Fuel

The oxygenated fuel program inputs and county coverages modeled are the same as those described for 1996, with the specific changes listed in Table VI-3 for several of the areas for 2007 and 2030.

Table VI-9
I/M Performance Standard Program Inputs

I/M Program Name	Basic I/M Performance Standard	Low Enhanced I/M Performance Standard	High Enhanced I/M Performance Standard
I/M Program Parameters			
Program Start Year	1983	1983	1983
Stringency Level (Percent)	20	20	20
Model Years Covered	1968-2020	1968-2020	1968-1985
Waiver Rate For Pre-1981 Model Years (%)	0	3	3
Waiver Rate For 1981 and Later Models (%)	0	3	3
Compliance Rate (%)	100	96	96
Program Type	TO	TO	TO
Inspection Frequency	Annual	Annual	Annual
Vehicle Types Inspected			
LDGV	YES	YES	YES
LDGT1	NO	YES	YES
LDGT2	NO	YES	YES
HDGV	NO	NO	NO
Test Type	IdleTest	IdleTest	2500/IdleTest
I/M Cutpoints	220/1.2/999	220/1.2/999	220/1.2/999
Effectiveness Rates (% hydrocarbon (HC)/CO/NO_x)	1.00/1.00/1.00	1.00/1.00/1.00	1.00/1.00/1.00
Program Start Year			1983
Stringency Level (Percent)			20
Model Years Covered			1986-2020
Waiver Rate For Pre-1981 Model Years (%)			3
Waiver Rate For 1981 and Later Models (%)			3
Compliance Rate (%)			96
Program Type			TO
Inspection Frequency			Annual
Vehicle Types Inspected			
LDGV			YES
LDGT1			YES
LDGT2			YES
HDGV			NO
Test Type			TransientTest
I/M Cutpoints (g/mi HC/CO/NO_x)			0.80/20.0/2.00
Effectiveness Rates (% HC/CO/NO_x)			1.00/1.00/1.00
Anti-Tampering Program Parameters			
Program Start Year		1995	1995
Model Years Covered		1972-2020	1984-2020
Vehicle Types Inspected			
LDGV		YES	YES
LDGT1		YES	YES
LDGT2		YES	YES
HDGV		NO	NO
Program Type		TO	TO
Effectiveness Rate		1.00	1.00
Inspection Frequency		Annual	Annual
Compliance Rate (%)		96	96

Table VI-9 (continued)

I/M Program Name	Basic I/M Performance Standard	Low Enhanced I/M Performance Standard	High Enhanced I/M Performance Standard
I/M Program Parameters			
Inspections Performed			
Air Pump System		NO	NO
Catalyst		NO	YES
Fuel Inlet Restrictor		NO	YES
Tailpipe Lead Deposit Test		NO	NO
EGR System		YES	NO
Evaporative Emission Control System		NO	NO
PCV System		NO	NO
Gas Cap		NO	NO
Functional Pressure Test Program Parameters			
Program Start Year			1995
Model Years Covered			1983-2020
Effectiveness Rate			1.00
Vehicle Types Tested			
LDGV			YES
LDGT1			YES
LDGT2			YES
HDGV			NO
Program Type			TO
Inspection Frequency			Annual
Compliance Rate (%)			96
Purge Test Program Parameters			
Program Start Year			1995
Model Years Covered			1986-2020
Effectiveness Rate			1.00
Vehicle Types Tested			
LDGV			YES
LDGT1			YES
LDGT2			YES
HDGV			NO
Program Type			TO
Inspection Frequency			Annual
Compliance Rate (%)			96

NOTES: TO=Test Only
TRC=Test And Repair (Computerized)

d. NLEV Program

The National LEV (NLEV) program was included for all States in the projection year modeling. This program starts with the 2001 model year nationwide, and in 1999 in the Northeast Ozone Transport Commission (OTC) States. The implementation schedule of the NLEV program in the OTC States is shown below.

Model Year	Federal Tier I Standards	Transitional LEV Standards	LEV Standards
1999	30%	40%	30%
2000		40%	60%
2001 and later			100%

States in the OTC that have adopted a LEV program on their own were modeled with the characteristics of their programs. These States include Massachusetts, New York, Vermont, and Maine.

California's LEV program began in 1994. This was modeled using the MOBILE5b default LEV implementation schedule, along with a start year of 1994 for this program. California's LEV program now includes LDGT2s which are not included in the default LEV modeling in MOBILE5b. As discussed below, this was accounted for by applying the Control Case Tier 2 and low sulfur fuel adjustment factors in the Base Case in California.

The following table shows the emission standards of the Federal Tier I program, the transitional LEV (TLEV) standards, the LEV standards, and the Ultra-Low Emission Vehicle (ULEV) standards. These standards apply to the LDGV and LDGT1a classes of vehicles. The LDGT1b category is also included in the NLEV program, but the emission standards for these vehicles are slightly less stringent than those listed below for the lighter vehicles.

Emission Standard	Nonmethane Organic Gas (NMOG)	CO	NO_x
Federal Tier 1	0.250 grams/mile nonmethane hydrocarbon (NMHC)	3.4 grams/mile	0.40 grams/mile
TLEV	0.125 grams/mile	3.4 grams/mile	0.40 grams/mile
LEV	0.075 grams/mile	3.4 grams/mile	0.20 grams/mile
ULEV	0.040 grams/mile	1.7 grams/mile	0.20 grams/mile

e. 2004 NO_x Standard for Heavy-Duty Diesel Engines

EPA determined that additional reductions in NO_x and NMHC emissions are needed at the national level from heavy-duty vehicles and promulgated a new standard, referred to as the HDDV 2.0 grams per brake horsepower-hour (g/bhp-hr) NO_x standard. This standard was modeled in the MOBILE5b input files following the guidance provided in "MOBILE5 Information Sheet #5, Inclusion of New 2004 NO_x Standard for Heavy-Duty Diesel Engines in MOBILE5a and MOBILE5b Modeling." This guidance was issued on

January 30, 1998. In effect, this modeling reduces the HDDV emission factors starting with the 2004 model year to be consistent with the new standard, and is applied nationally.

f. 2007 and 2030 Adjustment Factors

The 1996 section of this chapter discusses the VOC exhaust and NO_x MOBILE5b to MOBILE 6 adjustment factors, the air conditioning usage adjustment factors, and the HDDV NO_x defeat device adjustment factors. The actual factors applied, including those applied in 2007 and 2030 were shown in Tables VI-4 through VI-7. Separate factors were applied to produce a Base Case (without Tier 2 and low sulfur fuel) and a Control Case (with Tier 2 and low sulfur fuel). Each of these cases is labeled separately in the tables. No air conditioning usage factors were applied to HDGVs in 1996, but are applied in the projection years. Also, some of the factors add a separate category for areas implementing an "appropriate I/M" program (i.e., a program that meets EPA's requirements to be modeled with the maximum LEV benefits). In general, areas modeled with the EPA high enhanced performance standard, or an equivalent I/M program, were grouped in this category, labeled "APP IM CG" or "APP IM RFG" in the tables. Several exceptions to this general rule occurred for areas that indicated through comments, that were accepted by EPA, to the NO_x SIP Call specifically indicating that the area should or should not be modeled with the maximum LEV benefits.

i. VOC Evaporative Adjustments

An additional set of MOBILE5b to MOBILE6 adjustment factors was applied to the VOC evaporative emission factors in 2007 and 2030 that were not applied in 1996. In effect, these account for the new Tier 2 and low sulfur fuel controls, as all of the Base Case adjustment factors are 1. These factors were applied to the evaporative portion of the VOC emission factors and apply only to LDGVs, LDGT1s, and LDGT2s. Table VI-10 shows these factors.

ii. On-board Diagnostics

To simulate the effects of on-board diagnostic (OBD) devices in the projection years, adjustments were made to the MOBILE5b input files for areas modeled with an I/M program. This was modeled by adding or modifying pressure and purge test input lines, such that 1996 and later model year LDGVs and LDGTs would receive the full benefits of a test-only pressure test and purge test.

iii. PM and SO_2 Adjustment Factors

An additional set of factors was applied to PM and SO_2 emission factors in the projection years. These factors are only relevant in the Control Case (i.e., the factors are 1 in the Base Case). The PM factors are shown in Table VI-11 and apply to all vehicle types except HDDVs (the motorcycle factors are all 1). These factors were applied only to the exhaust portion of the PM_{10} and $PM_{2.5}$ emission factors. The brake wear and tire wear portions of the PM factors were not adjusted. Table VI-12 lists the SO_2 factors applied. These factors apply to all gasoline vehicle types and account for the lower levels of sulfur in gasoline under EPA's proposal.

iv. HDDV VOC Adjustment Factors

An adjustment was also made to the HDDV exhaust VOC emission factors to account for the MOBILE5b to MOBILE6 adjustments. This was accounted for by multiplying all VOC HDDV emission factors in both the Base Case and Control Case by 0.413 in 2007 and 0.316 in 2030.

v. California

MOBILE5b was used in the projection years to estimate the unadjusted emission factors for California, since CALI5 only projects emission factors to 2020. To account for the fact that California's LEV2 program comes fairly close to the benefits expected from EPA's proposed Tier 2 and low sulfur fuel program, the Control Case adjustment factors (including the PM and SO_2 adjustment factors) were applied to the California emission factors in both the Base Case and Control Case.

Table VI-10
Evaporative VOC MOBILE5b to MOBILE6 Adjustment Factors

Year	Case	Control Combination	Adjustment Factor by Vehicle Type (unitless)					
			LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT
2007	BASELINE	IM CG	1.000	1.000	1.000	1.000	1.000	1.000
		IM RFG	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM CG	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM RFG	1.000	1.000	1.000	1.000	1.000	1.000
	CONTROL	IM CG	0.970	0.963	1.000	1.000	1.000	1.000
		IM RFG	0.975	0.961	1.000	1.000	1.000	1.000
		NO IM CG	0.985	0.985	1.000	1.000	1.000	1.000
		NO IM RFG	0.983	0.986	1.000	1.000	1.000	1.000
2030	BASELINE	IM CG	1.000	1.000	1.000	1.000	1.000	1.000
		IM RFG	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM CG	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM RFG	1.000	1.000	1.000	1.000	1.000	1.000
	CONTROL	IM CG	0.796	0.778	0.857	1.000	1.000	1.000
		IM RFG	0.818	0.766	0.828	1.000	1.000	1.000
		NO IM CG	0.902	0.923	0.958	1.000	1.000	1.000
		NO IM RFG	0.911	0.927	0.961	1.000	1.000	1.000

Table VI-11
PM Adjustment Factors

Year	Case	Control Combination	Adjustment Factor by Vehicle Type (unitless)						
			LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	MC
2007	BASELINE	IM CG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		IM RFG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM CG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM RFG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	CONTROL	IM CG	0.415	0.342	0.370	0.767	0.826	0.800	1.000
		IM RFG	0.624	0.563	0.591	0.848	0.826	0.800	1.000
		NO IM CG	0.415	0.342	0.370	0.767	0.826	0.800	1.000
		NO IM RFG	0.624	0.563	0.591	0.848	0.826	0.800	1.000
2030	BASELINE	IM CG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		IM RFG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM CG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		NO IM RFG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	CONTROL	IM CG	0.417	0.333	0.333	0.767	0.109	0.107	1.000
		IM RFG	0.625	0.556	0.556	0.848	0.109	0.107	1.000
		NO IM CG	0.417	0.333	0.333	0.767	0.109	0.107	1.000
		NO IM RFG	0.625	0.556	0.556	0.848	0.109	0.107	1.000

Table VI-12
SO_2 Adjustment Factors

Year	Case	Control Combination	Adjustment Factor by Vehicle Type (unitless)				
			LDGV	LDGT1	LDGT2	HDGV	MC
2007	BASELINE	IM CG	1.000	1.000	1.000	1.000	1.000
		IM RFG	1.000	1.000	1.000	1.000	1.000
		NO IM CG	1.000	1.000	1.000	1.000	1.000
		NO IM RFG	1.000	1.000	1.000	1.000	1.000
	CONTROL	IM CG	0.088	0.088	0.088	0.088	0.088
		IM RFG	0.224	0.224	0.224	0.224	0.224
		NO IM CG	0.088	0.088	0.088	0.088	0.088
		NO IM RFG	0.224	0.224	0.224	0.224	0.224
2030	BASELINE	IM CG	1.000	1.000	1.000	1.000	1.000
		IM RFG	1.000	1.000	1.000	1.000	1.000
		NO IM CG	1.000	1.000	1.000	1.000	1.000
		NO IM RFG	1.000	1.000	1.000	1.000	1.000
	CONTROL	IM CG	0.088	0.088	0.088	0.088	0.088
		IM RFG	0.224	0.224	0.224	0.224	0.224
		NO IM CG	0.088	0.088	0.088	0.088	0.088
		NO IM RFG	0.224	0.224	0.224	0.224	0.224

C. MODELING INVENTORIES INPUTS FOR EMISSIONS PREPROCESSOR

1. EMS-95/SMOKE - File Structures

The on-highway vehicle-related files submitted as inputs to EMS-95 and SMOKE consist of MOBILE5b input shells, three VMT-related files, and an adjustment factor file. The MOBILE5b input shells are a set of MOBILE5b input files that correspond to each of the MOBILE5b input files developed in calculating the mass emissions inventory, but with only one scenario, representing July controls and at a single speed and temperature combination. The EMS-95 and SMOKE models then use these MOBILE5b shells to generate emission factors at all of the temperature and speed combinations necessary for the hourly meteorological conditions being modeled. The three VMT files include a file with the total VMT by county and road type. The format of these files is shown in Table VI-13. These models then break the VMT down by vehicle type using the VMT mix by hour, county, road type, and vehicle type. The file structure of these VMT mix files are shown in Table VI-14. (It should be noted that for this analysis, there is no difference in the VMT mixes by hour of the day.) The third VMT-related file provided for each year includes a file with average speed information by county and road type. The format of these files is shown in Table VI-15. Each of these three VMT-related files varies only by year, and not by control case. The last file included for the EMS-95 and SMOKE modeling related to the on-highway vehicle modeling varies by year and control case and includes the adjustment factors to be applied by county and vehicle type. The format of these files is shown in Table VI-16. The factors for the HDDV NO_x HDDV defeat device, the HDDV VOC adjustments, and the air conditioning temperature-dependent equation were applied separately in the modeling code and were not included in the adjustment factor files.

2. EPS-2.5 and Mass Emission Inventory - File Structures

The EPS-2.5 files for on-highway vehicle sources consist of monthly emissions data by county, vehicle type, and roadway type. The EPS-2.5 modeling files were assembled from detailed monthly emission files, developed as discussed in the sections above. Separate EPS-2.5 files were created for 1996, 2007 Base Case, 2007 Control Case, 2030 Base Case, and 2030 Control Case. All of the on-highway EPS-2.5 emission files have the same format. This format is shown in Table VI-17. The format of the final mass emissions file, which contain annual and summer season day emissions for each pollutant are shown in Table VI-18. The same set of years and cases applies to the mass emissions files. It should be noted that the summer season day values for the on-highway vehicle emissions are calculated by dividing July emissions by 31.

Table VI-13
Structure for VMT Files (OFNVMTyy.TXT)

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
ROADTYPE	C	2	0	Roadway Type as Defined by Codes Below:
				R1-Rural Interstates
				R2-Rural Other Principal Arterials
				R6-Rural Minor Arterials
				R7-Rural Major Collectors
				R8-Rural Minor Collectors
				R9-Rural Locals
				U1-Urban Interstates
				U2-Urban Other Freeways and Expressways
				U4-Urban Other Principal Arterials
				U6-Urban Minor Arterials
				U7-Urban Collectors
				U9-Urban Locals
VMT	N	15	3	Annual Average Daily VMT (miles)

Table VI-14
Structure for VMT Vehicle Mix Files (NTVMIXyy.TXT)

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
ROADTYPE	C	2	0	Roadway Type as Defined by Codes Below:
				01-Rural Interstates
				02-Rural Other Principal Arterials
				06-Rural Minor Arterials
				07-Rural Major Collectors
				08-Rural Minor Collectors
				09-Rural Locals
				11-Urban Interstates
				12-Urban Other Freeways and Expressways
				14-Urban Other Principal Arterials
				16-Urban Minor Arterials
				17-Urban Collectors
				19-Urban Locals
LINKID	C	10	0	Not Used
HOUR	N	2	0	Hour of Day (1 through 24)
VEHMIX01	N	5	3	VMT Mix Fraction for Light-Duty Gas Vehicles
VEHMIX02	N	5	3	VMT Mix Fraction for Light-Duty Gas Trucks 1
VEHMIX03	N	5	3	VMT Mix Fraction for Light-Duty Gas Trucks 2
VEHMIX04	N	5	3	VMT Mix Fraction for Heavy-Duty Gas Vehicles
VEHMIX05	N	5	3	VMT Mix Fraction for Light-Duty Diesel Vehicles
VEHMIX06	N	5	3	VMT Mix Fraction for Light-Duty Diesel Trucks
VEHMIX07	N	5	3	VMT Mix Fraction for Heavy-Duty Diesel Vehicles
VEHMIX08	N	5	3	VMT Mix Fraction for Motorcycles

Table VI-15
Structure for VMT Vehicle Mix Files (OFNSPyy.TXT)

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
ROADTYPE	C	2	0	Roadway Type as Defined by Codes Below:
				01-Rural Interstates
				02-Rural Other Principal Arterials
				06-Rural Minor Arterials
				07-Rural Major Collectors
				08-Rural Minor Collectors
				09-Rural Locals
				11-Urban Interstates
				12-Urban Other Freeways and Expressways
				14-Urban Other Principal Arterials
				16-Urban Minor Arterials
				17-Urban Collectors
				19-Urban Locals
AVESPEED	N	4	1	Average Vehicle Speed (miles per hour)

Table VI-16
Structure for Adjustment Factor Files

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS State Code
FIPSCNTY	C	3	0	FIPS County Code
V_TYPE	C	1	0	Vehicle Type : 1 = LDGV, 2 = LDGT1, 3 = LDGT2, 4 = HDGV, 5 = MC, 6 = LDDV, 7 = LDDT, 8 = HDDV
EXHVOCADJ	N	10	3	Multiplicative Exhaust VOC Adjustment Factor
EXHNOXADJ	N	10	3	Multiplicative NO_x Adjustment Factor
NOXACADJ	N	10	3	Additive NO_x Full Air Conditioning Usage Adjustment Factor (to be multiplied by temperature-dependent equation)
EVAPVOCADJ	N	10	3	Multiplicative Evaporative VOC Adjustment Factor
EXHPM10ADJ	N	10	3	Multiplicative Exhaust PM_{10} Adjustment Factor
EXHPM25ADJ	N	10	3	Multiplicative Exhaust $PM_{2.5}$ Adjustment Factor
EXHSO2ADJ	N	10	3	Multiplicative SO_2 Adjustment Factor

Table VI-17
Structure for On-Highway Mobile Source EPS Data Files

Variable	Type	Length	Decimals	Description
FIPSST	C	2	0	FIPS state code
FIPSCNTY	C	3	0	FIPS county code
SCC	C	10	0	AMS Source Category Code
V_TYPE	C	5	0	Vehicle Type
VOC	N	12	4	Annual VOC Emissions [tons per year (tpy)]
NOX	N	12	4	Annual NO_x Emissions (tpy)
CO	N	12	4	Annual CO Emissions (tpy)
SO2	N	12	4	Annual SO_2 Emissions (tpy)
PM10	N	12	4	Annual PM_{10} Emissions (tpy)
PM25	N	12	4	Annual $PM_{2.5}$ Emissions (tpy)
SOA	N	12	4	Annual SOA Emissions (tpy)
NH3	N	12	4	Annual NH_3 Emissions (tpy)
VOC_JAN	N	12	4	Monthly VOC Emissions (tons per month)
VOC_FEB	N	12	4	Monthly VOC Emissions (tons per month)
VOC_MAR	N	12	4	Monthly VOC Emissions (tons per month)
VOC_APR	N	12	4	Monthly VOC Emissions (tons per month)
VOC_MAY	N	12	4	Monthly VOC Emissions (tons per month)
VOC_JUN	N	12	4	Monthly VOC Emissions (tons per month)
VOC_JUL	N	12	4	Monthly VOC Emissions (tons per month)
VOC_AUG	N	12	4	Monthly VOC Emissions (tons per month)
VOC_SEP	N	12	4	Monthly VOC Emissions (tons per month)
VOC_OCT	N	12	4	Monthly VOC Emissions (tons per month)
VOC_NOV	N	12	4	Monthly VOC Emissions (tons per month)
VOC_DEC	N	12	4	Monthly VOC Emissions (tons per month)
NOX_JAN	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_FEB	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_MAR	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_APR	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_MAY	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_JUN	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_JUL	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_AUG	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_SEP	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_OCT	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_NOV	N	12	4	Monthly NO_x Emissions (tons per month)
NOX_DEC	N	12	4	Monthly NO_x Emissions (tons per month)
CO_JAN	N	12	4	Monthly CO Emissions (tons per month)
CO_FEB	N	12	4	Monthly CO Emissions (tons per month)
CO_MAR	N	12	4	Monthly CO Emissions (tons per month)
CO_APR	N	12	4	Monthly CO Emissions (tons per month)
CO_MAY	N	12	4	Monthly CO Emissions (tons per month)

Table VI-17 (continued)

Variable	Type	Length	Decimals	Description
CO_JUN	N	12	4	Monthly CO Emissions (tons per month)
CO_JUL	N	12	4	Monthly CO Emissions (tons per month)
CO_AUG	N	12	4	Monthly CO Emissions (tons per month)
CO_SEP	N	12	4	Monthly CO Emissions (tons per month)
CO_OCT	N	12	4	Monthly CO Emissions (tons per month)
CO_NOV	N	12	4	Monthly CO Emissions (tons per month)
CO_DEC	N	12	4	Monthly CO Emissions (tons per month)
SO2_JAN	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_FEB	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_MAR	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_APR	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_MAY	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_JUN	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_JUL	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_AUG	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_SEP	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_OCT	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_NOV	N	12	4	Monthly SO_2 Emissions (tons per month)
SO2_DEC	N	12	4	Monthly SO_2 Emissions (tons per month)
PM10_JAN	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_FEB	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_MAR	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_APR	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_MAY	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_JUN	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_JUL	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_AUG	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_SEP	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_OCT	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_NOV	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM10_DEC	N	12	4	Monthly PM_{10} Emissions (tons per month)
PM25_JAN	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_FEB	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_MAR	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_APR	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_MAY	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_JUN	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_JUL	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_AUG	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_SEP	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_OCT	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
PM25_NOV	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)

Table VI-17 (continued)

Variable	Type	Length	Decimals	Description
PM25_DEC	N	12	4	Monthly $PM_{2.5}$ Emissions (tons per month)
SOA_JAN	N	12	4	Monthly SOA Emissions (tons per month)
SOA_FEB	N	12	4	Monthly SOA Emissions (tons per month)
SOA_MAR	N	12	4	Monthly SOA Emissions (tons per month)
SOA_APR	N	12	4	Monthly SOA Emissions (tons per month)
SOA_MAY	N	12	4	Monthly SOA Emissions (tons per month)
SOA_JUN	N	12	4	Monthly SOA Emissions (tons per month)
SOA_JUL	N	12	4	Monthly SOA Emissions (tons per month)
SOA_AUG	N	12	4	Monthly SOA Emissions (tons per month)
SOA_SEP	N	12	4	Monthly SOA Emissions (tons per month)
SOA_OCT	N	12	4	Monthly SOA Emissions (tons per month)
SOA_NOV	N	12	4	Monthly SOA Emissions (tons per month)
SOA_DEC	N	12	4	Monthly SOA Emissions (tons per month)
NH3_JAN	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_FEB	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_MAR	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_APR	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_MAY	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_JUN	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_JUL	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_AUG	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_SEP	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_OCT	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_NOV	N	12	4	Monthly NH_3 Emissions (tons per month)
NH3_DEC	N	12	4	Monthly NH_3 Emissions (tons per month)

Table VI-18
Structure for On-Highway Mobile Source Mass Emissions Data Files

Variable	Type	Length	Decimals	Description
fipsst	C	2	0	FIPS State code
fipscnty	C	3	0	FIPS county code
scc	C	10	0	Source Category Classification Code
voc_ann	N	10	4	Annual VOC emissions from highway vehicles (tons per year)
nox_ann	N	10	4	Annual NO_x emissions from highway vehicles (tons per year)
co_ann	N	10	4	Annual CO emissions from highway vehicles (tons per year)
so2_ann	N	10	4	Annual SO_2 emissions from highway vehicles (tons per year)
pm10_ann	N	10	4	Annual PM_{10} emissions from highway vehicles (tons per year)
pm25_ann	N	10	4	Annual $PM_{2.5}$ emissions from highway vehicles (tons per year)
nh3_ann	N	10	4	Annual NH_3 emissions from highway vehicles (tons per year)
soa_ann	N	10	4	Annual SOA emissions from highway vehicles (tons per year)
voc_osd	N	10	4	Summer season day VOC emissions from highway vehicles [tons per day (tpd)]
nox_osd	N	10	4	Summer season day NO_x emissions from highway vehicles (tpd)
co_osd	N	10	4	Summer season day CO emissions from highway vehicles (tpd)
so2_osd	N	10	4	Summer season day SO_2 emissions from highway vehicles (tpd)
pm10_osd	N	10	4	Summer season day PM_{10} emissions from highway vehicles (tpd)
pm25_osd	N	10	4	Summer season day PM_{25} emissions from highway vehicles (tpd)
nh3_osd	N	10	4	Summer season day NH_3 emissions from highway vehicles (tpd)
soa_osd	N	10	4	Summer season day SOA emissions from highway vehicles (tpd)
vmt_ann	N	20	7	Annual VMT from highway vehicles using 8 vehicle types (million miles)

CHAPTER VII
EMISSION SUMMARIES AND COMPARISONS

Tables VII-1 through VII-5 present summaries of national annual emissions and emissions reductions by pollutant and source category as defined by the Tier 2-level emission summary for the 1996, 2007, and 2030 inventories. Table VII-1 summarizes national annual emissions for the 1996 Base Year inventory. Table VII-2 summarizes national annual emissions for the 2007 Base Case inventory, and Table VII-3 summarizes the mobile and nonroad emissions reductions associated with the 2007 Control Case relative to the 2007 Base Case. Table VII-4 summarizes national annual emissions for the 2030 Base Case inventory, and Table VII-5 summarizes the mobile and nonroad emissions reductions associated with the 2030 Control Case relative to the 2030 Base Case.

Tables VII-6 through VII-10 present summaries of annual emissions and emissions reductions by State and pollutant for each of the major source categories (i.e., EGU, non-EGU point, stationary area, nonroad, and on-highway mobile sources). Table VII-6 summarizes annual emissions for the 1996 Base Year inventory. Table VII-7 summarizes national annual emissions for the 2007 Base Case inventory, and Table VII-8 summarizes the mobile and nonroad emissions reductions associated with the 2007 Control Case relative to the 2007 Base Case. Table VII-9 summarizes national annual emissions for the 2030 Base Case inventory, and Table VII-10 summarizes the mobile and nonroad emissions reductions associated with the 2030 Control Case relative to the 2030 Base Case. Table VII-11 summarizes the total annual emissions in each of the years and cases for all eight pollutants.

The remainder of this chapter presents two types of pollutant density maps for the 48-contiguous States and the District of Columbia. Separate maps are presented for each inventory and pollutant. One type of density map is presented in units of tons of pollutant per square mile, and the other type of density map is presented in units of tons of pollutant per 1,000 people. Figures VII-1 through VII-16 present the maps for the 1996 Base Year inventory, Figures VII-17 through VII-32 present the maps for the 2007 Base Case inventory, Figures VII-33 through VII-44 present maps of the emissions reductions associated with the 2007 Control Case versus the 2007 Base Case inventory, Figures VII-45 through VII-60 present the maps for the 2030 Base Case inventory, and Figures VII-61 through VII-72 present maps of the emissions reductions associated with the 2030 Control Case versus the 2030 Base Case inventory. For each inventory, maps in units of tons of pollutant per square mile are presented first followed by the maps in units of tons of pollutant per 1,000 people. For the 1996, 2007, and 2030 Base Case inventories, the maps are presented in the following order: VOC, NO_x, CO, SOA, SO_2, PM_{10}, $PM_{2.5}$, and NH_3. For the 2007 and 2030 Control Cases, the maps show emission reductions associated with mobile and nonroad sources for the following pollutants: VOC, NO_x, SOA, SO_2, PM_{10}, and $PM_{2.5}$. There are no emissions reductions for CO or NH_3.

Table VII-1
Annual National Tier 2 Emissions Summary for 1996 Base Year
(tons/year)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Fuel Comb. Elec. Util.	Coal	27,964	5,541,738	247,892	12,136,584	263,791	133,247	248	540
	Oil	3,030	103,177	10,963	435,513	5,026	4,420	1,754	86
	Gas	7,734	263,552	76,156	2,436	463	463	3,682	5
	Internal Combustion	9,907	151,264	58,871	57,306	18,376	18,286	133	56
		48,636	**6,059,731**	**393,882**	**12,631,839**	**287,656**	**156,417**	**5,817**	**687**
Fuel Comb. Industrial	Coal	5,558	598,761	99,263	1,762,363	70,960	24,568	18	107
	Oil	11,999	246,041	72,017	918,434	49,779	28,459	4,191	294
	Gas	72,917	1,336,418	348,185	548,260	45,160	43,983	13,345	70
	Other	51,171	124,677	305,479	147,262	74,866	59,710	0	1,885
	Internal Combustion	66,143	864,247	247,020	22,867	65,069	48,550	0	60
		207,788	**3,170,145**	**1,071,964**	**3,399,186**	**305,834**	**205,270**	**17,554**	**2,416**
Fuel Comb. Other	Commercial/institutional Coal	903	38,394	15,072	200,391	15,856	6,230	2	17
	Commercial/institutional Oil	3,151	101,991	18,667	388,567	12,231	5,181	2,204	74
	Commercial/institutional Gas	11,048	233,546	54,108	7,923	6,514	6,131	781	9
	Misc. Fuel Comb. (except Residential)	8,377	29,093	162,781	5,410	72,019	71,559	0	200
	Residential Wood	757,723	48,439	3,992,752	6,920	472,197	472,197	0	32,658
	Residential Other	40,745	837,900	269,302	173,115	19,405	15,994	5,121	467
		821,948	**1,289,364**	**4,512,682**	**782,326**	**598,222**	**577,292**	**8,107**	**33,425**
Chemical & Allied Product Mfg	Organic Chemical Mfg	113,489	19,656	127,562	8,418	29,040	11,288	0	187
	Inorganic Chemical Mfg	2,509	6,961	134,276	199,060	4,614	3,409	0	11
	Polymer & Resin Mfg	135,314	3,781	4,947	450	3,790	3,187	0	552
	Agricultural Chemical Mfg	5,401	74,438	16,540	4,517	10,025	7,614	182,601	22
	Paint, Varnish, Lacquer, Enamel Mfg	9,858	29	13	0	944	439	0	109
	Pharmaceutical Mfg	31,810	23	38	279	150	124	0	162
	Other Chemical Mfg	137,738	53,743	939,397	73,829	18,304	15,964	0	230
		436,119	**158,632**	**1,222,773**	**286,553**	**66,867**	**42,025**	**182,601**	**1,274**
Metals Processing	Non-ferrous Metals Processing	20,908	12,061	424,165	361,531	40,471	25,259	0	112
	Ferrous Metals Processing	41,555	82,560	1,928,588	150,769	149,066	92,465	5,893	139
	Metals Processing Nec	7,835	3,675	25,106	17,793	21,541	15,954	1	25
		70,298	**98,297**	**2,377,859**	**530,093**	**211,077**	**133,677**	**5,894**	**276**
Petroleum & Related Industries	Oil & Gas Production	271,814	57,843	34,456	89,055	1,777	1,491	0	440
	Petroleum Refineries & Related Industrie	241,612	47,672	308,357	270,608	20,171	13,136	42,860	510
	Asphalt Manufacturing	3,521	4,839	4,998	8,816	17,814	7,734	0	34
		516,948	**110,354**	**347,810**	**368,478**	**39,762**	**22,362**	**42,860**	**984**

Table VII-1 (cont'd)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Other Industrial Processes	Agriculture, Food, & Kindred Products	134,878	5,916	6,522	2,921	80,125	40,608	1,990	105
	Textiles, Leather, & Apparel Products	17,794	94	41	74	288	224	0	3,392
	Wood, Pulp & Paper, & Publishing Product	123,149	90,107	493,712	116,538	81,924	61,315	0	12,464
	Rubber & Miscellaneous Plastic Products	59,589	189	77	65	3,151	2,567	0	347
	Mineral Products	31,660	290,382	128,872	284,655	314,241	132,888	7	214
	Machinery Products	10,724	6,608	371	552	6,842	2,846	0	92
	Electronic Equipment	1,739	82	1,528	0	20	8	0	18
	Transportation Equipment	2,220	221	38	0	374	231	0	22
	Construction	6	0	0	0	0	0	0	0
	Miscellaneous Industrial Processes	57,338	9,885	4,016	3,884	22,760	15,871	39,062	570
		439,097	**403,484**	**635,176**	**408,689**	**509,726**	**256,558**	**41,059**	**17,224**
Solvent Utilization	Degreasing	660,589	281	313	7	121	107	0	4,512
	Graphic Arts	388,897	695	82	48	344	325	0	4,352
	Dry Cleaning	189,697	4	761	1	1	1	0	994
	Surface Coating	2,880,597	1,708	941	435	4,574	4,013	0	33,156
	Other Industrial	53,208	192	3,579	128	1,032	902	0	134
	Nonindustrial	2,100,382	11	57	0	0	0	0	18,591
	Solvent Utilization Nec	0	0	0	0	0	0	0	0
		6,273,371	**2,891**	**5,733**	**619**	**6,072**	**5,349**	**0**	**61,740**
Storage & Transport	Bulk Terminals & Plants	242,870	542	3,793	199	42	41	0	420
	Petroleum & Petroleum Product Storage	133,010	347	3,996	436	269	261	0	1,181
	Petroleum & Petroleum Product Transport	130,677	296	111	85	22	20	0	2,198
	Service Stations: Stage I	341,042	0	0	0	0	0	0	6,669
	Service Stations: Stage Ii	405,501	21	41	1	1	1	0	7,765
	Service Stations: Breathing & Emptying	36,889	0	0	0	0	0	0	723
	Organic Chemical Storage	15,640	3,649	13,400	58	607	498	0	97
	Organic Chemical Transport	5,034	27	66	9	6	5	0	44
	Inorganic Chemical Storage	786	323	97	244	565	355	0	6
	Inorganic Chemical Transport	1	0	0	6	5	5	0	0
	Bulk Materials Storage	815	828	3,104	948	107,089	41,183	0	8
	Bulk Materials Transport	0	0	0	0	473	39	0	0
		1,312,265	**6,033**	**24,608**	**1,988**	**109,079**	**42,410**	**0**	**19,111**
Waste Disposal & Recycling	Incineration	54,762	53,615	442,939	35,168	70,816	50,581	0	335
	Open Burning	209,831	44,713	757,194	11,272	218,056	198,264	0	231
	Potw	51,934	78	59	64	1	1	94,835	32
	Industrial Waste Water	12,103	28	76	492	1	1	0	8
	Tsdf	45,131	7	1	0	45	45	0	24
	Landfills	22,298	650	1,864	122	440	431	0	24
	Other	37,416	729	602	486	508	474	0	27
		433,476	**99,820**	**1,202,735**	**47,604**	**289,868**	**249,798**	**94,835**	**681**

Table VII-1 (cont'd)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Highway Vehicles	Light-duty Gas Vehicles & Motorcycles	2,290,575	2,547,514	28,731,866	126,904	55,472	32,210	155,592	13,972
	Light-duty Gas Trucks	1,785,167	1,636,248	19,271,169	94,545	40,670	25,400	68,782	10,890
	Heavy-duty Gas Vehicles	275,537	378,989	3,765,872	11,291	8,910	5,875	2,567	2,011
	Diesels	267,248	2,343,215	1,492,850	82,787	177,358	157,199	4,286	6,334
		4,618,526	**6,905,967**	**53,261,756**	**315,527**	**282,410**	**220,683**	**231,227**	**33,207**
Off-highway	Non-road Gasoline	2,977,875	152,172	23,069,636	28,045	62,024	57,062	1,117	21,791
	Non-road Diesel	422,046	2,785,649	1,281,726	631,032	297,380	273,590	2,987	10,002
	Aircraft	177,449	166,710	949,313	11,305	39,549	27,891	3,370	4,206
	Marine Vessels	37,195	1,009,512	140,009	237,172	51,737	41,076	1,261	1,013
	Railroads	48,381	921,556	112,171	111,106	26,501	24,381	722	1,147
	Other	233	176,659	680,585	2,379	1,306	1,306	0	0
		3,663,180	**5,212,257**	**26,233,441**	**1,021,039**	**478,498**	**425,307**	**9,457**	**38,158**
Natural Sources	Biogenic	0	0	0	0	0	0	18,096	0
	Geogenic	13,792	0	0	0	5,315,831	797,375	0	0
		13,792	**0**	**0**	**0**	**5,315,831**	**797,375**	**18,096**	**0**
Miscellaneous	Agriculture & Forestry	74,718	0	0	0	4,840,839	945,892	3,644,518	0
	Other Combustion	760,753	341,425	9,462,207	12,833	1,004,273	875,124	0	519
	Catastrophic/accidental Releases	3,747	0	0	0	0	0	0	3
	Health Services	598	53	0	0	0	0	0	0
	Cooling Towers	2,261	3	35	0	1,316	1,316	0	44
	Fugitive Dust	505	1,310	349	273	19,002,359	3,378,021	7	2
		842,581	**342,790**	**9,462,591**	**13,106**	**24,848,787**	**5,200,353**	**3,644,525**	**568**
Total		**19,698,024**	**23,859,766**	**100,753,009**	**19,807,047**	**33,349,692**	**8,334,877**	**4,302,032**	**209,751**

Table VII-2
Annual National Tier 2 Emissions Summary for 2007 Base Case
(tons/year)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Fuel Comb. Elec. Util.	Coal	49,466	3,852,141	228,115	10,692,004	267,067	125,684	236	955
	Oil	466	14,937	2,249	61,868	1,862	1,644	360	13
	Gas	2,157	260,377	51,353	24,422	580	628	4,108	2
	Other	118	225	0	48	0	0	0	2
	Internal Combustion	33,992	126,477	155,800	1,258	27,346	27,348	0	20
		86,199	**4,254,157**	**437,517**	**10,779,599**	**296,855**	**155,304**	**4,704**	**991**
Fuel Comb. Industrial	Coal	5,757	566,765	100,903	1,810,915	68,760	22,388	19	111
	Oil	11,007	211,583	65,210	868,611	45,856	26,165	4,035	260
	Gas	71,595	1,389,654	380,586	546,217	48,066	46,883	13,628	69
	Other	54,889	131,625	328,088	156,036	79,436	63,071	0	2,068
	Internal Combustion	66,240	779,471	250,099	24,111	71,017	52,874	0	63
		209,488	**3,079,099**	**1,124,887**	**3,405,890**	**313,135**	**211,381**	**17,682**	**2,571**
Fuel Comb. Other	Commercial/institutional Coal	803	33,076	13,150	176,517	13,872	5,459	1	16
	Commercial/institutional Oil	2,869	92,494	17,132	359,761	11,114	4,688	2,048	68
	Commercial/institutional Gas	13,387	279,070	66,081	10,347	8,251	7,800	1,030	11
	Misc. Fuel Comb. (except Residential)	10,105	34,121	191,328	5,624	92,276	91,752	0	251
	Residential Wood	334,571	53,470	2,644,484	7,639	312,746	521,243	0	14,420
	Residential Other	38,855	800,939	253,698	146,008	18,090	15,124	4,538	403
		400,589	**1,293,170**	**3,185,873**	**705,897**	**456,348**	**646,066**	**7,617**	**15,168**
Chemical & Allied Product Mfg	Organic Chemical Mfg	123,914	22,833	148,896	10,133	33,940	13,278	0	212
	Inorganic Chemical Mfg	2,784	8,111	152,967	226,897	5,415	4,009	0	13
	Polymer & Resin Mfg	102,913	4,383	5,987	525	4,550	3,825	0	280
	Agricultural Chemical Mfg	5,467	84,021	18,939	5,040	11,800	8,952	211,562	20
	Paint, Varnish, Lacquer, Enamel Mfg	10,219	34	16	0	1,124	521	0	113
	Pharmaceutical Mfg	33,891	24	41	337	175	145	0	185
	Other Chemical Mfg	149,747	56,874	1,060,712	80,601	21,771	18,937	0	247
		428,935	**176,280**	**1,387,559**	**323,533**	**78,775**	**49,667**	**211,562**	**1,070**
Metals Processing	Non-ferrous Metals Processing	23,113	13,610	459,088	415,416	42,315	25,333	0	120
	Ferrous Metals Processing	43,292	87,496	1,909,376	139,604	158,011	96,517	5,635	146
	Metals Processing Nec	9,318	4,202	29,314	20,629	26,806	19,549	1	29
		75,723	**105,308**	**2,397,778**	**575,648**	**227,132**	**141,398**	**5,636**	**295**
Petroleum & Related Industries	Oil & Gas Production	222,300	61,346	30,183	75,746	1,762	1,442	0	326
	Petroleum Refineries & Related Industrie	108,358	53,144	357,578	299,110	22,714	14,807	48,293	206
	Asphalt Manufacturing	4,010	5,658	5,704	10,336	20,681	9,064	0	38
		334,668	**120,148**	**393,465**	**385,192**	**45,157**	**25,313**	**48,293**	**569**

Table VII-2 (cont'd)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Other Industrial Processes	Agriculture, Food, & Kindred Products	152,890	6,835	7,617	3,382	91,816	48,082	2,327	122
	Textiles, Leather, & Apparel Products	19,943	105	50	90	317	252	0	3,770
	Wood, Pulp & Paper, & Publishing Product	55,895	96,775	534,485	127,036	87,852	65,838	0	8,204
	Rubber & Miscellaneous Plastic Products	35,872	246	103	88	4,229	3,442	0	189
	Mineral Products	33,863	278,535	140,521	293,401	246,756	122,660	8	233
	Machinery Products	12,182	7,326	441	620	8,827	3,575	0	107
	Electronic Equipment	2,037	109	1,641	0	25	10	0	21
	Transportation Equipment	2,670	279	48	0	463	302	0	27
	Construction	7	0	0	0	0	0	0	0
	Miscellaneous Industrial Processes	66,970	11,074	4,711	4,739	27,794	19,376	47,412	664
		382,330	**401,283**	**689,615**	**429,355**	**468,079**	**263,537**	**49,747**	**13,337**
Solvent Utilization	Degreasing	554,991	361	435	9	142	126	0	3,776
	Graphic Arts	400,170	790	90	54	370	349	0	4,400
	Dry Cleaning	168,414	5	748	1	1	1	0	898
	Surface Coating	2,585,957	1,992	1,277	512	5,726	5,011	0	28,597
	Other Industrial	70,287	215	4,368	146	1,311	1,151	0	165
	Nonindustrial	1,972,164	14	64	0	0	0	0	18,587
	Solvent Utilization Nec	1	0	0	0	0	0	0	0
		5,196,993	**3,016**	**6,546**	**714**	**7,408**	**6,512**	**0**	**52,646**
Storage & Transport	Bulk Terminals & Plants	302,793	615	4,234	232	47	46	0	517
	Petroleum & Petroleum Product Storage	88,848	412	4,508	495	335	325	0	1,111
	Petroleum & Petroleum Product Transport	89,445	379	145	99	27	25	0	1,409
	Service Stations: Stage I	344,743	0	0	0	0	0	0	6,736
	Service Stations: Stage Ii	163,560	23	43	1	2	2	0	2,963
	Service Stations: Breathing & Emptying	44,806	0	0	0	0	0	0	878
	Organic Chemical Storage	15,445	4,100	15,618	67	725	600	0	106
	Organic Chemical Transport	1,866	32	78	10	7	6	0	16
	Inorganic Chemical Storage	907	381	116	265	645	410	0	7
	Inorganic Chemical Transport	1	0	0	8	6	6	0	0
	Bulk Materials Storage	952	992	3,195	1,115	131,120	50,278	0	10
	Bulk Materials Transport	0	0	0	0	571	46	0	0
		1,053,365	**6,933**	**27,937**	**2,292**	**133,483**	**51,744**	**0**	**13,753**
Waste Disposal & Recycling	Incineration	62,502	64,402	499,624	37,306	79,117	56,511	0	382
	Open Burning	235,691	50,315	855,513	12,567	241,110	219,232	0	259
	Potw	13,458	97	73	80	1	1	116,542	9
	Industrial Waste Water	14,455	33	87	570	1	1	0	9
	Tsdf	34,867	8	2	0	37	37	0	17
	Landfills	16,259	778	2,188	147	524	513	0	6
	Other	44,650	850	776	530	616	575	0	32
		421,881	**116,482**	**1,358,261**	**51,200**	**321,407**	**276,870**	**116,542**	**715**

Table VII-2 (cont'd)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Highway Vehicles	Light-duty Gas Vehicles & Motorcycles	811,767	1,217,617	15,787,781	81,563	45,093	25,070	138,753	4,952
	Light-duty Gas Trucks	1,292,069	2,044,448	26,440,855	139,055	63,123	37,148	165,233	7,882
	Heavy-duty Gas Vehicles	137,655	315,731	1,752,244	11,246	6,895	4,505	3,707	1,005
	Diesels	166,381	1,365,071	1,968,644	102,476	90,730	77,029	5,947	3,943
		2,407,871	**4,942,867**	**45,949,524**	**334,340**	**205,841**	**143,752**	**313,640**	**17,782**
Off-highway	Non-road Gasoline	2,385,906	202,507	21,321,170	29,360	57,769	53,147	1,146	17,471
	Non-road Diesel	292,683	2,544,957	705,989	859,312	351,748	323,608	4,034	6,936
	Aircraft	206,593	197,046	1,205,430	13,333	41,011	28,922	4,437	4,896
	Marine Vessels	40,876	1,122,006	154,867	236,692	56,348	45,316	1,269	1,150
	Railroads	44,940	770,467	119,300	111,106	26,934	24,779	722	1,065
	Other	312	242,133	910,574	3,318	1,747	1,747	0	0
		2,971,310	**5,079,116**	**24,417,330**	**1,253,121**	**535,557**	**477,519**	**11,607**	**31,518**
Natural Sources	Biogenic	0	0	0	0	0	0	17,825	0
	Geogenic	13,792	0	0	0	5,315,831	797,375	0	0
		13,792	**0**	**0**	**0**	**5,315,831**	**797,375**	**17,825**	**0**
Miscellaneous	Agriculture & Forestry	76,331	0	0	0	4,391,049	855,155	3,758,963	0
	Other Combustion	880,591	429,433	12,505,780	16,120	1,342,164	1,160,905	0	585
	Catastrophic/accidental Releases	3,747	0	0	0	0	0	0	3
	Health Services	693	64	0	0	0	0	0	0
	Cooling Towers	2,617	3	41	0	1,673	1,673	0	51
	Fugitive Dust	605	1,793	540	323	19,095,797	3,504,184	8	2
		964,585	**431,294**	**12,506,361**	**16,443**	**24,830,683**	**5,521,916**	**3,758,971**	**641**
Total		**15,502,720**	**20,009,513**	**93,883,088**	**18,263,234**	**33,235,832**	**8,768,480**	**4,563,825**	**154,834**

Table VII-3
Annual National Tier 2 Emissions Reductions for 2007 Control Case Versus 2007 Base Case
(tons/year)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Highway Vehicles	Light-duty Gas Vehicles & Motorcycles	49,573	333,662	0	72,282	7,896	7,608	0	302
	Light-duty Gas Trucks	112,936	477,165	0	123,184	14,798	13,996	0	689
	Heavy-duty Gas Vehicles	5,418	32,063	0	10,008	962	766	0	40
	Diesels	1,403	3,066	0	0	140	129	0	33
		169,330	**845,958**	**0**	**205,474**	**23,797**	**22,499**	**0**	**1,064**
Off-highway	Non-road Gasoline	**0**	**0**	**0**	**26,776**	**0**	**0**	**0**	**0**
Total		**169,330**	**845,958**	**0**	**232,250**	**23,797**	**22,499**	**0**	**1,064**

Table VII-4
Annual National Tier 2 Emissions Summary for 2030 Base Case
(tons/year)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Fuel Comb. Elec. Util.	Coal	50,001	3,811,985	229,190	8,996,964	236,526	111,520	239	965
	Gas	1,538	95,524	36,635	33,482	380	418	2,930	1
	Other	123	233	0	49	0	0	0	2
	Internal Combustion	84,652	99,558	387,987	0	68,183	68,183	0	51
		136,314	**4,007,300**	**653,812**	**9,030,495**	**305,088**	**180,122**	**3,169**	**1,018**
Fuel Comb. Industrial	Coal	5,644	553,184	97,633	1,764,832	66,884	21,904	18	109
	Oil	11,510	206,036	60,816	800,242	42,103	24,094	3,784	259
	Gas	76,103	1,501,691	421,643	571,828	52,826	51,629	13,735	74
	Other	57,510	135,509	334,364	156,984	79,937	63,159	0	2,156
	Internal Combustion	65,787	764,639	252,516	25,408	76,442	56,912	0	66
		216,553	**3,161,059**	**1,166,972**	**3,319,294**	**318,192**	**217,698**	**17,537**	**2,664**
Fuel Comb. Other	Commercial/institutional Coal	1,010	41,254	16,358	220,329	17,109	6,746	2	19
	Commercial/institutional Oil	3,289	106,763	19,010	422,771	13,512	5,634	2,305	79
	Commercial/institutional Gas	16,713	360,409	84,876	13,846	10,783	10,196	1,378	14
	Misc. Fuel Comb. (except Residential)	13,807	46,624	255,510	7,349	130,704	130,009	0	351
	Residential Wood	399,041	63,774	2,102,707	9,111	248,673	621,683	0	17,199
	Residential Other	36,677	775,105	226,813	113,185	16,758	14,535	4,003	309
		470,536	**1,393,929**	**2,705,273**	**786,591**	**437,538**	**788,803**	**7,688**	**17,972**
Chemical & Allied Product Mfg	Organic Chemical Mfg	165,080	30,340	198,550	14,013	45,199	17,763	0	282
	Inorganic Chemical Mfg	3,546	10,725	199,025	293,947	7,240	5,370	0	16
	Polymer & Resin Mfg	131,737	5,874	8,272	708	6,253	5,255	0	362
	Agricultural Chemical Mfg	7,260	104,679	23,724	6,457	15,651	11,852	278,537	26
	Paint, Varnish, Lacquer, Enamel Mfg	13,799	45	21	0	1,529	706	0	153
	Pharmaceutical Mfg	45,836	29	53	464	234	193	0	251
	Other Chemical Mfg	179,190	65,912	1,349,528	97,478	27,284	23,737	0	291
		546,448	**217,605**	**1,779,173**	**413,066**	**103,389**	**64,878**	**278,537**	**1,382**
Metals Processing	Non-ferrous Metals Processing	27,815	16,815	535,921	523,940	54,660	31,682	0	139
	Ferrous Metals Processing	48,423	99,990	2,019,772	134,672	180,515	108,250	5,443	166
	Metals Processing Nec	12,214	5,252	35,769	26,376	36,086	25,910	1	37
		88,453	**122,058**	**2,591,462**	**684,988**	**271,261**	**165,841**	**5,444**	**341**
Petroleum & Related Industries	Oil & Gas Production	226,820	61,073	24,684	59,081	1,830	1,444	0	332
	Petroleum Refineries & Related Industrie	142,060	68,292	472,579	380,664	29,433	19,199	62,236	272
	Asphalt Manufacturing	5,201	7,490	7,397	13,933	27,441	12,165	0	49
		374,081	**136,855**	**504,661**	**453,679**	**58,703**	**32,808**	**62,236**	**653**

Table VII-4 (cont'd)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Other Industrial Processes	Agriculture, Food, & Kindred Products	195,063	8,953	10,026	4,402	119,613	63,476	3,070	161
	Textiles, Leather, & Apparel Products	24,955	128	65	117	383	312	0	4,669
	Wood, Pulp & Paper, & Publishing Product	68,483	108,049	598,360	144,521	99,872	74,904	0	10,543
	Rubber & Miscellaneous Plastic Products	54,027	363	154	135	6,380	5,189	0	287
	Mineral Products	39,504	302,230	169,525	325,076	304,211	150,300	10	280
	Machinery Products	15,219	8,797	580	774	12,330	4,872	0	134
	Electronic Equipment	2,472	150	1,771	0	33	13	0	26
	Transportation Equipment	3,417	391	67	0	624	427	0	34
	Construction	10	0	0	0	0	0	0	0
	Miscellaneous Industrial Processes	88,240	13,898	6,193	6,396	37,121	25,878	63,612	874
		491,391	**442,959**	**786,741**	**481,420**	**580,566**	**325,369**	**66,692**	**17,008**
Solvent Utilization	Degreasing	737,249	503	612	12	181	161	0	5,020
	Graphic Arts	483,978	996	107	69	433	409	0	5,303
	Dry Cleaning	201,323	6	825	1	2	1	0	1,077
	Surface Coating	3,367,770	2,568	1,900	667	7,869	6,866	0	37,653
	Other Industrial	104,916	265	6,041	187	1,845	1,625	0	227
	Nonindustrial	2,357,301	18	78	0	0	0	0	22,696
	Solvent Utilization Nec	1	0	0	0	0	0	0	0
		7,252,537	**4,356**	**9,563**	**936**	**10,330**	**9,061**	**0**	**71,976**
Storage & Transport	Bulk Terminals & Plants	422,796	792	5,156	303	59	58	0	718
	Petroleum & Petroleum Product Storage	121,579	565	5,532	632	453	440	0	1,598
	Petroleum & Petroleum Product Transport	122,067	533	207	132	38	35	0	1,928
	Service Stations: Stage I	490,300	0	0	0	0	0	0	9,580
	Service Stations: Stage II	75,648	27	51	2	2	2	0	1,129
	Service Stations: Breathing & Emptying	64,008	0	0	0	0	0	0	1,255
	Organic Chemical Storage	20,500	5,324	20,943	88	989	827	0	141
	Organic Chemical Transport	2,512	42	104	14	9	8	0	22
	Inorganic Chemical Storage	1,197	510	156	335	836	537	0	9
	Inorganic Chemical Transport	1	0	0	11	7	7	0	0
	Bulk Materials Storage	1,228	1,325	3,503	1,478	173,825	66,428	0	13
	Bulk Materials Transport	0	0	0	0	764	60	0	0
		1,321,835	**9,117**	**35,652**	**2,995**	**176,981**	**68,402**	**0**	**16,392**
Waste Disposal & Recycling	Incineration	77,655	85,238	610,838	49,724	97,219	69,557	0	475
	Open Burning	287,908	61,579	1,053,398	15,192	289,148	262,920	0	317
	Potw	17,874	132	99	108	2	2	157,299	12
	Industrial Waste Water	18,963	42	116	759	2	2	0	12
	Tsdf	45,783	9	2	0	47	47	0	23
	Landfills	19,938	1,027	2,830	195	674	659	0	9
	Other	60,986	1,109	1,101	626	830	773	0	44
		529,107	**149,135**	**1,668,384**	**66,605**	**387,922**	**333,959**	**157,299**	**891**

Table VII-4 (cont'd)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Highway Vehicles	Light-duty Gas Vehicles & Motorcycles	658,676	1,027,359	14,846,328	86,170	47,506	26,586	146,254	4,018
	Light-duty Gas Trucks	1,530,709	2,729,378	41,031,476	233,853	105,453	61,919	280,790	9,337
	Heavy-duty Gas Vehicles	137,817	165,747	2,606,528	18,491	9,317	6,077	6,288	1,006
	Diesels	214,176	1,257,907	3,330,173	165,546	109,672	90,505	10,067	5,076
		2,541,378	**5,180,391**	**61,814,505**	**504,059**	**271,948**	**185,086**	**443,399**	**19,437**
Off-highway	Non-road Gasoline	2,431,268	253,298	27,046,403	37,170	63,457	58,380	1,453	17,811
	Non-road Diesel	238,827	2,216,927	958,712	1,329,471	537,884	494,853	6,203	5,660
	Aircraft	262,203	262,324	1,502,265	16,813	43,399	30,606	6,483	6,214
	Marine Vessels	50,460	1,399,117	191,995	261,779	68,959	56,195	1,413	1,421
	Railroads	31,510	532,405	119,300	111,106	18,094	16,647	722	747
	Other	487	375,300	1,417,563	5,126	2,721	2,721	0	0
		3,014,755	**5,039,371**	**31,236,237**	**1,761,464**	**734,514**	**659,403**	**16,272**	**31,853**
Natural Sources	Biogenic	0	0	0	0	0	0	17,734	0
	Geogenic	13,792	0	0	0	5,315,831	797,375	0	0
		13,792	**0**	**0**	**0**	**5,315,831**	**797,375**	**17,734**	**0**
Miscellaneous	Agriculture & Forestry	82,451	0	0	0	4,299,032	835,081	4,221,903	0
	Other Combustion	924,081	456,210	13,415,600	17,121	1,447,234	1,250,849	0	613
	Catastrophic/accidental Releases	3,747	0	0	0	0	0	0	3
	Health Services	914	87	0	0	0	0	0	0
	Cooling Towers	3,491	4	54	0	2,276	2,276	0	67
	Fugitive Dust	783	2,601	857	432	20,304,598	3,905,997	11	3
		1,015,466	**458,902**	**13,416,511**	**17,552**	**26,053,141**	**5,994,203**	**4,221,914**	**685**
Total		**18,012,646**	**20,323,037**	**118,368,948**	**17,523,146**	**35,025,406**	**9,823,009**	**5,297,923**	**182,273**

Table VII-5
Annual National Tier 2 Emissions Reductions for 2030 Control Case Versus 2030 Base Case
(tons/year)

Tier 1	Tier 2	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Highway Vehicles	Light-duty Gas Vehicles & Motorcycles	68,506	729,306	0	76,336	8,095	7,986	0	418
	Light-duty Gas Trucks	361,351	2,016,298	0	207,162	25,177	23,869	0	2,204
	Heavy-duty Gas Vehicles	3,033	34,244	0	16,455	1,162	990	0	22
	Diesels	2,337	9,572	0	0	844	774	0	55
		435,227	**2,789,421**	**0**	**299,952**	**35,277**	**33,620**	**0**	**2,700**
Off-highway	Non-road Gasoline	**0**	**0**	**0**	**33,900**	**0**	**0**	**0**	**0**
Total		**435,227**	**2,789,421**	**0**	**333,852**	**35,277**	**33,620**	**0**	**2,700**

Table VII-6
Annual State-Level Emissions Summary by Major Source Category for 1996 Base Year
(tons/year)

Stationary Area Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	172,641	70,670	610,294	72,214	554,206	149,752	55,572	2,002
Alaska	51,874	10,373	373,481	420	162,060	53,938	244	142
Arizona	137,913	70,564	544,139	4,000	243,308	87,754	24,752	1,428
Arkansas	137,439	41,678	279,124	19,956	477,229	108,879	108,207	2,052
California	809,030	103,777	973,064	5,633	1,410,501	366,608	137,992	7,016
Colorado	129,481	57,293	160,778	4,687	436,884	96,162	60,103	1,557
Connecticut	73,947	10,079	28,547	16,561	82,980	22,285	5,424	798
Delaware	23,250	7,253	19,790	10,577	32,142	10,008	3,131	213
DC	10,074	2,091	1,049	6,184	3,725	1,177	927	79
Florida	368,025	54,571	603,375	43,143	705,861	187,593	65,841	4,215
Georgia	271,932	74,462	1,238,966	6,636	934,549	264,186	65,099	2,737
Hawaii	115	21	784	1	29,237	6,086	4,228	0
Idaho	69,949	26,547	403,288	8,078	602,800	128,547	38,065	875
Illinois	309,822	131,029	97,054	38,089	906,326	189,240	153,633	3,462
Indiana	248,056	47,574	172,354	136,381	540,606	121,030	82,788	3,014
Iowa	137,826	29,694	83,323	13,666	566,585	112,668	301,653	1,506
Kansas	278,573	100,437	1,229,426	4,618	1,596,305	354,105	197,412	1,387
Kentucky	150,796	72,285	198,773	55,699	296,201	76,932	97,783	2,195
Louisiana	145,915	106,121	216,196	93,371	399,025	111,733	63,758	1,421
Maine	57,852	11,277	78,294	14,443	137,786	89,566	5,130	1,029
Maryland	119,073	45,129	112,371	102,128	178,585	41,667	16,396	1,416
Massachusetts	149,146	27,799	58,285	68,533	250,701	54,623	8,609	1,626
Michigan	314,904	130,099	210,660	35,215	463,092	111,536	52,206	3,942
Minnesota	196,247	24,432	154,423	6,128	836,607	161,813	120,441	2,388
Mississippi	159,566	54,000	462,332	76,926	440,307	115,657	60,385	1,832
Missouri	212,927	17,153	327,581	32,216	1,225,984	231,872	175,430	2,911
Montana	66,260	32,182	426,226	1,985	1,076,115	203,030	103,839	767
Nebraska	101,189	19,117	204,540	10,089	600,155	118,861	203,351	836
Nevada	43,276	13,590	115,016	3,749	129,127	33,670	9,768	445
New Hampshire	38,764	13,505	44,166	89,424	47,228	14,555	2,724	682
New Jersey	167,902	87,291	55,877	48,358	236,871	58,336	8,476	1,474
New Mexico	61,318	31,179	158,628	8,087	4,921,546	757,645	41,076	778
New York	379,210	121,221	184,858	145,601	640,829	155,707	51,808	4,707
North Carolina	378,471	35,916	834,559	32,723	418,784	134,767	90,127	4,651
North Dakota	61,687	19,502	51,552	56,930	373,059	73,562	93,545	469
Ohio	318,186	84,052	181,243	62,713	556,400	134,810	66,223	3,645
Oklahoma	176,071	92,858	502,840	25,948	986,845	202,493	145,287	1,487
Oregon	152,786	41,332	951,385	19,145	756,831	208,060	44,768	2,245
Pennsylvania	291,788	125,954	249,557	98,956	450,973	117,114	79,642	3,501
Rhode Island	21,606	3,422	7,375	5,198	22,271	5,904	1,145	226
South Carolina	161,723	24,746	349,732	14,340	354,160	91,051	23,998	1,937
South Dakota	41,911	7,214	50,166	19,315	299,774	60,622	120,645	416
Tennessee	265,913	50,565	335,314	44,360	348,353	100,632	99,167	3,718
Texas	662,080	42,587	417,591	27,190	3,145,445	579,567	419,206	5,708
Utah	71,492	29,633	197,963	11,548	232,473	57,449	26,626	718
Vermont	25,743	14,423	37,106	13,744	74,116	16,885	12,501	506
Virginia	228,361	63,253	349,415	144,082	340,436	98,172	49,898	3,368
Washington	198,092	27,407	473,519	3,717	379,951	117,505	49,849	2,906
West Virginia	66,806	22,774	103,108	11,535	113,873	31,368	16,579	1,129
Wisconsin	203,596	61,396	169,907	44,040	346,430	87,905	94,287	2,923
Wyoming	20,999	65,318	54,255	15,929	703,059	111,827	53,062	279
Total	**8,941,607**	**2,456,844**	**15,143,644**	**1,834,210**	**31,068,698**	**6,826,918**	**3,812,805**	**100,764**

Table VII-6 (cont'd)

Nonroad Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	35,122	79,306	316,040	13,558	7,843	6,802	103	464
Alaska	256,760	26,944	767,732	7,002	10,791	9,927	82	1,905
Arizona	45,177	77,115	484,783	13,796	11,483	8,082	166	579
Arkansas	21,718	58,163	202,234	9,962	4,904	4,500	77	294
California	252,903	508,078	2,482,179	88,383	37,999	34,367	1,122	2,844
Colorado	59,169	95,084	476,496	15,182	8,814	7,635	211	677
Connecticut	21,802	26,072	247,390	5,659	2,971	2,728	71	235
Delaware	6,538	19,402	58,248	2,254	1,419	1,381	15	75
DC	2,362	6,455	17,895	804	406	364	49	42
Florida	174,091	213,525	1,606,012	46,916	26,591	22,989	523	1,981
Georgia	57,362	111,626	581,187	23,467	11,985	10,666	283	738
Hawaii	24,178	9,137	116,324	2,261	1,609	1,480	15	198
Idaho	38,524	33,212	199,976	5,720	3,877	3,058	63	366
Illinois	135,049	233,427	996,162	36,067	17,724	16,384	426	1,535
Indiana	60,345	147,576	544,461	26,196	11,232	10,291	197	714
Iowa	48,561	108,908	319,524	19,426	8,661	7,936	135	578
Kansas	27,961	132,761	251,704	22,653	9,090	8,204	141	435
Kentucky	27,697	99,096	265,844	25,135	7,326	7,009	148	405
Louisiana	61,930	232,759	367,034	38,470	13,980	12,929	312	771
Maine	82,604	15,757	366,604	3,342	2,911	2,645	49	647
Maryland	43,231	56,597	410,321	18,008	6,527	5,447	162	486
Massachusetts	54,767	84,116	495,649	14,764	8,038	7,451	213	593
Michigan	374,253	116,377	1,589,408	23,796	18,204	16,675	302	3,015
Minnesota	237,993	116,623	941,151	21,631	12,878	11,827	220	1,993
Mississippi	23,265	62,669	189,716	10,266	5,571	4,968	73	322
Missouri	41,713	104,166	449,540	17,718	8,532	7,800	194	540
Montana	32,294	56,597	178,313	7,706	3,891	3,462	75	336
Nebraska	21,528	98,762	176,762	16,599	6,582	5,997	112	333
Nevada	20,486	45,847	165,015	8,199	5,483	4,475	98	290
New Hampshire	44,305	10,366	234,132	2,203	1,775	1,579	30	356
New Jersey	54,548	117,473	616,417	70,738	13,856	9,831	267	632
New Mexico	12,682	16,226	135,251	3,094	2,581	2,005	42	168
New York	169,903	132,104	1,340,024	27,350	15,544	14,037	372	1,607
North Carolina	71,726	112,045	676,718	22,603	13,910	12,250	215	833
North Dakota	19,281	81,870	103,566	13,940	6,061	5,485	91	304
Ohio	111,405	177,489	1,006,591	35,492	21,439	16,917	300	1,293
Oklahoma	27,081	65,622	255,983	11,681	5,849	5,160	98	359
Oregon	49,872	83,311	388,088	12,446	6,402	5,858	144	594
Pennsylvania	111,142	119,110	998,915	26,038	11,928	10,667	280	1,212
Rhode Island	6,299	8,430	64,658	4,316	1,065	822	17	67
South Carolina	32,436	51,374	315,350	10,786	5,547	4,985	84	373
South Dakota	19,130	52,199	126,640	9,192	4,250	3,851	63	253
Tennessee	42,349	174,095	417,890	28,387	10,576	10,460	202	606
Texas	159,729	565,081	1,646,601	85,700	39,276	33,277	825	1,985
Utah	41,569	40,519	230,715	7,252	4,516	3,959	82	407
Vermont	30,118	7,106	132,443	1,400	1,107	1,002	21	238
Virginia	59,355	113,413	573,813	22,263	12,961	11,135	183	710
Washington	78,193	118,570	584,360	25,264	11,521	9,960	236	840
West Virginia	10,614	67,276	93,111	36,375	6,251	4,347	60	178
Wisconsin	205,998	91,441	901,656	16,286	10,826	9,861	168	1,694
Wyoming	22,252	30,980	126,809	3,294	1,788	1,557	39	204
Total	**3,669,370**	**5,212,257**	**26,233,441**	**1,021,039**	**486,353**	**426,485**	**9,457**	**38,305**

Table VII-6 (cont'd)

EGU Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	976	218,406	8,168	585,095	9,243	4,329	15	18
Alaska	60	4,835	2,750	790	181	165	0	0
Arizona	650	74,618	5,359	120,363	9,061	4,168	24	9
Arkansas	563	50,571	4,449	95,427	1,639	1,128	60	9
California	2,006	21,664	16,058	2,049	1,582	1,566	492	9
Colorado	723	84,346	8,029	92,731	2,122	1,189	16	10
Connecticut	323	11,374	1,261	36,465	432	305	153	8
Delaware	137	15,719	974	42,160	536	297	42	3
DC	7	186	25	924	37	35	4	0
Florida	3,069	294,252	20,719	650,616	9,627	6,408	900	47
Georgia	888	163,752	7,360	474,825	7,637	3,580	16	17
Hawaii	301	7,341	927	19,536	233	206	147	8
Idaho	0	0	0	0	0	0	0	0
Illinois	1,815	292,574	12,256	738,727	6,121	3,416	75	30
Indiana	1,779	369,716	13,939	941,849	11,534	6,233	28	34
Iowa	573	80,976	5,185	158,556	3,303	1,898	11	11
Kansas	960	102,394	6,730	117,192	2,369	1,526	40	13
Kentucky	1,272	366,942	12,184	643,695	17,997	8,146	15	25
Louisiana	1,294	76,901	11,163	101,203	3,041	1,863	403	8
Maine	96	1,859	315	5,656	76	67	19	1
Maryland	461	106,784	3,617	252,253	2,704	1,324	49	9
Massachusetts	791	34,192	4,829	105,834	1,600	1,028	240	12
Michigan	1,352	184,548	13,707	379,297	6,493	3,896	40	23
Minnesota	645	90,797	4,981	87,323	4,480	2,182	13	12
Mississippi	408	46,113	3,537	110,409	1,024	600	121	5
Missouri	1,296	187,039	8,602	364,489	3,145	2,051	16	24
Montana	242	25,524	2,007	17,145	4,112	2,049	3	5
Nebraska	518	48,745	2,717	66,650	1,246	916	5	7
Nevada	453	60,454	2,960	53,232	4,754	2,135	47	6
New Hampshire	117	16,944	633	50,469	238	167	25	3
New Jersey	4,147	68,946	19,600	61,202	6,458	6,258	20	35
New Mexico	566	81,303	4,544	78,503	8,903	4,013	50	9
New York	1,766	77,032	8,019	245,334	3,226	2,199	530	24
North Carolina	909	250,850	7,148	429,292	11,422	5,201	11	15
North Dakota	822	106,578	9,582	177,617	3,590	2,088	9	16
Ohio	1,669	562,205	13,645	1,505,023	14,891	6,809	24	31
Oklahoma	1,048	88,848	10,120	106,600	2,390	1,686	196	12
Oregon	50	9,674	659	8,751	197	163	0	1
Pennsylvania	1,400	254,644	10,894	1,013,813	27,782	12,970	97	27
Rhode Island	12	150	37	0	0	0	0	0
South Carolina	405	110,636	3,138	201,595	8,542	3,600	5	7
South Dakota	77	17,585	366	14,801	51	36	1	1
Tennessee	1,037	262,012	6,944	539,465	32,410	17,298	10	15
Texas	6,916	413,281	82,598	665,534	21,319	15,165	1,645	62
Utah	439	72,475	3,529	32,039	3,797	1,667	8	8
Vermont	49	947	171	54	49	46	0	0
Virginia	546	103,884	3,629	192,902	4,379	2,233	21	7
Washington	166	22,188	1,407	78,391	1,874	1,285	2	3
West Virginia	1,039	296,473	8,245	658,189	9,427	4,702	15	20
Wisconsin	779	107,115	6,285	207,141	3,275	1,992	11	14
Wyoming	803	107,484	6,382	100,637	7,105	4,135	9	14
Total	**48,424**	**6,053,874**	**392,381**	**12,631,843**	**287,657**	**156,417**	**5,684**	**687**

Table VII-6 (cont'd)

Non-EGU Point Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	78,888	99,602	214,083	119,242	22,084	14,710	3,624	2,520
Alaska	1,474	11,819	4,101	2,692	2,664	777	0	2
Arizona	20,772	77,667	18,627	96,204	25,936	14,339	4	287
Arkansas	14,300	21,869	97,341	16,669	30,216	18,196	14,971	283
California	113,184	181,413	143,240	51,926	37,157	23,596	14,812	983
Colorado	37,930	51,676	22,535	14,291	18,243	9,111	238	245
Connecticut	9,968	13,778	5,243	12,272	3,541	1,799	59	97
Delaware	7,953	11,330	14,852	41,676	1,181	830	654	96
DC	246	807	252	2,297	104	73	10	3
Florida	25,122	44,916	54,118	79,166	16,436	10,660	7,344	341
Georgia	43,212	61,667	153,657	81,695	29,291	20,464	13,811	1,364
Hawaii	5,656	18,641	6,707	13,310	3,332	2,343	0	25
Idaho	482	6,292	4,522	23,957	12,976	8,035	2	16
Illinois	195,384	173,463	362,348	264,380	88,936	54,588	11,313	1,830
Indiana	85,889	119,883	270,912	216,505	74,683	41,287	7,593	1,340
Iowa	10,514	25,335	6,539	84,938	8,030	4,416	8,111	142
Kansas	37,623	110,214	66,688	37,037	37,015	15,387	12,553	358
Kentucky	119,850	32,236	91,680	42,173	12,971	7,403	1,152	813
Louisiana	103,266	263,303	616,301	181,120	27,560	21,121	62,394	1,392
Maine	17,899	28,019	139,122	67,746	11,427	7,681	133	2,276
Maryland	14,425	24,071	100,775	27,596	5,694	2,963	329	151
Massachusetts	17,658	16,328	5,500	22,593	3,098	1,871	90	218
Michigan	86,003	140,011	84,528	170,197	32,847	16,954	456	1,231
Minnesota	38,492	79,045	77,645	39,744	77,473	34,509	993	1,331
Mississippi	57,089	64,548	101,432	64,544	14,906	10,690	25,027	550
Missouri	58,898	27,326	98,526	118,147	46,240	17,355	21,868	478
Montana	7,558	16,713	43,468	33,701	10,228	6,629	402	188
Nebraska	33,076	20,288	12,394	7,588	19,191	9,615	14	198
Nevada	1,264	4,551	11,443	2,626	11,481	4,018	7	18
New Hampshire	6,810	3,146	33,587	4,822	1,876	1,355	24	79
New Jersey	90,246	47,346	20,131	72,660	11,099	7,686	511	961
New Mexico	12,436	71,362	22,018	101,192	7,992	6,170	34	155
New York	56,870	44,060	30,346	218,358	143,821	57,619	235	1,799
North Carolina	95,299	50,630	67,784	74,838	9,685	7,257	109	2,355
North Dakota	928	13,455	8,125	53,506	1,851	1,407	13	3
Ohio	78,180	86,182	663,207	365,651	40,785	27,593	2,641	911
Oklahoma	42,664	93,977	56,319	81,082	25,394	15,112	16,418	302
Oregon	16,130	16,330	75,342	6,461	11,187	8,276	15	608
Pennsylvania	103,288	191,251	612,666	139,579	61,115	34,663	5,881	1,233
Rhode Island	5,831	867	1,673	2,664	1,218	895	8	85
South Carolina	42,293	56,327	45,544	74,849	13,043	7,678	52	1,011
South Dakota	1,459	4,420	440	735	1,276	587	0	102
Tennessee	114,719	111,675	96,834	190,033	19,313	10,778	79	2,432
Texas	224,461	356,459	413,891	297,745	29,984	23,776	1,262	1,955
Utah	20,887	27,170	112,294	26,464	19,728	16,674	1,119	104
Vermont	2,157	820	1,526	1,965	895	724	3	52
Virginia	73,446	91,829	39,164	105,680	71,297	49,895	692	916
Washington	73,037	38,356	244,864	49,081	15,690	11,875	4,127	962
West Virginia	33,618	73,544	225,078	42,331	11,184	7,063	408	208
Wisconsin	60,011	57,627	54,110	104,183	14,810	10,330	848	1,690
Wyoming	21,251	47,178	68,268	54,520	26,394	15,537	417	92
Total	**2,420,097**	**3,230,824**	**5,721,788**	**4,004,429**	**1,224,575**	**704,373**	**242,860**	**36,788**

Table VII-6 (cont'd)

Mobile Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	110,859	152,013	1,329,978	6,749	6,356	5,014	4,764	789
Alaska	9,849	13,894	116,790	539	507	400	381	69
Arizona	70,950	115,280	706,631	5,308	4,766	3,717	3,896	516
Arkansas	55,039	88,840	659,269	3,780	3,730	2,976	2,558	399
California	478,662	643,983	4,232,792	34,007	28,403	21,766	26,160	3,332
Colorado	66,882	102,834	807,822	4,646	4,242	3,324	3,363	546
Connecticut	51,307	81,638	524,204	3,485	2,974	2,291	2,640	362
Delaware	13,952	22,812	140,346	977	936	741	714	103
DC	5,674	7,365	62,407	382	294	222	315	40
Florida	282,293	350,938	3,149,030	16,160	13,993	10,816	12,191	1,970
Georgia	184,198	257,947	2,202,147	11,469	10,486	8,218	8,293	1,305
Hawaii	21,616	21,254	211,184	1,000	867	672	752	148
Idaho	26,401	42,189	331,541	1,761	1,742	1,389	1,190	191
Illinois	167,459	263,617	1,992,378	11,976	9,894	7,618	9,055	1,195
Indiana	139,102	204,069	1,779,766	8,713	8,230	6,500	6,130	993
Iowa	57,074	89,083	764,792	3,629	3,555	2,830	2,473	409
Kansas	49,873	81,308	680,289	3,431	3,267	2,585	2,398	359
Kentucky	81,995	133,211	963,806	5,651	5,394	4,271	3,934	593
Louisiana	85,205	120,293	993,662	5,049	4,963	3,953	3,521	612
Maine	24,978	43,149	313,028	1,766	1,774	1,420	1,173	183
Maryland	60,227	110,659	674,846	5,674	4,542	3,474	4,323	446
Massachusetts	73,223	115,507	833,925	5,913	4,401	3,316	4,706	531
Michigan	173,456	242,082	2,294,363	11,427	9,938	7,694	8,407	1,242
Minnesota	89,439	142,101	1,012,438	5,799	5,407	4,258	4,124	636
Mississippi	62,912	96,042	737,738	4,160	4,121	3,288	2,806	456
Missouri	92,335	165,206	1,207,367	7,790	6,733	5,255	5,680	679
Montana	19,380	33,519	256,008	1,306	1,321	1,059	864	140
Nebraska	33,648	52,652	456,158	2,180	2,119	1,684	1,496	241
Nevada	31,145	40,120	303,914	1,806	1,630	1,273	1,320	245
New Hampshire	21,778	35,727	261,384	1,466	1,408	1,117	1,014	157
New Jersey	94,024	146,357	931,371	7,489	5,705	4,306	5,864	673
New Mexico	48,268	67,255	575,066	2,894	2,823	2,244	1,980	390
New York	196,680	291,318	2,268,027	14,517	11,365	8,682	11,120	1,405
North Carolina	117,457	198,400	1,457,750	10,150	8,409	6,513	7,313	865
North Dakota	15,349	23,891	201,986	931	939	753	617	110
Ohio	206,219	300,048	2,592,361	13,173	11,911	9,311	9,607	1,463
Oklahoma	78,954	116,938	994,954	5,143	4,801	3,780	3,657	565
Oregon	52,739	94,143	580,179	3,978	3,744	2,953	2,808	384
Pennsylvania	188,904	283,619	2,238,546	12,320	11,497	9,085	8,983	1,363
Rhode Island	14,430	19,517	155,332	859	700	533	672	100
South Carolina	84,012	125,503	992,640	5,351	5,221	4,153	3,660	602
South Dakota	16,478	28,091	219,655	1,085	1,103	885	714	119
Tennessee	116,661	176,270	1,434,455	7,582	7,020	5,517	5,427	832
Texas	339,230	500,559	3,605,022	22,971	21,842	17,256	17,337	2,447
Utah	44,939	57,610	577,384	2,493	2,249	1,757	1,822	347
Vermont	12,946	21,466	177,660	874	874	699	584	94
Virginia	118,537	201,346	1,424,149	9,164	8,589	6,778	6,626	875
Washington	94,381	144,260	1,051,684	6,229	5,511	4,288	4,618	667
West Virginia	34,463	59,368	443,882	2,430	2,434	1,948	1,621	251
Wisconsin	87,975	154,575	1,135,190	6,883	6,664	5,289	4,881	658
Wyoming	14,970	26,100	204,463	1,012	1,017	814	674	108
Total	**4,618,526**	**6,905,967**	**53,261,756**	**315,527**	**282,410**	**220,683**	**231,227**	**33,207**
Total for All Categories	**19,698,024**	**23,859,766**	**100,753,009**	**19,807,047**	**33,349,692**	**8,334,877**	**4,302,032**	**209,751**

Table VII-7
Annual State-Level Emissions Summary by Major Source Category for 2007 Base Case
(tons/year)

Stationary Area Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	154,758	75,221	612,230	69,142	543,757	154,916	57,956	1,417
Alaska	50,516	10,395	369,307	423	124,622	49,131	253	83
Arizona	123,322	65,393	381,869	3,982	214,633	76,737	26,276	1,194
Arkansas	136,594	61,600	701,021	20,406	505,089	149,756	109,140	1,389
California	778,366	118,467	1,090,328	5,880	1,369,407	392,830	144,070	5,666
Colorado	128,043	66,516	238,452	5,133	461,402	110,243	61,810	1,373
Connecticut	66,862	9,680	20,879	14,299	91,960	24,953	5,937	631
Delaware	21,633	7,182	19,620	9,547	36,122	11,344	3,123	164
DC	8,703	2,046	1,041	5,558	4,722	1,442	1,054	68
Florida	344,174	61,739	669,137	43,660	784,973	219,129	67,590	3,366
Georgia	268,987	83,279	1,336,465	7,178	934,305	281,405	69,155	2,260
Hawaii	115	21	784	1	32,751	7,046	4,402	0
Idaho	73,904	35,298	567,567	9,153	489,360	127,349	39,225	635
Illinois	281,380	128,926	84,632	36,946	879,045	187,751	161,833	2,855
Indiana	219,531	50,624	149,935	141,753	544,834	125,612	89,023	2,298
Iowa	127,360	31,288	73,603	13,526	537,553	108,425	327,137	1,237
Kansas	269,418	105,762	1,225,259	4,815	1,551,079	347,298	201,690	1,178
Kentucky	128,062	76,998	225,766	57,840	311,265	89,084	100,570	1,383
Louisiana	125,296	111,356	287,408	87,836	415,862	120,459	67,058	1,019
Maine	39,115	12,482	57,917	13,714	156,994	110,703	5,131	667
Maryland	102,489	44,941	110,223	94,881	192,250	46,506	16,560	1,063
Massachusetts	128,507	27,010	46,985	66,034	258,802	58,499	9,336	1,226
Michigan	256,528	125,152	158,755	33,211	479,191	118,238	53,689	2,648
Minnesota	179,102	26,549	155,234	6,060	820,345	164,240	121,860	1,865
Mississippi	140,740	60,515	535,232	76,502	427,291	123,526	61,483	1,313
Missouri	186,923	18,281	286,510	31,450	1,190,141	232,048	183,100	1,997
Montana	60,702	33,323	430,529	2,023	1,085,290	207,464	105,825	535
Nebraska	98,034	20,181	203,078	10,122	583,183	116,466	212,328	734
Nevada	42,976	15,587	129,252	4,212	119,790	35,336	10,358	393
New Hampshire	32,650	13,016	31,882	84,995	50,135	16,326	2,821	477
New Jersey	154,101	87,229	51,551	44,549	270,337	66,929	8,926	1,282
New Mexico	65,658	34,711	381,395	8,908	4,886,278	773,162	41,987	615
New York	332,942	100,738	125,108	127,345	639,097	159,359	53,176	3,853
North Carolina	355,550	43,473	887,238	34,668	475,259	164,699	99,200	3,518
North Dakota	60,906	22,160	51,580	64,836	355,150	70,127	92,155	441
Ohio	291,661	86,830	143,662	60,499	591,000	145,001	69,937	2,985
Oklahoma	158,764	100,525	483,613	27,890	943,041	207,643	148,901	1,098
Oregon	141,839	46,302	1,004,610	20,879	660,444	206,549	45,282	1,508
Pennsylvania	243,124	116,571	209,143	89,310	464,364	124,315	83,535	2,539
Rhode Island	18,684	3,139	5,329	4,624	24,538	6,578	1,296	171
South Carolina	157,591	29,186	387,508	15,618	356,638	100,352	25,113	1,478
South Dakota	42,618	9,272	71,334	23,856	294,249	61,703	124,420	355
Tennessee	239,242	59,985	388,023	49,046	380,383	121,670	103,144	2,581
Texas	639,722	54,145	575,027	28,851	3,140,395	604,229	429,571	5,016
Utah	69,933	34,481	217,552	12,840	250,872	64,242	27,148	633
Vermont	21,594	13,137	26,816	13,315	72,822	17,809	12,825	353
Virginia	205,583	74,219	563,300	143,968	397,342	134,972	51,513	2,268
Washington	188,492	44,844	852,144	4,446	412,732	161,177	51,854	1,985
West Virginia	50,149	22,494	74,153	11,190	116,014	33,285	17,078	647
Wisconsin	165,611	62,361	149,818	45,935	359,248	95,093	96,710	1,984
Wyoming	22,551	74,274	142,803	16,855	649,586	111,384	53,330	207
Total	**8,201,104**	**2,618,902**	**16,992,605**	**1,809,710**	**30,935,940**	**7,244,540**	**3,956,894**	**76,652**

Table VII-7 (cont'd)

Nonroad Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	25,757	74,808	289,002	16,433	8,726	7,455	128	374
Alaska	206,934	30,960	783,998	8,506	9,487	8,728	87	1,543
Arizona	32,324	74,059	440,326	18,383	14,399	9,753	212	470
Arkansas	16,033	54,664	192,033	12,890	5,331	4,828	101	228
California	173,264	520,674	2,251,210	108,873	44,874	40,193	1,333	2,172
Colorado	49,978	88,200	450,760	19,909	10,289	8,825	268	588
Connecticut	14,024	26,856	218,947	7,719	3,645	3,336	92	169
Delaware	4,344	20,618	51,329	2,835	1,621	1,458	14	56
DC	2,169	6,358	16,696	1,085	502	450	64	44
Florida	125,739	214,367	1,467,811	60,626	30,362	26,367	670	1,580
Georgia	37,963	106,543	509,598	30,247	13,997	12,520	364	541
Hawaii	18,127	9,223	104,668	3,071	1,763	1,622	19	149
Idaho	36,702	30,159	199,193	7,336	4,485	3,342	80	340
Illinois	110,752	223,632	917,835	47,402	19,961	18,214	548	1,286
Indiana	46,286	135,799	499,723	32,973	12,712	11,590	244	563
Iowa	40,660	100,299	300,316	25,560	9,075	8,299	175	458
Kansas	19,561	118,659	231,176	28,043	9,599	8,624	173	320
Kentucky	19,244	95,866	228,391	28,168	8,314	7,392	192	300
Louisiana	49,838	241,829	341,426	41,307	15,231	13,320	378	679
Maine	81,964	14,702	376,722	4,064	3,094	2,793	58	641
Maryland	30,851	60,137	372,682	20,558	7,502	6,533	179	411
Massachusetts	41,997	84,562	451,462	19,734	9,657	8,803	271	484
Michigan	340,910	115,806	1,540,999	31,452	19,555	17,870	373	2,701
Minnesota	234,835	110,162	949,219	28,356	13,811	12,658	276	1,914
Mississippi	18,329	60,946	183,558	12,478	6,099	5,293	93	273
Missouri	29,112	100,194	411,698	23,118	9,520	8,587	250	407
Montana	30,216	50,164	182,519	9,690	4,008	3,523	92	302
Nebraska	15,730	88,484	165,033	20,729	6,809	6,191	140	250
Nevada	15,338	43,539	147,447	10,843	6,722	5,381	125	244
New Hampshire	44,543	10,317	239,917	2,925	2,116	1,845	37	356
New Jersey	36,312	120,716	557,981	71,244	15,689	12,970	279	477
New Mexico	9,902	15,780	130,277	4,162	3,045	2,292	55	145
New York	142,227	133,222	1,266,704	36,644	18,352	16,588	474	1,358
North Carolina	50,383	107,440	609,492	29,743	15,960	14,075	275	623
North Dakota	14,299	73,823	99,514	18,036	6,021	5,426	117	223
Ohio	83,672	169,368	910,595	45,025	24,408	20,769	339	1,024
Oklahoma	19,488	60,234	233,832	14,909	6,327	5,581	124	278
Oregon	39,922	75,281	358,663	15,448	7,173	6,543	172	484
Pennsylvania	89,047	113,747	917,399	32,652	13,970	12,509	352	1,000
Rhode Island	4,147	8,902	58,873	4,645	1,232	1,057	20	50
South Carolina	22,428	49,033	283,257	13,937	6,467	5,813	106	280
South Dakota	15,590	47,789	125,279	12,224	4,274	3,854	82	194
Tennessee	30,764	176,305	370,065	33,550	12,155	11,113	228	486
Texas	109,457	563,722	1,462,473	103,432	44,361	37,694	999	1,504
Utah	36,866	38,071	220,455	9,559	5,297	4,595	103	360
Vermont	30,520	6,770	135,383	1,817	1,233	1,111	26	237
Virginia	42,023	108,280	517,123	27,390	14,525	12,529	223	558
Washington	63,490	114,291	548,213	30,170	12,941	11,178	285	696
West Virginia	8,044	70,335	83,455	37,925	6,855	5,427	60	154
Wisconsin	196,485	86,506	880,914	21,421	11,800	10,715	208	1,567
Wyoming	22,004	26,914	131,691	3,874	1,927	1,647	44	199
Total	**2,980,597**	**5,079,116**	**24,417,330**	**1,253,121**	**547,275**	**479,277**	**11,607**	**31,738**

Table VII-7 (cont'd)

EGU Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	956	123,773	7,720	497,526	7,557	3,569	8	17.1661
Alaska	0	0	0	0	0	0	0	0
Arizona	983	83,071	6,244	48,358	6,417	3,139	12	8.8088
Arkansas	809	55,873	5,444	92,570	1,614	1,222	48	6.8873
California	5,163	15,224	35,462	782	4,387	3,947	1,162	3.5174
Colorado	881	79,414	8,551	90,364	2,197	1,367	4	8.3426
Connecticut	398	10,831	2,388	20,325	1,310	729	108	3.7
Delaware	273	11,343	1,528	47,716	927	586	25	2.3658
DC	30	25	138	0	24	24	0	0.0181
Florida	5,951	257,989	35,116	374,315	32,358	13,714	414	21.7621
Georgia	1,003	131,065	8,205	563,433	9,882	4,345	9	18.5319
Hawaii	0	0	0	0	0	0	0	0
Idaho	227	2,572	1,043	17	183	183	0	0.1365
Illinois	1,481	165,666	9,830	655,557	6,022	3,277	25	27.9855
Indiana	1,478	201,004	11,361	690,130	9,778	4,833	13	28.375
Iowa	692	85,638	5,033	161,640	3,127	1,859	4	9.1668
Kansas	1,172	93,709	7,072	70,628	2,163	1,560	38	9.6463
Kentucky	1,228	185,846	11,432	396,248	15,998	7,242	10	23.3947
Louisiana	2,260	63,285	8,383	110,125	2,234	1,719	247	27.9348
Maine	435	4,383	2,282	4,040	453	433	37	0.8042
Maryland	1,138	65,026	6,947	215,822	3,215	1,809	54	6.7221
Massachusetts	1,233	34,663	7,172	125,265	2,857	1,822	243	8.9702
Michigan	2,209	119,093	14,066	357,578	5,567	3,511	77	17.4252
Minnesota	868	105,434	7,464	95,600	3,006	1,651	6	11.1101
Mississippi	903	52,495	5,831	73,173	1,881	1,280	104	3.8016
Missouri	1,100	114,217	7,605	303,142	2,694	1,736	9	21.0719
Montana	260	36,778	1,969	15,961	2,057	1,042	2	4.0153
Nebraska	472	57,850	3,219	90,345	1,136	824	10	5.8129
Nevada	983	45,760	5,432	55,916	5,192	2,607	2	5.1965
New Hampshire	933	9,669	4,404	41,414	903	849	21	2.7862
New Jersey	1,542	32,457	7,804	68,372	3,176	1,869	29	3.9971
New Mexico	433	76,751	3,416	48,154	1,604	757	12	6.9165
New York	3,146	66,297	16,848	188,380	5,107	3,458	123	7.5619
North Carolina	1,611	140,056	11,022	535,645	18,478	7,762	11	18.9539
North Dakota	6,858	80,775	8,190	178,005	3,899	2,009	6	129.9705
Ohio	1,504	230,064	12,517	1,084,789	12,047	5,530	14	28.7223
Oklahoma	1,334	92,361	9,473	123,376	2,240	1,753	178	8.7749
Oregon	835	13,662	4,007	15,196	807	753	0	1.3832
Pennsylvania	1,964	206,444	13,692	827,042	22,866	10,644	88	31.8636
Rhode Island	317	2,630	1,452	3	255	255	0	0.1901
South Carolina	845	59,330	5,510	179,148	11,502	4,969	4	8.6433
South Dakota	838	13,269	1,222	42,291	566	201	3	13.7563
Tennessee	710	102,268	5,506	346,687	26,845	12,164	6	13.6939
Texas	22,219	415,854	63,226	723,382	21,064	15,881	1,465	347.2931
Utah	400	71,884	3,265	36,561	3,564	1,393	4	7.347
Vermont	236	556	1,114	410	186	186	0	0.2179
Virginia	1,438	67,723	8,645	194,475	7,044	3,166	41	9.2072
Washington	2,008	28,556	9,718	108,529	3,356	2,772	7	3.4859
West Virginia	1,199	184,864	9,440	628,642	8,817	4,275	10	22.2746
Wisconsin	723	67,004	5,852	201,686	2,470	1,499	5	11.9964
Wyoming	519	89,655	4,259	50,835	5,821	3,131	5	9.6499
Total	**86,199**	**4,254,157**	**437,517**	**10,779,599**	**296,855**	**155,304**	**4,704**	**992**

Table VII-7 (cont'd)

Non-EGU Point Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	45,409	78,463	225,541	114,732	23,316	15,491	4,048	1,842
Alaska	2,036	11,582	3,034	2,496	2,664	767	0	2
Arizona	13,839	111,147	24,076	121,328	35,866	19,700	5	340
Arkansas	11,589	23,030	107,641	16,795	34,163	20,096	16,678	151
California	76,521	185,526	153,789	52,755	39,929	25,364	15,538	681
Colorado	33,790	48,859	21,411	15,421	22,734	11,365	301	180
Connecticut	8,414	13,694	6,117	11,361	3,759	1,879	52	73
Delaware	5,290	7,955	15,559	38,071	1,168	820	677	72
DC	235	698	246	1,975	100	73	9	3
Florida	20,186	46,398	58,140	81,085	17,360	11,257	7,658	340
Georgia	33,413	56,496	170,951	86,060	32,558	22,741	16,690	984
Hawaii	5,705	19,988	5,777	13,492	3,475	2,445	0	22
Idaho	343	6,461	4,408	25,403	12,922	8,180	2	14
Illinois	169,184	146,638	378,372	267,331	97,783	59,429	12,699	1,413
Indiana	70,018	103,549	294,045	218,434	81,228	45,030	8,536	899
Iowa	5,805	25,487	7,282	81,877	8,516	4,712	8,884	79
Kansas	21,090	117,336	69,665	40,083	36,003	17,429	13,819	234
Kentucky	121,550	29,062	105,992	43,491	15,025	8,527	1,305	814
Louisiana	69,608	270,222	704,310	204,577	29,581	22,649	73,010	968
Maine	11,846	27,190	157,649	63,482	11,522	7,736	121	1,115
Maryland	11,944	17,801	91,383	24,629	5,379	2,779	268	110
Massachusetts	15,213	17,298	5,997	20,918	3,098	1,861	81	179
Michigan	58,553	129,758	92,335	193,189	34,627	17,688	493	686
Minnesota	28,353	82,902	95,919	40,090	95,649	42,272	1,262	1,029
Mississippi	50,412	71,294	113,250	71,765	16,102	11,627	28,891	413
Missouri	53,809	24,551	107,864	128,899	52,773	19,701	25,786	321
Montana	4,983	19,283	49,714	38,021	13,471	8,522	486	140
Nebraska	30,796	21,982	14,154	7,608	23,295	11,424	14	173
Nevada	1,644	5,384	12,451	3,272	14,833	5,184	8	23
New Hampshire	2,858	3,215	35,848	4,475	2,004	1,431	21	48
New Jersey	73,167	43,506	21,333	67,341	10,417	7,241	460	687
New Mexico	9,164	68,513	21,508	107,958	8,581	6,567	36	147
New York	49,235	37,297	31,396	186,420	59,007	36,404	199	1,751
North Carolina	78,305	46,677	82,835	78,821	10,588	8,010	103	1,727
North Dakota	752	12,303	7,850	48,241	2,007	1,529	11	3
Ohio	53,920	69,418	707,810	340,608	39,797	26,023	2,770	568
Oklahoma	24,561	90,043	57,987	89,440	29,316	17,313	19,101	174
Oregon	8,245	16,244	74,883	6,368	10,954	8,022	15	298
Pennsylvania	66,452	167,371	526,897	131,572	56,074	32,156	6,593	840
Rhode Island	3,144	837	1,778	2,337	1,213	883	7	38
South Carolina	42,203	52,148	55,804	80,771	14,417	8,619	55	1,109
South Dakota	2,067	4,322	413	673	1,347	602	1	126
Tennessee	92,006	84,917	109,365	202,850	21,272	11,975	80	2,501
Texas	155,294	376,822	461,672	314,113	34,102	27,136	1,394	1,302
Utah	14,740	30,183	120,805	29,585	22,439	18,875	1,320	70
Vermont	1,707	822	1,651	1,813	981	797	3	50
Virginia	59,032	77,781	41,729	104,731	78,051	54,587	744	712
Washington	20,761	43,404	255,550	52,287	16,570	12,403	4,905	282
West Virginia	27,161	61,100	229,678	38,712	11,286	7,141	378	151
Wisconsin	47,481	58,890	62,192	112,871	16,886	11,644	953	1,710
Wyoming	13,114	48,625	80,055	55,835	33,711	19,503	511	80
Total	**1,826,949**	**3,114,471**	**6,086,113**	**4,086,463**	**1,249,921**	**745,607**	**276,981**	**27,671**

Table VII-7 (cont'd)

Mobile Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	73,608	111,154	1,223,899	8,355	4,540	3,253	6,274	517
Alaska	3,718	9,767	81,859	701	381	272	527	28
Arizona	44,252	92,173	623,744	7,318	3,866	2,725	5,710	325
Arkansas	36,736	65,222	594,419	4,771	2,670	1,938	3,442	263
California	143,789	399,147	2,744,924	12,700	20,465	13,531	36,641	1,156
Colorado	36,884	81,237	684,340	6,242	3,334	2,365	4,804	324
Connecticut	14,714	45,585	281,547	2,269	2,204	1,522	3,480	118
Delaware	6,649	16,730	138,978	682	678	480	973	50
DC	1,832	4,342	39,774	250	235	154	439	14
Florida	201,916	298,613	3,581,680	22,246	11,508	8,034	17,810	1,394
Georgia	90,570	190,920	1,636,410	15,269	8,153	5,785	11,751	667
Hawaii	20,090	16,664	280,773	1,278	663	464	1,020	133
Idaho	15,940	33,055	326,651	2,324	1,300	944	1,675	116
Illinois	74,403	175,020	1,572,435	10,666	7,360	5,050	11,936	559
Indiana	75,409	145,448	1,569,770	10,253	5,833	4,179	8,020	545
Iowa	31,780	62,540	661,105	4,400	2,449	1,773	3,197	229
Kansas	30,201	59,674	605,194	4,308	2,358	1,694	3,207	217
Kentucky	45,734	96,381	891,270	5,947	3,808	2,735	5,160	334
Louisiana	55,818	90,723	912,482	6,234	3,304	2,358	4,634	391
Maine	12,916	31,327	314,868	2,210	1,252	914	1,565	97
Maryland	23,226	66,295	464,290	4,331	3,466	2,343	5,865	191
Massachusetts	25,526	67,720	556,151	3,860	3,472	2,315	6,214	204
Michigan	93,817	173,979	2,126,222	13,776	6,979	4,885	10,695	675
Minnesota	49,323	108,892	951,239	7,349	3,972	2,836	5,567	355
Mississippi	42,378	69,322	664,533	5,131	2,874	2,088	3,691	302
Missouri	50,014	116,245	1,020,379	9,875	4,686	3,231	7,556	377
Montana	10,497	24,703	236,358	1,694	962	703	1,194	78
Nebraska	19,397	38,350	411,142	2,719	1,506	1,088	1,990	140
Nevada	18,177	37,966	302,300	2,642	1,399	988	2,055	153
New Hampshire	10,261	24,981	234,452	1,239	1,012	725	1,359	77
New Jersey	31,903	85,439	619,562	4,871	4,322	2,875	7,708	257
New Mexico	30,405	54,665	557,491	3,891	2,159	1,561	2,839	255
New York	74,680	173,945	1,696,015	13,117	8,255	5,609	13,953	576
North Carolina	79,033	149,686	1,496,176	13,490	6,509	4,504	10,208	587
North Dakota	7,754	16,524	170,028	1,128	639	466	798	57
Ohio	98,905	206,284	2,024,666	15,926	8,457	5,986	12,348	720
Oklahoma	50,925	87,814	949,461	6,443	3,483	2,488	4,876	361
Oregon	25,507	67,875	507,875	5,226	2,840	2,032	3,928	195
Pennsylvania	89,687	203,080	1,824,703	13,310	7,664	5,365	11,605	661
Rhode Island	5,424	11,840	101,943	536	521	355	874	40
South Carolina	58,326	94,664	940,153	6,916	3,842	2,780	5,038	412
South Dakota	8,827	20,366	189,357	1,391	792	579	978	65
Tennessee	76,726	136,959	1,445,733	9,746	5,246	3,737	7,420	542
Texas	189,333	385,217	3,091,767	23,845	14,749	10,121	24,086	1,368
Utah	25,872	50,394	536,268	3,479	1,845	1,304	2,703	212
Vermont	6,632	17,154	142,662	1,125	634	461	802	50
Virginia	62,575	139,818	1,188,720	8,879	5,962	4,176	8,990	468
Washington	57,869	120,412	1,251,586	8,384	4,398	3,093	6,608	411
West Virginia	20,070	40,811	372,334	2,911	1,645	1,199	2,070	146
Wisconsin	40,189	107,183	934,337	7,421	4,474	3,163	6,462	312
Wyoming	7,659	18,561	175,499	1,264	715	522	896	57
Total	**2,407,871**	**4,942,867**	**45,949,524**	**334,340**	**205,841**	**143,752**	**313,640**	**17,782**
Total for All Categories	**15,502,720**	**20,009,513**	**93,883,088**	**18,263,234**	**33,235,832**	**8,768,480**	**4,563,826**	**154,834**

Table VII-8
Annual State-Level Emissions Reductions by Major Source Category for 2007 Control Case Versus 2007 Base Case
(tons/year)

Mobile Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	4,505	21,320	0	5,517	593	563	0	28
Alaska	386	1,926	0	463	50	47	0	2
Arizona	3,244	18,970	0	5,019	538	506	0	20
Arkansas	2,304	12,065	0	3,027	329	313	0	14
California	0	0	0	0	0	0	0	0
Colorado	3,181	16,462	0	4,221	455	429	0	20
Connecticut	920	6,645	0	1,005	205	190	0	6
Delaware	440	2,465	0	281	57	53	0	3
DC	111	639	0	126	25	23	0	1
Florida	14,826	63,422	0	15,652	1,673	1,573	0	93
Georgia	7,045	37,501	0	10,327	1,112	1,050	0	44
Hawaii	912	3,440	0	896	96	91	0	6
Idaho	1,361	6,269	0	1,473	159	151	0	8
Illinois	5,706	30,397	0	6,165	856	803	0	36
Indiana	5,877	27,362	0	6,592	733	694	0	37
Iowa	2,521	11,730	0	2,812	304	289	0	16
Kansas	2,313	11,394	0	2,820	305	289	0	14
Kentucky	3,300	17,085	0	3,522	429	406	0	21
Louisiana	3,584	17,771	0	4,071	436	414	0	22
Maine	1,187	5,735	0	1,377	149	142	0	7
Maryland	1,418	9,398	0	2,122	369	345	0	9
Massachusetts	1,653	9,629	0	1,791	357	332	0	11
Michigan	8,038	32,694	0	9,396	1,005	957	0	50
Minnesota	4,992	22,363	0	4,893	529	501	0	31
Mississippi	2,530	12,781	0	3,248	351	334	0	16
Missouri	4,082	22,063	0	6,634	699	673	0	26
Montana	912	4,515	0	1,051	114	108	0	6
Nebraska	1,566	7,235	0	1,750	189	179	0	10
Nevada	1,628	8,086	0	1,806	194	183	0	10
New Hampshire	615	3,739	0	588	93	87	0	4
New Jersey	1,922	12,153	0	2,223	446	415	0	13
New Mexico	2,246	10,590	0	2,497	269	256	0	14
New York	5,454	29,301	0	7,974	1,045	983	0	35
North Carolina	6,007	28,447	0	8,965	955	906	0	38
North Dakota	669	3,047	0	702	76	72	0	4
Ohio	8,570	41,031	0	10,850	1,169	1,104	0	54
Oklahoma	3,573	17,004	0	4,287	462	438	0	22
Oregon	2,327	12,981	0	3,453	373	353	0	15
Pennsylvania	7,718	38,233	0	8,343	969	920	0	48
Rhode Island	361	1,855	0	252	51	47	0	2
South Carolina	3,524	17,715	0	4,432	480	455	0	22
South Dakota	747	3,734	0	861	94	89	0	5
Tennessee	6,160	27,607	0	6,522	703	664	0	38
Texas	11,035	66,890	0	14,524	1,849	1,749	0	70
Utah	2,391	10,698	0	2,375	256	241	0	15
Vermont	733	3,485	0	705	77	72	0	5
Virginia	3,723	22,108	0	5,021	677	643	0	24
Washington	5,708	25,510	0	5,804	626	590	0	36
West Virginia	1,426	7,467	0	1,821	198	188	0	9
Wisconsin	3,209	17,583	0	4,424	530	505	0	20
Wyoming	671	3,417	0	789	86	81	0	4
Total	**169,330**	**845,958**	**0**	**205,474**	**23,797**	**22,499**	**0**	**1,064**

Table VII-8 (cont'd)

Nonroad Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	0	0	0	264	0	0	0	0
Alaska	0	0	0	3,186	0	0	0	0
Arizona	0	0	0	338	0	0	0	0
Arkansas	0	0	0	164	0	0	0	0
California	0	0	0	2,219	0	0	0	0
Colorado	0	0	0	336	0	0	0	0
Connecticut	0	0	0	205	0	0	0	0
Delaware	0	0	0	60	0	0	0	0
DC	0	0	0	10	0	0	0	0
Florida	0	0	0	1,491	0	0	0	0
Georgia	0	0	0	440	0	0	0	0
Hawaii	0	0	0	239	0	0	0	0
Idaho	0	0	0	168	0	0	0	0
Illinois	0	0	0	791	0	0	0	0
Indiana	0	0	0	391	0	0	0	0
Iowa	0	0	0	241	0	0	0	0
Kansas	0	0	0	181	0	0	0	0
Kentucky	0	0	0	192	0	0	0	0
Louisiana	0	0	0	511	0	0	0	0
Maine	0	0	0	432	0	0	0	0
Maryland	0	0	0	378	0	0	0	0
Massachusetts	0	0	0	439	0	0	0	0
Michigan	0	0	0	2,579	0	0	0	0
Minnesota	0	0	0	982	0	0	0	0
Mississippi	0	0	0	168	0	0	0	0
Missouri	0	0	0	337	0	0	0	0
Montana	0	0	0	172	0	0	0	0
Nebraska	0	0	0	131	0	0	0	0
Nevada	0	0	0	131	0	0	0	0
New Hampshire	0	0	0	185	0	0	0	0
New Jersey	0	0	0	490	0	0	0	0
New Mexico	0	0	0	96	0	0	0	0
New York	0	0	0	1,211	0	0	0	0
North Carolina	0	0	0	631	0	0	0	0
North Dakota	0	0	0	127	0	0	0	0
Ohio	0	0	0	829	0	0	0	0
Oklahoma	0	0	0	212	0	0	0	0
Oregon	0	0	0	338	0	0	0	0
Pennsylvania	0	0	0	749	0	0	0	0
Rhode Island	0	0	0	63	0	0	0	0
South Carolina	0	0	0	276	0	0	0	0
South Dakota	0	0	0	127	0	0	0	0
Tennessee	0	0	0	298	0	0	0	0
Texas	0	0	0	1,288	0	0	0	0
Utah	0	0	0	252	0	0	0	0
Vermont	0	0	0	113	0	0	0	0
Virginia	0	0	0	506	0	0	0	0
Washington	0	0	0	569	0	0	0	0
West Virginia	0	0	0	63	0	0	0	0
Wisconsin	0	0	0	1,066	0	0	0	0
Wyoming	0	0	0	110	0	0	0	0
Total	**0**	**0**	**0**	**26,777**	**0**	**0**	**0**	**0**
Total for All Categories	**169,330**	**845,958**	**0**	**232,250**	**23,797**	**22,499**	**0**	**1,064**

Table VII-9
Annual State-Level Emissions Summary by Major Source Category for 2030 Base Case
(tons/year)

Stationary Area Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	189,680	83,310	620,022	90,320	556,982	166,642	65,101	1,754
Alaska	50,730	10,429	367,453	428	115,576	49,057	274	93
Arizona	162,741	71,152	422,823	4,261	243,023	90,639	29,518	1,583
Arkansas	170,929	68,321	777,592	18,727	521,432	164,518	125,047	1,727
California	954,564	136,019	1,151,861	6,292	1,531,341	460,661	161,173	7,158
Colorado	163,241	73,877	262,820	5,751	516,775	127,530	66,766	1,780
Connecticut	78,512	9,652	17,925	12,567	112,382	30,648	7,244	730
Delaware	26,282	7,421	22,011	9,016	44,212	13,957	3,699	196
DC	9,492	2,258	1,083	6,196	6,722	1,979	1,337	75
Florida	441,900	70,002	693,307	48,702	952,145	269,643	75,648	4,362
Georgia	337,227	91,490	1,376,792	8,361	970,147	307,140	80,376	2,956
Hawaii	115	21	784	1	40,779	8,911	4,774	0
Idaho	92,251	40,275	633,544	10,281	426,401	126,899	41,922	809
Illinois	338,666	132,653	81,233	40,562	910,858	200,659	193,439	3,414
Indiana	272,991	53,820	145,420	138,316	577,197	138,345	107,203	2,814
Iowa	153,255	33,202	74,077	13,931	536,975	111,210	392,287	1,480
Kansas	293,797	110,091	1,232,693	5,269	1,538,813	349,028	222,639	1,408
Kentucky	156,453	80,610	226,484	59,259	343,055	102,600	111,459	1,658
Louisiana	149,376	113,852	304,869	78,006	457,931	135,789	79,432	1,196
Maine	49,304	15,443	53,762	14,575	200,526	151,540	5,779	843
Maryland	122,858	46,214	114,276	87,921	221,789	54,935	19,147	1,279
Massachusetts	150,178	27,485	41,383	63,707	279,613	66,481	11,421	1,408
Michigan	303,672	132,112	134,975	32,611	516,716	132,462	62,203	3,062
Minnesota	223,400	29,531	153,656	6,348	819,397	170,901	142,614	2,302
Mississippi	172,869	62,995	556,966	67,872	421,770	130,026	68,104	1,621
Missouri	227,009	19,948	275,189	30,377	1,165,292	238,084	207,171	2,412
Montana	71,489	34,560	445,241	2,063	1,083,853	211,714	113,714	650
Nebraska	114,193	21,202	205,523	9,439	567,255	115,876	239,508	882
Nevada	57,291	17,745	135,649	4,894	132,217	40,680	11,619	529
New Hampshire	40,295	10,986	26,386	69,903	56,916	19,323	3,189	575
New Jersey	179,557	90,370	50,212	43,825	328,998	81,909	10,677	1,487
New Mexico	83,940	39,685	430,846	9,043	4,854,308	777,070	44,519	798
New York	380,332	79,791	95,921	105,764	668,758	172,220	59,518	4,509
North Carolina	444,232	49,186	922,451	35,719	580,341	204,516	121,895	4,512
North Dakota	70,275	23,572	52,286	67,076	348,863	69,763	102,388	513
Ohio	357,892	93,844	134,317	60,615	659,685	166,273	81,948	3,669
Oklahoma	180,994	105,682	478,482	27,862	933,397	211,907	164,995	1,321
Oregon	177,004	51,300	1,074,047	24,029	618,654	217,907	48,879	1,940
Pennsylvania	277,566	96,340	197,795	89,619	512,116	141,857	96,204	2,843
Rhode Island	22,356	3,004	4,504	4,253	29,613	8,017	1,620	200
South Carolina	200,891	32,376	399,165	17,229	368,062	110,702	28,894	1,885
South Dakota	53,001	10,610	77,566	27,080	302,759	64,978	138,305	444
Tennessee	301,889	69,080	397,947	54,176	436,137	144,653	115,180	3,219
Texas	779,080	62,856	603,195	30,925	3,266,441	650,522	468,683	6,312
Utah	93,397	39,249	227,060	14,426	276,092	72,953	28,865	852
Vermont	27,264	11,873	22,103	13,369	71,574	19,307	13,848	441
Virginia	258,117	79,602	616,646	142,996	468,853	164,800	57,314	2,777
Washington	242,300	52,210	943,637	5,070	458,568	189,269	57,623	2,545
West Virginia	58,684	23,275	64,195	11,543	117,692	36,582	18,560	752
Wisconsin	206,423	66,206	147,311	49,594	406,803	111,112	107,697	2,417
Wyoming	26,863	79,257	159,980	17,304	616,987	109,230	55,594	245
Total	**9,996,816**	**2,766,043**	**17,655,465**	**1,797,472**	**32,192,789**	**7,913,425**	**4,477,012**	**94,436**

Table VII-9 (cont'd)

Nonroad Sources

State	VOC	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	23,808	71,755	370,754	22,519	11,288	9,683	174	348
Alaska	160,731	40,458	900,199	11,880	9,265	8,524	104	1,217
Arizona	33,357	70,936	574,423	27,959	21,103	14,090	308	485
Arkansas	14,723	50,424	241,191	18,858	7,412	6,732	143	210
California	174,067	567,028	2,969,694	155,030	65,742	59,298	1,803	2,205
Colorado	54,251	78,254	572,091	29,735	14,673	12,530	385	620
Connecticut	13,868	28,822	292,126	12,025	5,570	5,103	137	173
Delaware	3,924	23,931	67,678	4,119	2,230	2,018	21	53
DC	2,724	6,448	22,920	1,668	763	686	94	58
Florida	121,601	223,502	1,916,896	89,152	42,163	37,059	968	1,576
Georgia	39,232	102,803	686,486	44,461	19,856	17,880	531	588
Hawaii	14,936	9,558	134,279	4,794	2,450	2,254	27	124
Idaho	40,689	26,221	244,372	10,683	6,384	4,564	112	364
Illinois	116,390	209,253	1,193,255	70,736	28,766	26,266	789	1,302
Indiana	46,979	118,047	637,367	46,935	17,656	16,089	343	540
Iowa	42,658	84,175	377,786	38,074	12,918	11,817	255	445
Kansas	17,308	94,496	291,660	39,048	12,688	11,383	240	269
Kentucky	20,972	96,965	316,775	35,765	11,262	9,975	266	350
Louisiana	45,841	275,015	428,710	49,784	18,989	16,706	469	685
Maine	91,249	14,553	453,427	5,612	3,824	3,434	77	718
Maryland	31,834	63,113	489,115	27,523	10,637	9,358	239	460
Massachusetts	43,288	86,400	587,340	30,100	14,342	13,093	395	510
Michigan	354,395	119,515	1,910,846	47,451	25,802	23,570	524	2,827
Minnesota	263,691	99,381	1,156,044	42,237	18,878	17,311	392	2,109
Mississippi	16,530	61,397	225,185	17,211	7,861	6,889	124	249
Missouri	28,885	95,050	537,023	34,429	13,728	12,408	363	405
Montana	31,969	39,450	218,496	13,747	5,146	4,488	125	303
Nebraska	14,388	70,374	207,397	29,154	9,052	8,229	196	217
Nevada	15,477	41,248	192,379	16,343	9,836	7,778	182	253
New Hampshire	51,019	10,702	290,695	4,415	2,919	2,526	52	399
New Jersey	36,085	131,830	743,443	81,772	21,321	18,115	379	482
New Mexico	9,980	15,052	162,972	6,379	4,309	3,196	80	145
New York	151,912	136,394	1,641,366	56,262	26,871	24,375	695	1,448
North Carolina	46,601	104,849	788,276	44,663	22,303	19,860	402	584
North Dakota	11,989	58,716	119,477	26,355	8,194	7,388	170	183
Ohio	82,916	162,574	1,175,436	65,183	33,612	28,878	491	993
Oklahoma	18,031	51,453	297,302	21,515	8,519	7,565	177	256
Oregon	39,254	68,076	454,360	21,856	9,832	8,984	229	458
Pennsylvania	94,633	112,902	1,180,024	46,750	19,788	17,739	505	1,043
Rhode Island	3,842	10,043	76,979	5,928	1,747	1,524	30	49
South Carolina	20,612	47,451	365,506	20,522	9,204	8,317	151	258
South Dakota	14,860	39,127	150,612	18,382	6,008	5,424	121	173
Tennessee	32,400	192,407	495,863	44,239	16,610	15,201	326	538
Texas	108,417	585,198	1,904,248	141,742	59,369	50,798	1,369	1,547
Utah	38,532	35,181	275,153	14,364	7,541	6,501	148	372
Vermont	35,137	6,625	164,699	2,691	1,659	1,492	37	271
Virginia	40,714	103,956	671,420	38,587	19,004	16,621	312	555
Washington	64,464	115,283	699,079	41,538	17,626	15,257	391	701
West Virginia	8,496	81,758	110,026	44,157	8,546	6,862	77	172
Wisconsin	216,224	80,719	1,096,358	32,067	16,009	14,527	289	1,716
Wyoming	24,189	20,502	157,030	5,062	2,267	1,893	55	209
Total	**3,030,070**	**5,039,371**	**31,236,237**	**1,761,464**	**753,543**	**662,257**	**16,272**	**32,216**

Table VII-9 (cont'd)

EGU Sources

State	VOC	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	848	108,876	6,824	377,078	6,918	3,283	7	15
Alaska	0	0	0	0	0	0	0	0
Arizona	1,662	80,569	9,271	48,358	7,206	3,797	4	9
Arkansas	1,848	54,219	9,936	92,547	2,573	2,145	21	8
California	5,823	4,466	37,661	307	4,970	4,510	1,080	4
Colorado	1,205	75,209	9,999	89,732	2,517	1,675	4	8
Connecticut	63	4,012	619	16,255	831	274	16	1
Delaware	190	13,326	1,936	43,802	700	346	45	2
DC	120	100	550	0	97	97	0	0
Florida	11,363	257,925	58,223	393,419	38,262	18,641	221	26
Georgia	1,024	135,003	8,415	580,098	10,231	4,541	10	19
Hawaii	0	0	0	0	0	0	0	0
Idaho	145	121	667	0	117	117	0	0
Illinois	1,703	165,875	10,486	471,316	5,177	2,876	40	28
Indiana	2,603	198,704	16,550	493,037	9,636	5,084	13	30
Iowa	1,386	84,300	7,905	156,141	3,567	2,423	4	9
Kansas	2,759	95,144	14,080	69,158	3,585	2,929	13	11
Kentucky	1,854	192,565	15,101	361,353	7,345	3,602	10	24
Louisiana	4,008	50,832	14,916	110,125	3,775	3,227	101	29
Maine	266	1,829	1,718	2,910	193	194	34	1
Maryland	2,691	68,576	14,084	214,765	4,736	3,172	49	8
Massachusetts	728	20,824	6,457	71,577	1,725	951	262	3
Michigan	3,237	107,420	19,506	331,760	6,613	4,462	173	17
Minnesota	1,737	97,621	9,348	83,797	3,729	2,399	4	10
Mississippi	8,719	51,046	41,003	72,973	8,248	7,621	38	9
Missouri	1,233	122,768	8,322	316,229	3,094	2,009	9	23
Montana	593	36,125	3,494	15,741	2,511	1,402	2	4
Nebraska	1,028	56,464	5,686	88,182	1,650	1,320	5	6
Nevada	989	43,057	5,461	55,916	5,401	2,701	2	5
New Hampshire	828	12,062	4,882	42,807	721	673	63	3
New Jersey	944	48,684	7,372	111,599	2,522	1,164	48	8
New Mexico	787	76,549	4,985	48,154	2,036	1,109	7	7
New York	3,281	37,367	18,887	119,586	4,699	3,307	298	6
North Carolina	4,946	134,139	26,158	486,416	21,041	10,374	11	20
North Dakota	7,517	85,271	10,689	191,939	4,451	2,433	6	135
Ohio	2,913	220,716	18,662	812,848	12,848	6,464	16	30
Oklahoma	2,550	80,524	13,929	123,376	3,393	2,860	67	9
Oregon	879	10,194	4,205	15,191	858	799	0	1
Pennsylvania	2,269	204,243	16,796	641,292	20,594	9,454	92	32
Rhode Island	128	1,070	589	0	103	103	0	0
South Carolina	3,697	67,226	18,745	192,406	15,056	7,746	4	11
South Dakota	1,289	16,752	2,466	2,758	766	393	1	18
Tennessee	548	81,873	4,150	206,747	6,886	3,142	5	11
Texas	31,846	325,154	95,832	476,465	28,462	23,446	342	353
Utah	770	69,707	4,907	31,973	2,819	1,313	3	7
Vermont	205	1,325	1,068	2,398	152	152	0	0
Virginia	3,830	62,184	19,375	182,595	9,142	5,160	17	10
Washington	2,310	24,951	11,047	108,515	3,618	3,028	1	4
West Virginia	2,126	167,878	13,447	438,888	9,476	5,014	10	22
Wisconsin	1,867	63,341	11,131	190,128	3,540	2,532	5	12
Wyoming	960	89,111	6,271	47,838	6,497	3,658	5	10
Total	**136,314**	**4,007,300**	**653,812**	**9,030,495**	**305,088**	**180,122**	**3,169**	**1,018**

Table VII-9 (cont'd)

Non-EGU Point Sources

State	VOC	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	54,557	83,739	258,607	114,994	26,765	17,534	5,133	2,239
Alaska	3,128	11,299	3,263	2,269	2,670	748	0	3
Arizona	19,752	129,110	29,418	141,292	51,389	27,834	7	516
Arkansas	14,700	23,790	126,057	16,939	40,977	23,020	21,168	186
California	95,984	200,569	176,757	61,202	49,328	30,823	18,693	860
Colorado	43,416	44,676	19,845	17,690	30,028	14,969	429	242
Connecticut	10,346	16,193	7,678	11,918	4,436	2,182	49	88
Delaware	6,542	8,281	19,217	38,781	1,307	931	805	88
DC	261	795	283	2,110	114	84	9	3
Florida	24,725	48,142	62,032	89,593	19,227	12,307	9,267	380
Georgia	43,311	61,812	193,523	90,599	38,081	26,401	22,954	1,218
Hawaii	7,195	23,141	5,754	15,091	4,129	2,863	0	26
Idaho	345	6,664	4,267	29,103	13,501	8,745	2	14
Illinois	211,627	161,369	421,528	305,609	120,230	72,256	16,226	1,780
Indiana	89,622	107,404	343,934	235,955	98,975	54,342	10,695	1,247
Iowa	7,303	26,916	8,522	81,054	10,121	5,617	11,176	94
Kansas	26,854	124,384	79,828	48,607	45,049	22,565	17,542	303
Kentucky	156,976	33,305	135,607	51,356	18,913	10,689	1,697	1,139
Louisiana	84,683	287,733	894,096	255,404	33,742	25,659	96,406	1,171
Maine	14,266	26,691	200,719	57,459	12,078	8,014	102	1,251
Maryland	15,159	18,379	87,004	24,939	5,816	2,940	217	135
Massachusetts	18,261	20,283	7,132	20,314	3,507	2,081	74	213
Michigan	77,765	145,672	106,695	231,864	40,790	20,232	576	922
Minnesota	38,479	87,752	133,615	43,175	127,312	55,989	1,825	1,386
Mississippi	67,005	83,030	136,309	84,269	17,714	12,759	37,464	521
Missouri	69,878	26,558	128,830	154,228	67,955	25,139	34,671	414
Montana	5,912	22,575	61,090	48,394	19,011	11,914	654	148
Nebraska	35,098	24,474	16,559	7,957	30,475	14,670	14	234
Nevada	2,475	6,882	15,040	4,476	20,581	7,170	9	35
New Hampshire	3,553	3,447	38,758	4,234	2,300	1,618	19	57
New Jersey	89,318	47,164	24,632	67,194	10,604	7,369	395	830
New Mexico	8,918	62,354	20,428	123,543	9,881	7,361	41	134
New York	56,905	38,294	33,761	176,997	61,689	38,122	183	2,020
North Carolina	104,576	49,583	104,991	83,544	12,115	9,309	96	2,167
North Dakota	745	11,113	7,762	42,315	2,137	1,586	8	3
Ohio	69,621	75,551	819,376	331,527	45,384	29,489	3,254	739
Oklahoma	27,246	87,240	61,905	103,282	35,961	20,954	24,773	194
Oregon	9,637	16,369	76,308	6,257	11,297	8,098	15	311
Pennsylvania	79,293	161,770	461,115	130,403	57,026	32,600	8,403	989
Rhode Island	3,938	807	1,947	2,222	1,227	875	7	48
South Carolina	57,004	56,865	68,966	85,060	16,799	10,287	56	1,473
South Dakota	3,364	4,601	433	740	1,636	736	1	179
Tennessee	118,169	88,472	135,263	206,137	25,409	14,536	82	3,386
Texas	198,662	416,567	560,622	354,518	42,428	33,557	1,403	1,738
Utah	17,940	34,686	137,244	34,468	27,663	23,006	1,665	94
Vermont	2,165	818	1,681	1,632	1,084	880	2	63
Virginia	73,539	84,195	46,391	110,284	86,276	60,103	866	912
Washington	28,429	52,532	284,799	60,718	18,657	13,674	6,670	357
West Virginia	30,663	61,773	264,736	39,799	12,464	7,897	355	165
Wisconsin	63,409	64,884	72,586	122,099	21,111	14,331	1,230	2,350
Wyoming	15,350	49,228	102,014	56,044	44,667	25,256	684	97
Total	**2,308,067**	**3,329,932**	**7,008,929**	**4,429,655**	**1,502,037**	**882,118**	**358,070**	**35,165**

Table VII-9 (cont'd)

Mobile Sources

State	VOC	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	81,076	120,033	1,687,147	12,364	5,718	3,959	8,751	580
Alaska	3,801	10,597	103,864	1,038	480	332	734	30
Arizona	48,785	107,504	836,304	11,775	5,333	3,653	8,676	372
Arkansas	40,933	70,302	825,365	7,159	3,377	2,369	4,861	300
California	125,565	217,347	2,965,654	20,551	26,769	16,913	52,863	1,125
Colorado	40,971	93,845	935,986	9,803	4,473	3,081	7,116	383
Connecticut	16,649	49,853	315,409	3,421	2,821	1,887	4,854	137
Delaware	6,562	17,416	199,190	1,047	850	575	1,381	52
DC	1,888	4,657	56,907	392	331	215	640	16
Florida	229,380	359,432	5,537,518	36,336	16,256	11,030	27,499	1,626
Georgia	101,623	216,821	2,114,108	23,829	10,875	7,483	17,318	771
Hawaii	23,037	18,588	395,746	1,922	864	588	1,450	153
Idaho	16,938	36,764	467,569	3,567	1,679	1,177	2,419	128
Illinois	78,014	189,391	1,890,882	15,636	9,726	6,559	16,359	605
Indiana	78,294	155,208	2,099,201	14,992	7,229	5,009	11,010	583
Iowa	32,236	64,792	877,703	6,292	2,955	2,067	4,305	239
Kansas	31,288	63,628	825,472	6,317	2,936	2,040	4,435	232
Kentucky	46,554	101,097	1,215,233	8,743	4,716	3,268	7,092	351
Louisiana	57,292	94,218	1,220,958	9,029	4,196	2,917	6,321	411
Maine	12,847	33,939	433,924	3,308	1,570	1,107	2,200	102
Maryland	27,412	74,920	619,486	6,602	4,923	3,314	8,277	229
Massachusetts	25,588	69,590	760,380	5,807	4,834	3,202	8,624	215
Michigan	95,071	186,188	2,856,762	19,451	8,883	6,095	14,208	703
Minnesota	48,651	118,152	1,313,409	10,822	4,980	3,445	7,736	364
Mississippi	46,044	72,565	898,327	7,471	3,523	2,470	5,058	335
Missouri	54,529	128,239	1,342,083	14,575	6,719	4,638	10,480	423
Montana	10,830	26,612	326,451	2,545	1,211	854	1,685	83
Nebraska	19,846	40,519	556,575	3,952	1,849	1,290	2,725	148
Nevada	20,346	47,938	485,259	4,483	2,033	1,394	3,296	185
New Hampshire	9,858	26,311	322,420	1,881	1,278	884	1,907	78
New Jersey	38,348	100,106	723,806	7,242	6,001	3,989	10,540	310
New Mexico	34,001	62,912	828,802	6,150	2,879	2,011	4,225	300
New York	70,231	184,465	2,054,184	18,150	10,592	7,137	17,900	567
North Carolina	87,079	173,494	2,185,770	21,008	9,719	6,733	14,919	669
North Dakota	7,605	16,874	223,804	1,600	760	535	1,065	57
Ohio	97,559	215,741	2,447,287	22,631	10,300	7,073	16,564	735
Oklahoma	54,379	94,772	1,303,935	9,493	4,376	3,024	6,779	394
Oregon	27,671	75,889	668,556	8,076	3,728	2,585	5,723	220
Pennsylvania	87,218	211,769	2,498,801	19,298	9,988	6,862	15,784	671
Rhode Island	4,910	12,434	99,426	801	668	440	1,211	38
South Carolina	66,671	104,375	1,328,441	10,564	4,959	3,468	7,242	480
South Dakota	9,248	22,031	264,925	2,102	1,001	707	1,391	71
Tennessee	80,502	150,679	2,032,507	14,622	6,715	4,635	10,498	585
Texas	212,501	396,459	4,141,909	36,075	20,630	13,981	34,339	1,570
Utah	28,035	60,625	816,180	5,639	2,563	1,760	4,135	246
Vermont	6,374	18,799	200,975	1,701	802	565	1,140	51
Virginia	67,868	148,431	1,661,752	13,546	8,138	5,577	12,845	524
Washington	59,892	141,300	1,844,930	13,211	5,960	4,074	9,841	443
West Virginia	20,923	42,046	491,258	4,181	1,985	1,398	2,792	157
Wisconsin	40,785	111,216	1,276,602	11,010	5,919	4,100	8,953	332
Wyoming	7,671	19,508	235,366	1,850	878	619	1,232	59
Total	**2,541,378**	**5,180,391**	**61,814,505**	**504,059**	**271,948**	**185,086**	**443,399**	**19,437**
Total for All Categories	**18,012,646**	**20,323,037**	**118,368,948**	**17,523,146**	**35,025,406**	**9,823,009**	**5,297,923**	**182,273**

Table VII-10
Annual State-Level Emissions Reductions by Major Source Category for 2030 Control Case Versus 2030 Base Case
(tons/year)

Mobile Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	10,623	64,474	0	7,931	862	822	0	66
Alaska	877	6,151	0	666	72	69	0	5
Arizona	9,462	63,591	0	7,866	844	809	0	59
Arkansas	5,411	36,955	0	4,403	486	465	0	34
California	0	0	0	0	0	0	0	0
Colorado	8,349	56,191	0	6,450	695	669	0	52
Connecticut	3,949	28,803	0	1,448	306	286	0	25
Delaware	1,718	10,313	0	412	87	81	0	11
DC	458	2,605	0	191	39	36	0	3
Florida	42,158	215,354	0	24,930	2,672	2,553	0	261
Georgia	18,142	123,381	0	15,696	1,696	1,627	0	113
Hawaii	2,573	10,484	0	1,313	143	136	0	16
Idaho	3,230	20,220	0	2,193	239	228	0	20
Illinois	16,280	107,741	0	8,706	1,247	1,176	0	101
Indiana	12,779	84,381	0	9,358	1,052	1,003	0	79
Iowa	5,118	34,695	0	3,902	428	408	0	32
Kansas	4,862	34,422	0	4,018	440	421	0	30
Kentucky	8,751	55,841	0	5,008	620	589	0	54
Louisiana	8,069	52,766	0	5,729	625	598	0	50
Maine	2,333	17,820	0	1,994	218	209	0	14
Maryland	5,723	39,852	0	3,087	559	524	0	36
Massachusetts	6,141	37,682	0	2,567	539	502	0	38
Michigan	17,582	101,757	0	12,873	1,402	1,335	0	109
Minnesota	11,864	71,140	0	7,010	761	731	0	73
Mississippi	5,891	37,887	0	4,584	503	480	0	37
Missouri	9,211	70,011	0	9,491	1,040	994	0	57
Montana	1,851	14,038	0	1,527	168	161	0	11
Nebraska	3,205	21,761	0	2,470	270	258	0	20
Nevada	4,575	30,100	0	2,988	321	308	0	28
New Hampshire	1,679	13,242	0	855	138	130	0	10
New Jersey	9,006	57,057	0	3,145	658	613	0	56
New Mexico	5,650	35,207	0	3,830	417	399	0	35
New York	13,792	99,812	0	10,675	1,436	1,352	0	86
North Carolina	15,752	93,052	0	13,518	1,474	1,411	0	98
North Dakota	1,296	8,954	0	966	106	101	0	8
Ohio	19,049	124,110	0	15,010	1,624	1,557	0	118
Oklahoma	7,885	51,642	0	6,142	670	639	0	49
Oregon	5,503	42,831	0	5,188	562	540	0	34
Pennsylvania	19,840	125,918	0	11,736	1,393	1,331	0	123
Rhode Island	1,368	7,481	0	361	76	70	0	8
South Carolina	8,603	55,276	0	6,563	720	688	0	53
South Dakota	1,549	11,635	0	1,260	139	133	0	10
Tennessee	15,389	87,528	0	9,515	1,031	987	0	95
Texas	31,836	220,188	0	21,295	2,813	2,666	0	198
Utah	6,330	37,667	0	3,747	405	389	0	39
Vermont	1,880	11,588	0	1,034	111	108	0	12
Virginia	10,723	76,455	0	7,382	1,024	971	0	67
Washington	14,841	88,269	0	8,917	962	925	0	92
West Virginia	3,017	22,015	0	2,529	279	267	0	19
Wisconsin	7,734	58,732	0	6,357	783	746	0	48
Wyoming	1,320	10,350	0	1,116	123	117	0	8
Total	**435,227**	**2,789,421**	**0**	**299,952**	**35,277**	**33,620**	**0**	**2,700**

Table VII-10 (cont'd)

Nonroad Sources

State	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	NH_3	SOA
Alabama	0	0	0	341	0	0	0	0
Alaska	0	0	0	3,724	0	0	0	0
Arizona	0	0	0	451	0	0	0	0
Arkansas	0	0	0	210	0	0	0	0
California	0	0	0	2,954	0	0	0	0
Colorado	0	0	0	441	0	0	0	0
Connecticut	0	0	0	271	0	0	0	0
Delaware	0	0	0	77	0	0	0	0
DC	0	0	0	14	0	0	0	0
Florida	0	0	0	1,941	0	0	0	0
Georgia	0	0	0	586	0	0	0	0
Hawaii	0	0	0	292	0	0	0	0
Idaho	0	0	0	211	0	0	0	0
Illinois	0	0	0	1,036	0	0	0	0
Indiana	0	0	0	509	0	0	0	0
Iowa	0	0	0	314	0	0	0	0
Kansas	0	0	0	239	0	0	0	0
Kentucky	0	0	0	250	0	0	0	0
Louisiana	0	0	0	628	0	0	0	0
Maine	0	0	0	520	0	0	0	0
Maryland	0	0	0	497	0	0	0	0
Massachusetts	0	0	0	564	0	0	0	0
Michigan	0	0	0	3,100	0	0	0	0
Minnesota	0	0	0	1,202	0	0	0	0
Mississippi	0	0	0	211	0	0	0	0
Missouri	0	0	0	446	0	0	0	0
Montana	0	0	0	212	0	0	0	0
Nebraska	0	0	0	173	0	0	0	0
Nevada	0	0	0	171	0	0	0	0
New Hampshire	0	0	0	229	0	0	0	0
New Jersey	0	0	0	660	0	0	0	0
New Mexico	0	0	0	126	0	0	0	0
New York	0	0	0	1,568	0	0	0	0
North Carolina	0	0	0	800	0	0	0	0
North Dakota	0	0	0	160	0	0	0	0
Ohio	0	0	0	1,069	0	0	0	0
Oklahoma	0	0	0	276	0	0	0	0
Oregon	0	0	0	432	0	0	0	0
Pennsylvania	0	0	0	978	0	0	0	0
Rhode Island	0	0	0	82	0	0	0	0
South Carolina	0	0	0	354	0	0	0	0
South Dakota	0	0	0	158	0	0	0	0
Tennessee	0	0	0	387	0	0	0	0
Texas	0	0	0	1,691	0	0	0	0
Utah	0	0	0	312	0	0	0	0
Vermont	0	0	0	139	0	0	0	0
Virginia	0	0	0	656	0	0	0	0
Washington	0	0	0	724	0	0	0	0
West Virginia	0	0	0	86	0	0	0	0
Wisconsin	0	0	0	1,293	0	0	0	0
Wyoming	0	0	0	134	0	0	0	0
Total	**0**	**0**	**0**	**33,900**	**0**	**0**	**0**	**0**
Total for All Categories	**435,227**	**2,789,421**	**0**	**333,852**	**35,277**	**33,620**	**0**	**2,700**

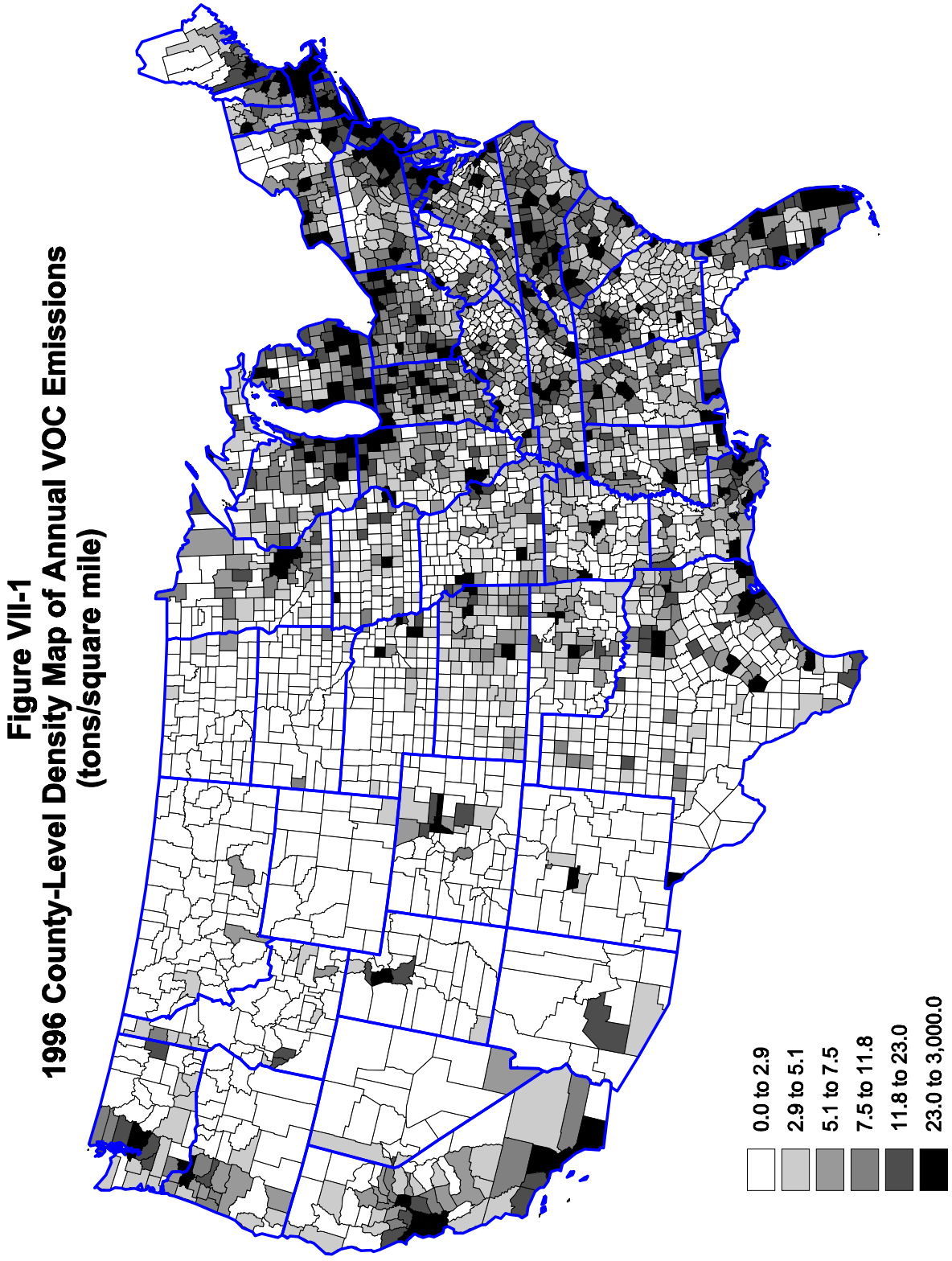


Figure VII-1
1996 County-Level Density Map of Annual VOC Emissions
(tons/square mile)
0.0 to 2.9
2.9 to 5.1
5.1 to 7.5
7.5 to 11.8
11.8 to 23.0
23.0 to 3,000.0

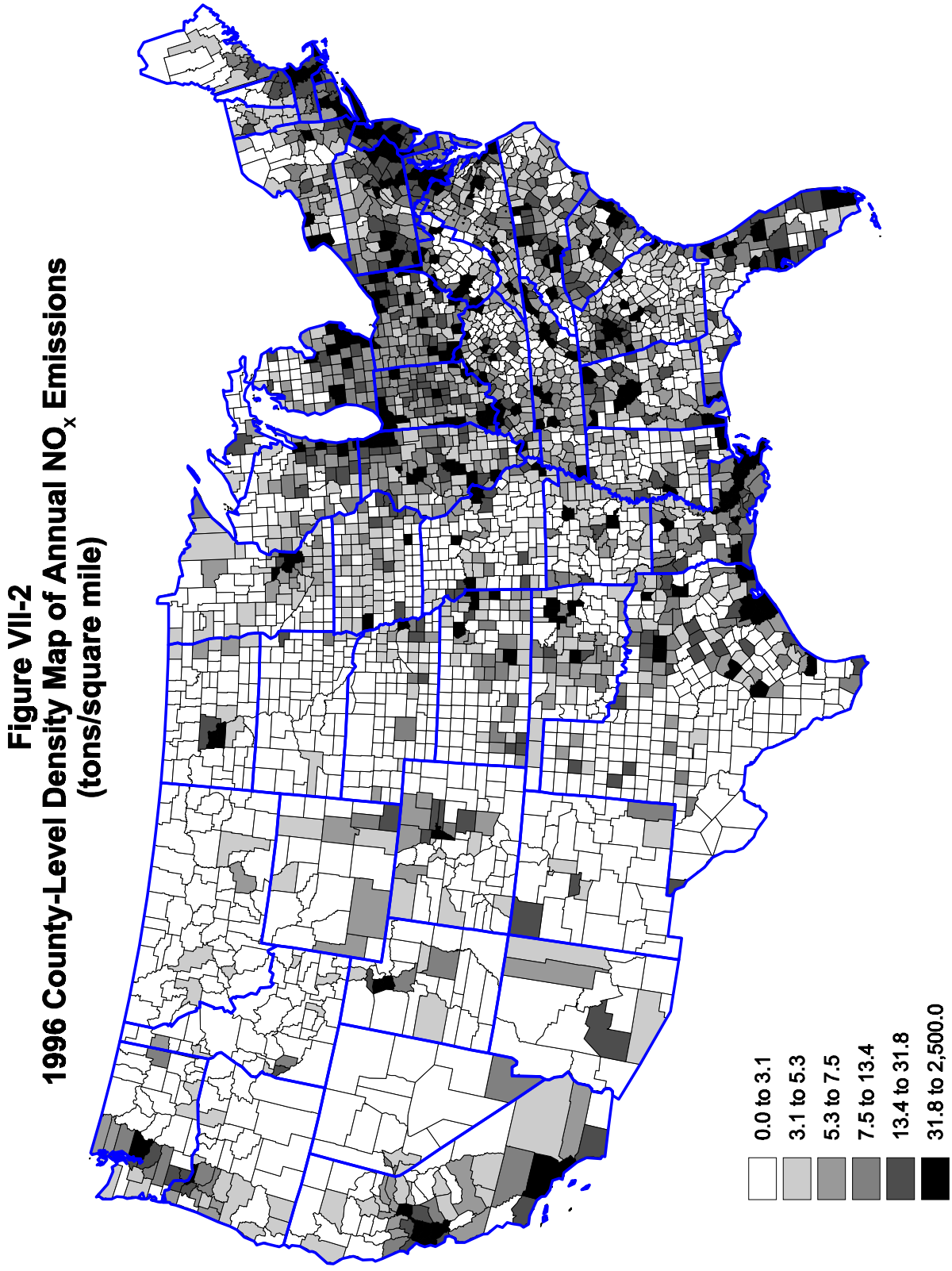
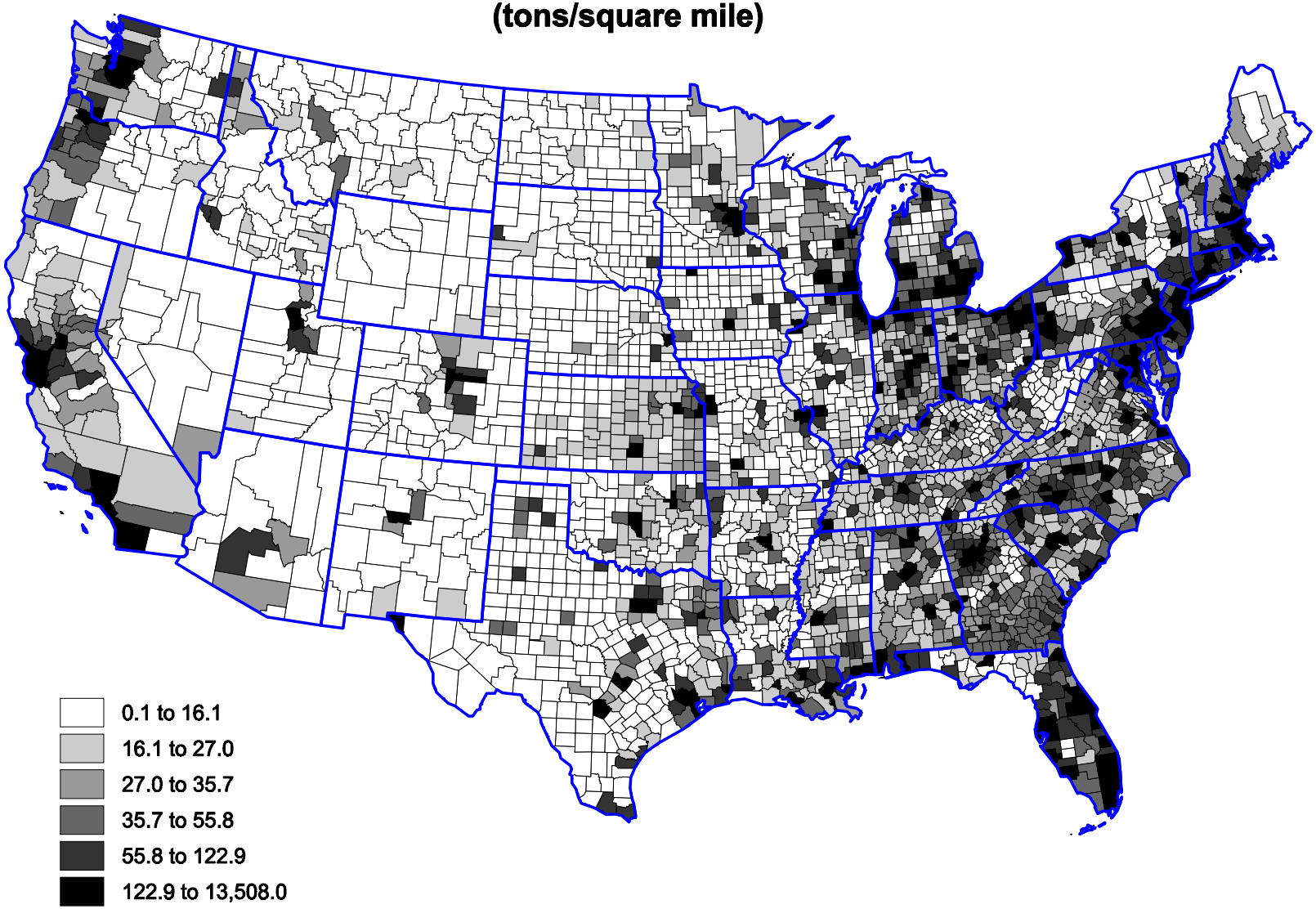


Figure VII-2
1996 County-Level Density Map of Annual NOx Emissions
(tons/square mile)
0.0 to 3.1
3.1 to 5.3
5.3 to 7.5
7.5 to 13.4
13.4 to 31.8
31.8 to 2,500.0

Figure VII-3
1996 County-Level Density Map of Annual CO Emissions
(tons/square mile)



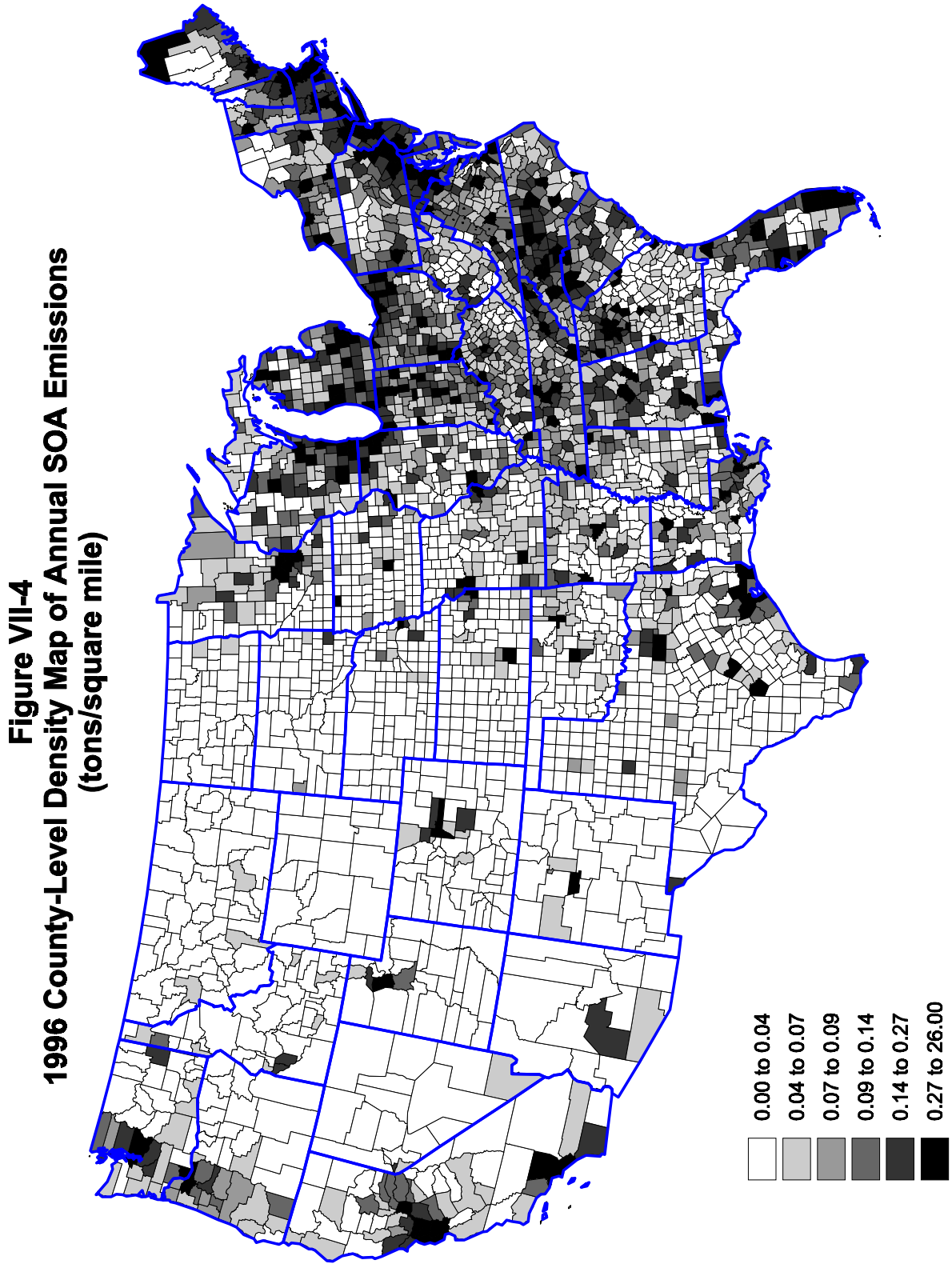


Figure VII-4
1996 County-Level Density Map of Annual SOA Emissions
(tons/square mile)
0.00 to 0.04
0.04 to 0.07
0.07 to 0.09
0.09 to 0.14
0.14 to 0.27
0.27 to 26.00

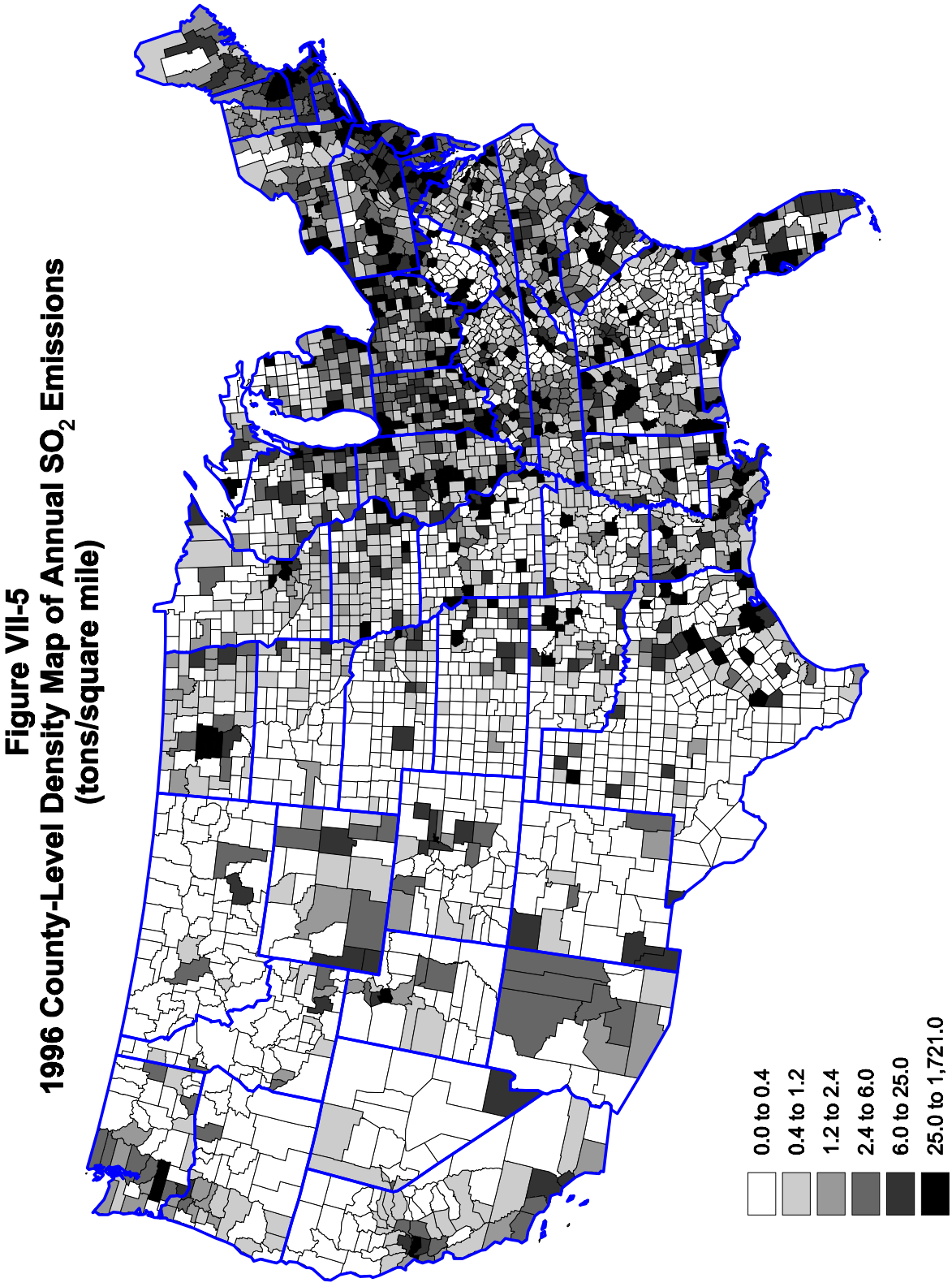
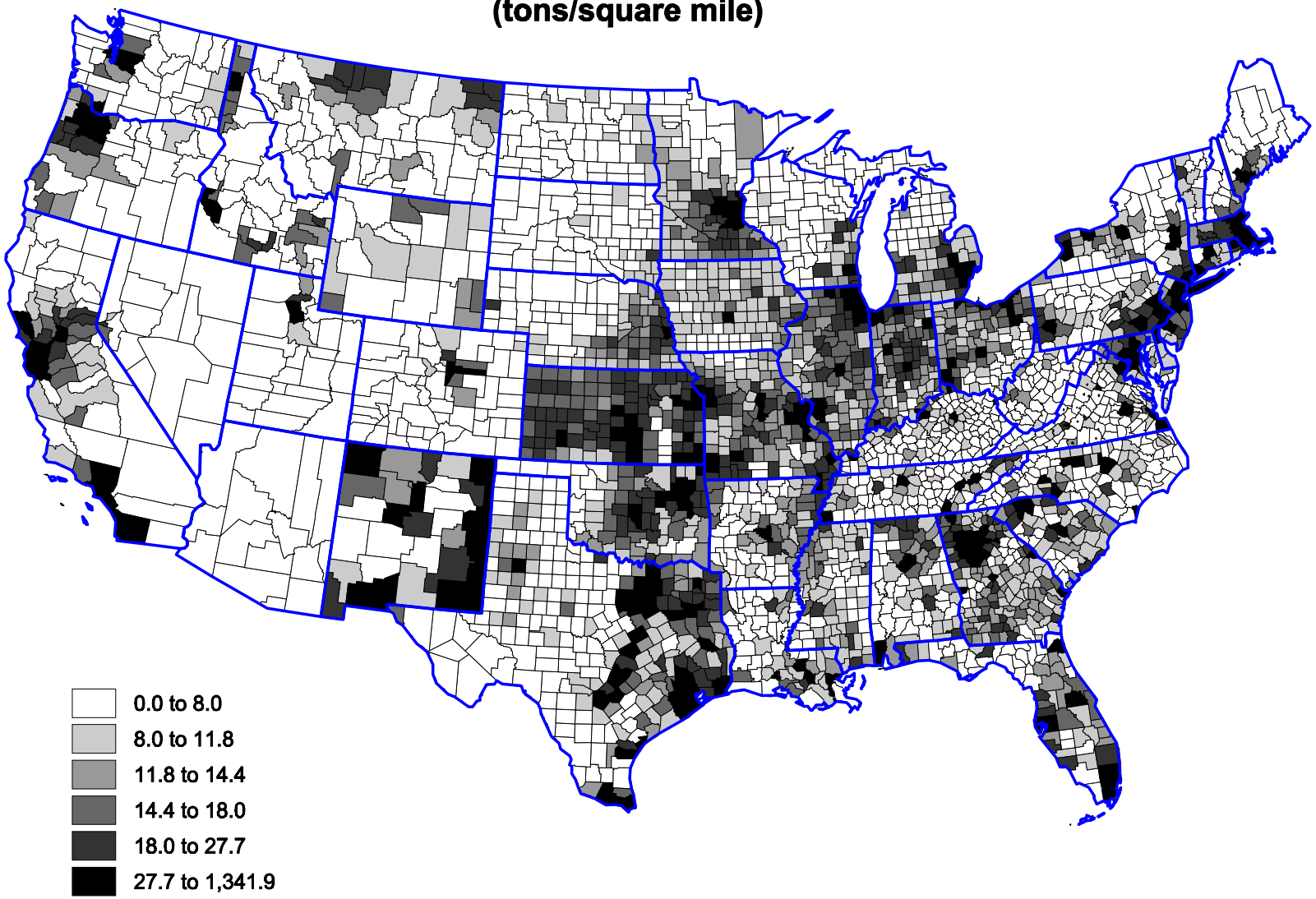


Figure VII-5
1996 County-Level Density Map of Annual SO_2 Emissions
(tons/square mile)
0.0 to 0.4
0.4 to 1.2
1.2 to 2.4
2.4 to 6.0
6.0 to 25.0
25.0 to 1,721.0

Figure VII-6
1996 County-Level Density Map of Annual PM_{10} Emissions
(tons/square mile)



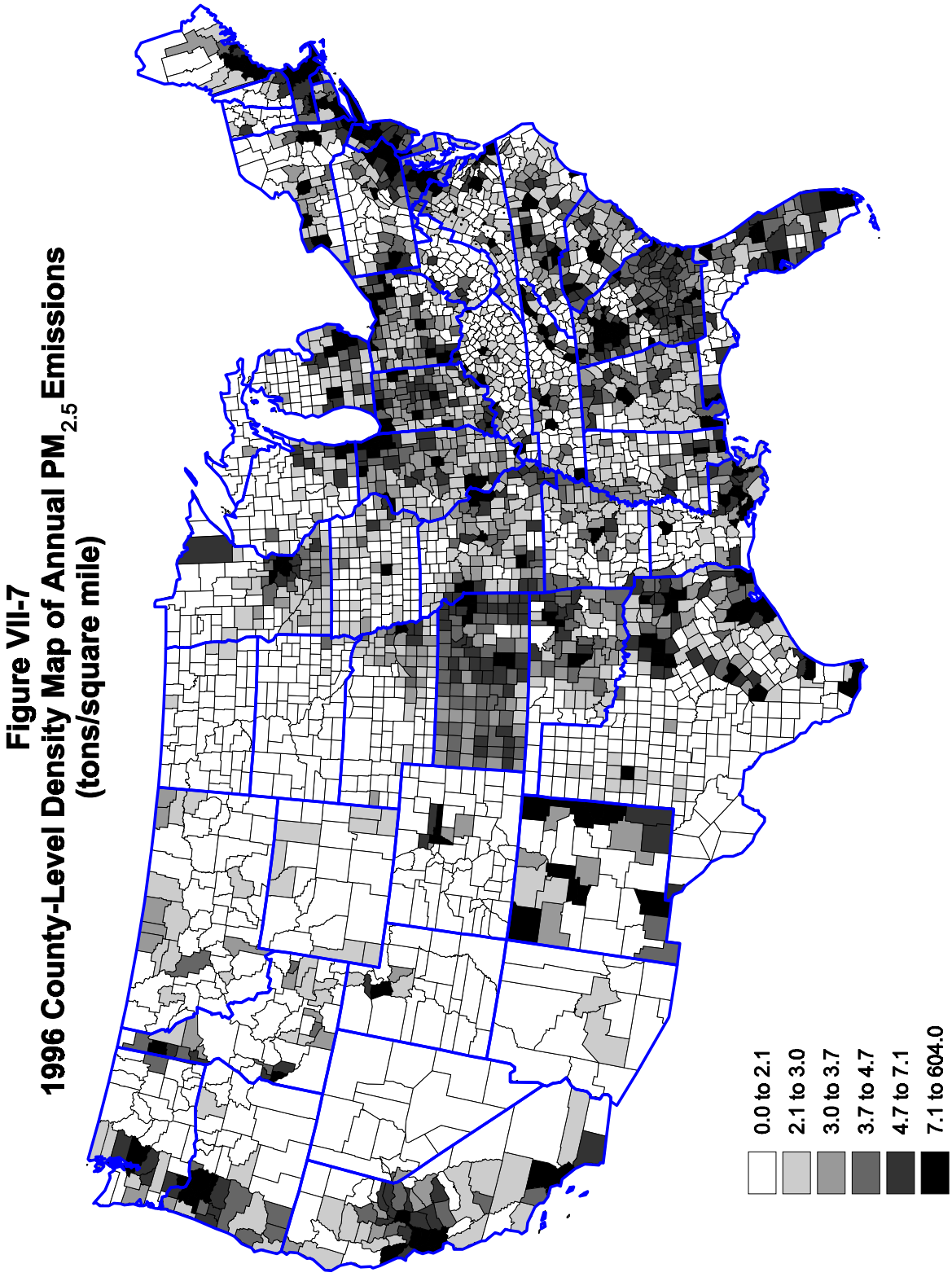


Figure VII-7
1996 County-Level Density Map of Annual PM2.5 Emissions
(tons/square mile)
0.0 to 2.1
2.1 to 3.0
3.0 to 3.7
3.7 to 4.7
4.7 to 7.1
7.1 to 604.0

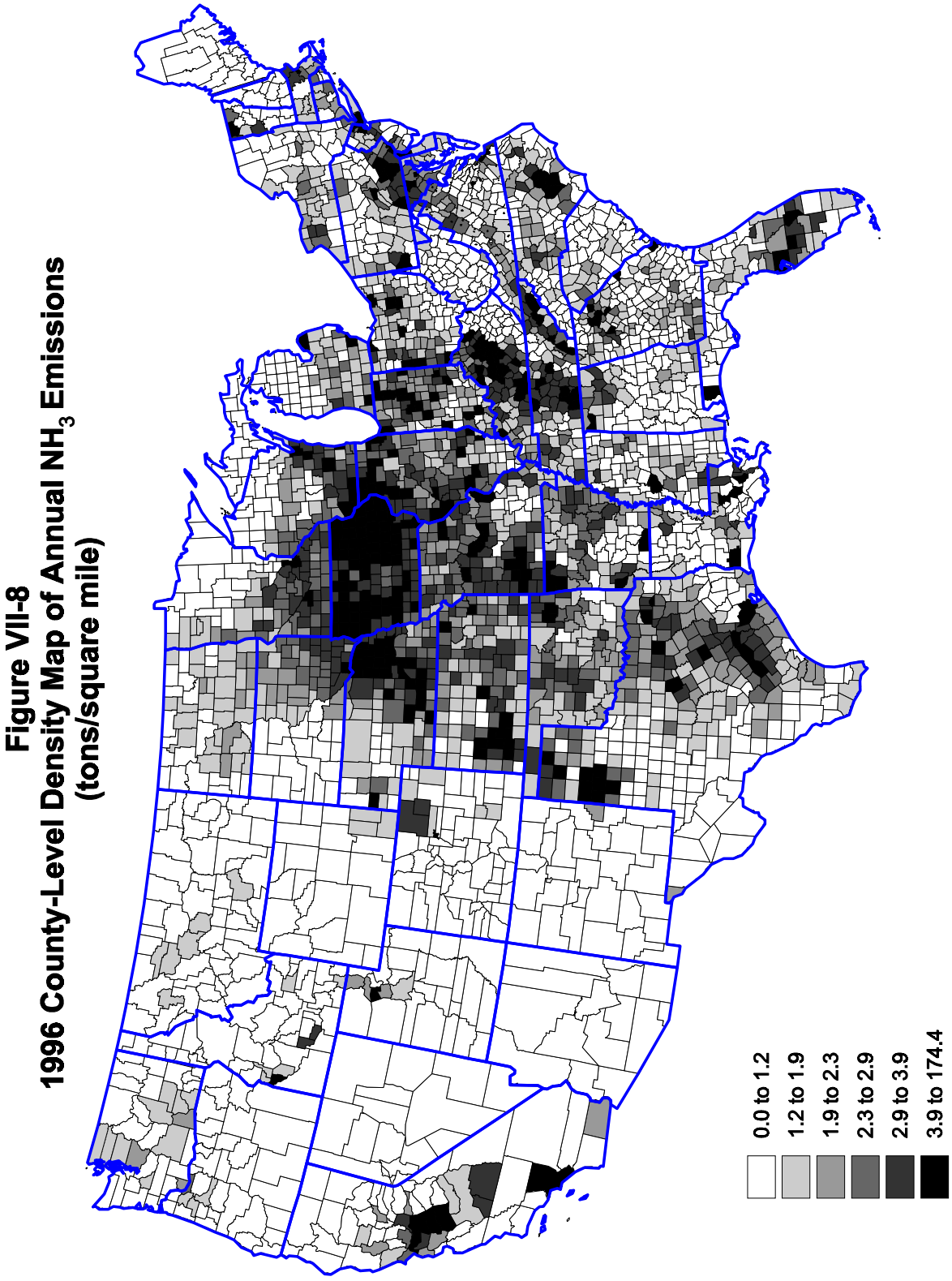


Figure VII-8
1996 County-Level Density Map of Annual NH3 Emissions
(tons/square mile)
0.0 to 1.2
1.2 to 1.9
1.9 to 2.3
2.3 to 2.9
2.9 to 3.9
3.9 to 174.4

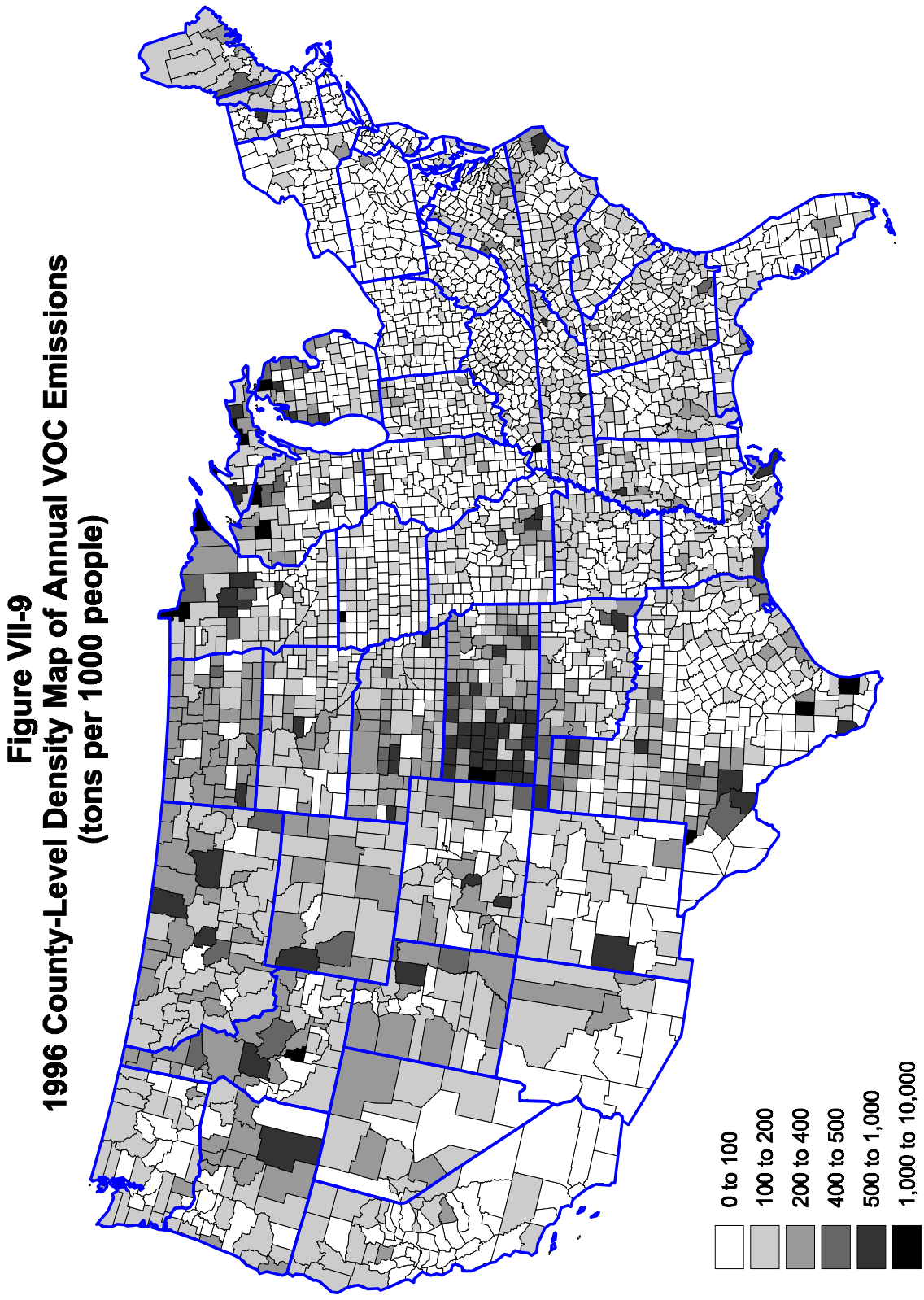


Figure VII-9
1996 County-Level Density Map of Annual VOC Emissions
(tons per 1000 people)
0 to 100
100 to 200
200 to 400
400 to 500
500 to 1,000
1,000 to 10,000

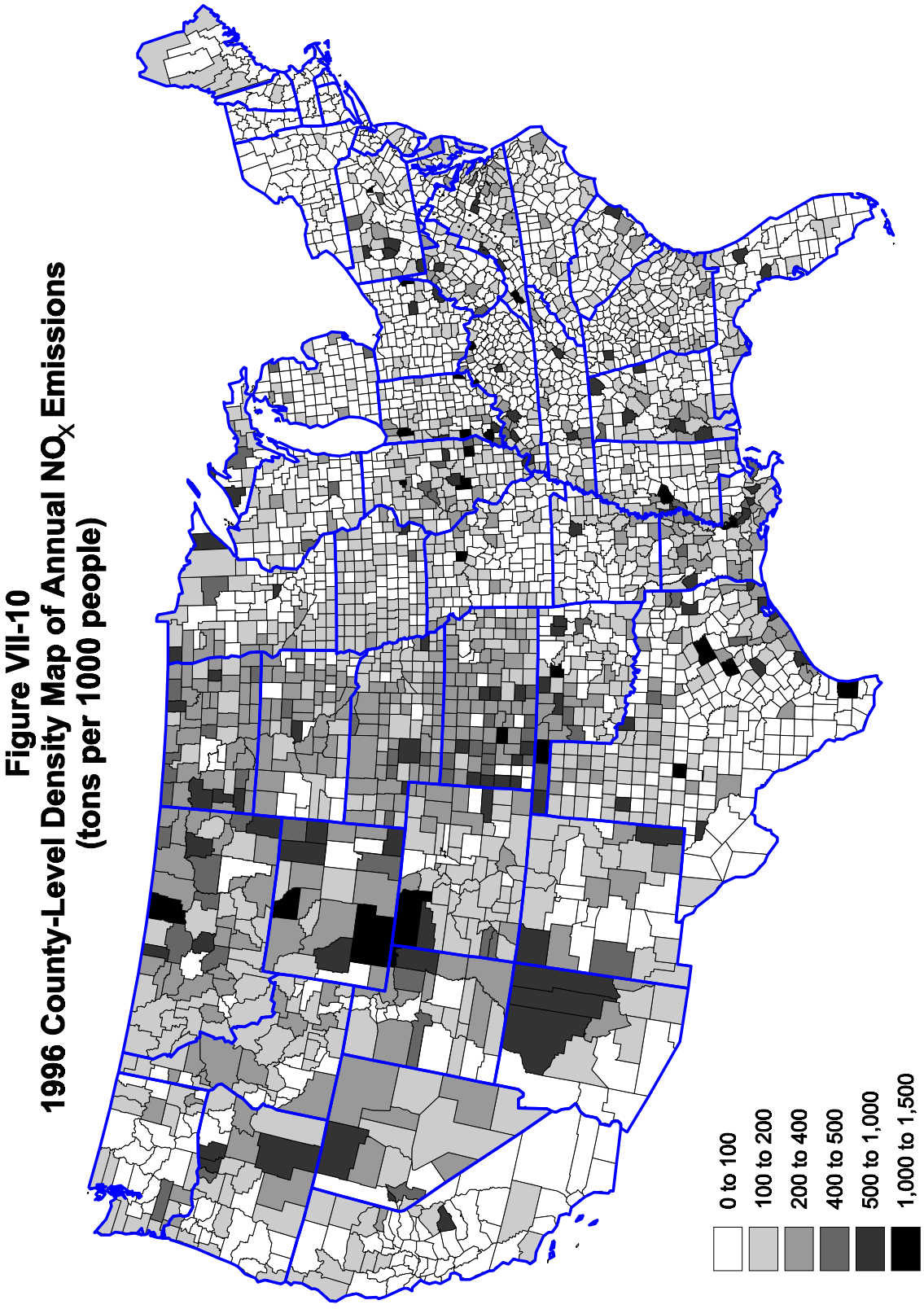


Figure VII-10
1996 County-Level Density Map of Annual NO_X Emissions
(tons per 1000 people)
0 to 100
100 to 200
200 to 400
400 to 500
500 to 1,000
1,000 to 1,500

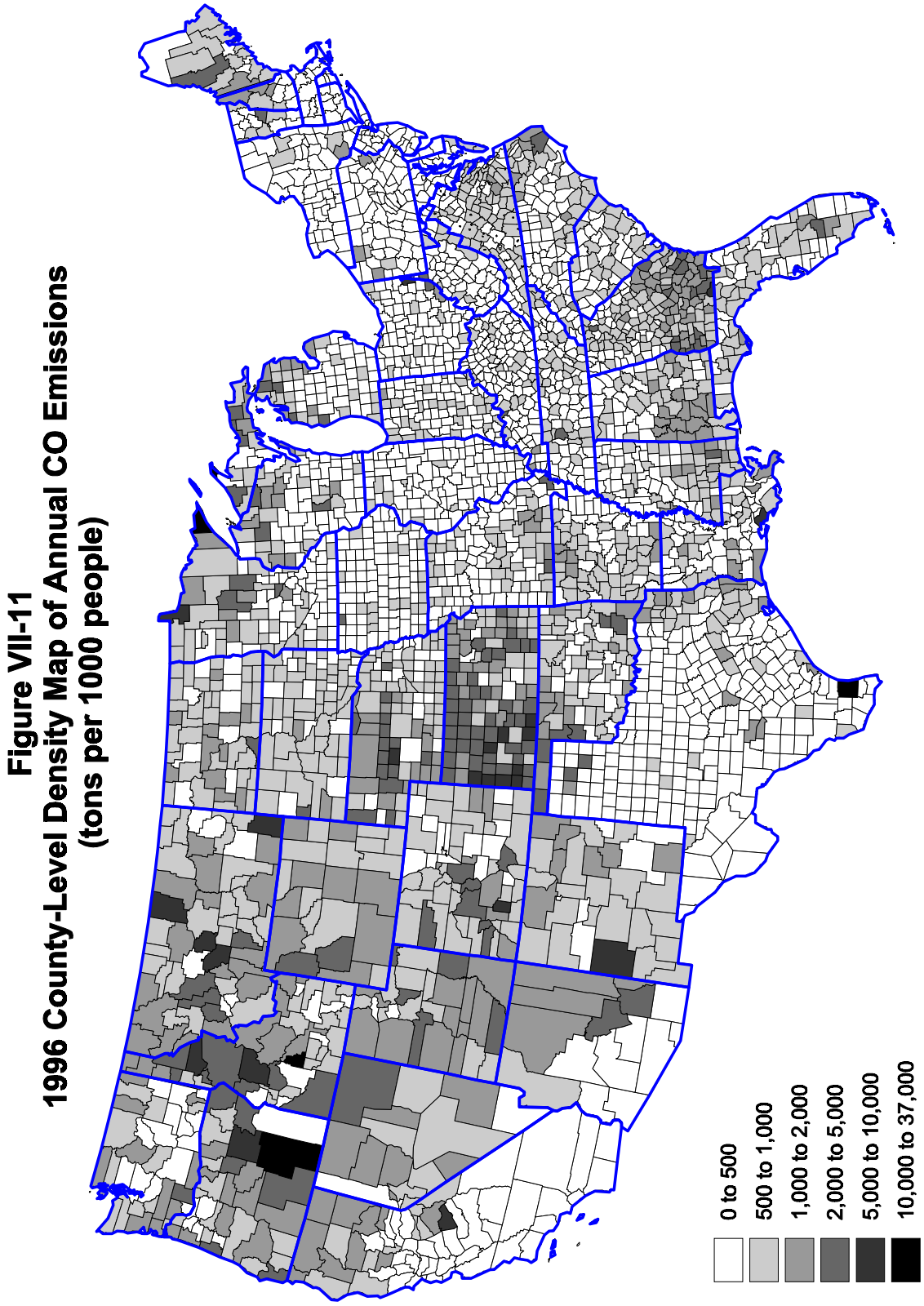


Figure VII-11
1996 County-Level Density Map of Annual CO Emissions
(tons per 1000 people)
0 to 500
500 to 1,000
1,000 to 2,000
2,000 to 5,000
5,000 to 10,000
10,000 to 37,000

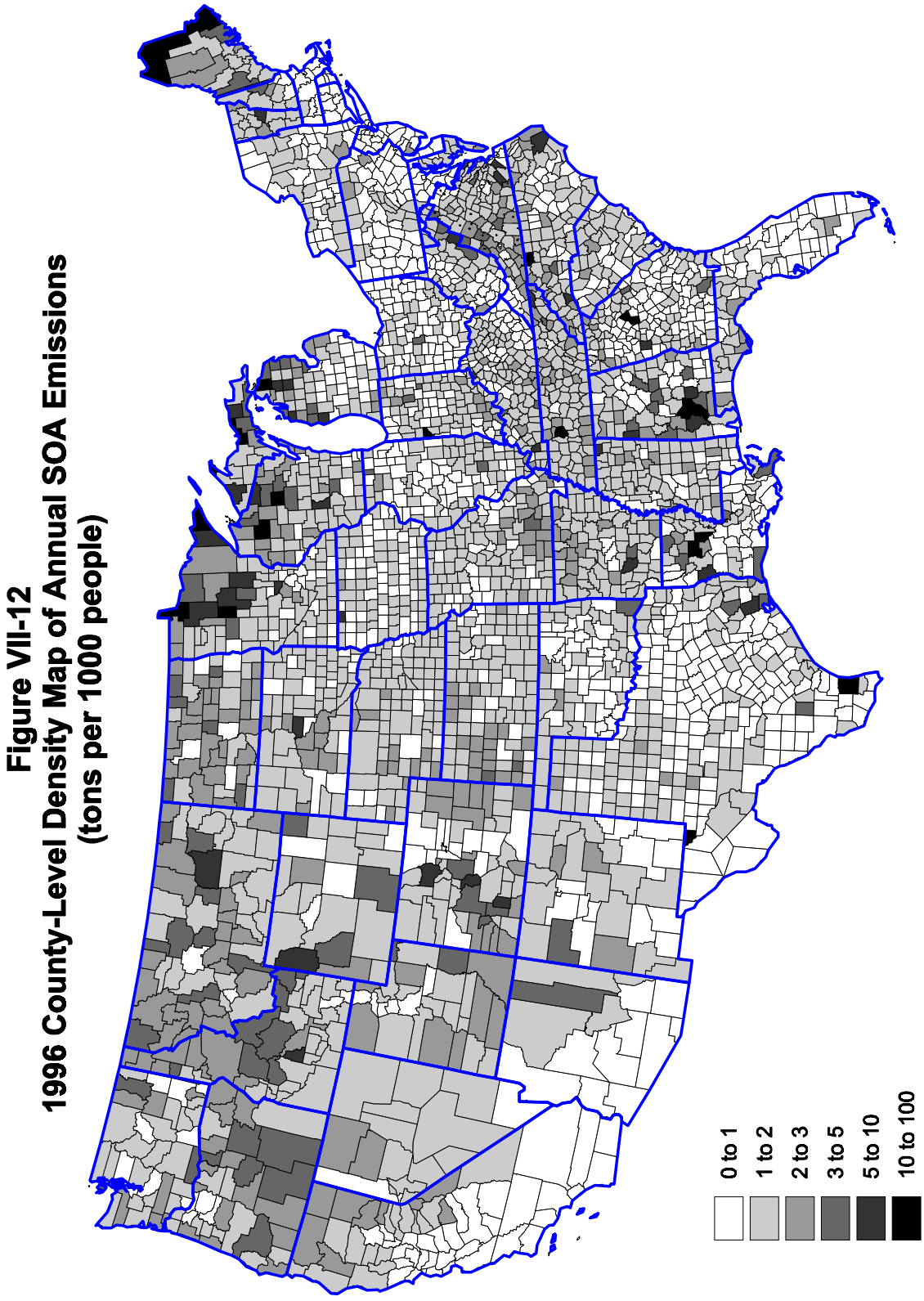


Figure VII-12
1996 County-Level Density Map of Annual SOA Emissions
(tons per 1000 people)
0 to 1
1 to 2
2 to 3
3 to 5
5 to 10
10 to 100

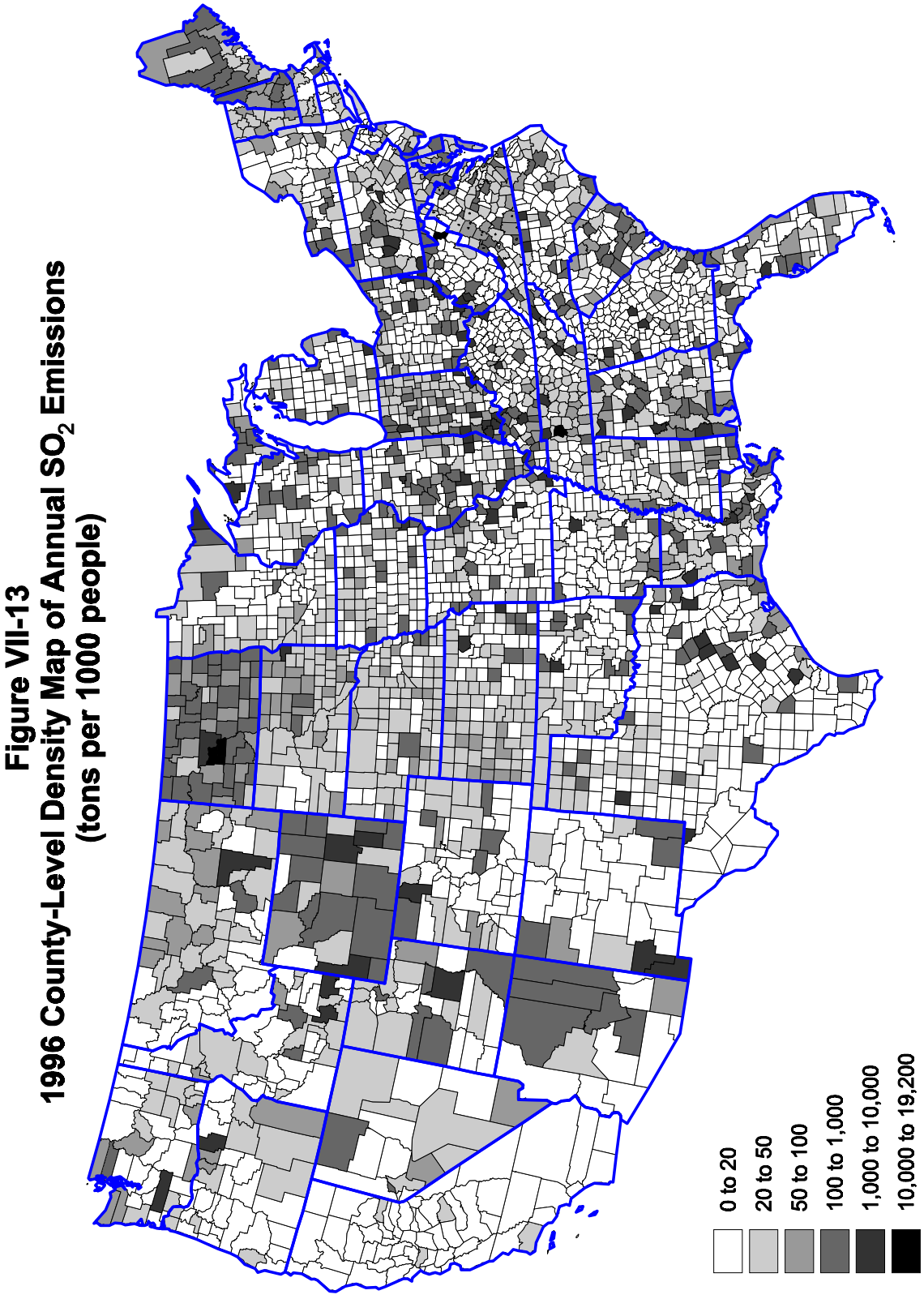


Figure VII-13
1996 County-Level Density Map of Annual SO_2 Emissions
(tons per 1000 people)
0 to 20
20 to 50
50 to 100
100 to 1,000
1,000 to 10,000
10,000 to 19,200

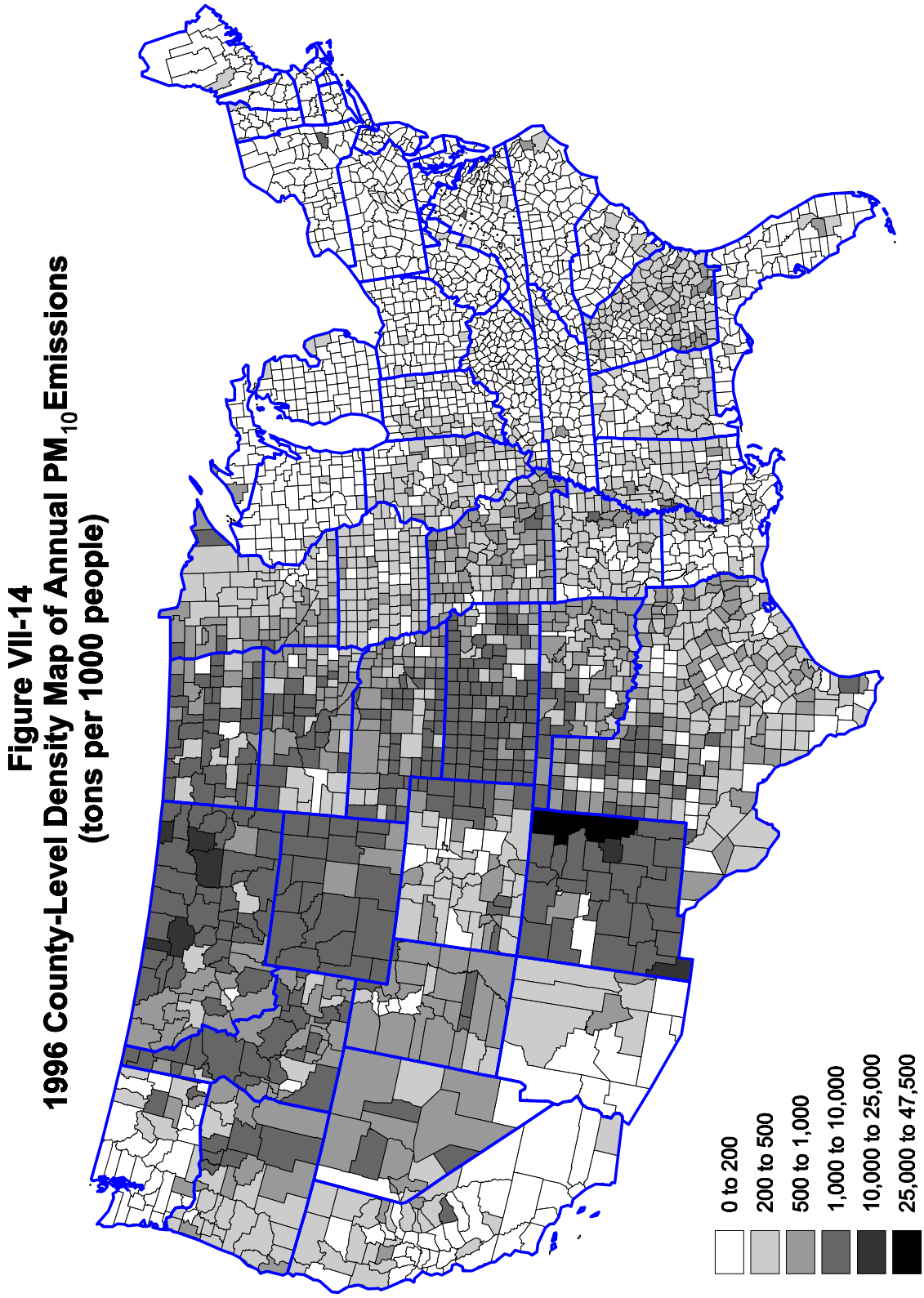


Figure VII-14
1996 County-Level Density Map of Annual PM10 Emissions
(tons per 1000 people)
0 to 200
200 to 500
500 to 1,000
1,000 to 10,000
10,000 to 25,000
25,000 to 47,500

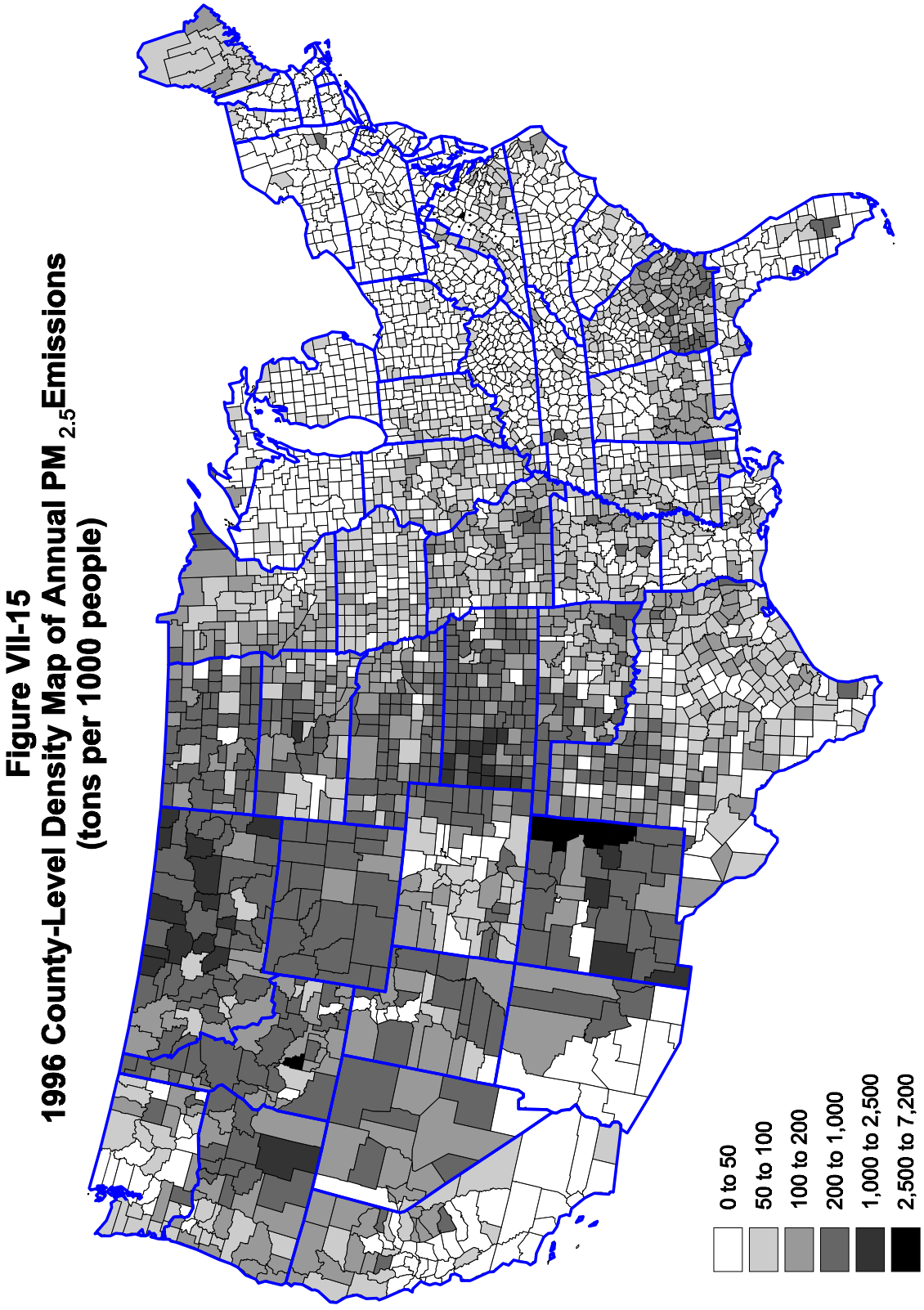


Figure VII-15
1996 County-Level Density Map of Annual PM 2.5 Emissions
(tons per 1000 people)
0 to 50
50 to 100
100 to 200
200 to 1,000
1,000 to 2,500
2,500 to 7,200

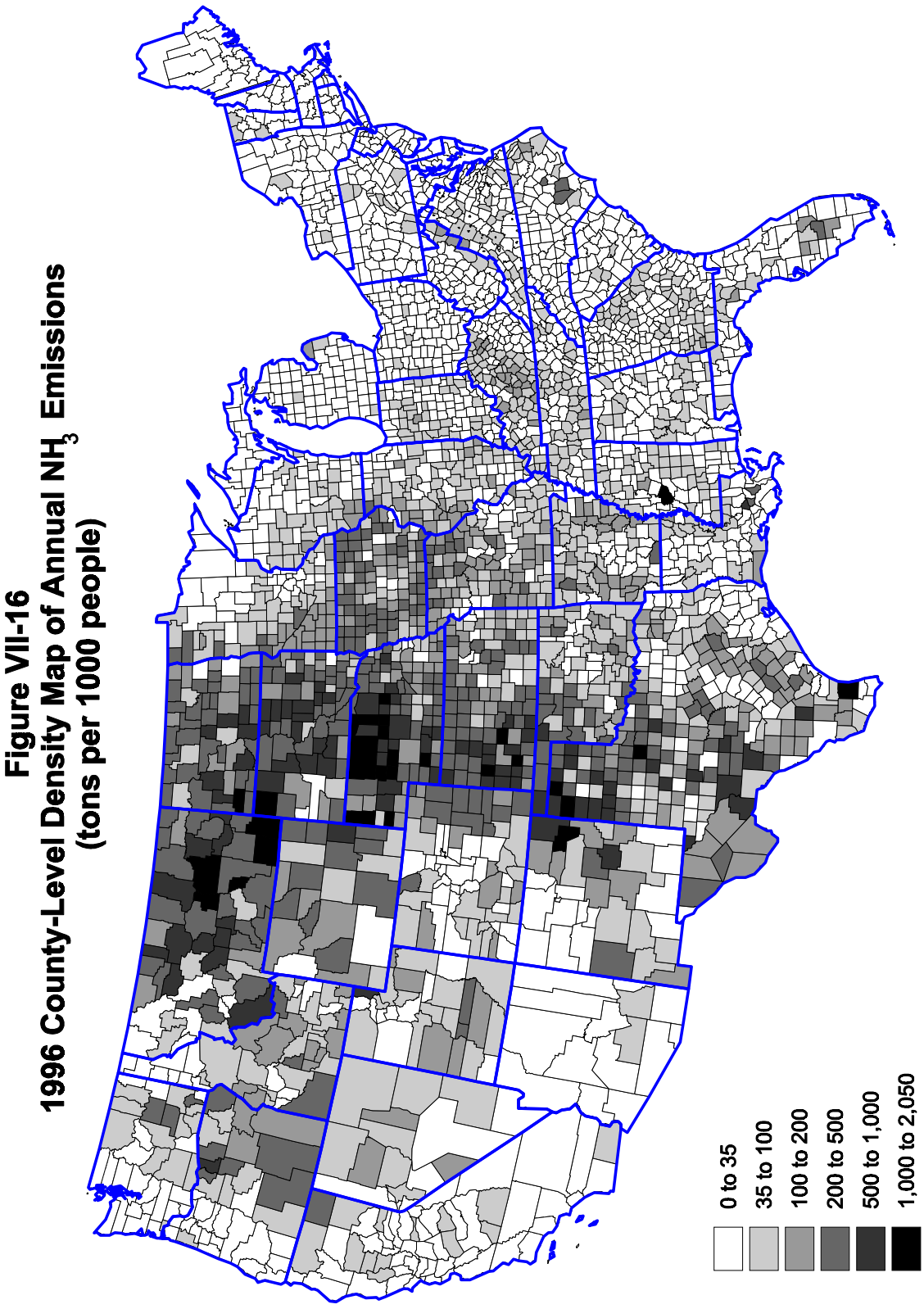


Figure VII-16
1996 County-Level Density Map of Annual NH3 Emissions
(tons per 1000 people)
0 to 35
35 to 100
100 to 200
200 to 500
500 to 1,000
1,000 to 2,050

Figure VII-17
County-Level Density Map of Annual VOC Emissions for 2007 Base Case
(tons/square mile)

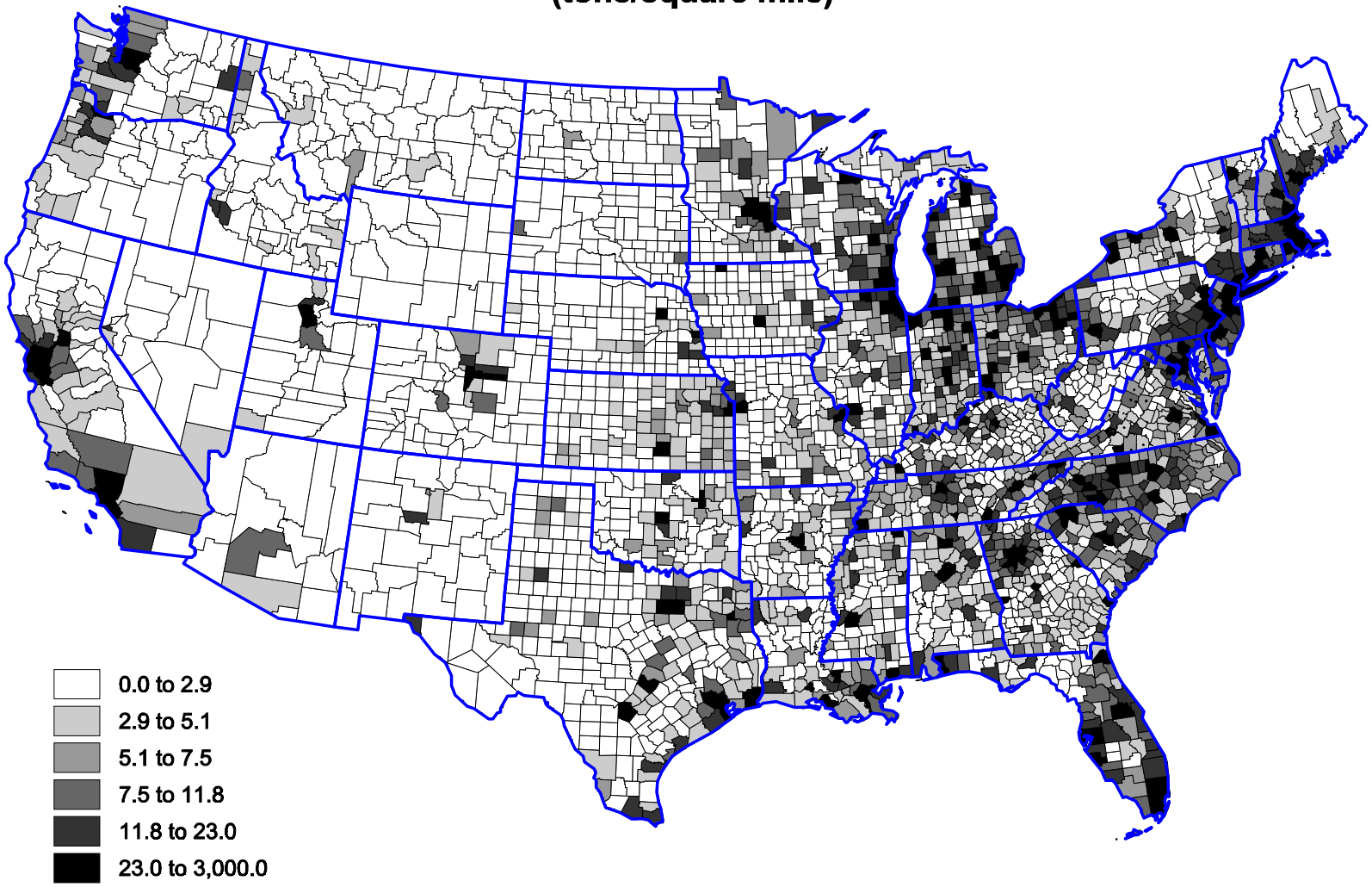


Figure VII-18
County-Level Density Map of Annual NO_X Emissions for 2007 Base Case
(tons/square mile)

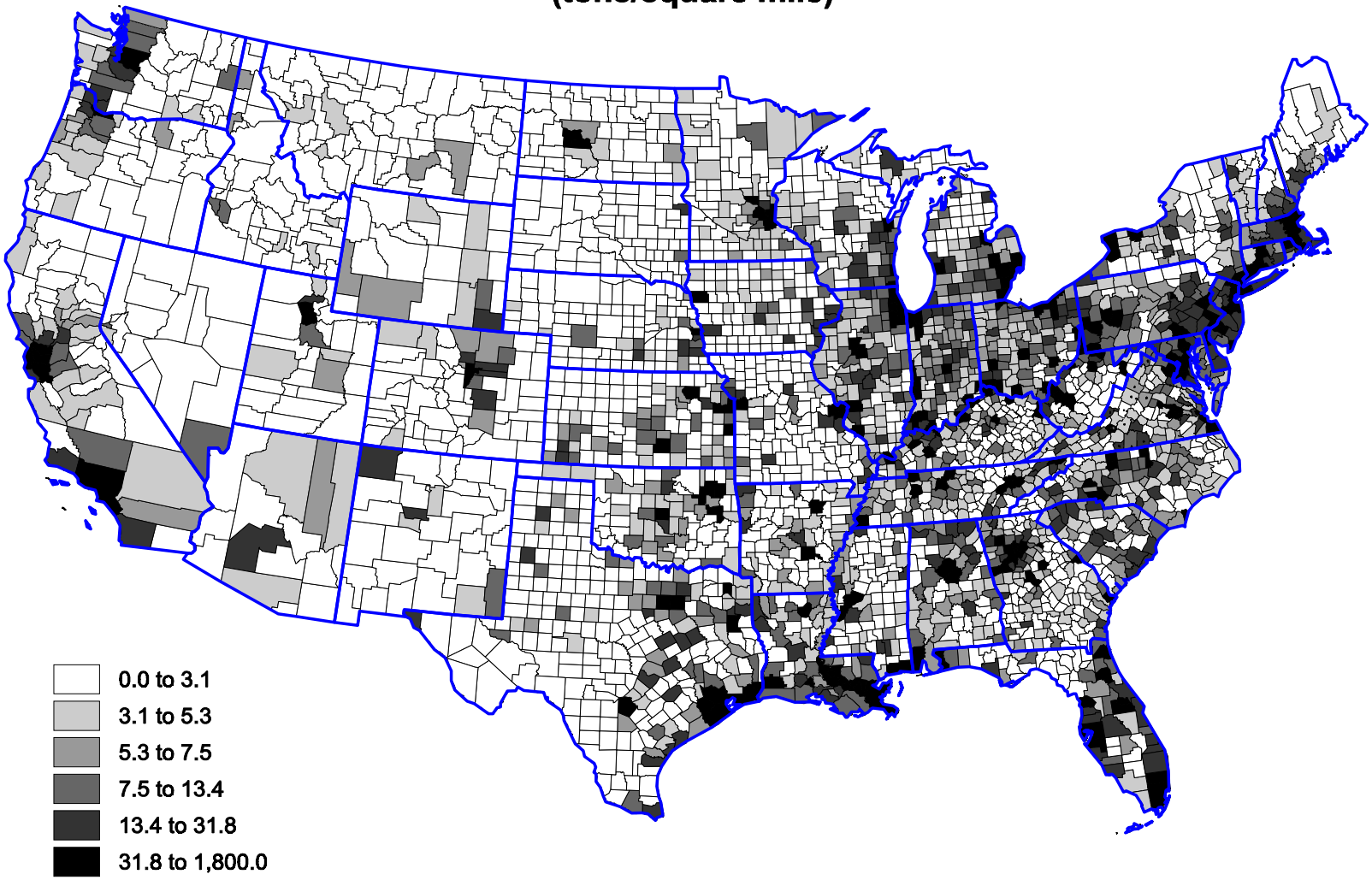


Figure VII-19
County-Level Density Map of Annual CO Emissions for 2007 Base Case
(tons/square mile)

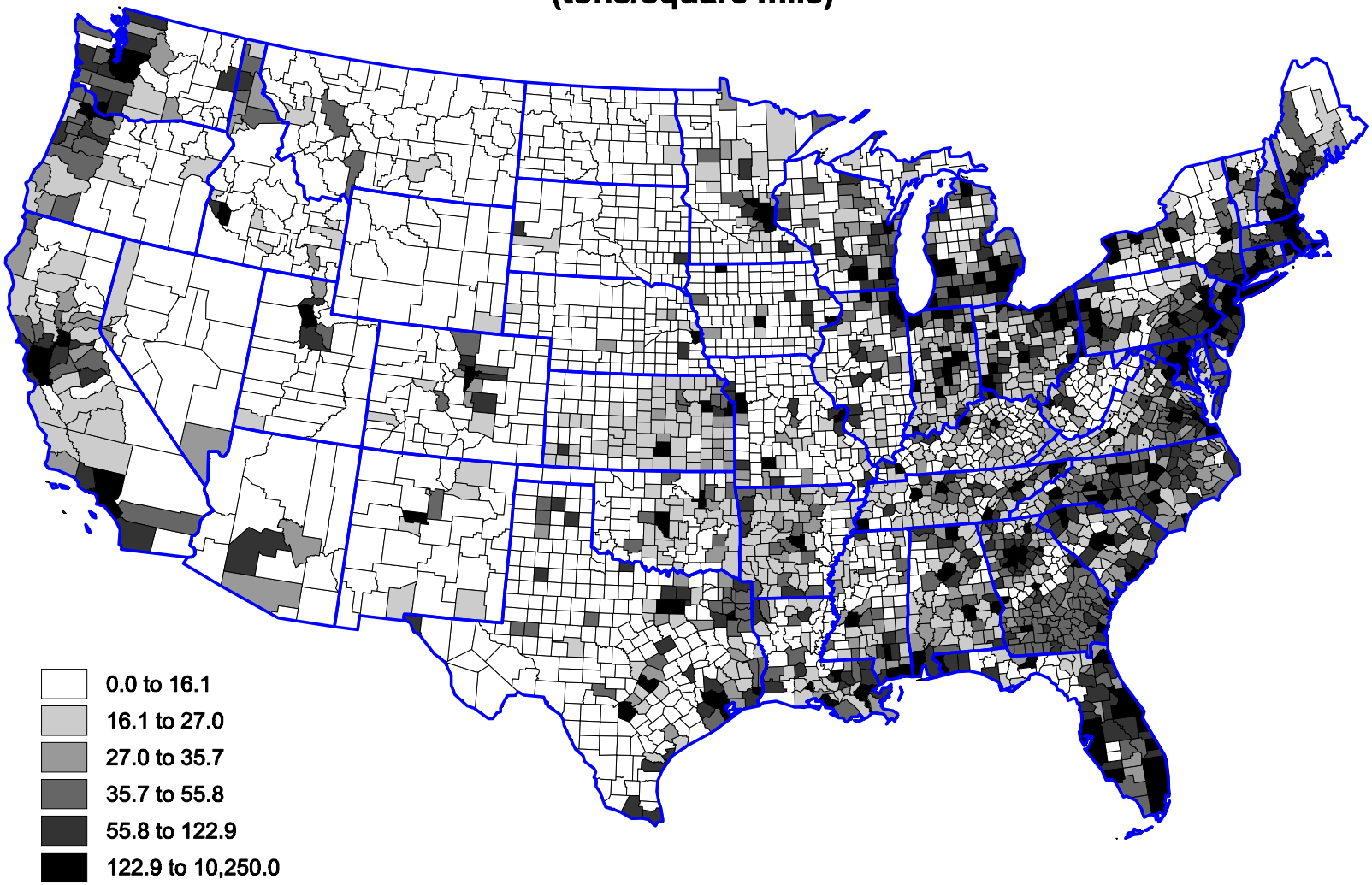


Figure VII-20
County-Level Density Map of Annual SOA Emissions for 2007 Base Case
(tons/square mile)

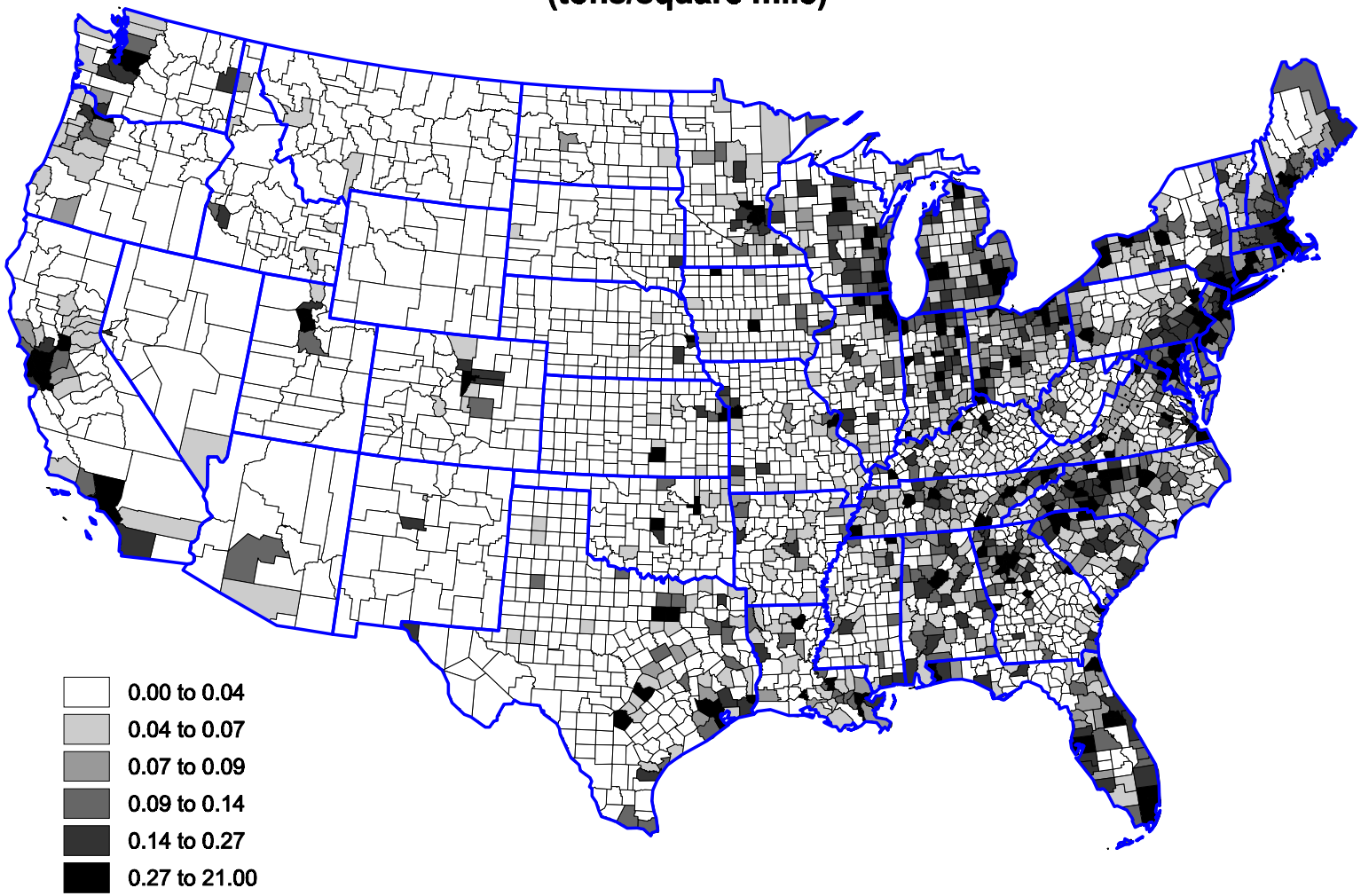


Figure VII-21
County-Level Density Map of Annual SO_2 Emissions for 2007 Base Case
(tons/square mile)

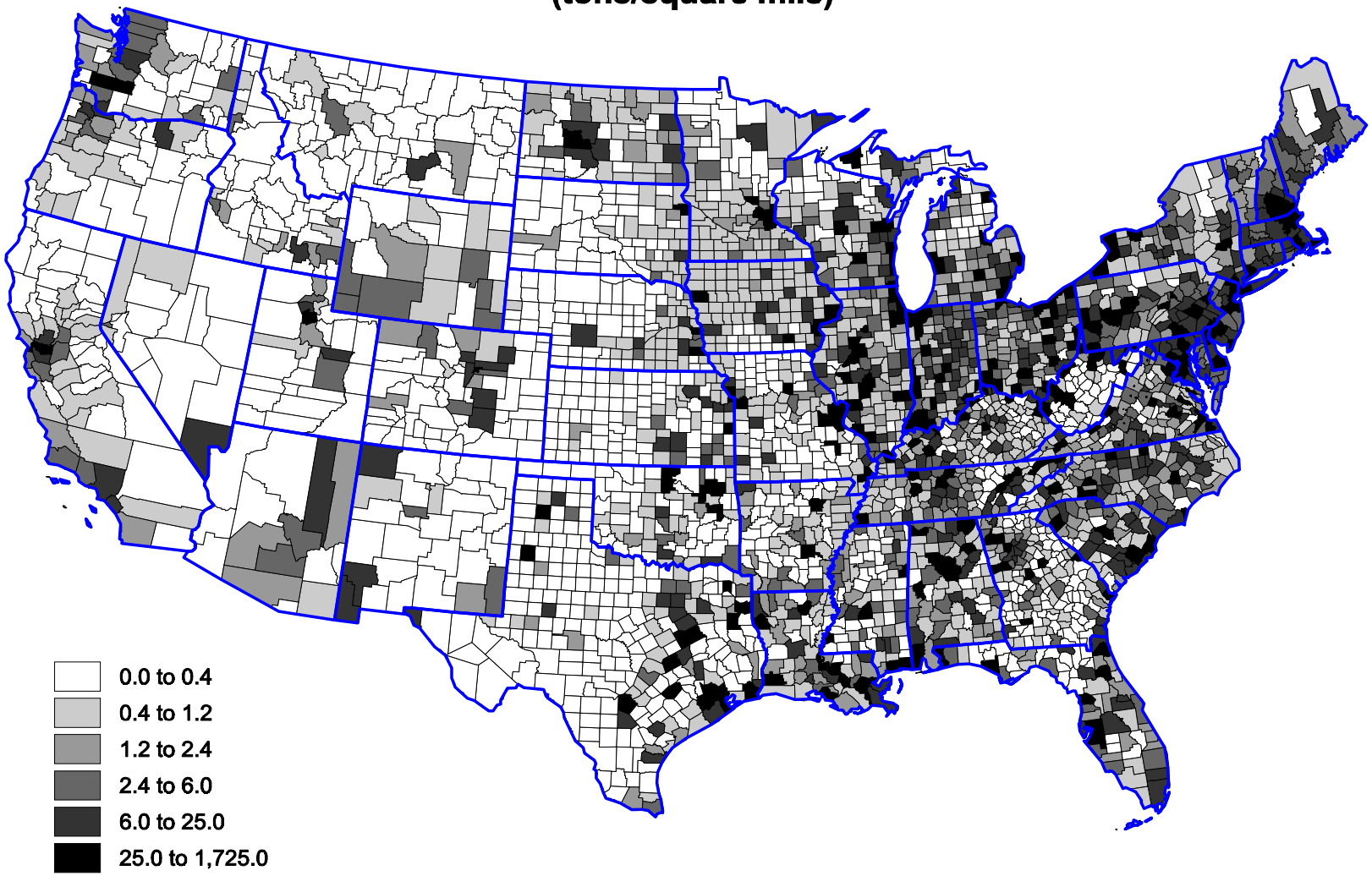


Figure VII-22
County-Level Density Map of Annual PM_{10} Emissions for 2007 Base Case
(tons/square mile)

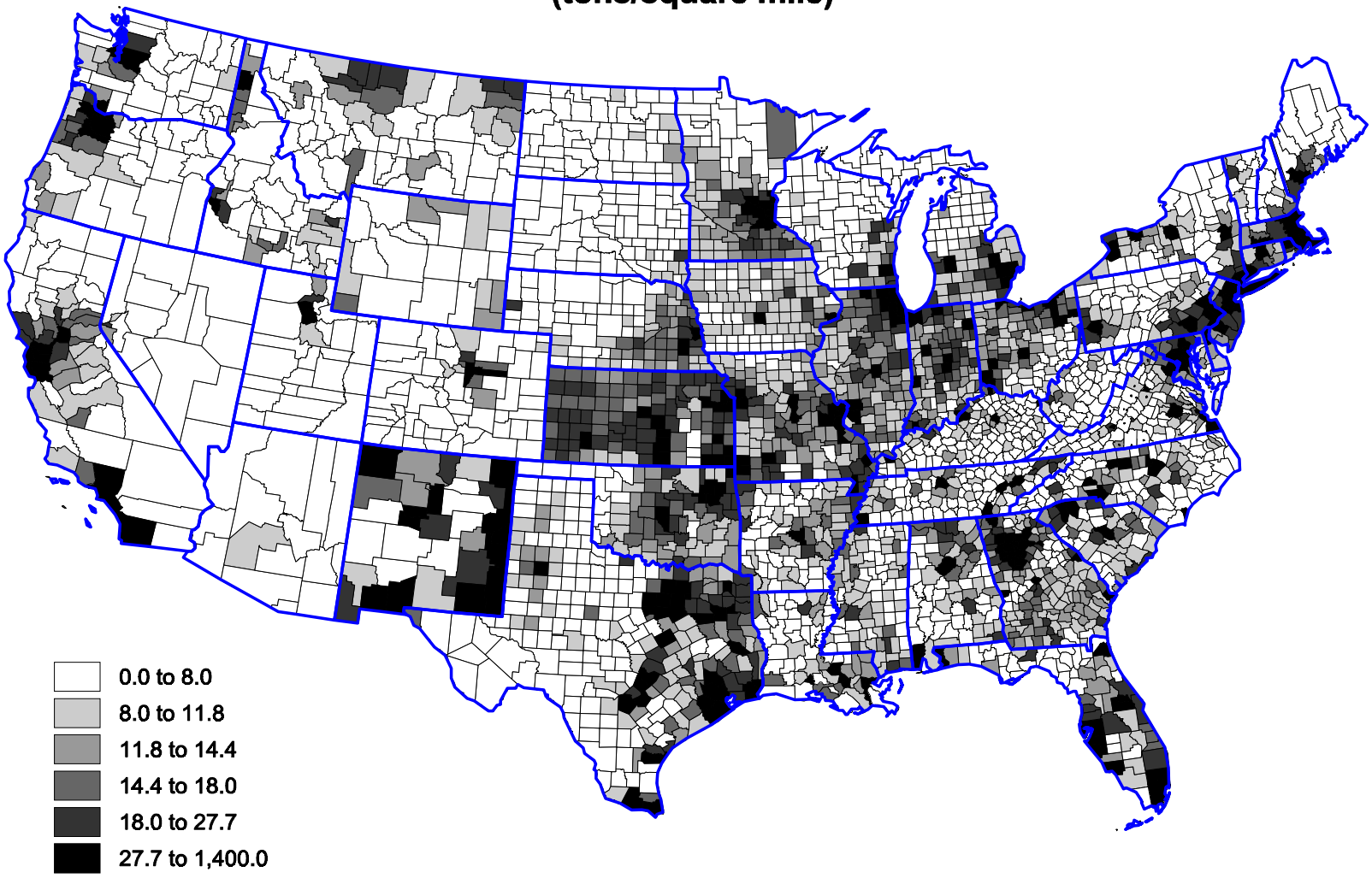


Figure VII-23
County-Level Density Map of Annual $PM_{2.5}$ Emissions for 2007 Base Case (tons/square mile)

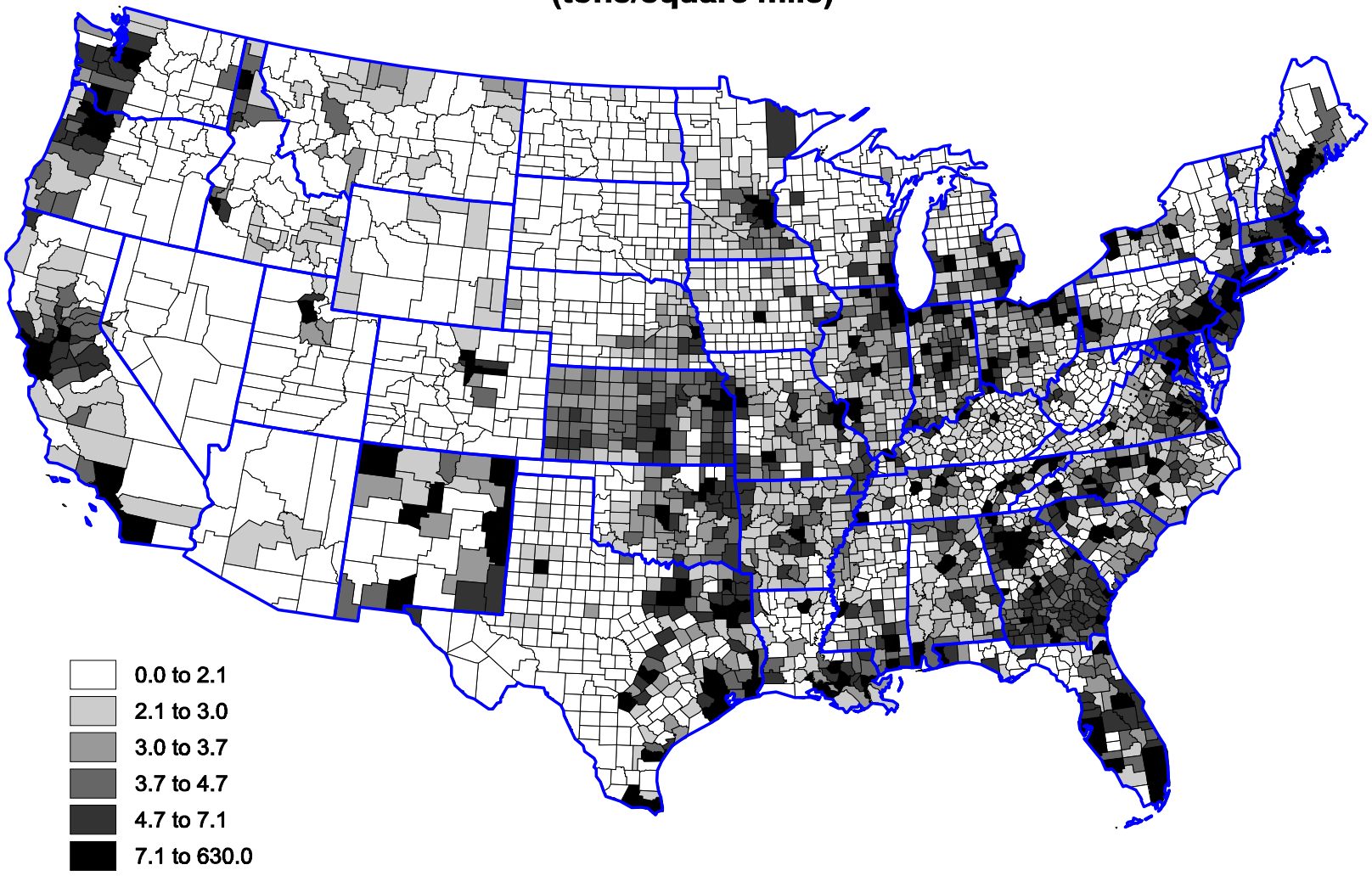


Figure VII-24
County-Level Density Map of Annual NH_3 Emissions for 2007 Base Case
(tons/square mile)

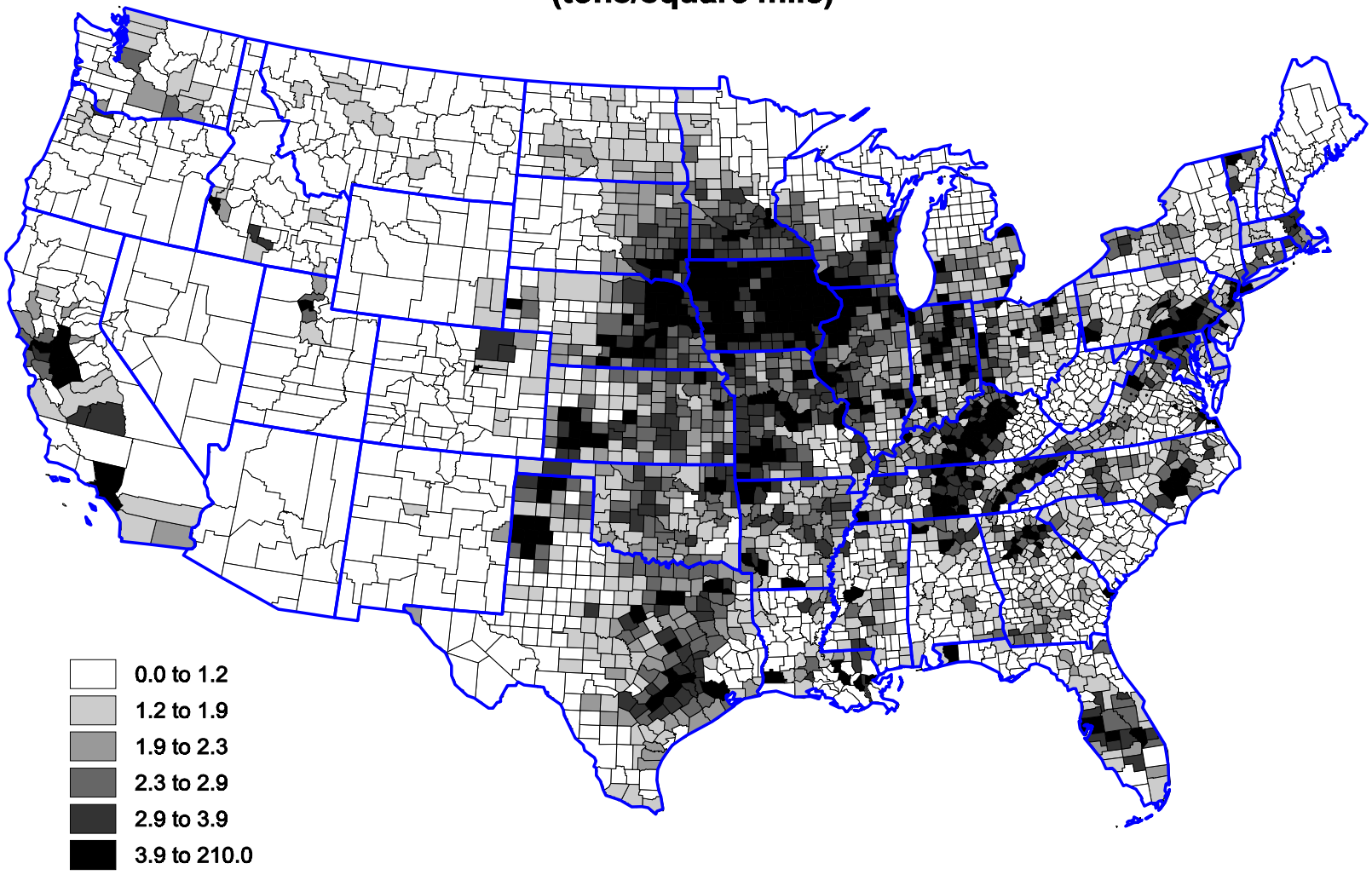


Figure VII-25
County-Level Density Map of Annual VOC Emissions for 2007 Base Case
(tons per 1000 people)

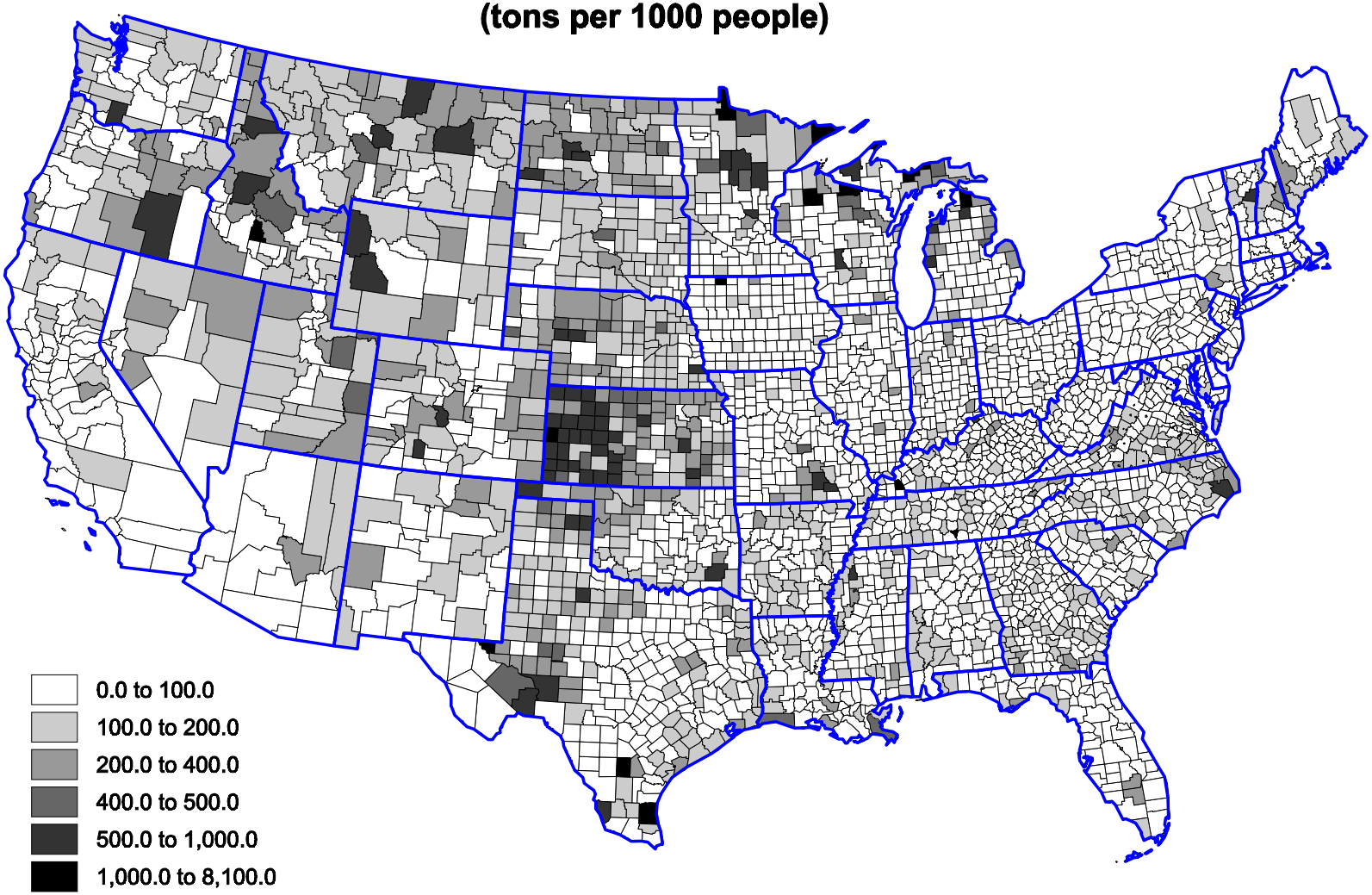


Figure VII-26
County-Level Density Map of Annual NO_x Emissions for 2007 Base Case
(tons per 1000 people)

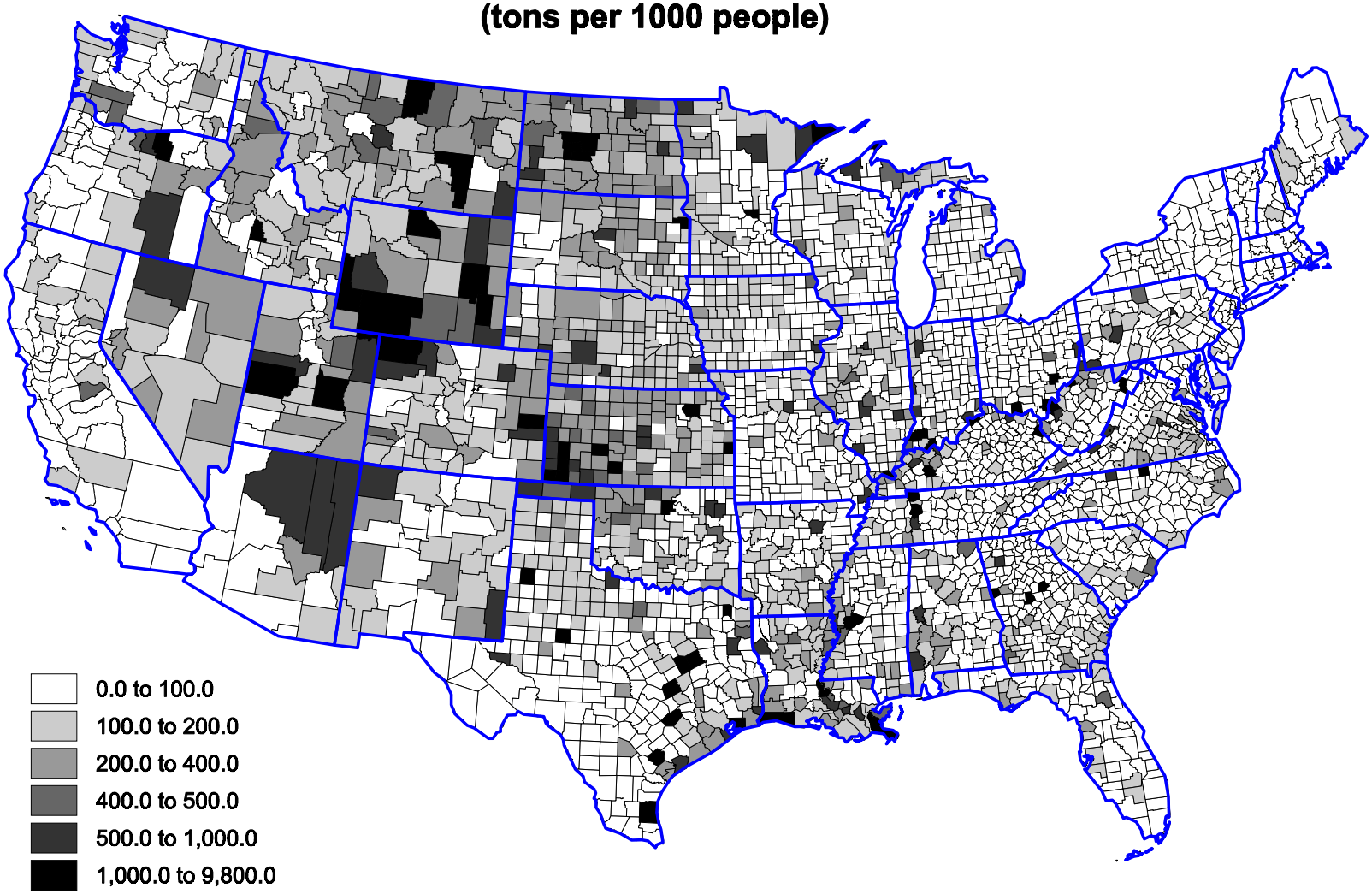


Figure VII-27
County-Level Density Map of Annual CO Emissions for 2007 Base Case
(tons per 1000 people)

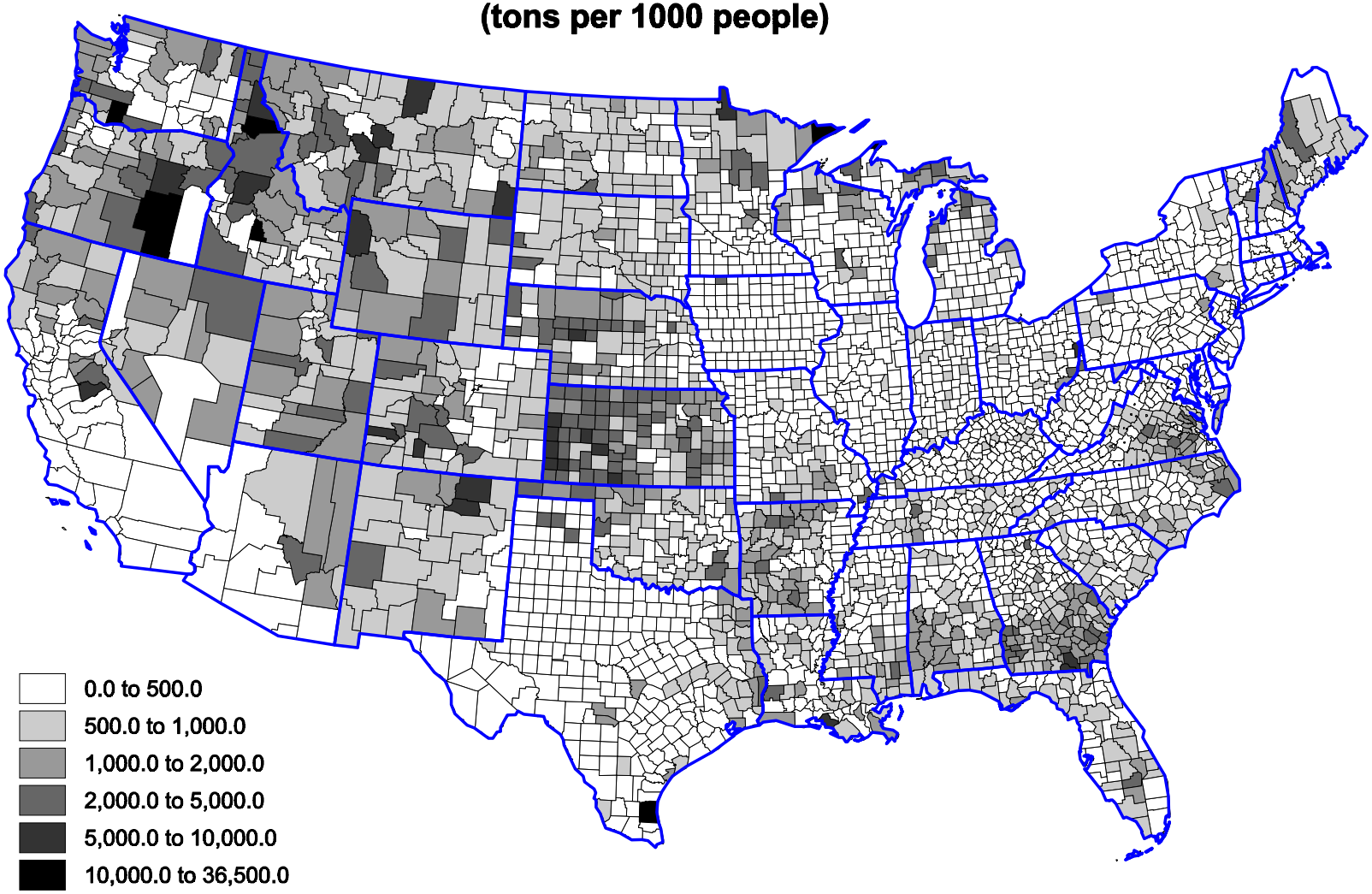


Figure VII-28
County-Level Density Map of Annual SOA Emissions for 2007 Base Case
(tons per 1000 people)

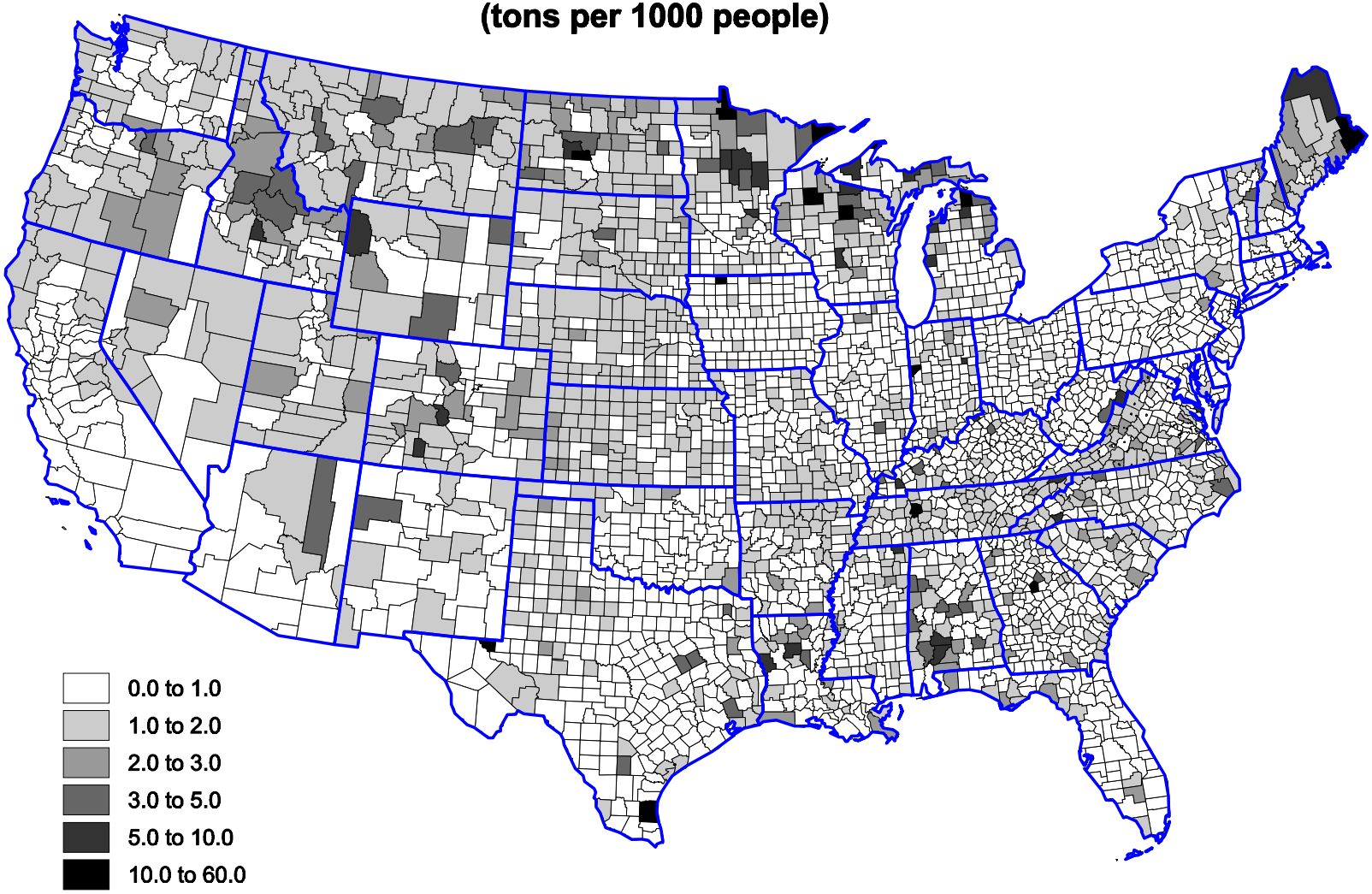


Figure VII-29
County-Level Density Map of Annual SO_2 Emissions for 2007 Base Case
(tons per 1000 people)

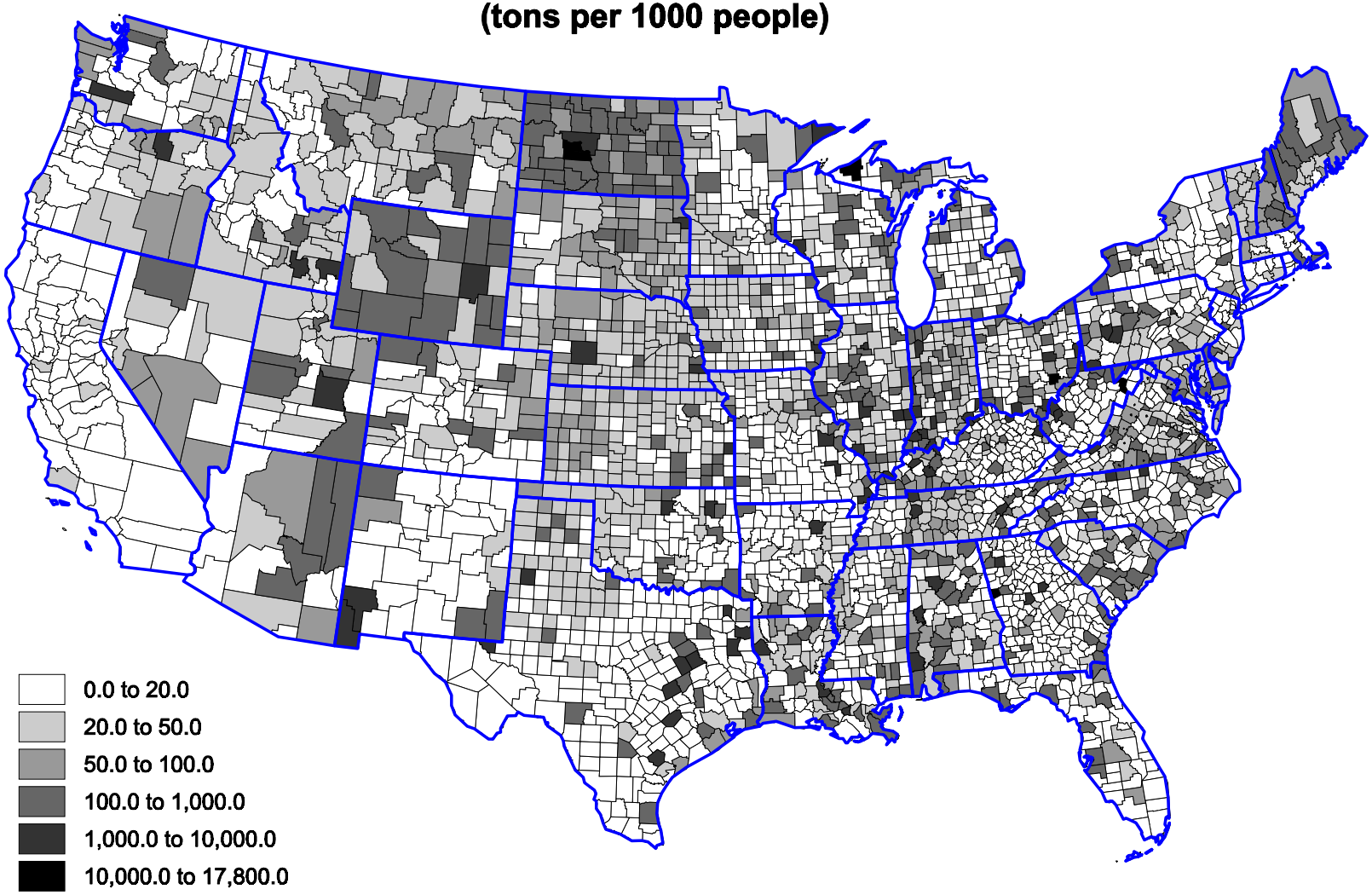


Figure VII-30
County-Level Density Map of Annual PM_{10} Emissions for 2007 Base Case
(tons per 1000 people)

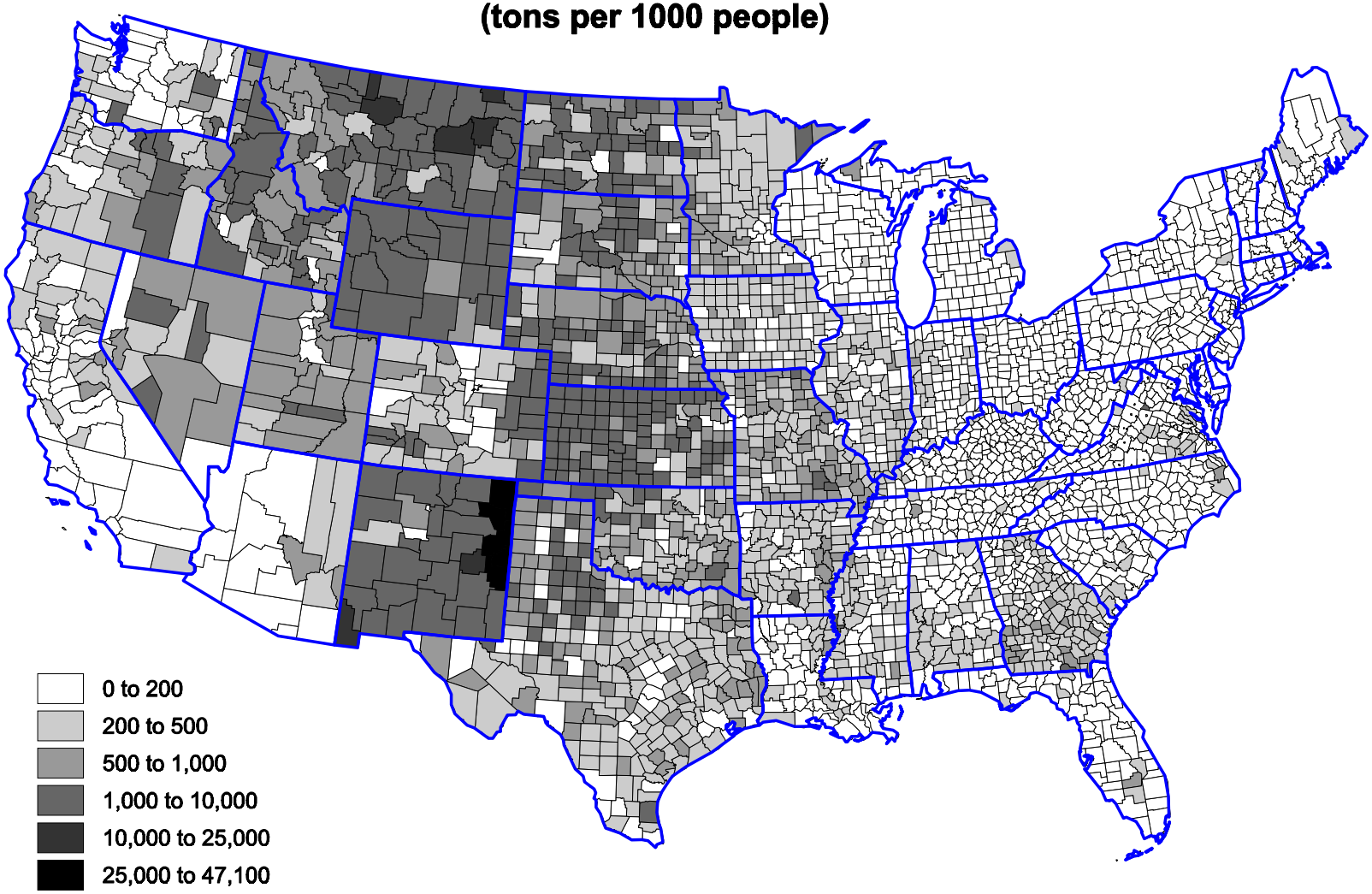


Figure VII-31
County-Level Density Map of Annual $PM_{2.5}$ Emissions for 2007 Base Case
(tons per 1000 people)

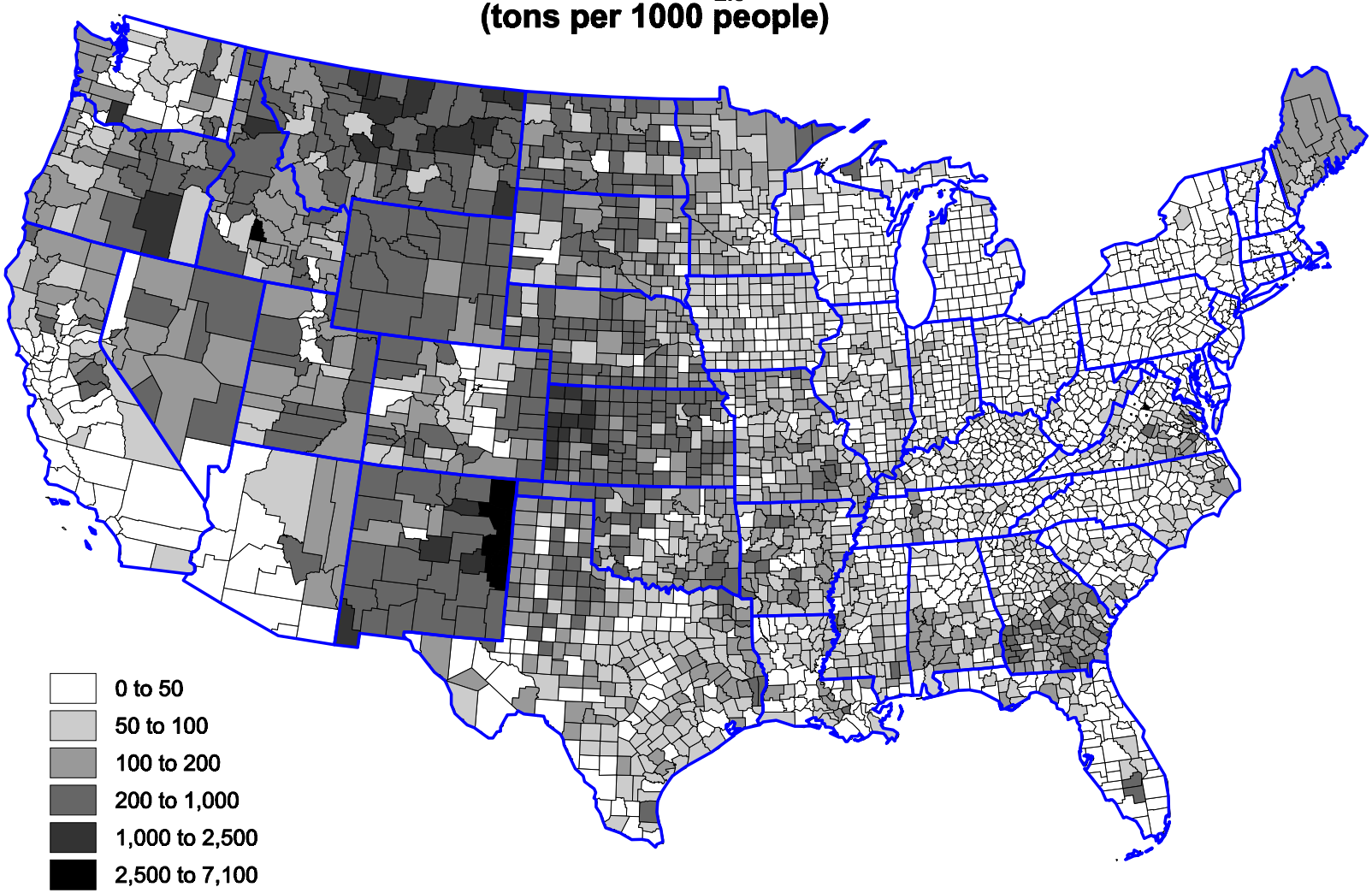


Figure VII-32
County-Level Density Map of Annual NH_3 Emissions for 2007 Base Case
(tons per 1000 people)

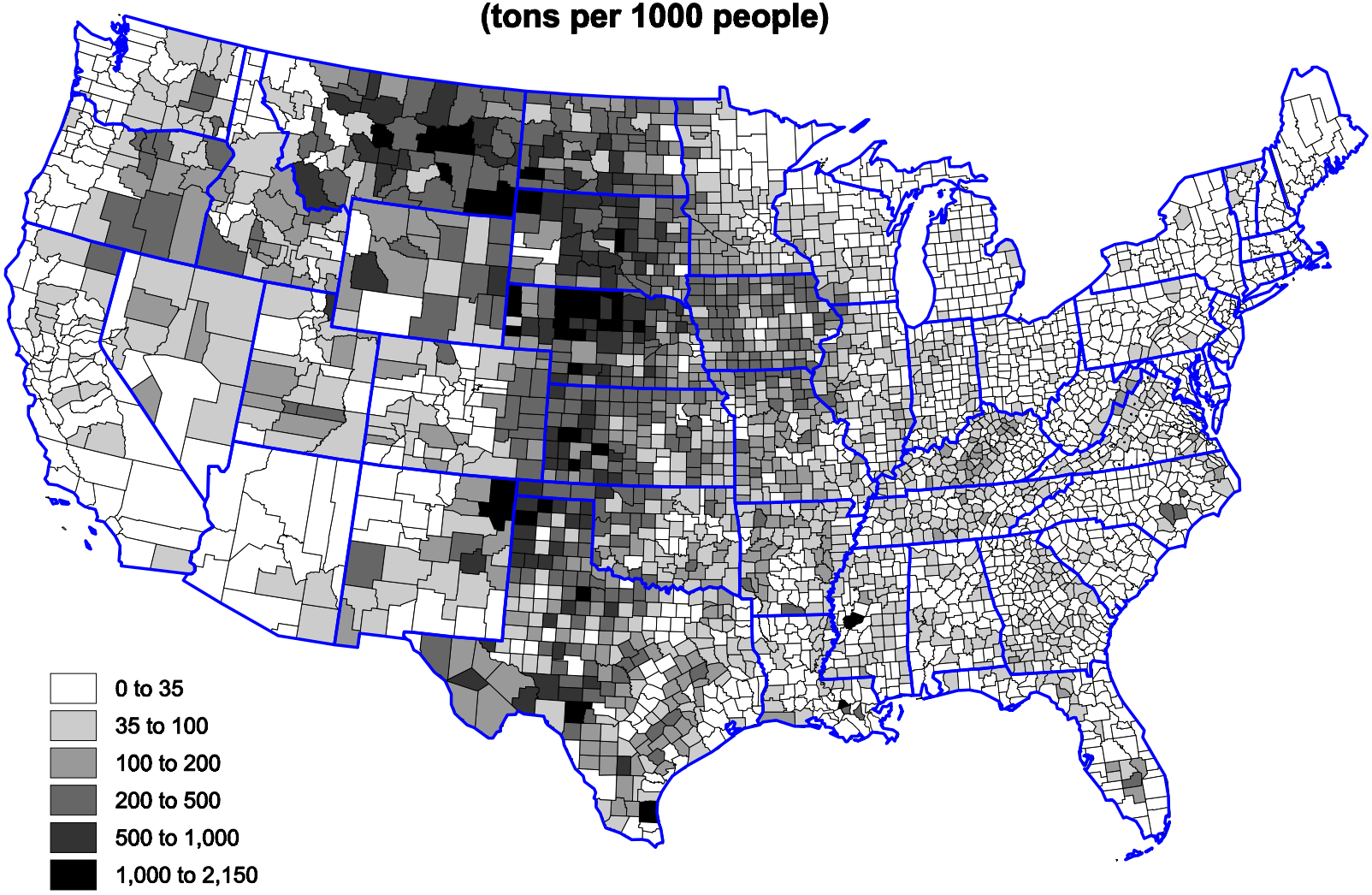


Figure VII-33
County-Level Density Map of Annual VOC Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons/square mile)

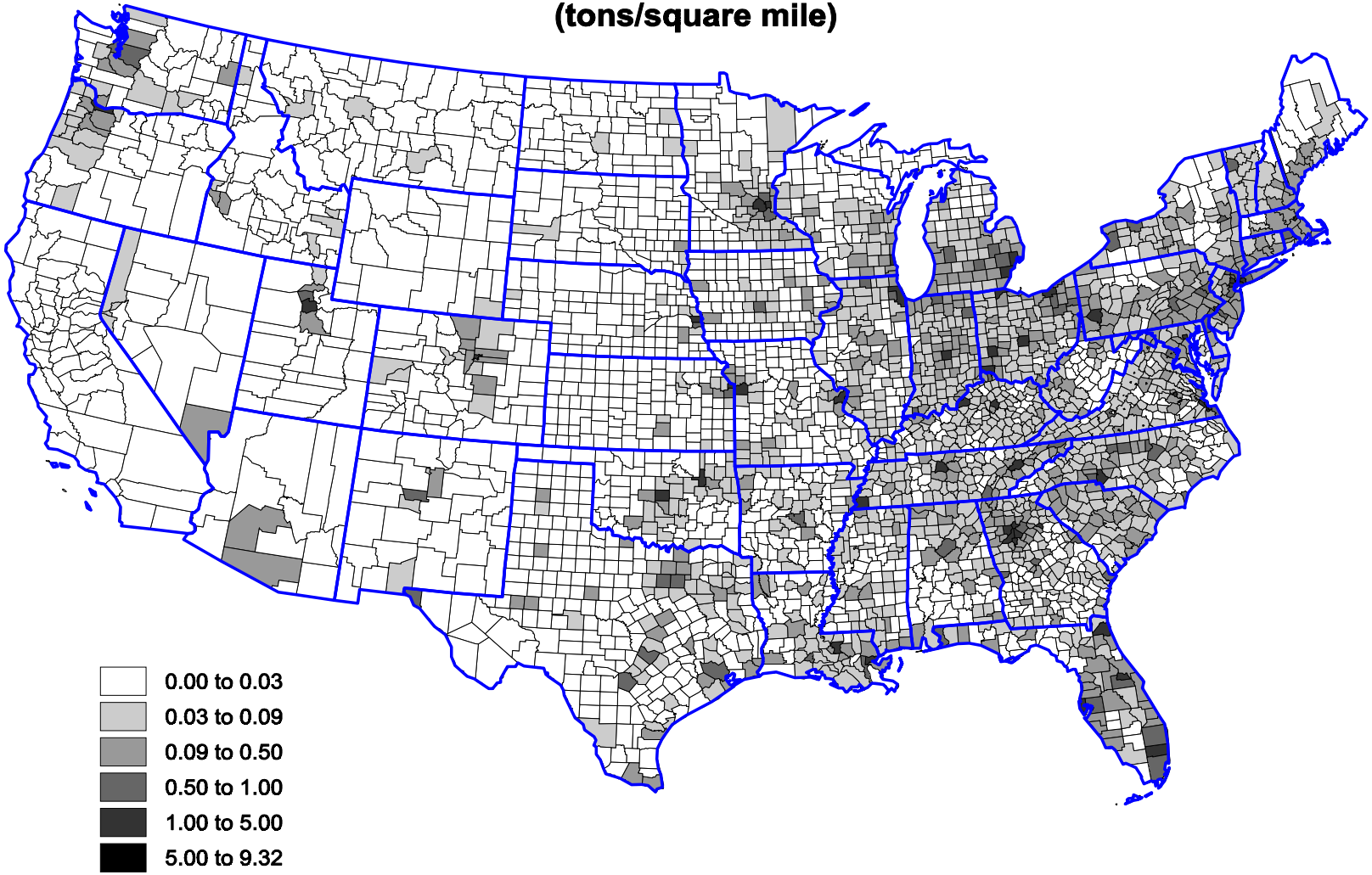


Figure VII-34
County-Level Density Map of Annual NO_x Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons/square mile)

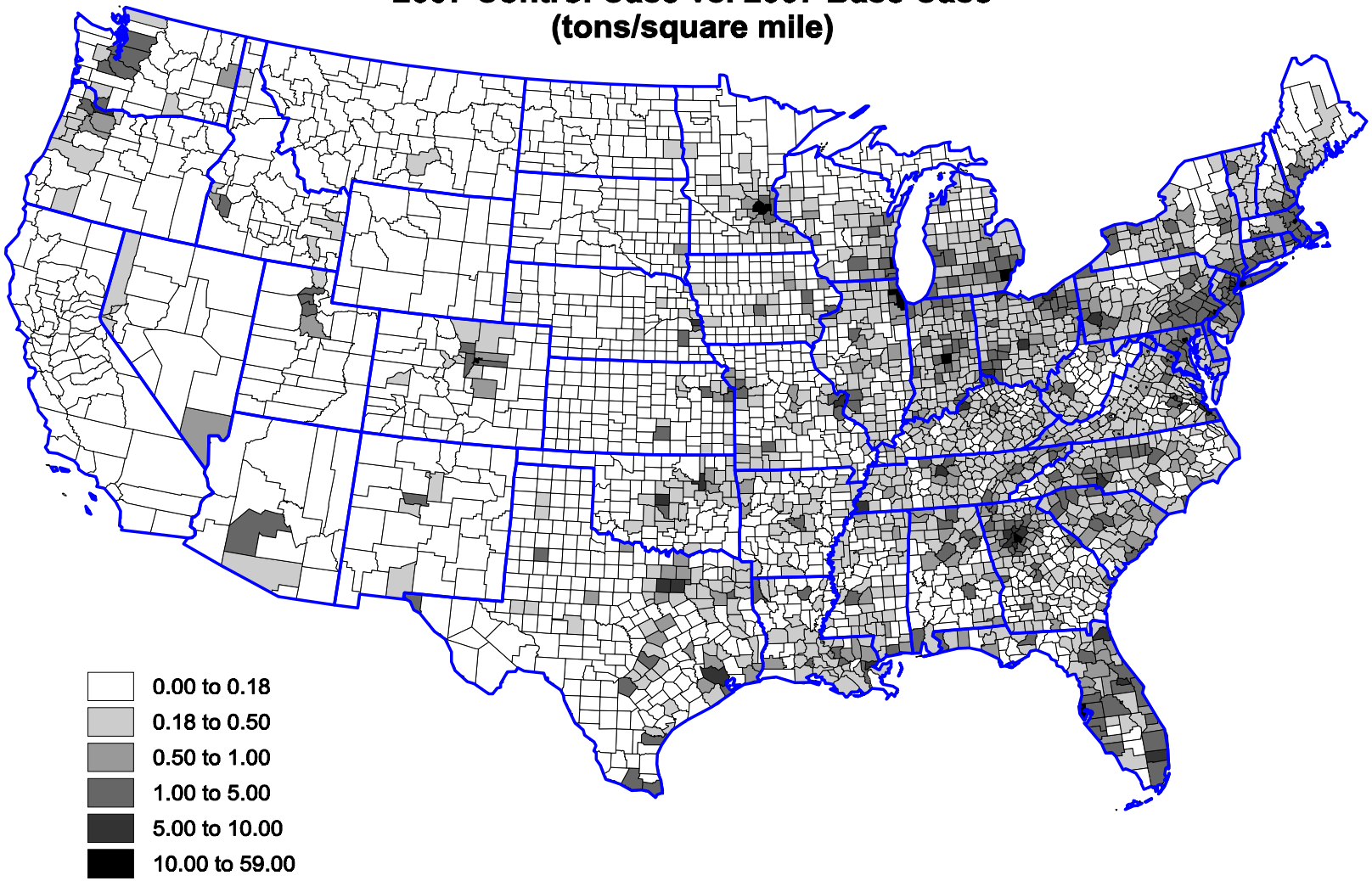


Figure VII-35
County-Level Density Map of Annual SOA Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons/square mile)

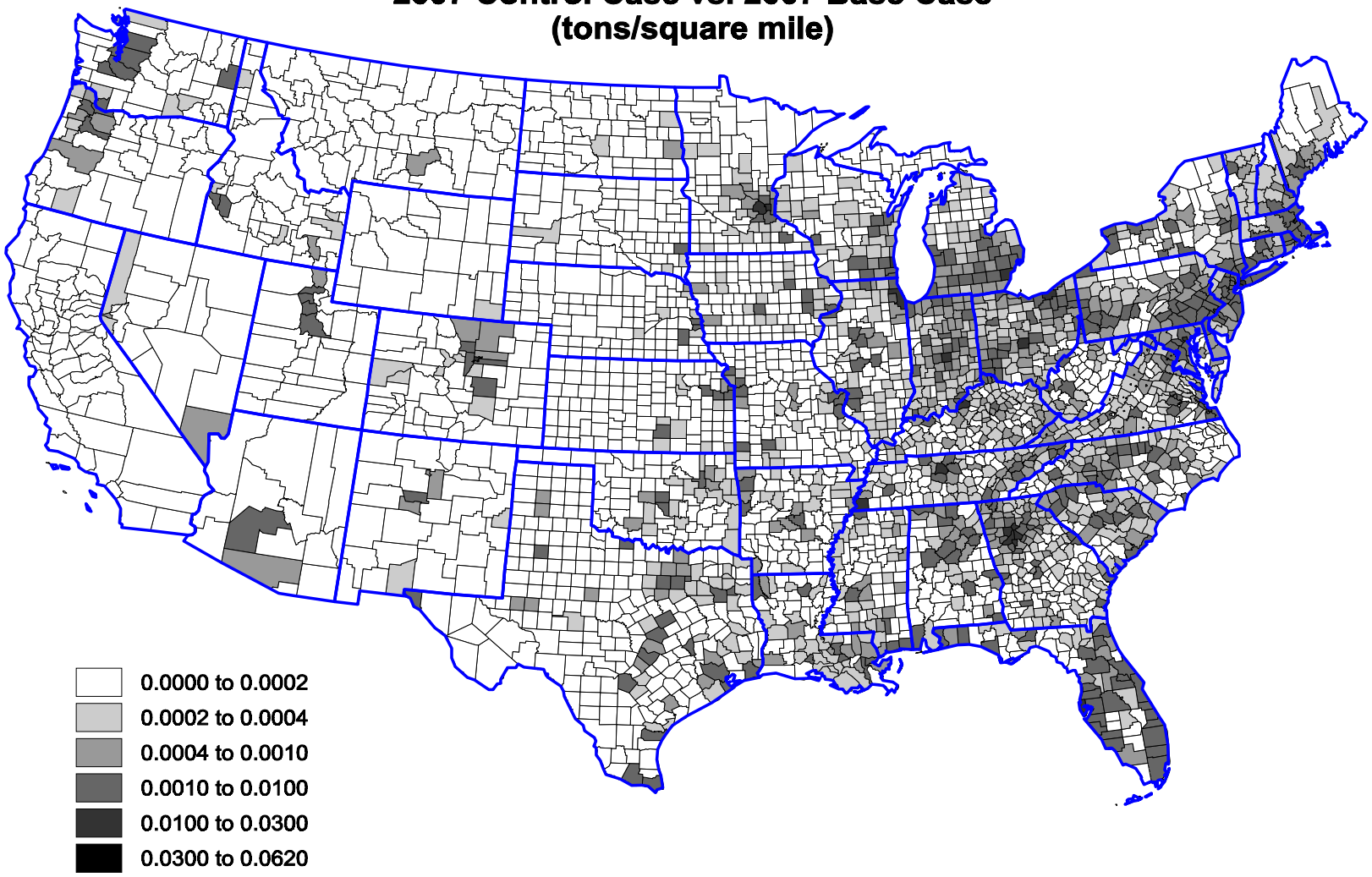


Figure VII-36
County-Level Density Map of Annual SO_2 Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons/square mile)

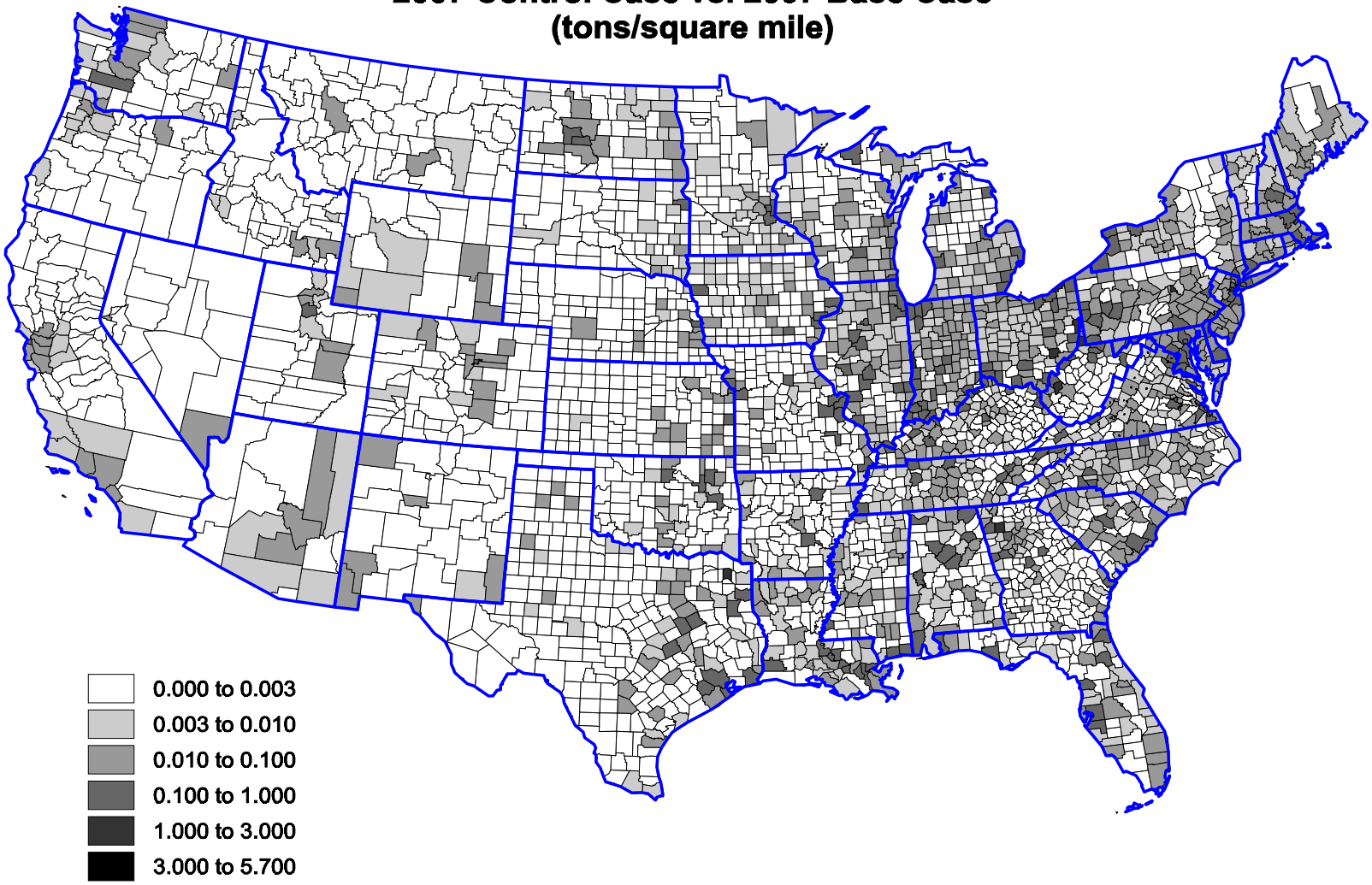


Figure VII-37
County-Level Density Map of Annual PM_{10} Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons/square mile)

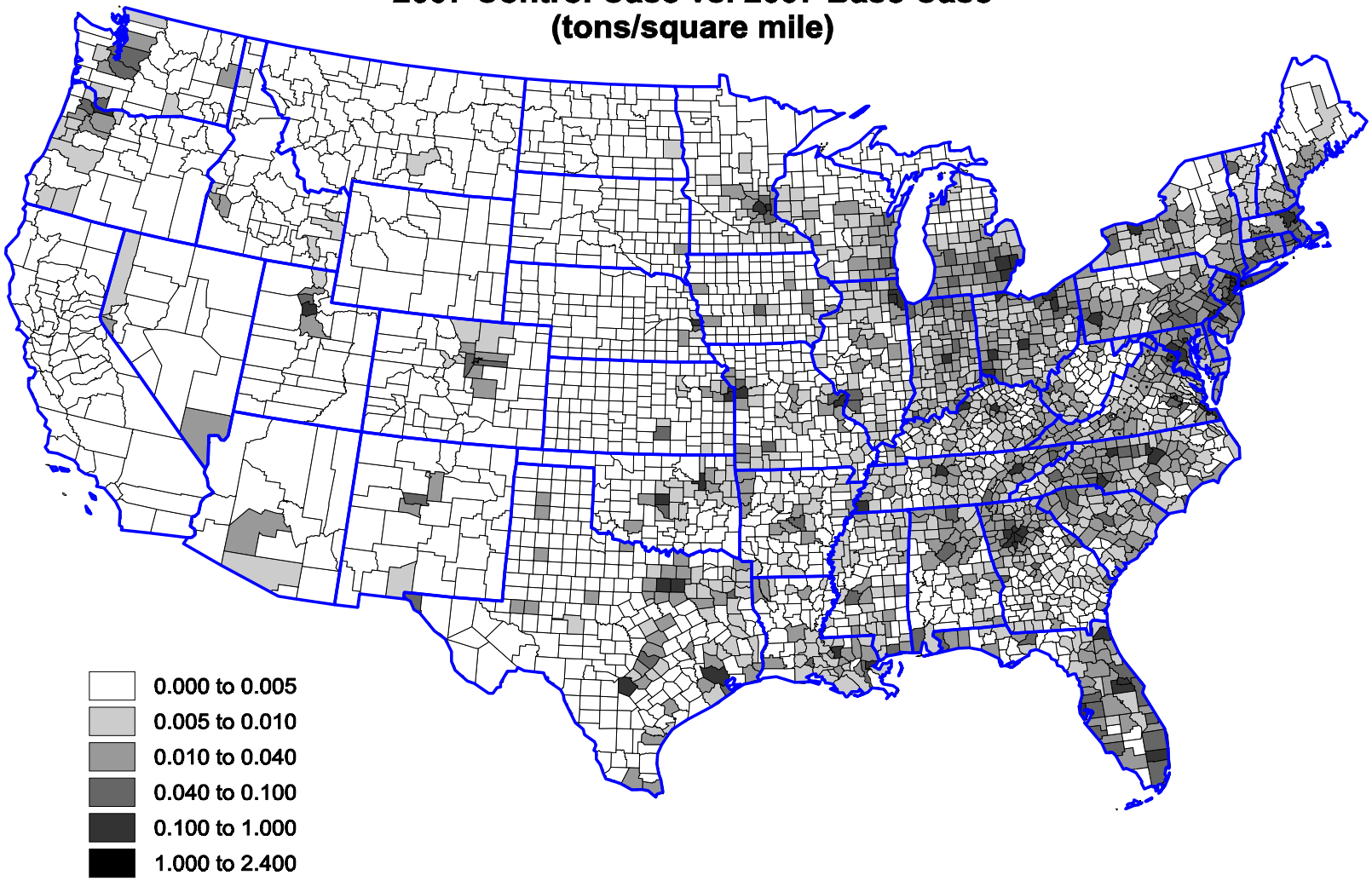


Figure VII-38
County-Level Density Map of Annual $PM_{2.5}$ Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons/square mile)

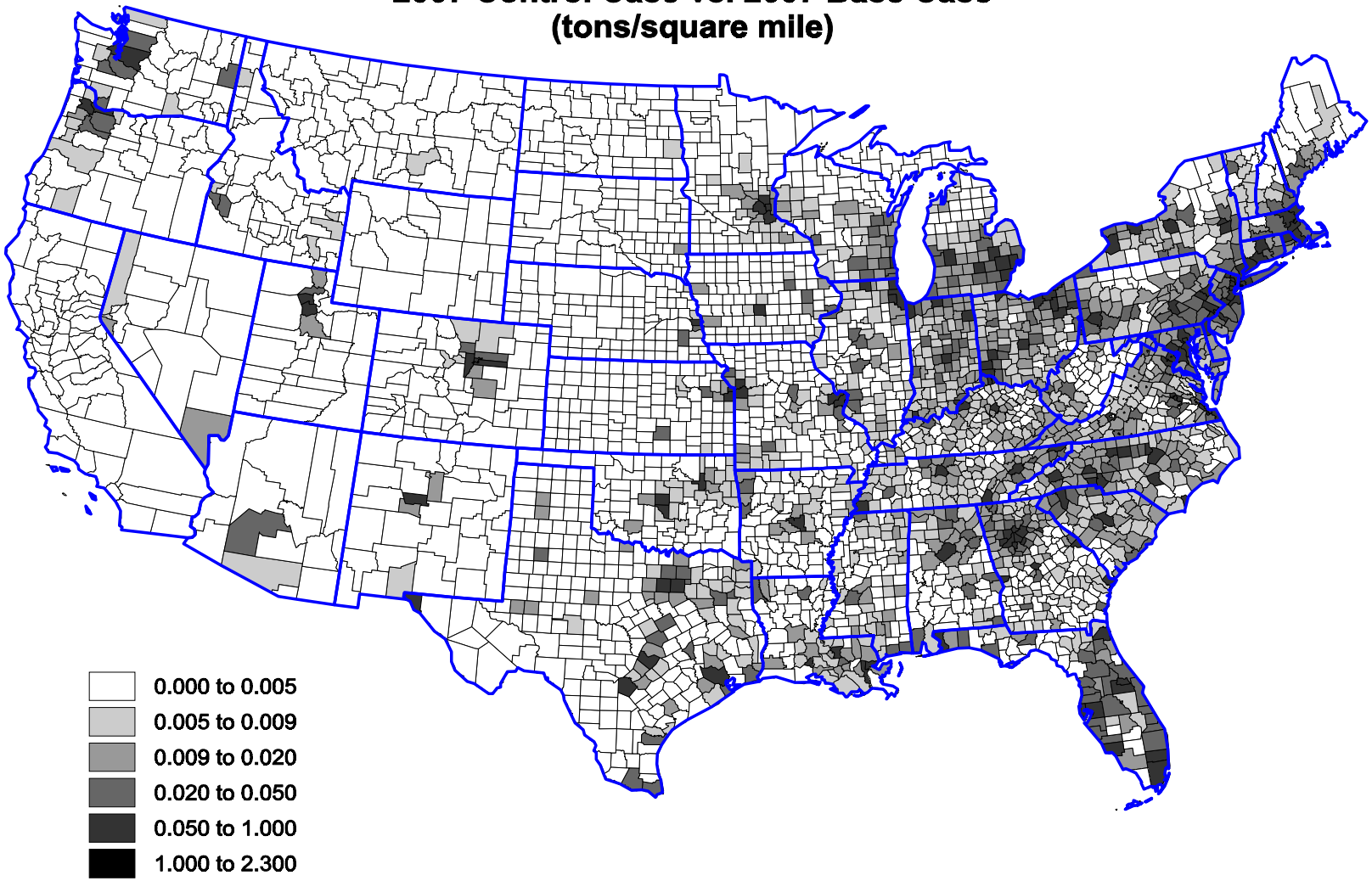


Figure VII-39
County-Level Density Map of Annual VOC Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons per 1000 people)

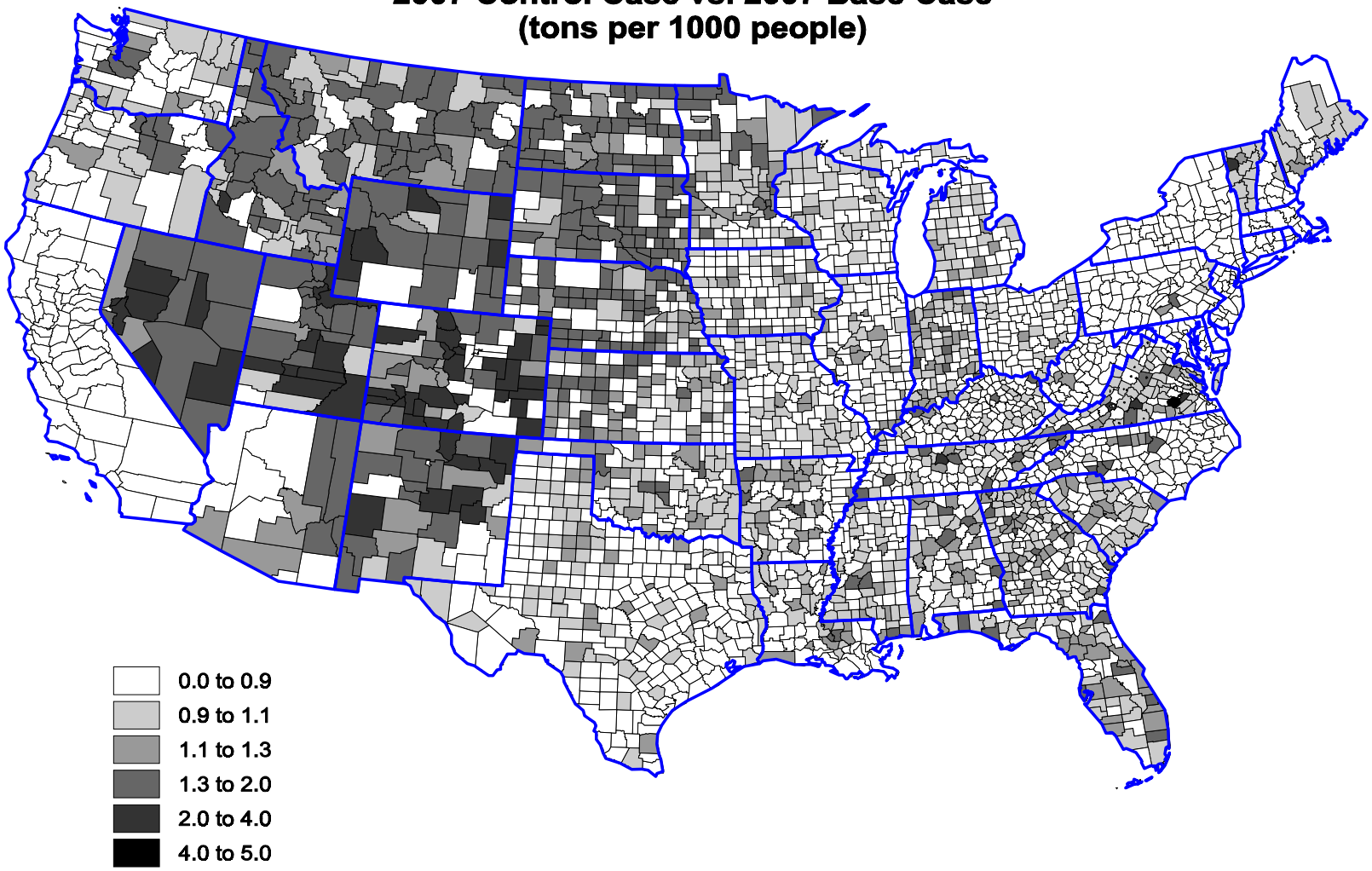


Figure VII-40
County-Level Density Map of Annual NO_x Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons per 1000 people)

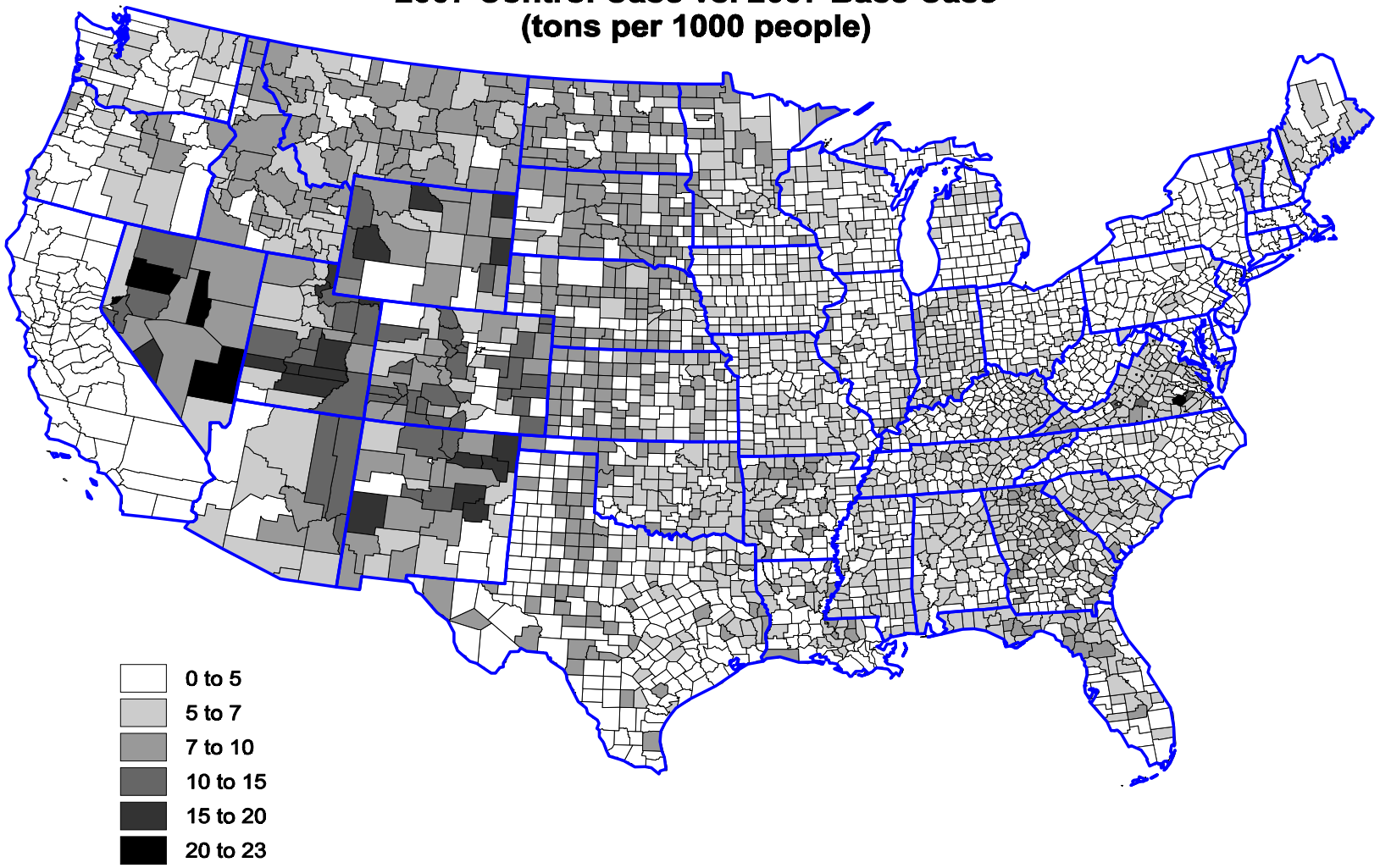


Figure VII-41
County-Level Density Map of Annual SOA Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons per 1000 people)

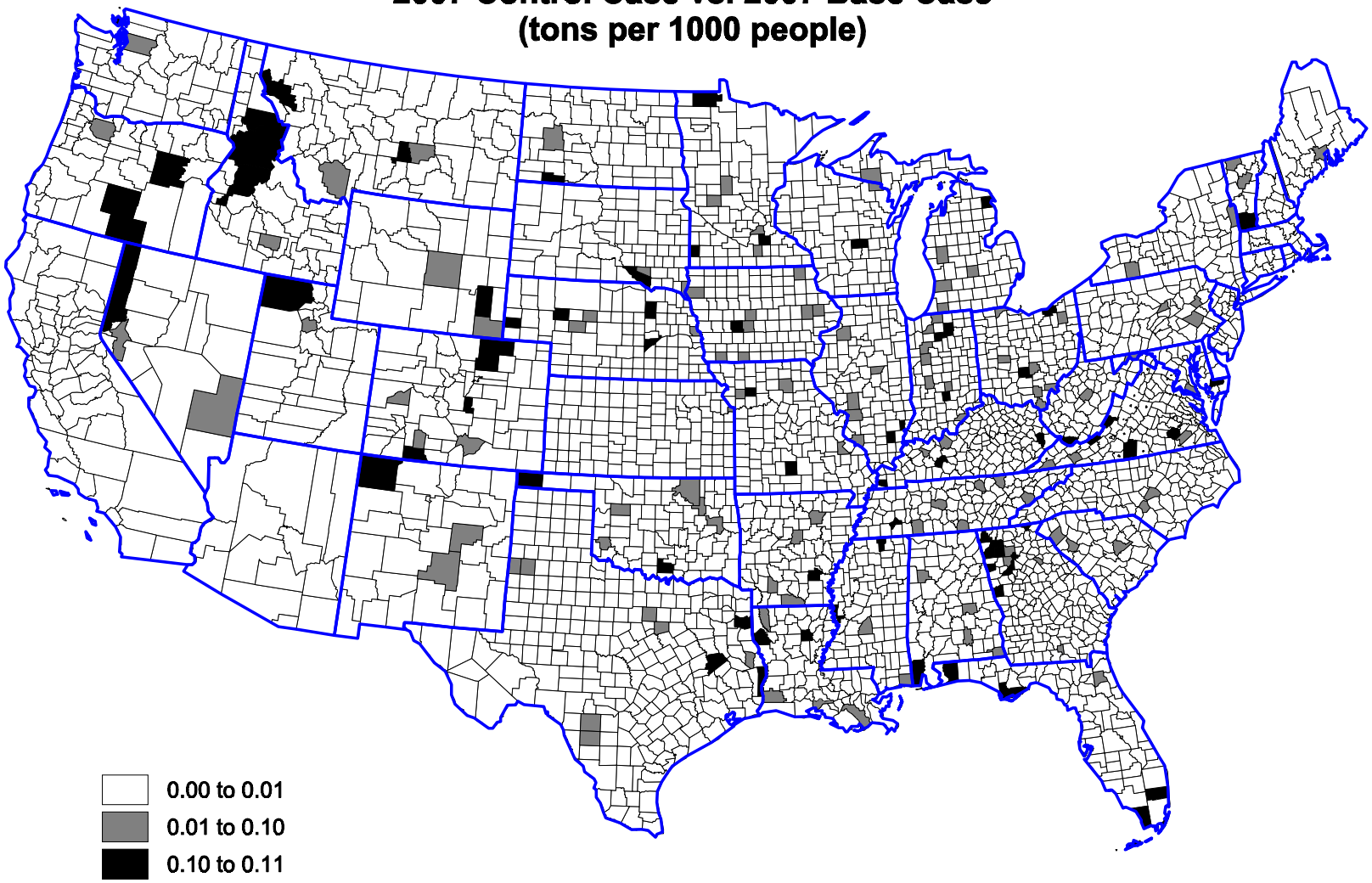


Figure VII-42
County-Level Density Map of Annual SO_2 Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons per 1000 people)

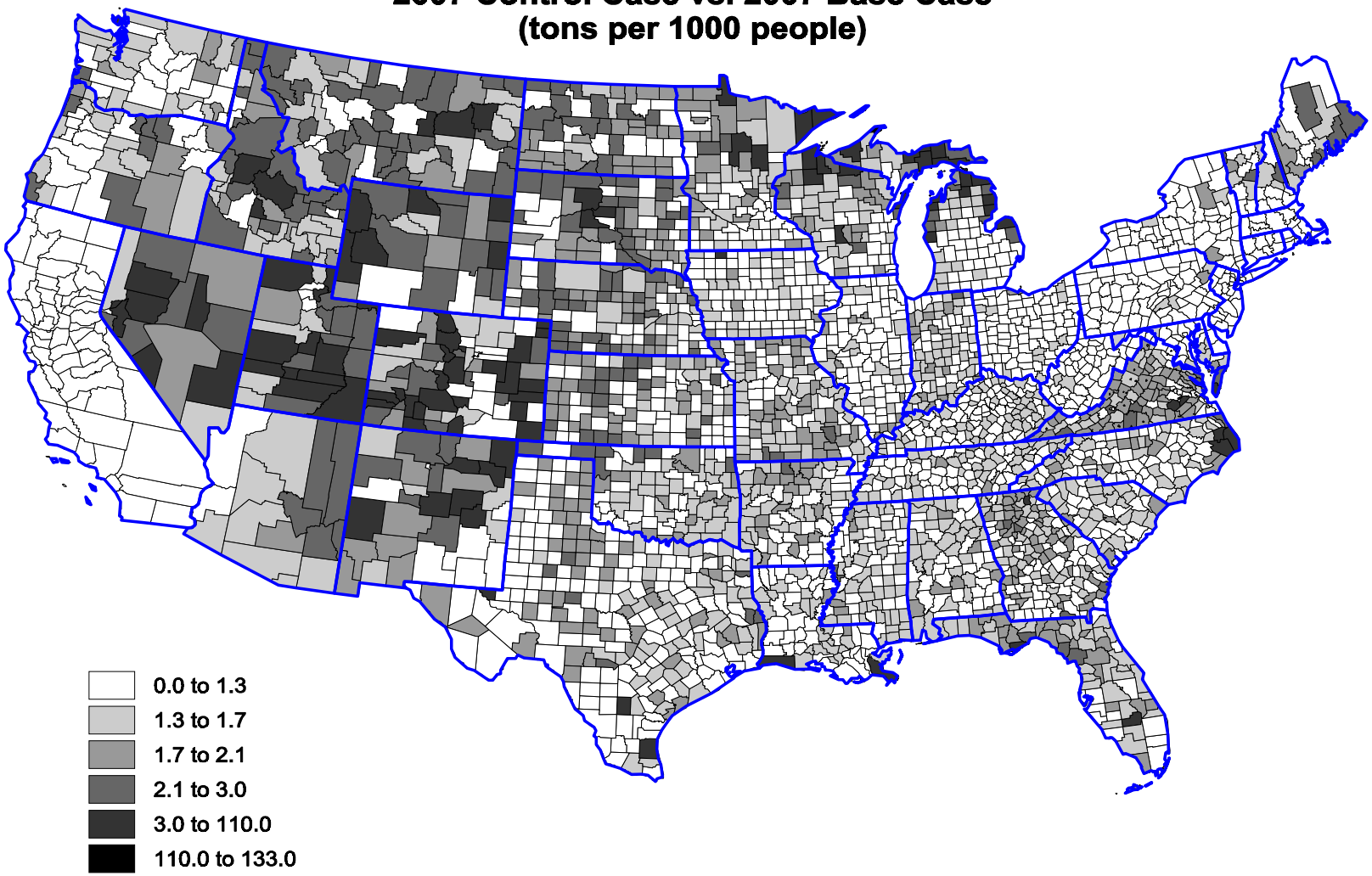


Figure VII-43
County-Level Density Map of Annual PM_{10} Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons per 1000 people)

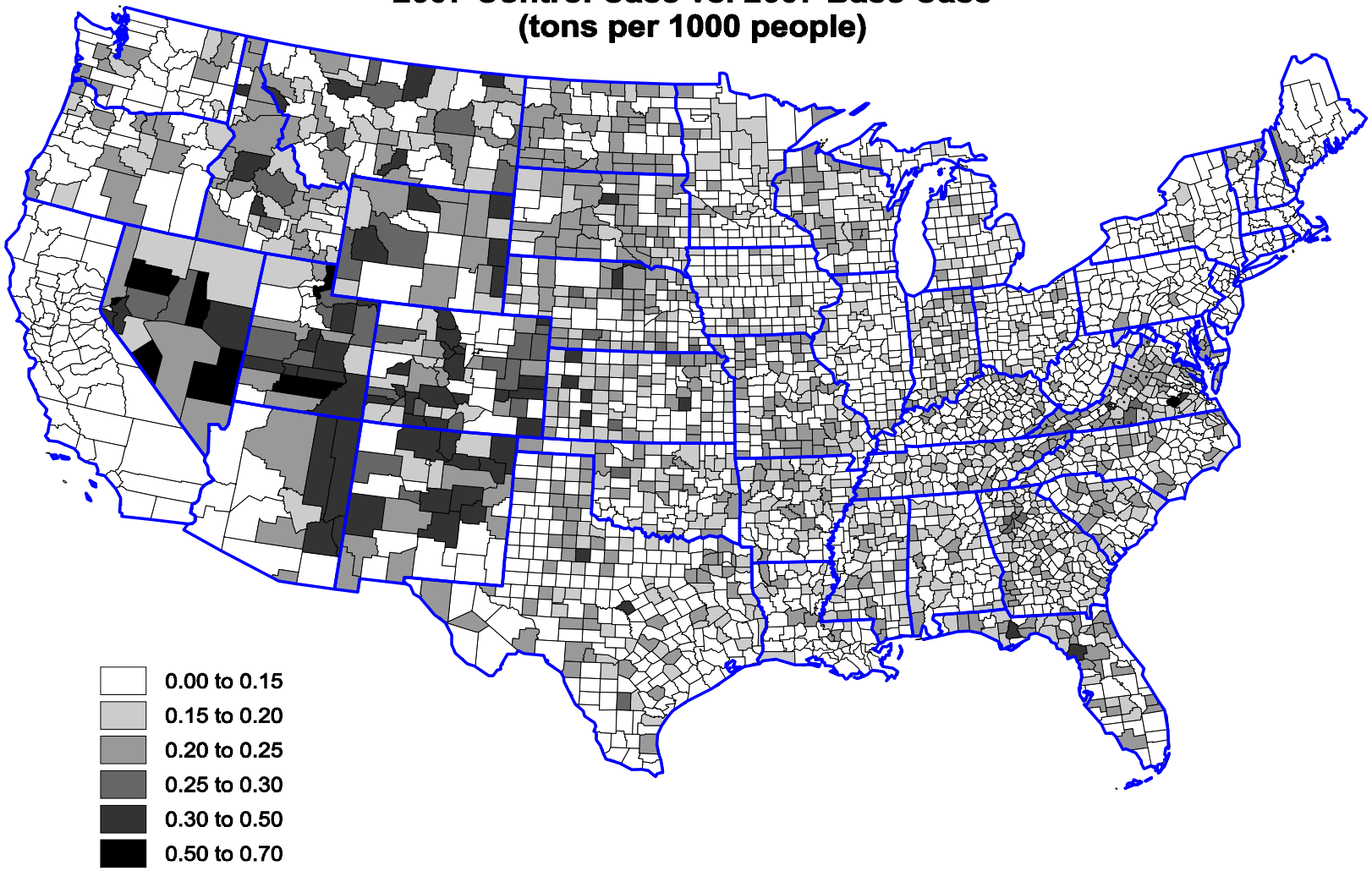


Figure VII-44
County-Level Density Map of Annual $PM_{2.5}$ Emission Reductions
2007 Control Case vs. 2007 Base Case
(tons per 1000 people)

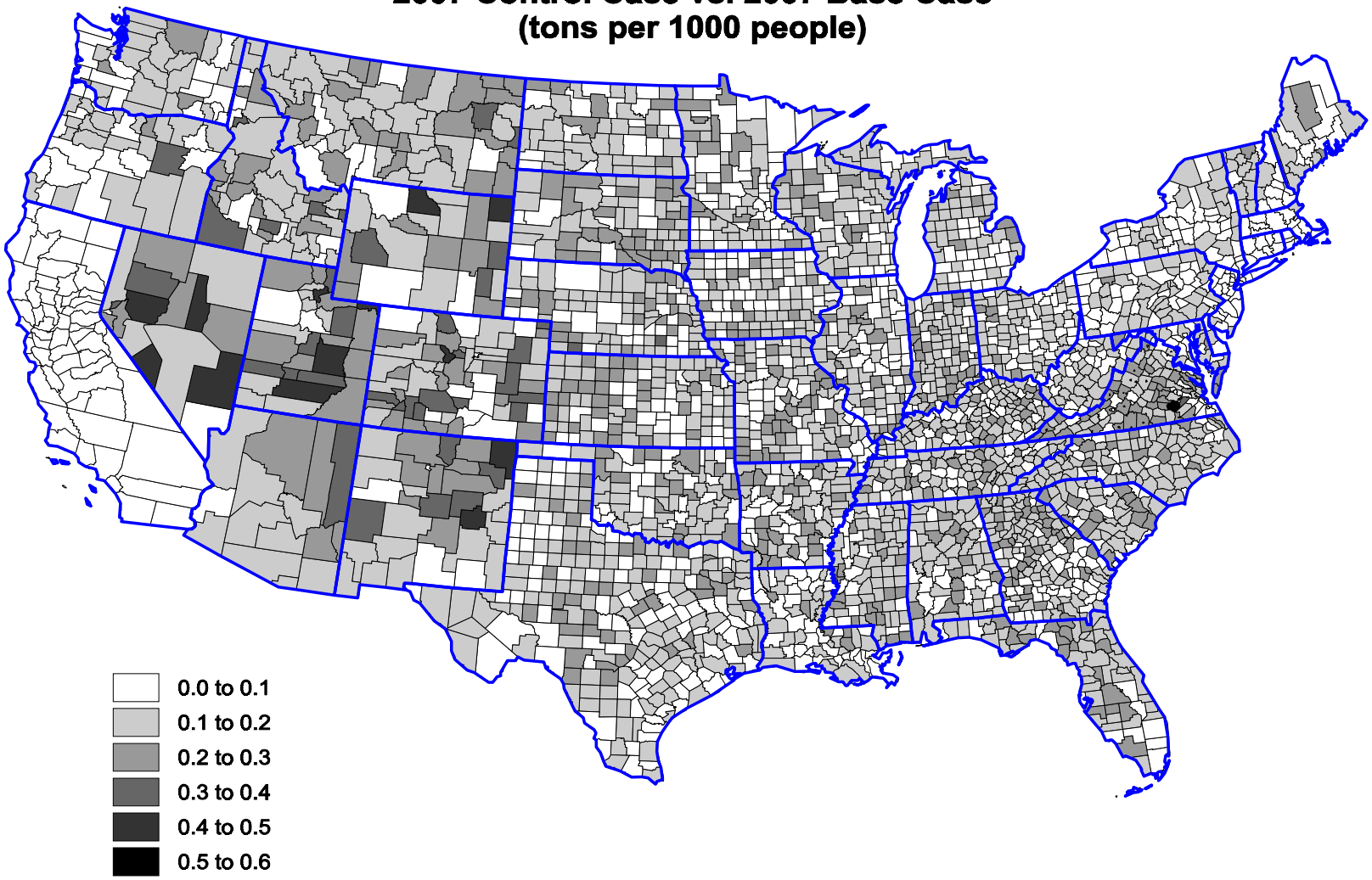


Figure VII-45
County-Level Density Map of Annual VOC Emissions for 2030 Base Case
(tons/square mile)

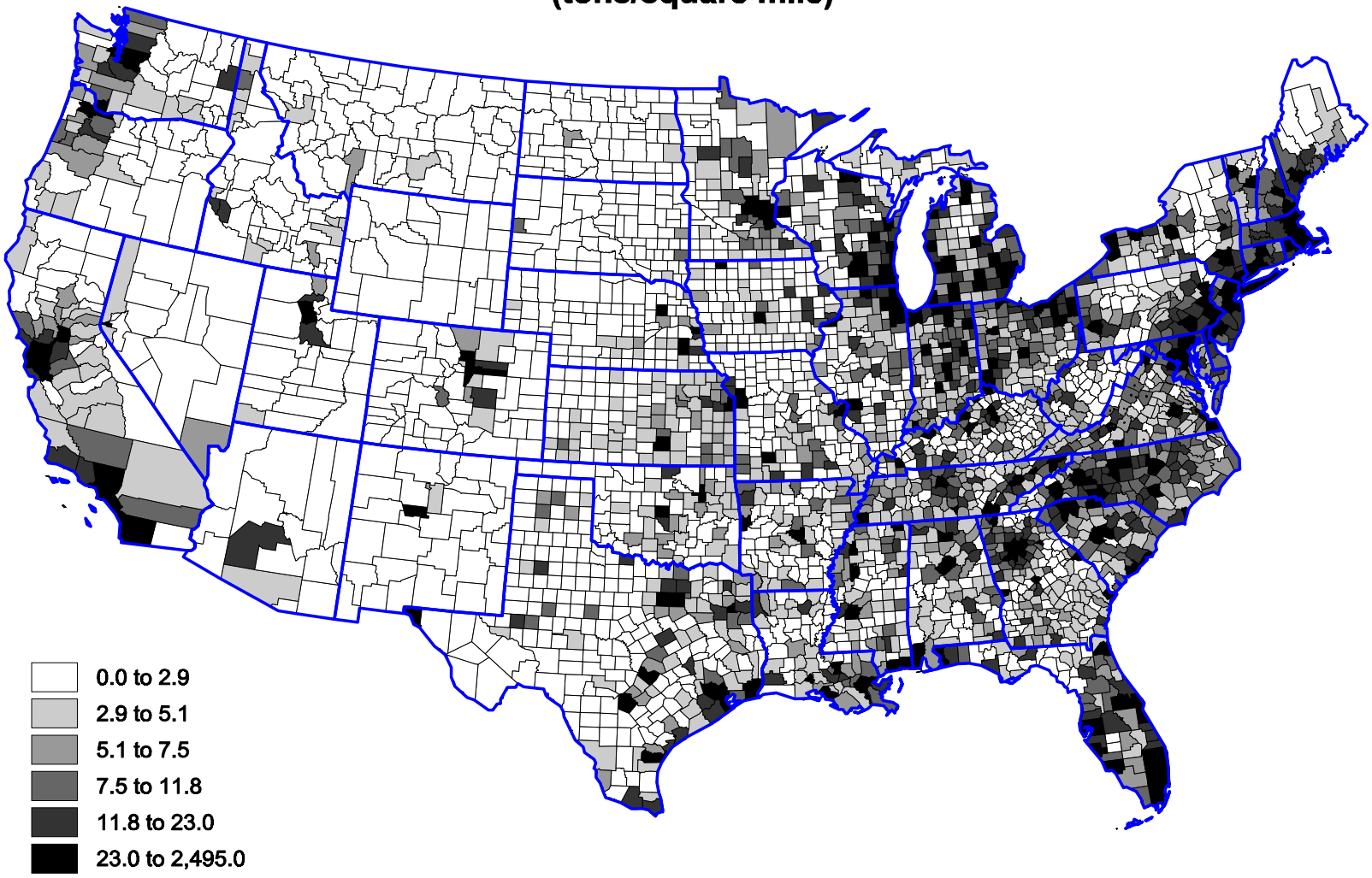


Figure VII-46
County-Level Density Map of Annual NO_x Emissions for 2030 Base Case
(tons/square mile)

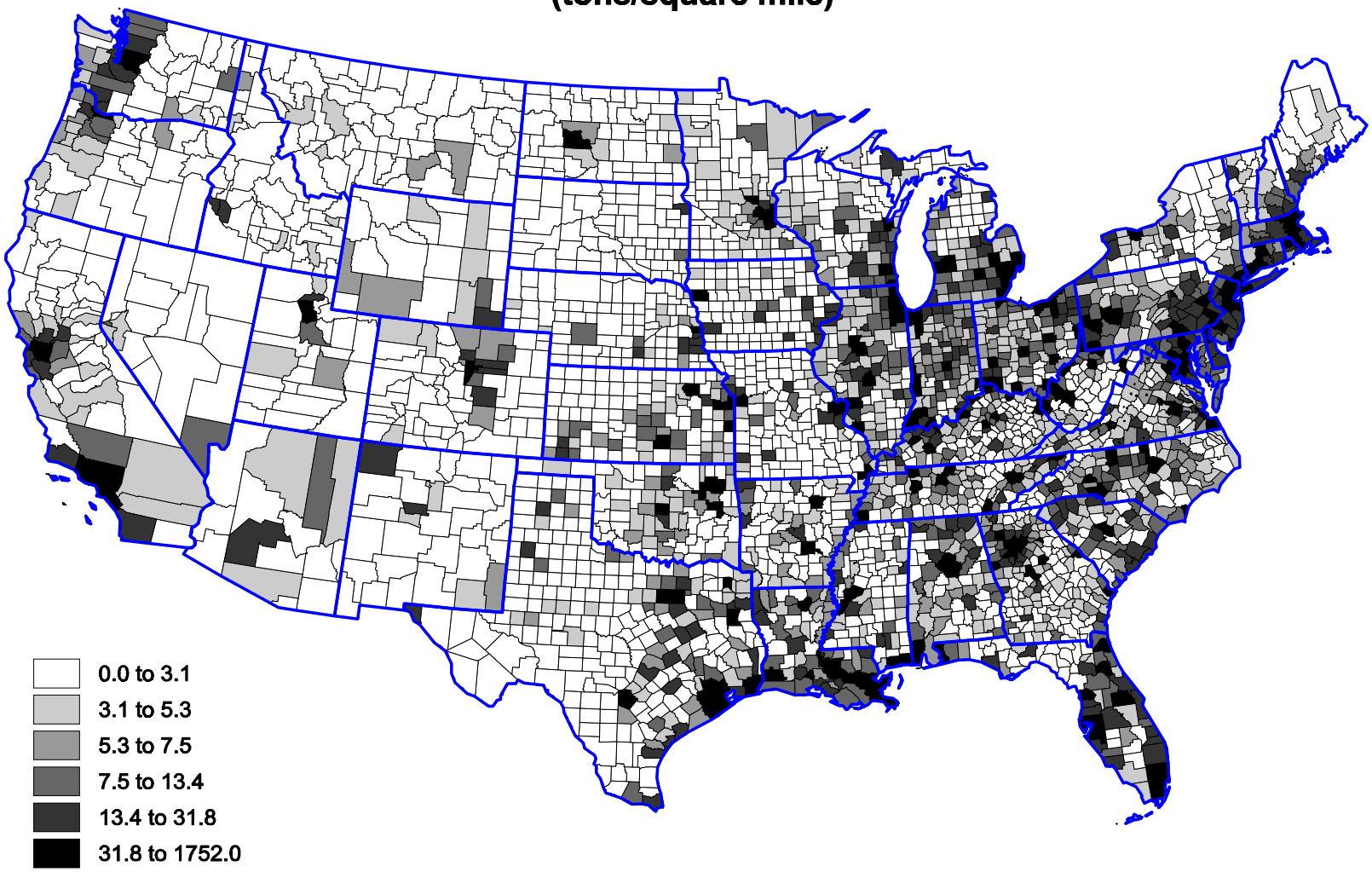


Figure VII-47
County-Level Density Map of Annual CO Emissions for 2030 Base Case
(tons/square mile)

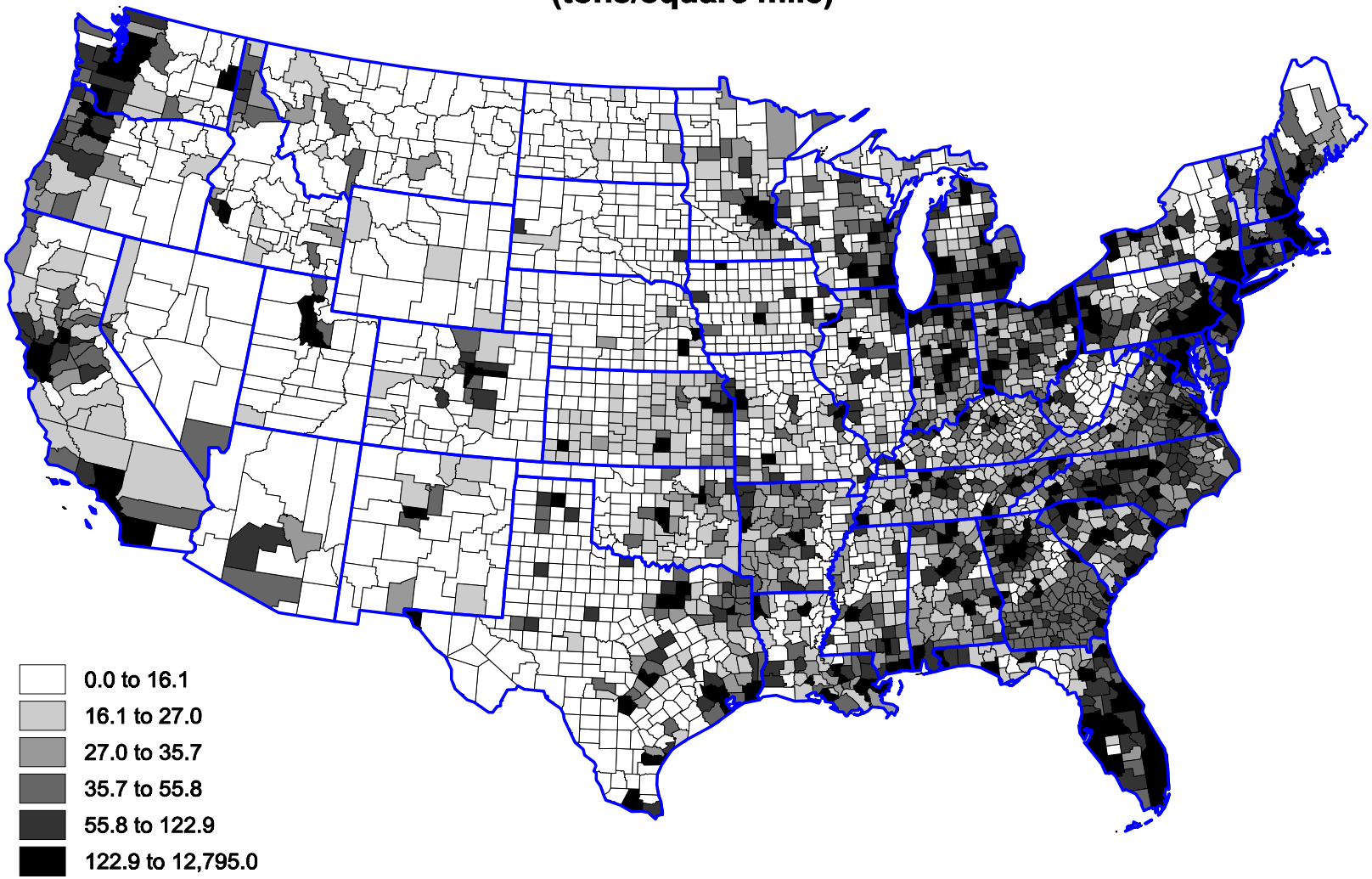


Figure VII-48
County-Level Density Map of Annual SOA Emissions for 2030 Base Case
(tons/square mile)

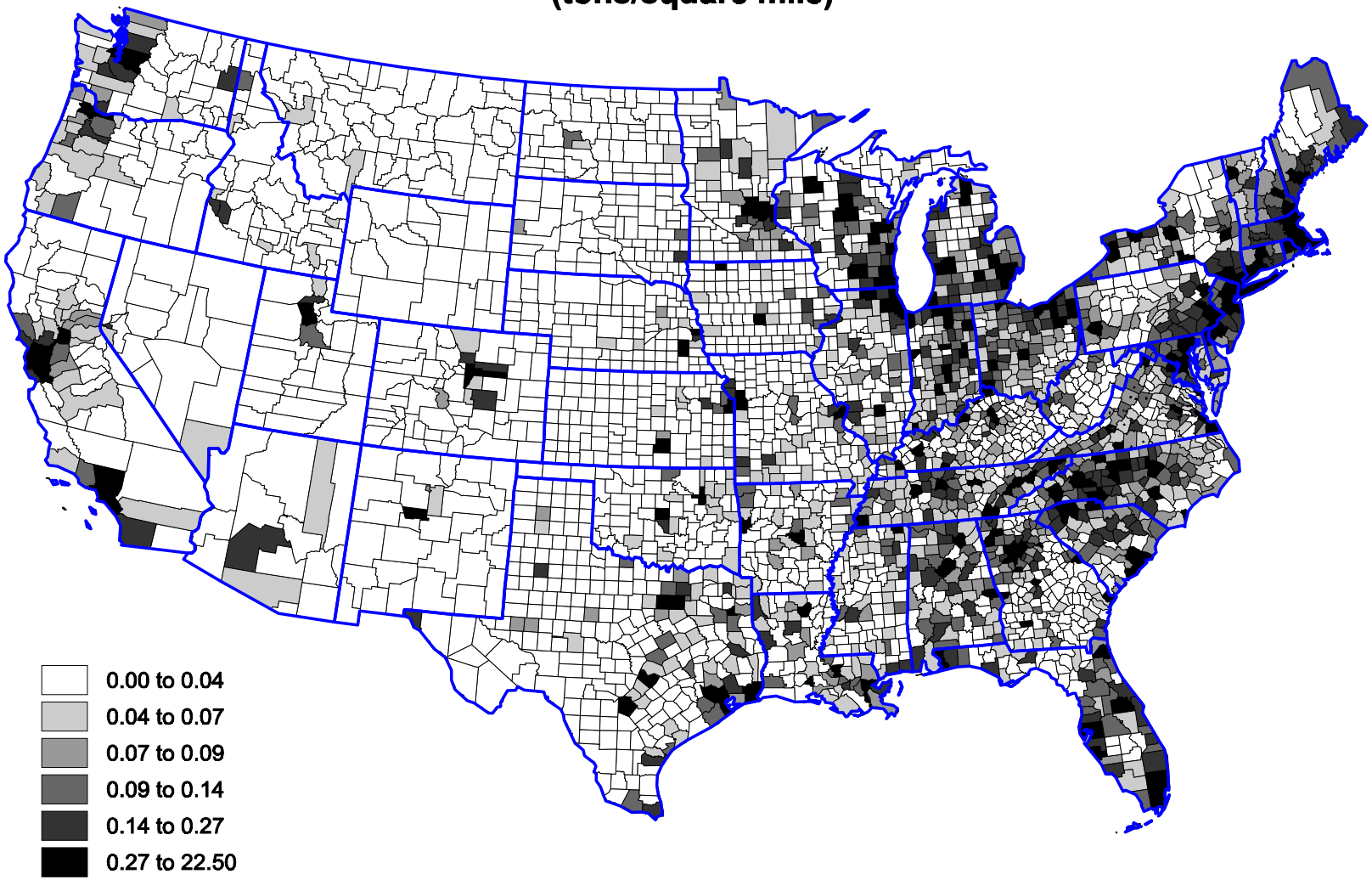


Figure VII-49
County-Level Density Map of Annual SO_2 Emissions for 2030 Base Case
(tons/square mile)

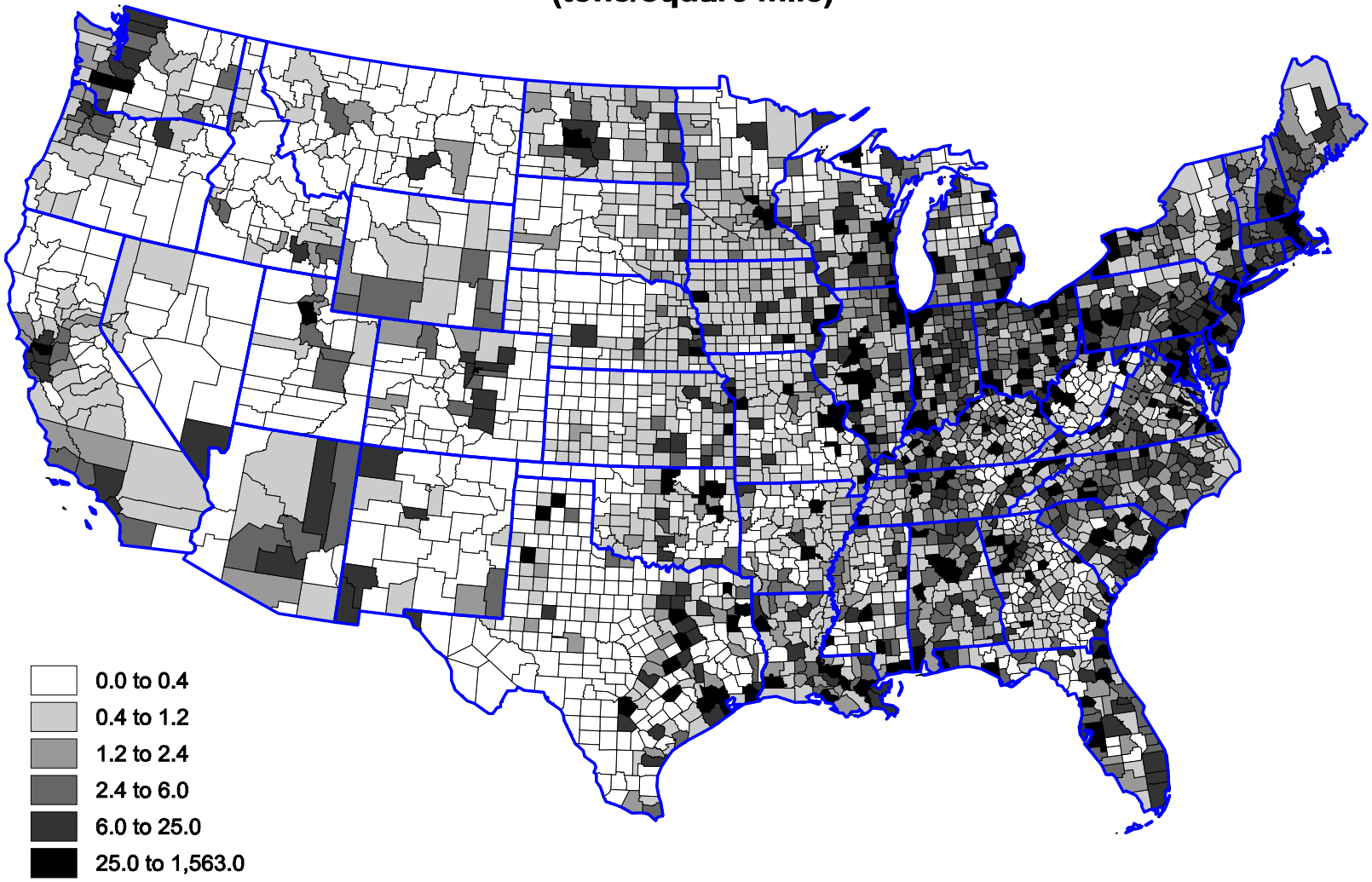


Figure VII-50
County-Level Density Map of Annual PM_{10} Emissions for 2030 Base Case
(tons/square mile)

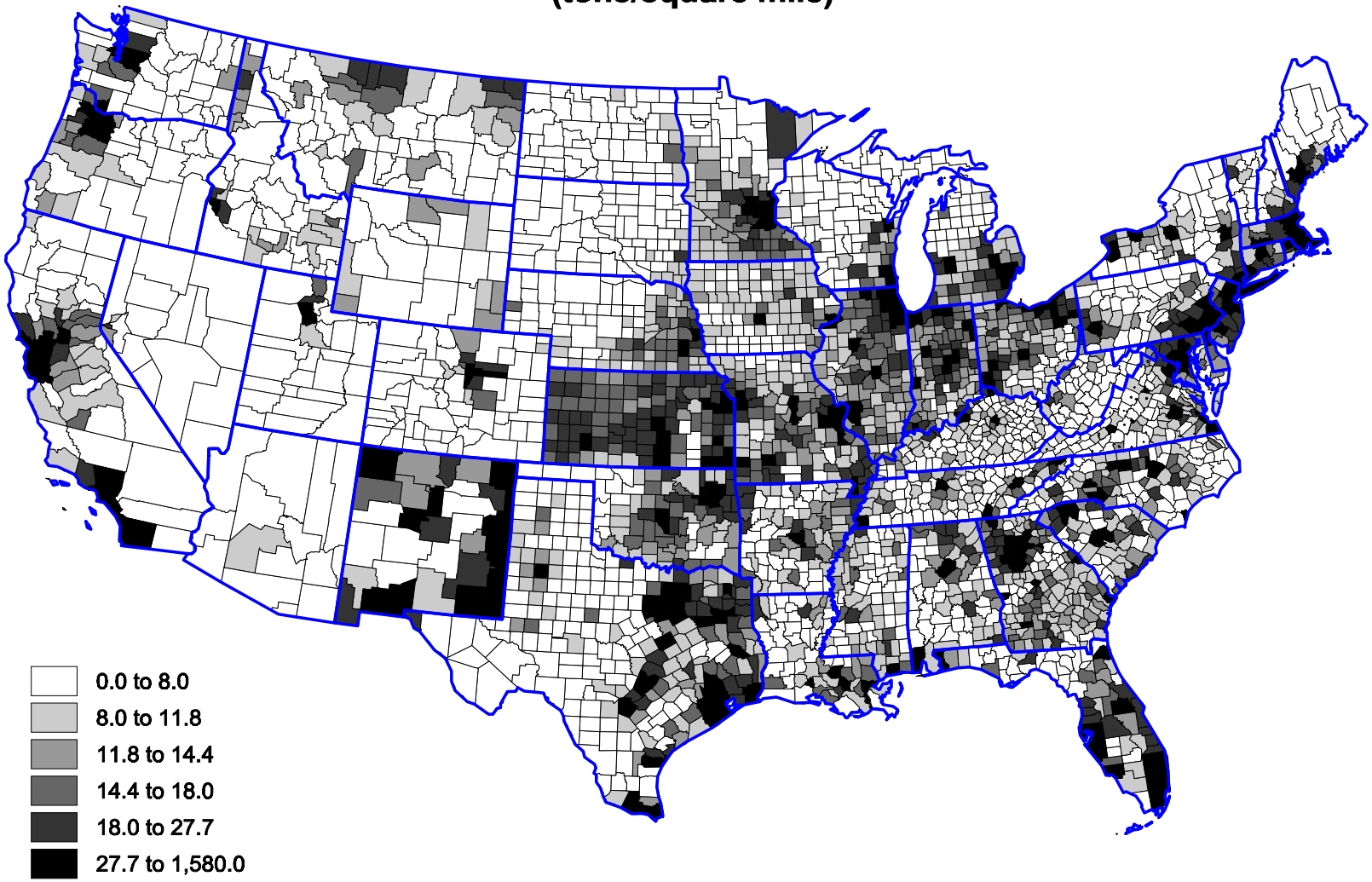


Figure VII-51
County-Level Density Map of Annual $PM_{2.5}$ Emissions for 2030 Base Case
(tons/square mile)

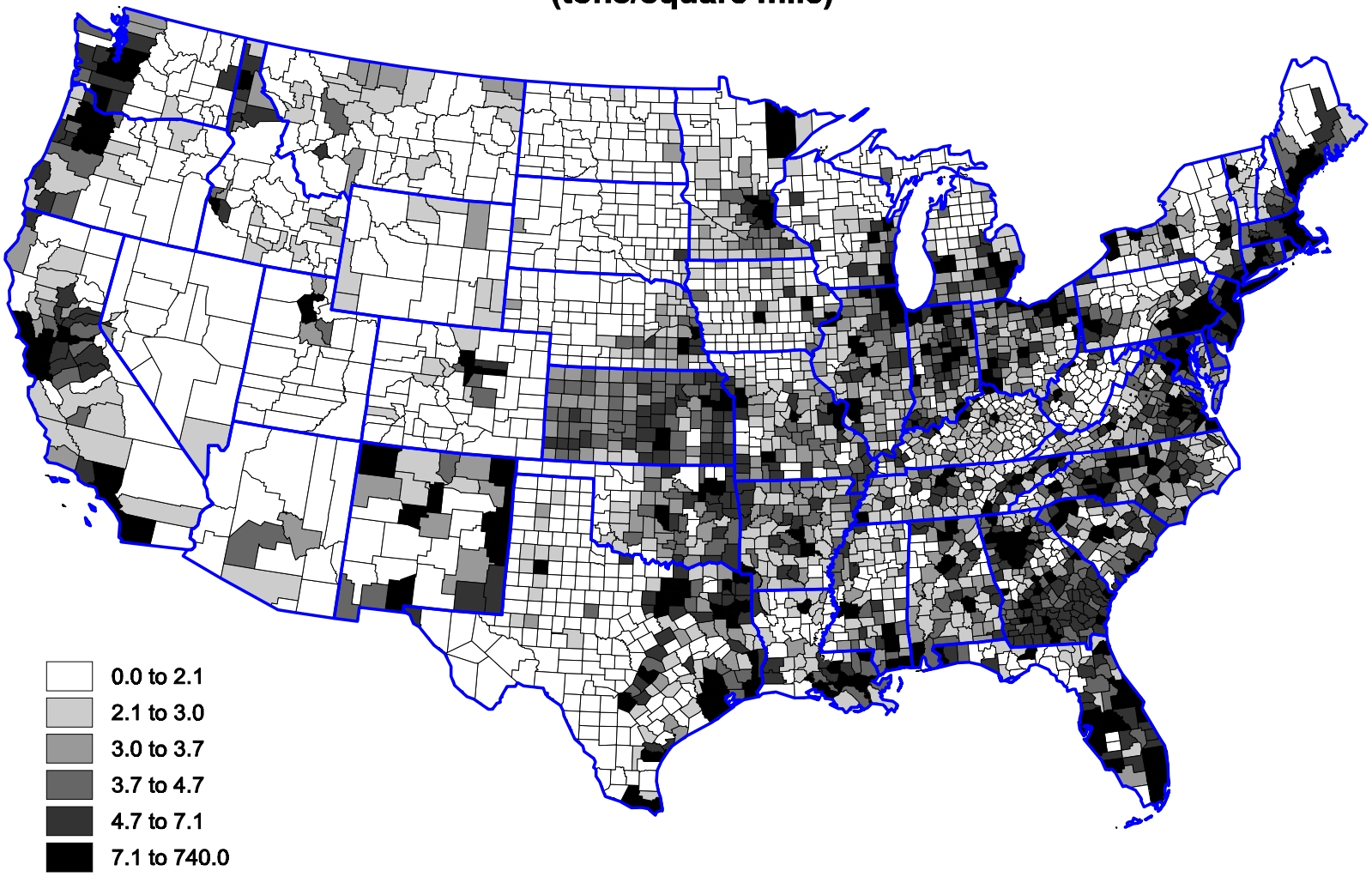


Figure VII-52
County-Level Density Map of Annual NH_3 Emissions for 2030 Base Case
(tons/square mile)

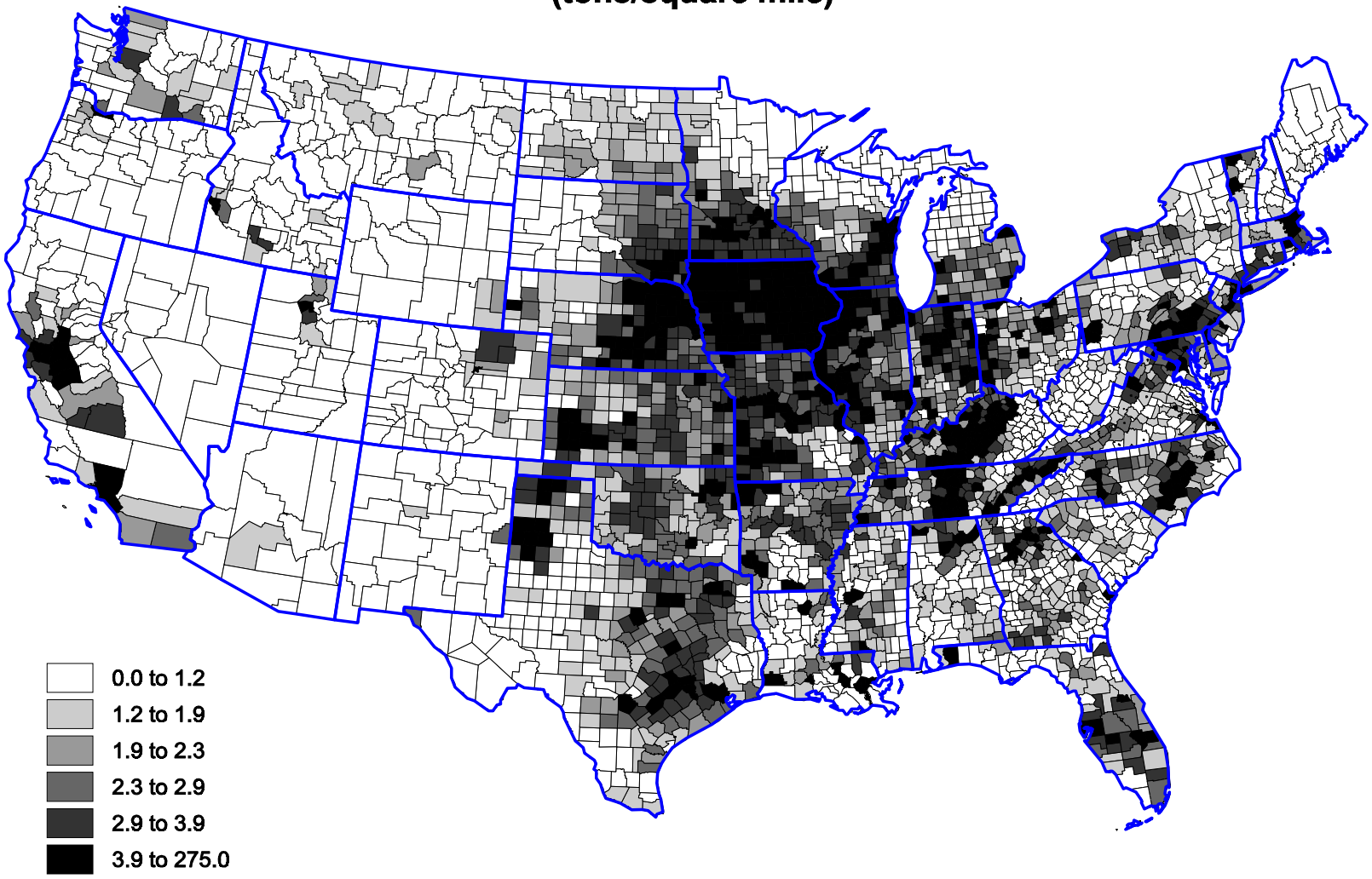


Figure VII-53
County-Level Density Map of Annual VOC Emissions for 2030 Base Case
(tons per 1000 people)

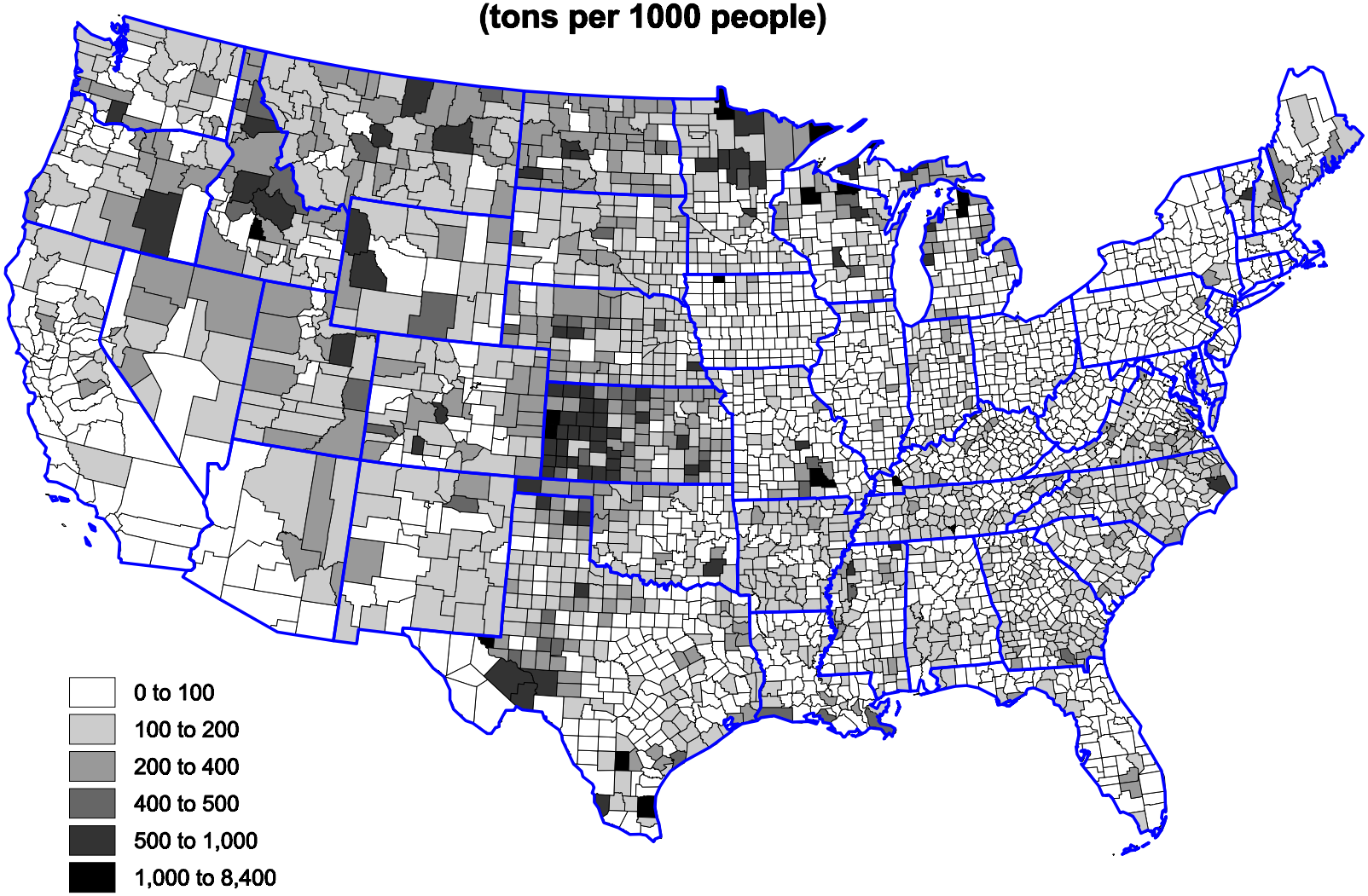


Figure VII-54
County-Level Density Map of Annual NO_x Emissions for 2030 Base Case
(tons per 1000 people)

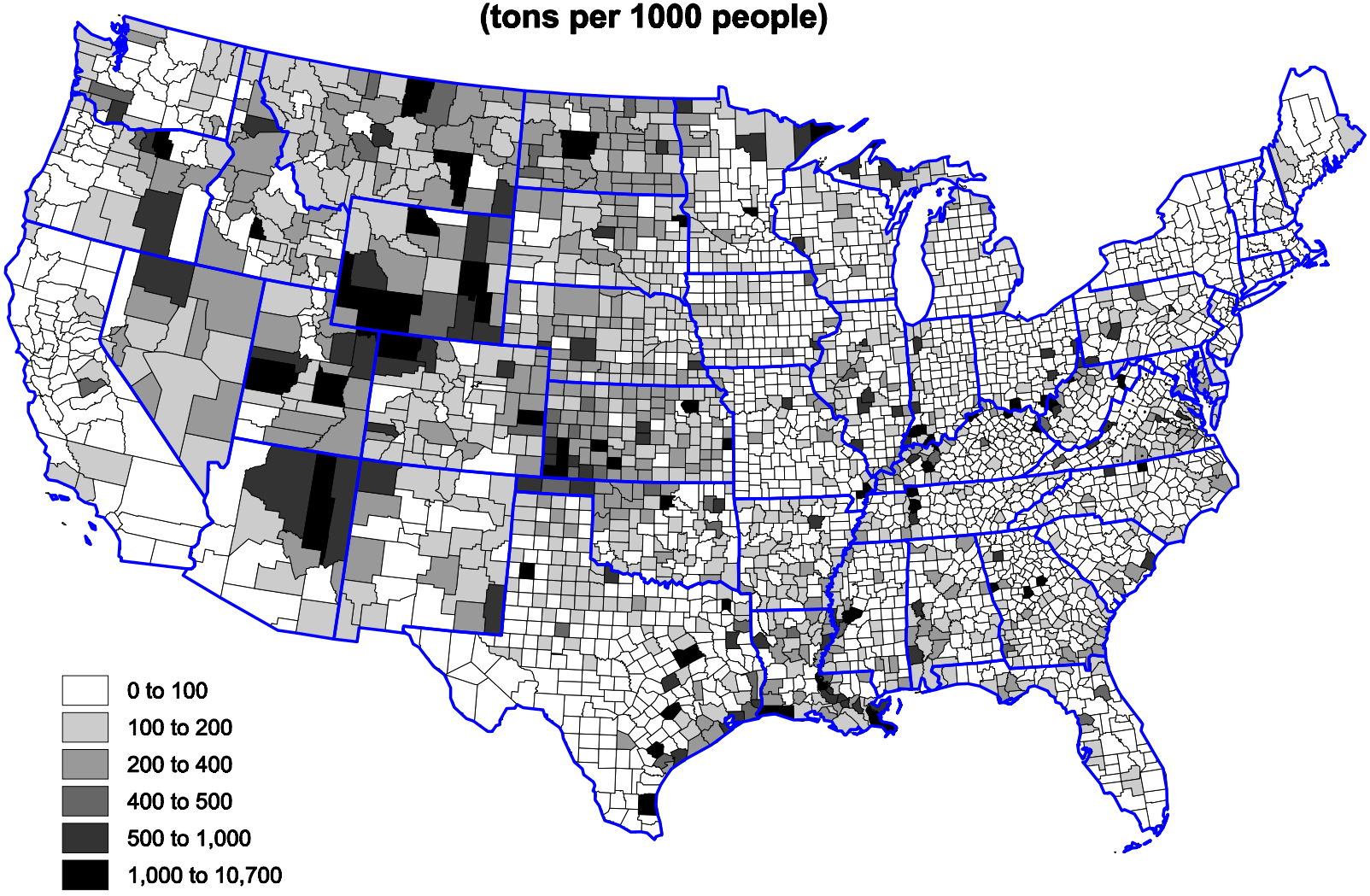


Figure VII-55
County-Level Density Map of Annual CO Emissions for 2030 Base Case
(tons per 1000 people)

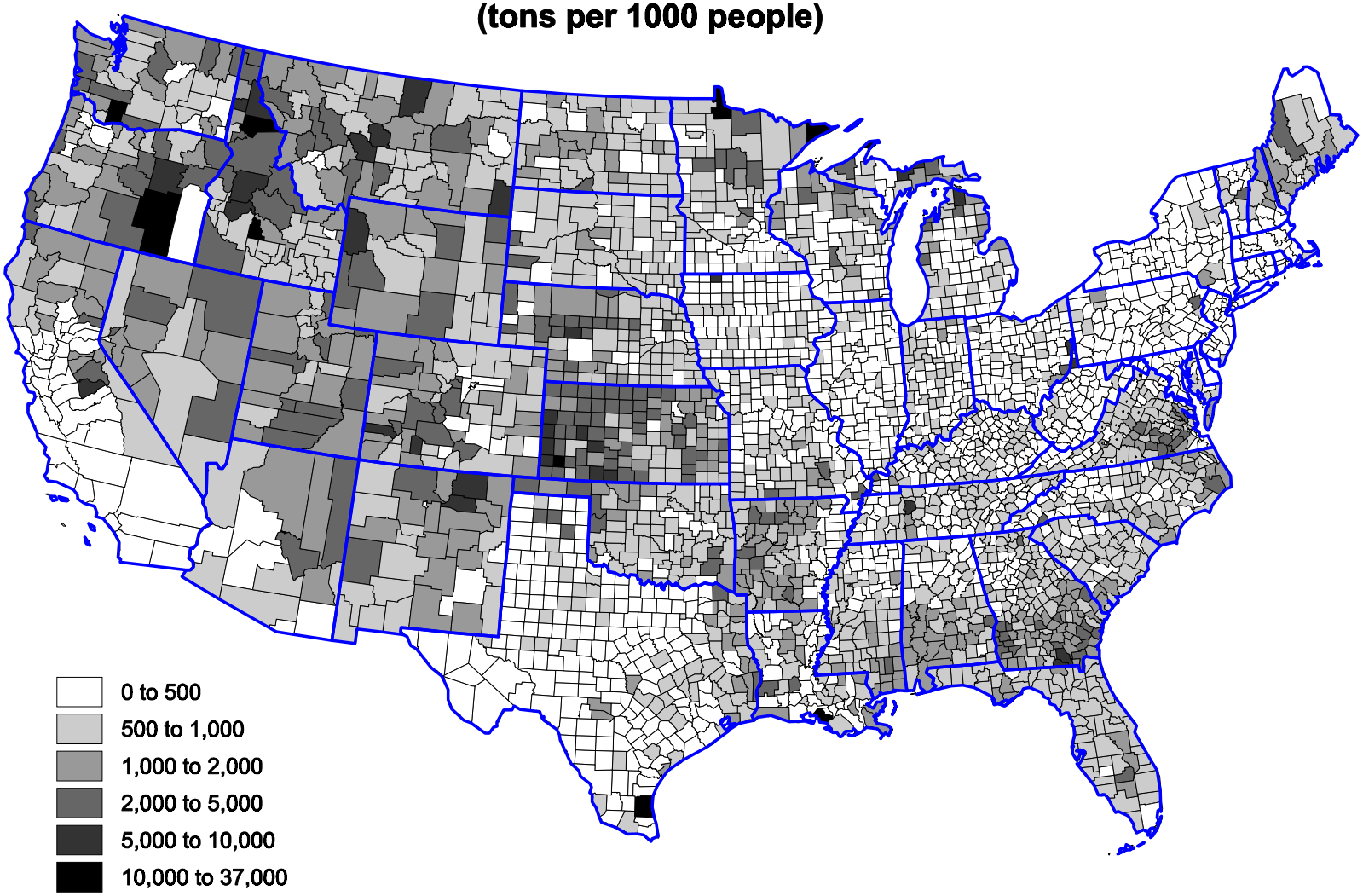


Figure VII-56
County-Level Density Map of Annual SOA Emissions for 2030 Base Case
(tons per 1000 people)

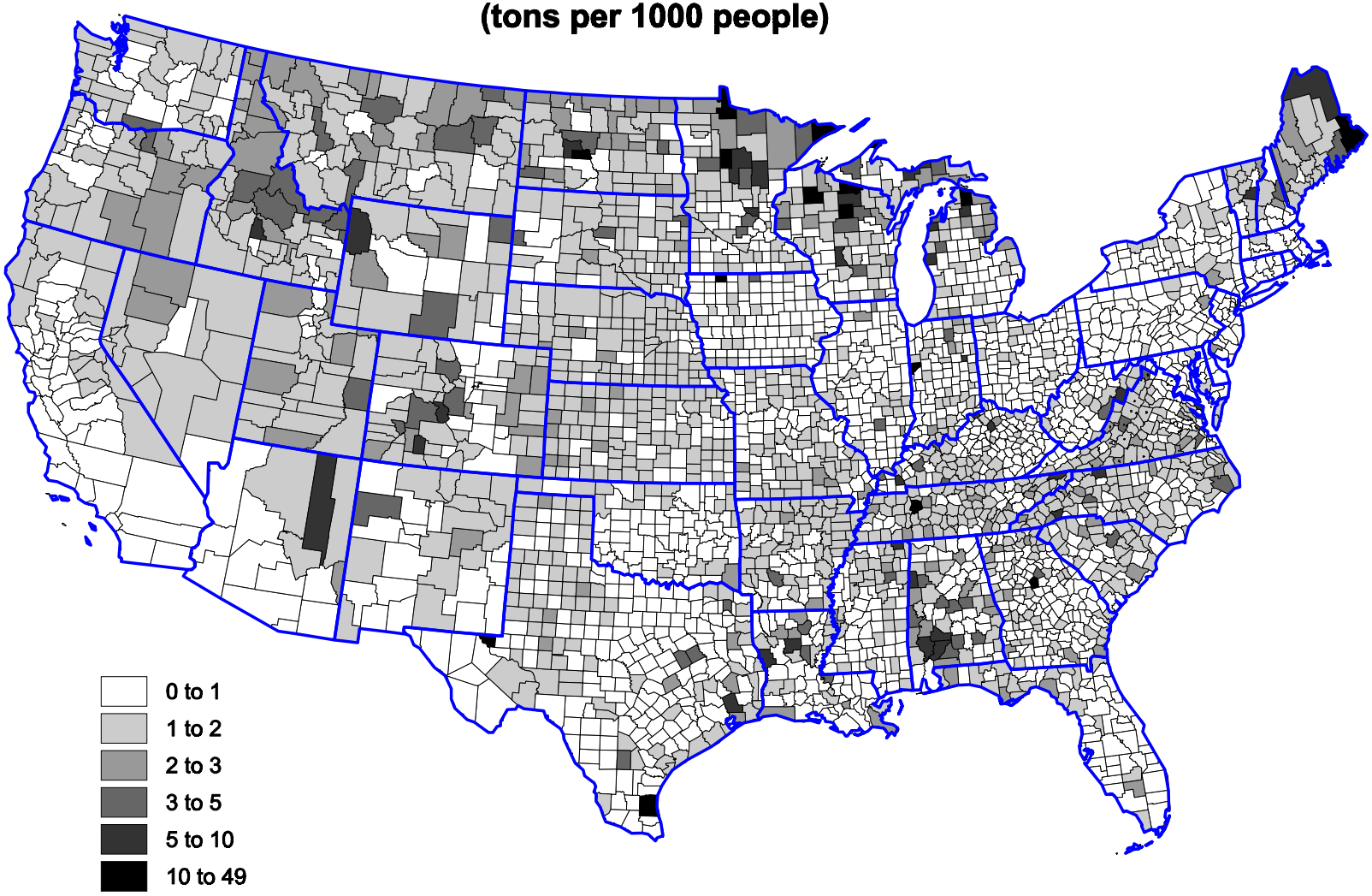


Figure VII-57
County-Level Density Map of Annual SO_2 Emissions for 2030 Base Case
(tons per 1000 people)

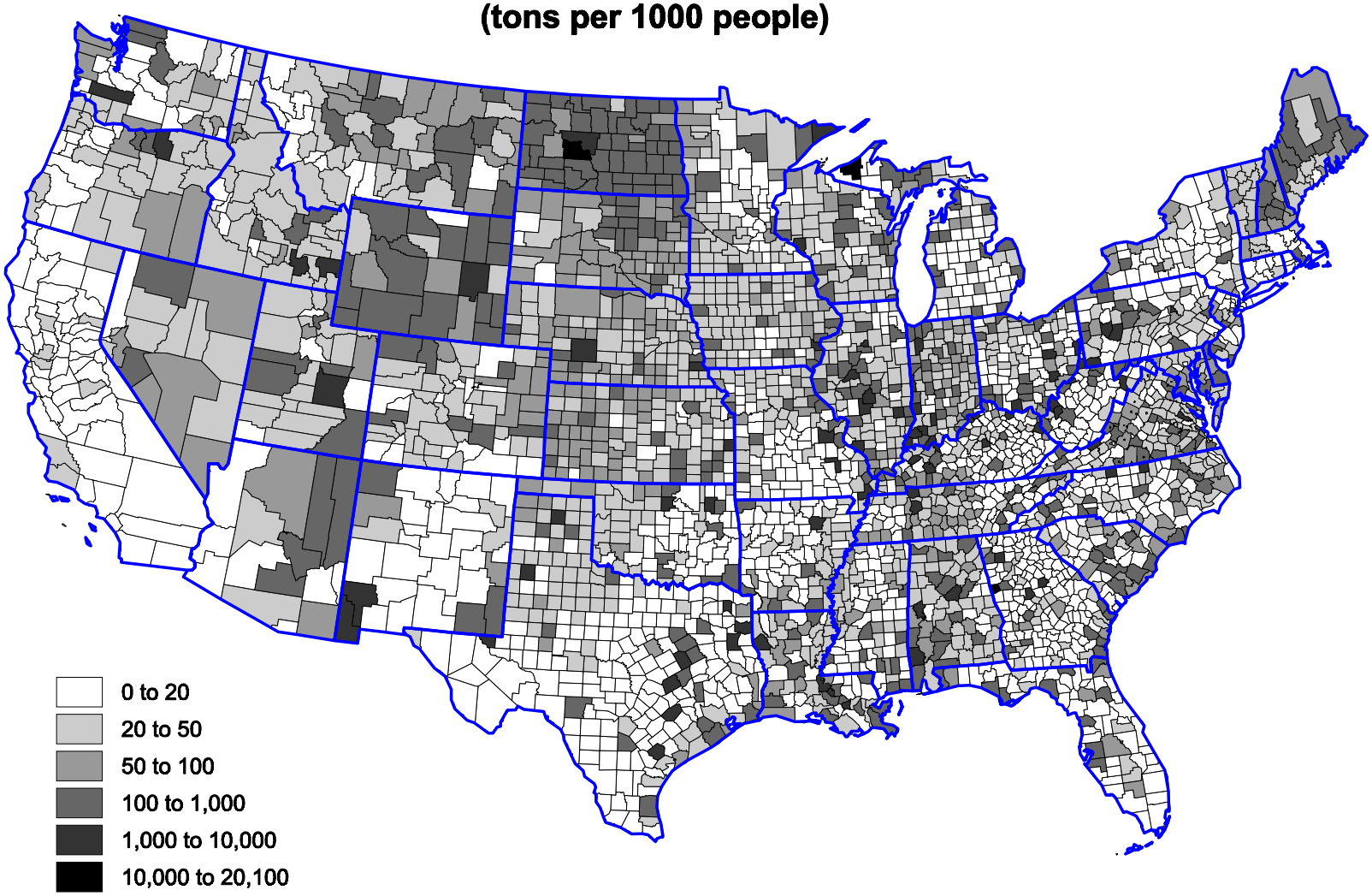


Figure VII-58
County-Level Density Map of Annual PM_{10} Emissions for 2030 Base Case
(tons per 1000 people)

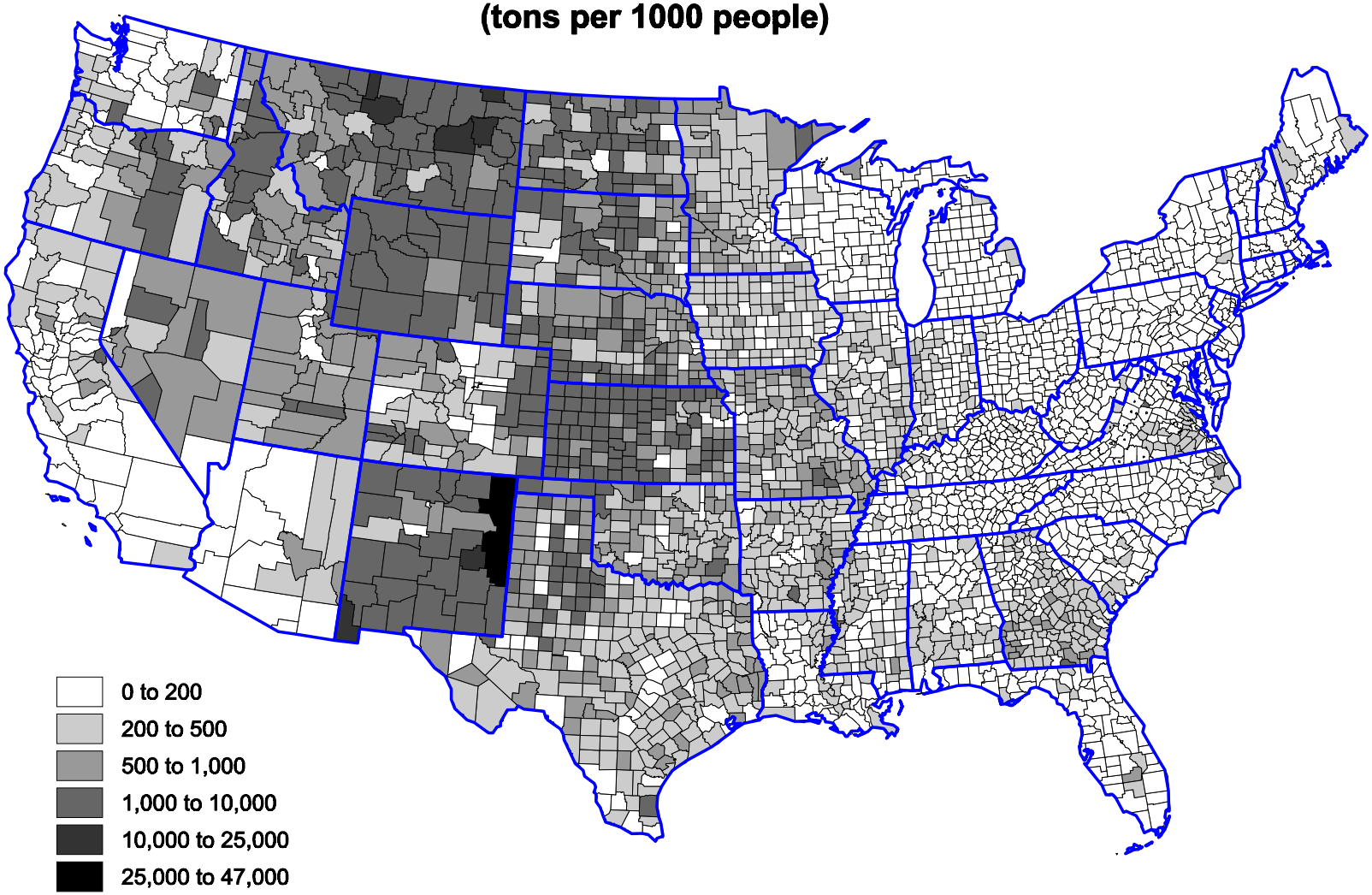


Figure VII-59
County-Level Density Map of Annual $PM_{2.5}$ Emissions for 2030 Base Case
(tons per 1000 people)

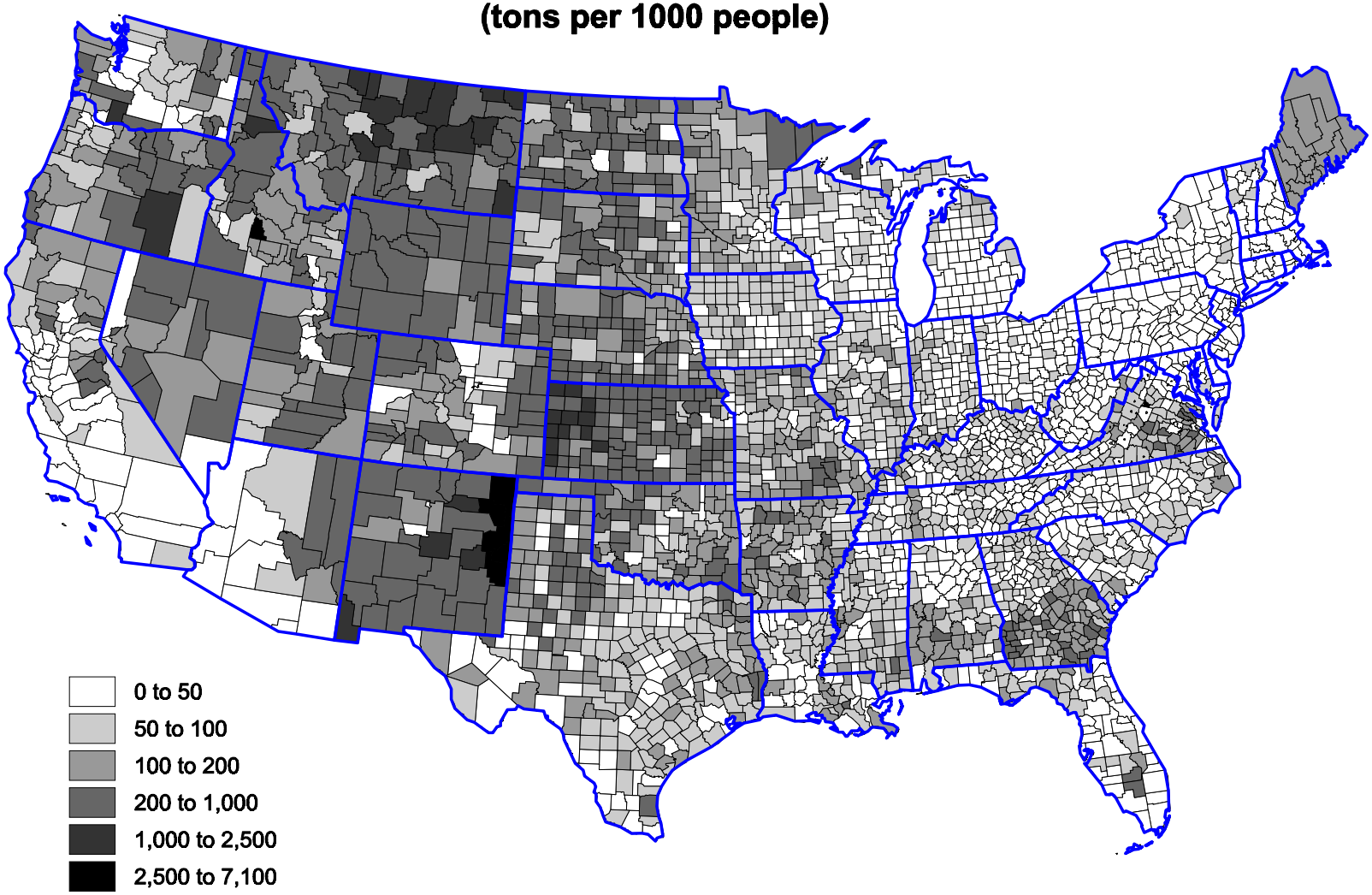


Figure VII-60
County-Level Density Map of Annual NH_3 Emissions for 2030 Base Case
(tons per 1000 people)

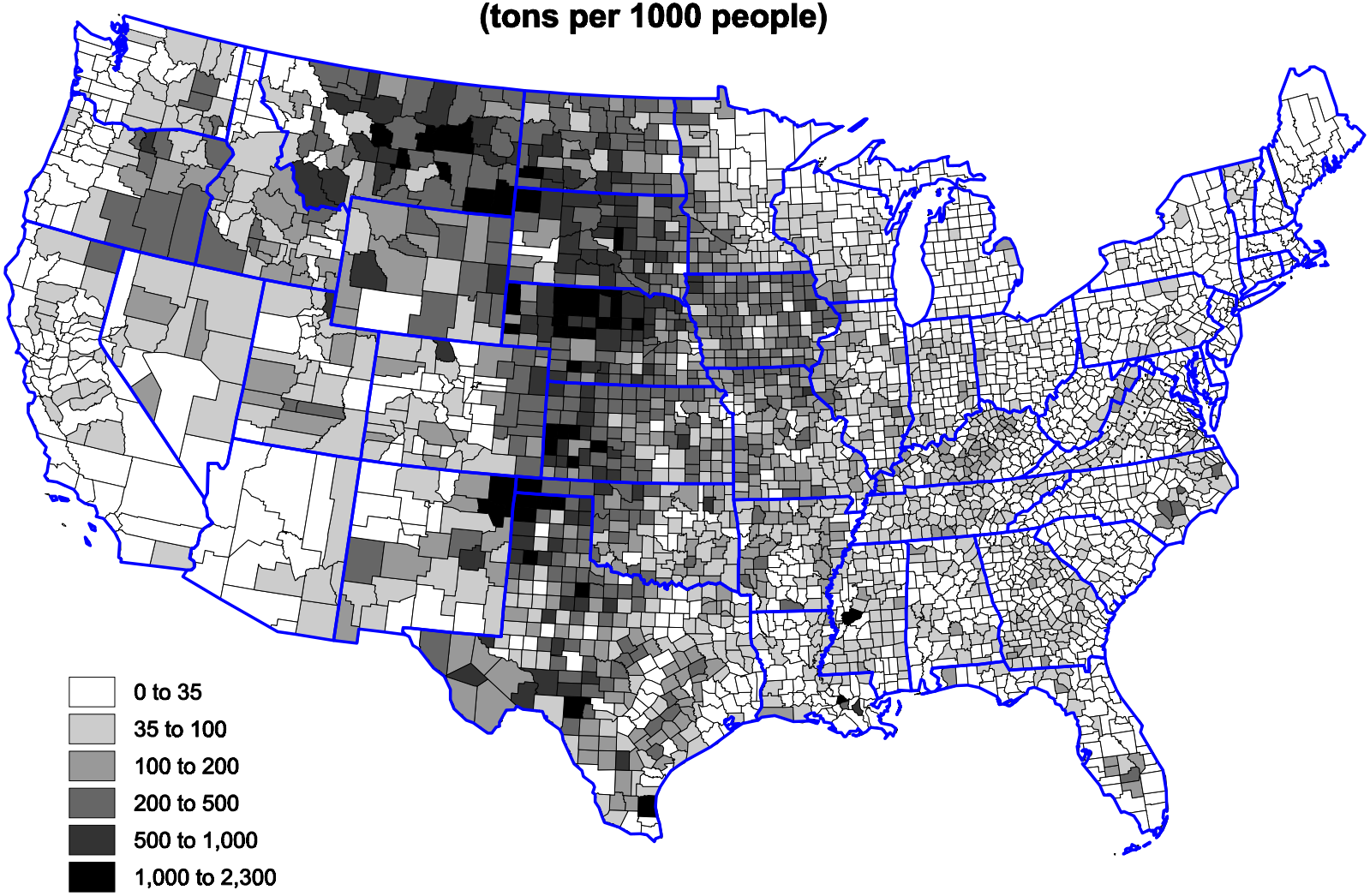


Figure VII-61
County-Level Density Map of Annual VOC Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons/square mile)

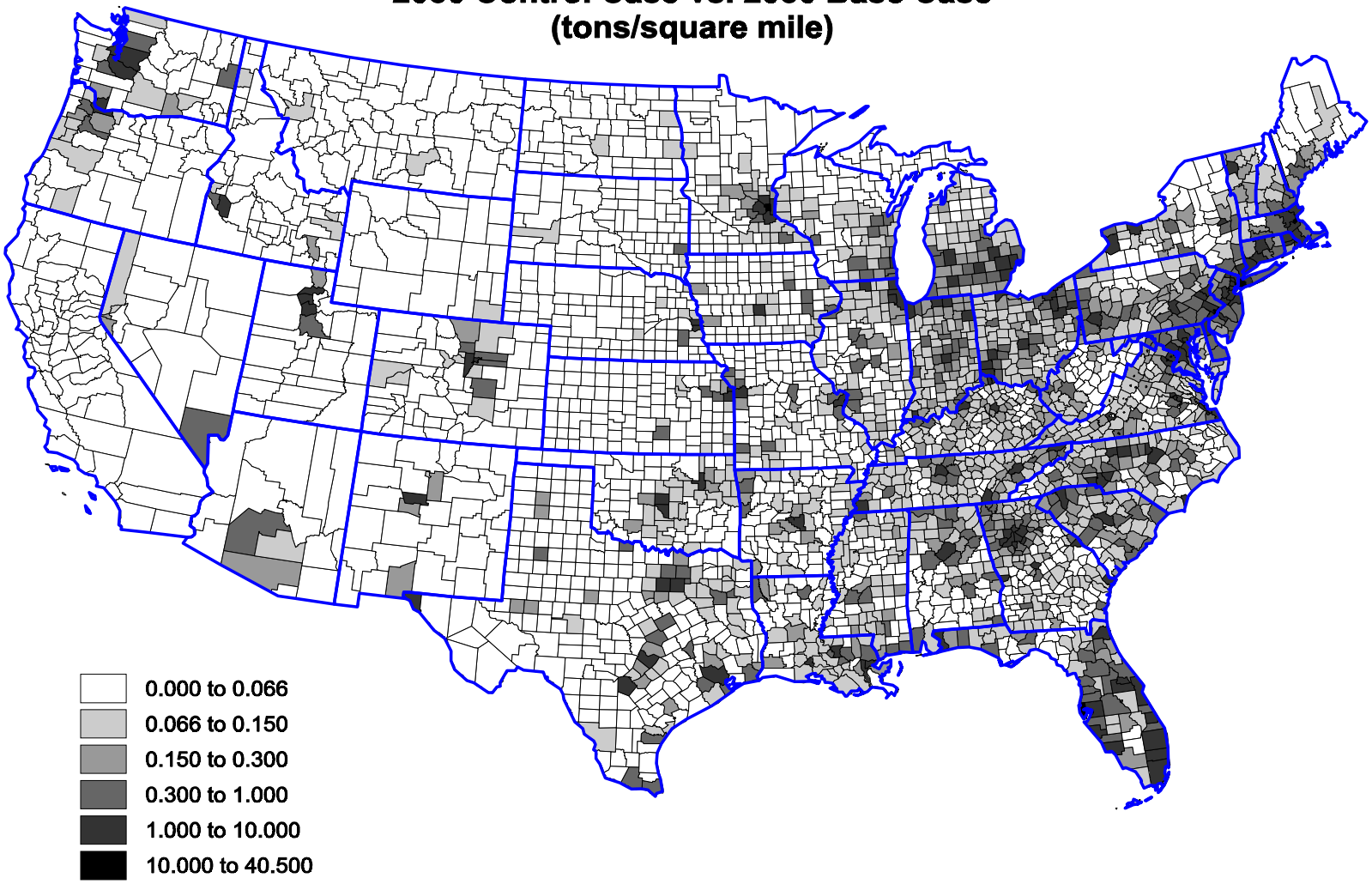


Figure VII-62
County-Level Density Map of Annual NO_x Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons/square mile)

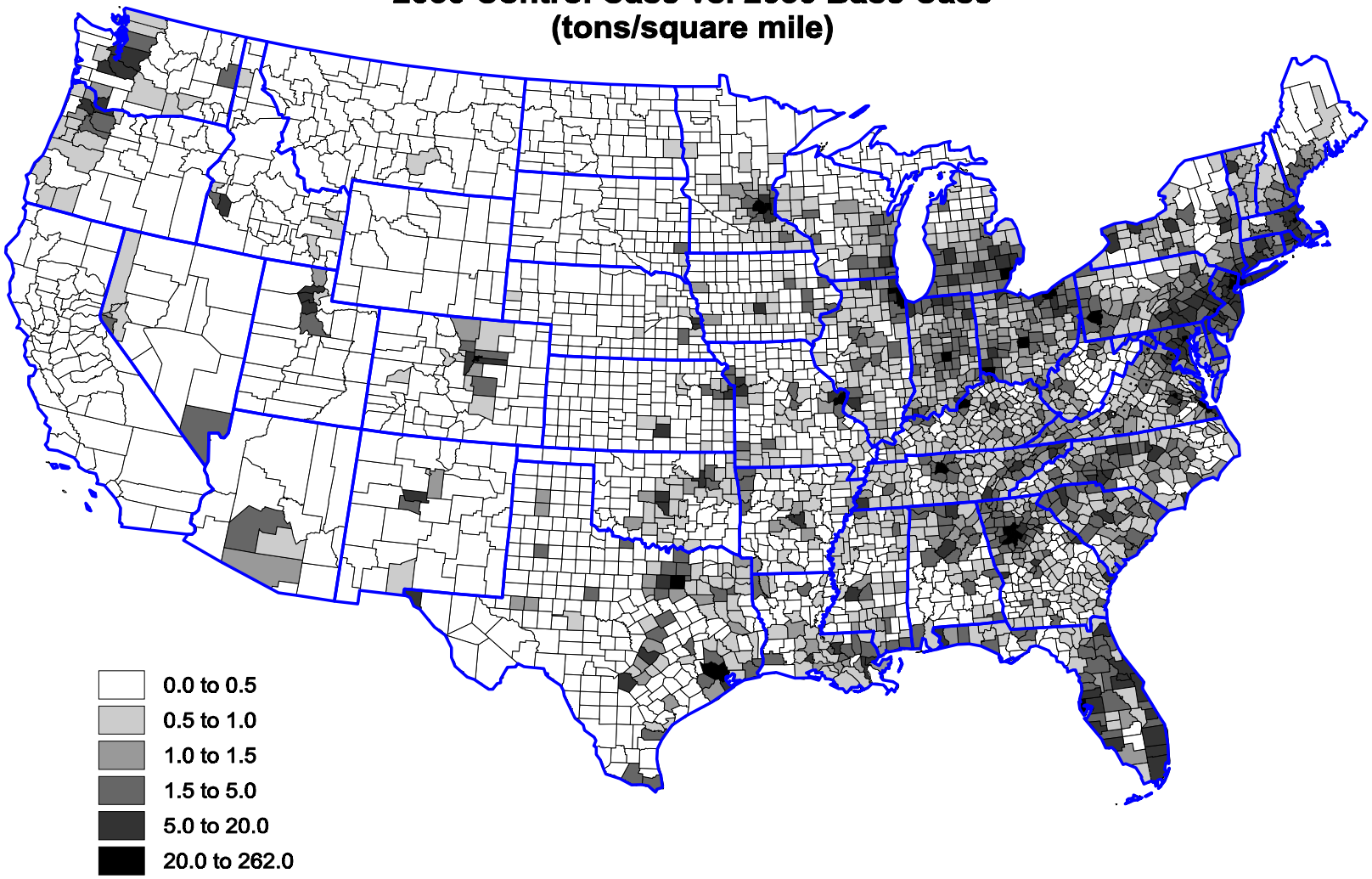


Figure VII-63
County-Level Density Map of Annual SOA Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons/square mile)

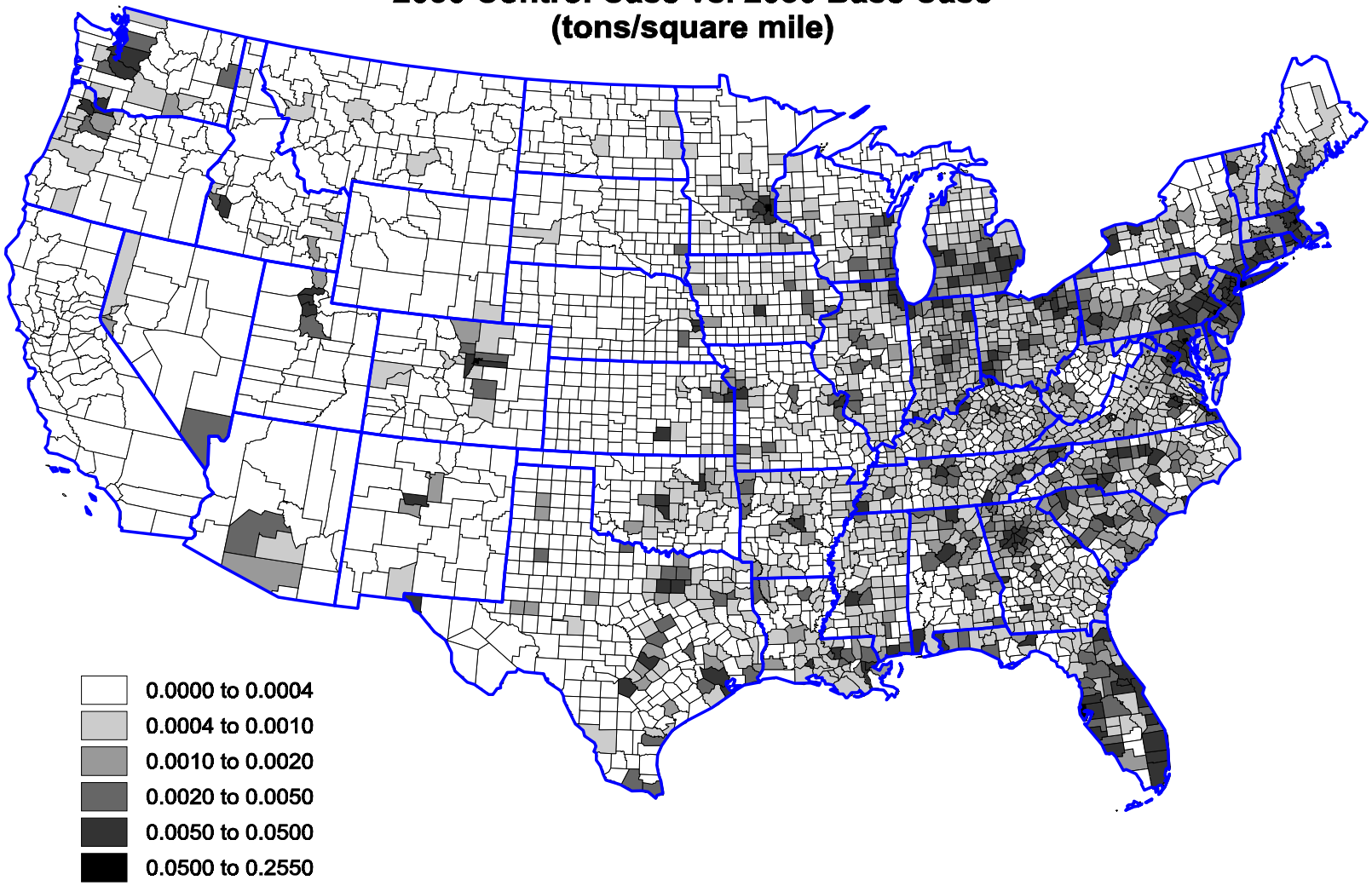


Figure VII-64
County-Level Density Map of Annual SO_2 Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons/square mile)

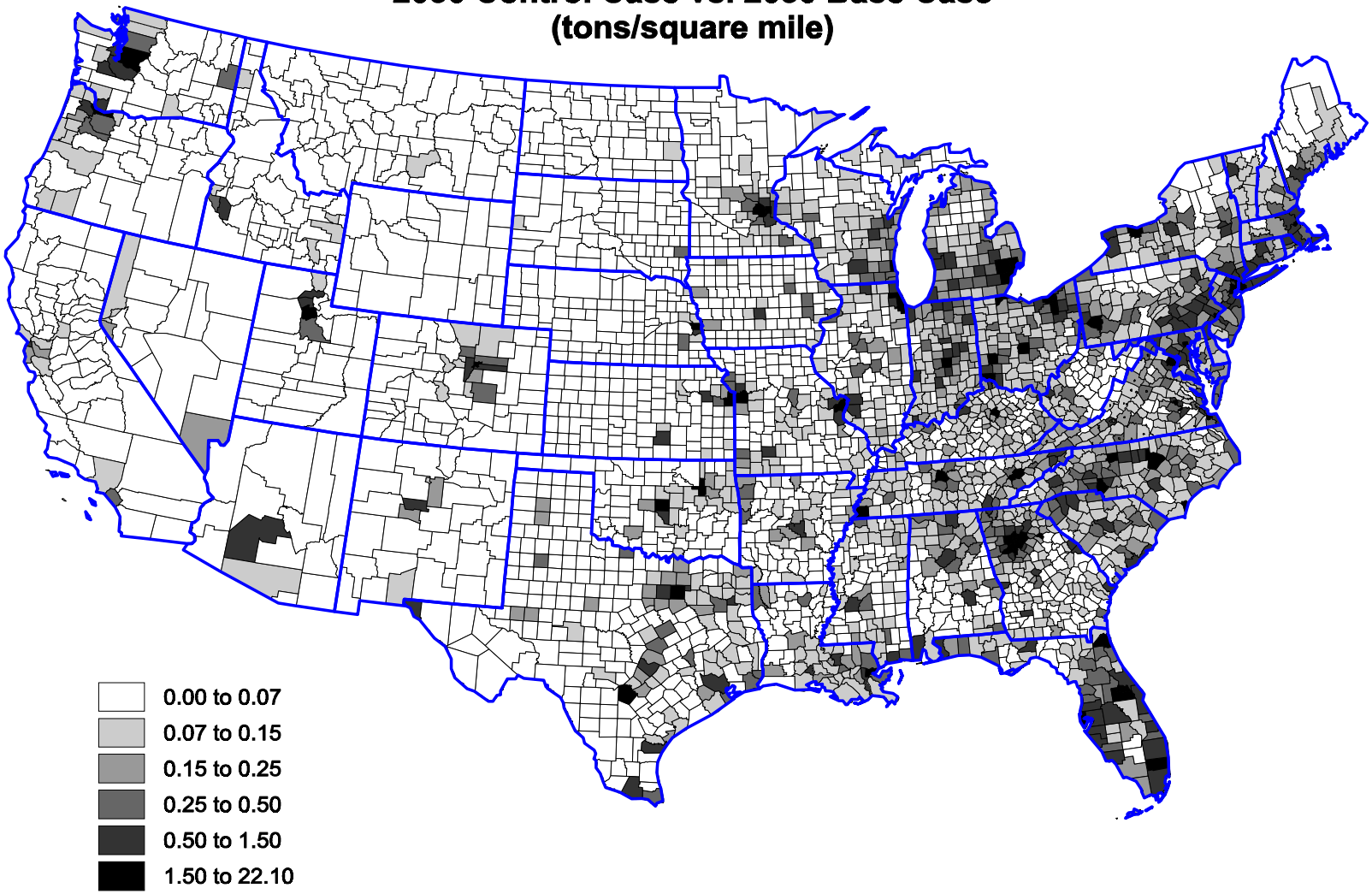


Figure VII-65
County-Level Density Map of Annual PM_{10} Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons/square mile)

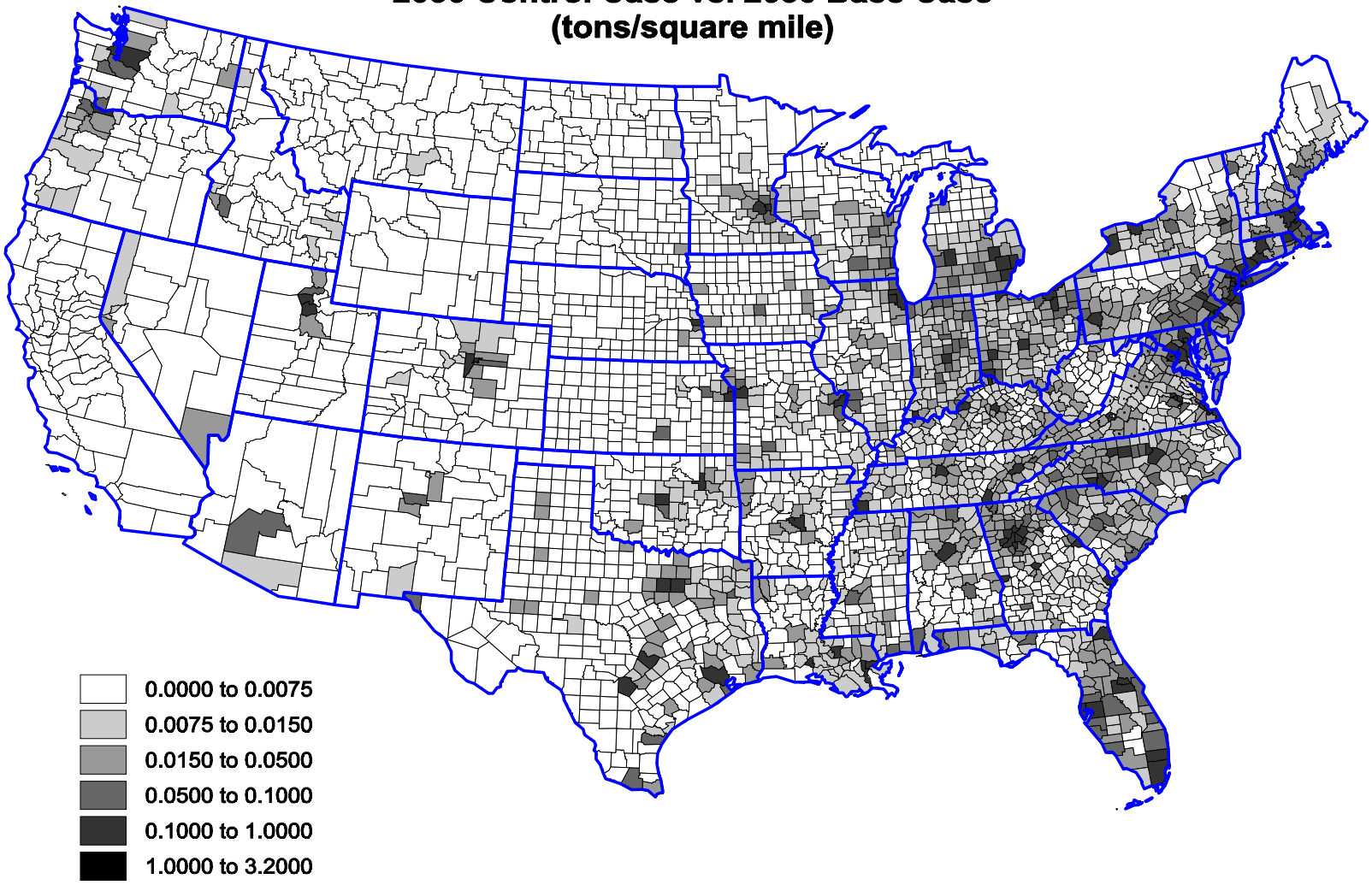


Figure VII-66
County-Level Density Map of Annual $PM_{2.5}$ Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons/square mile)

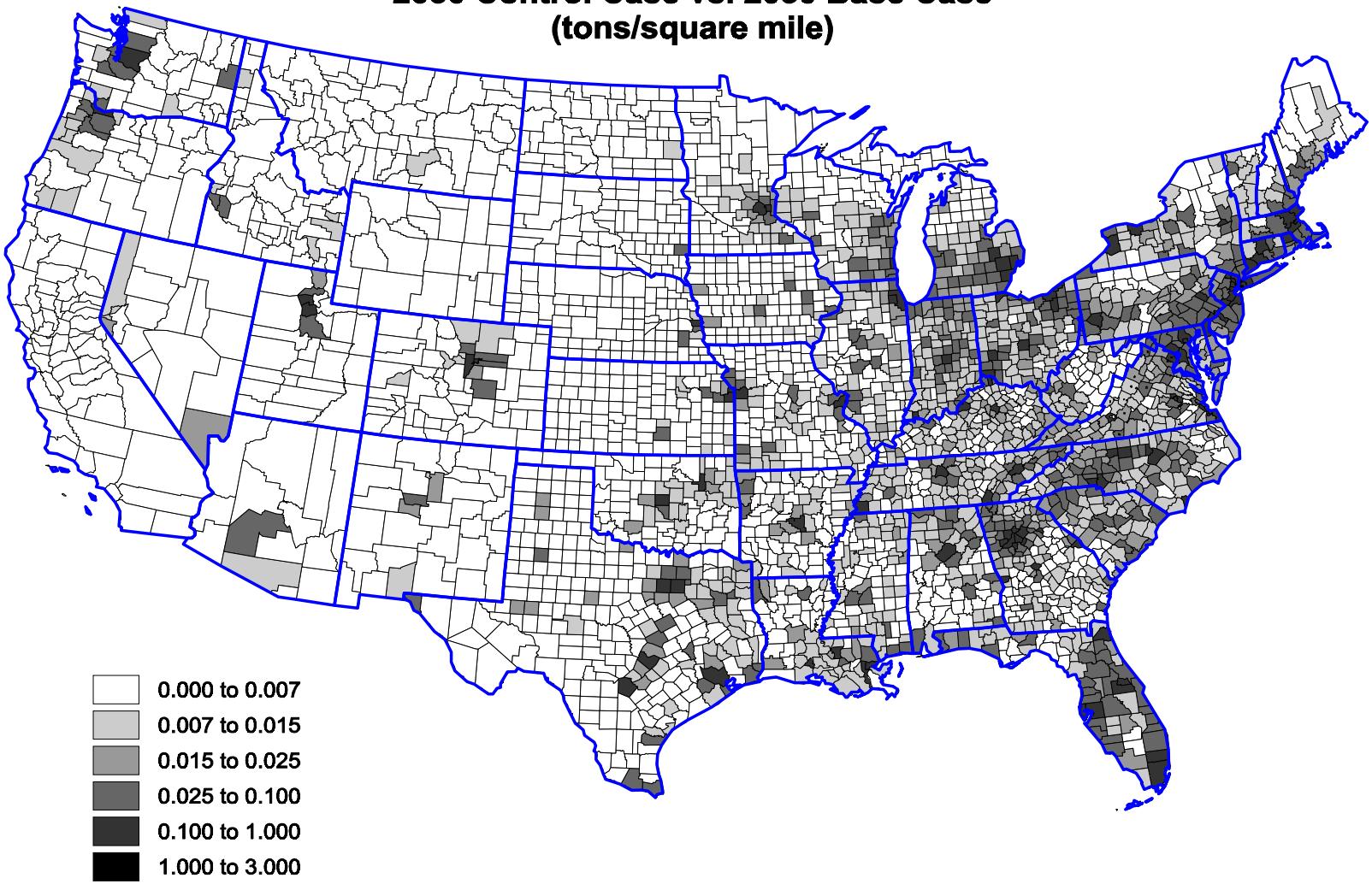


Figure VII-67
County-Level Density Map of Annual VOC Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons per 1000 people)

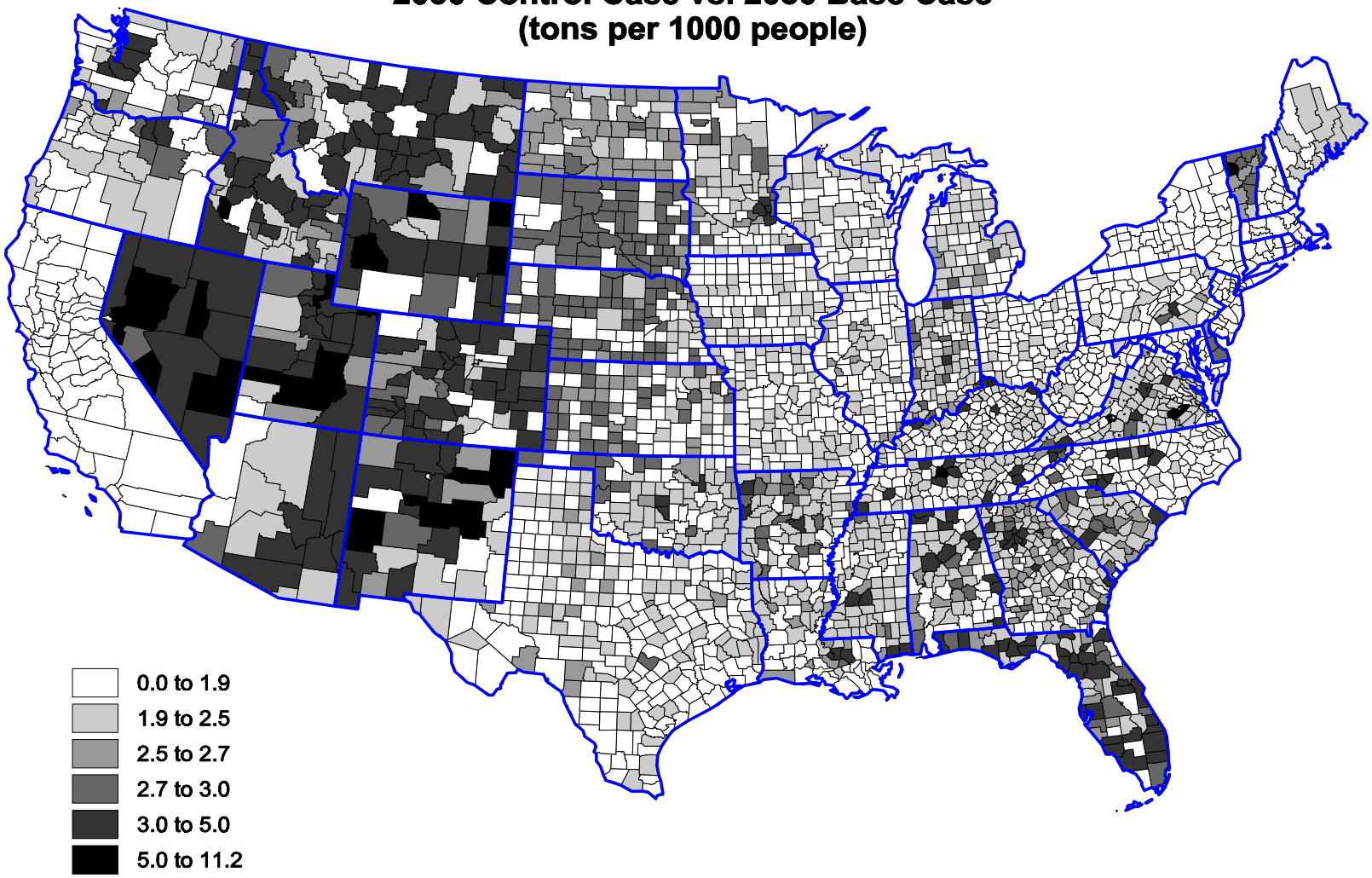


Figure VII-68
County-Level Density Map of Annual NO_x Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons per 1000 people)

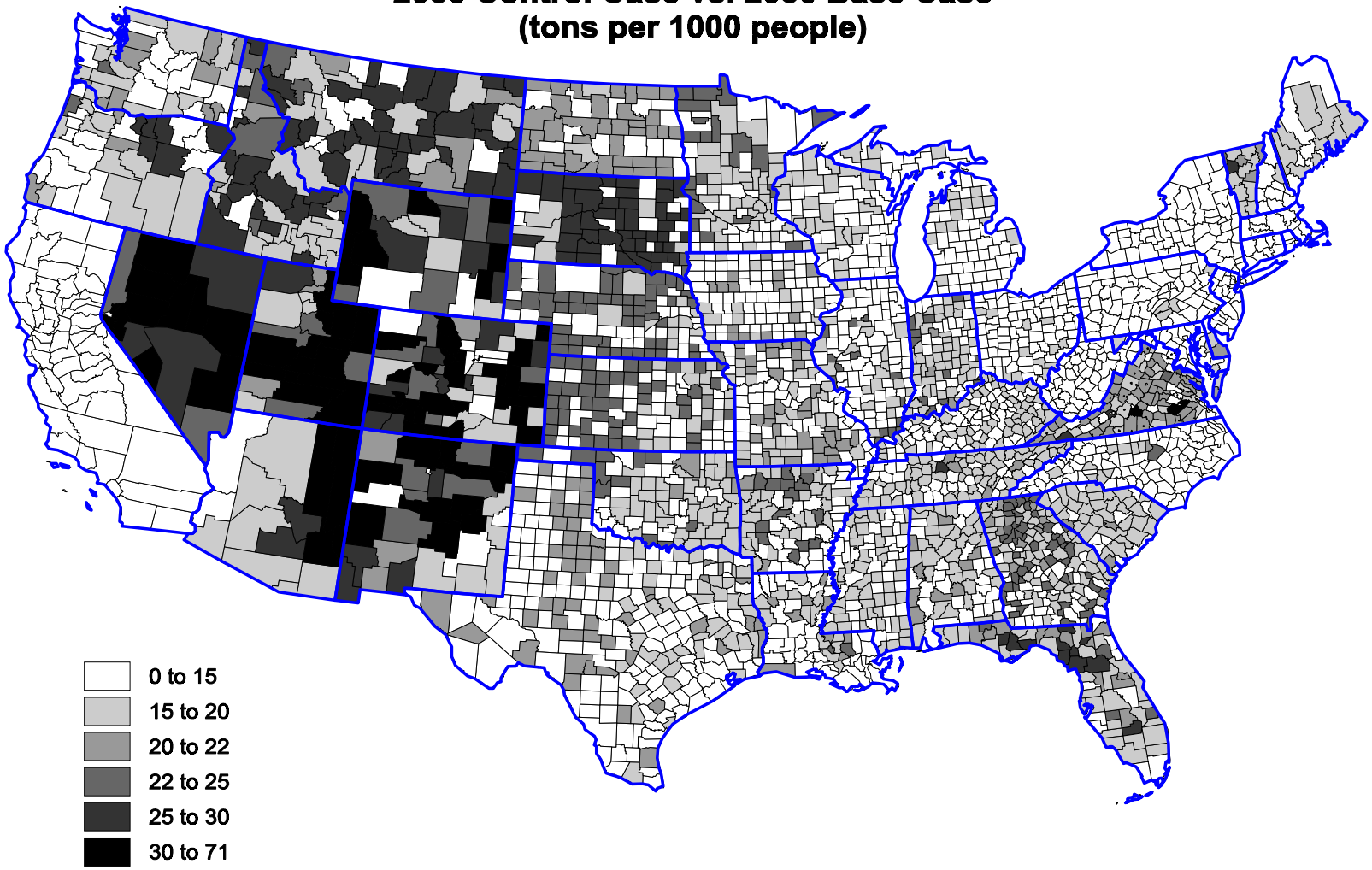


Figure VII-69
County-Level Density Map of Annual SOA Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons per 1000 people)

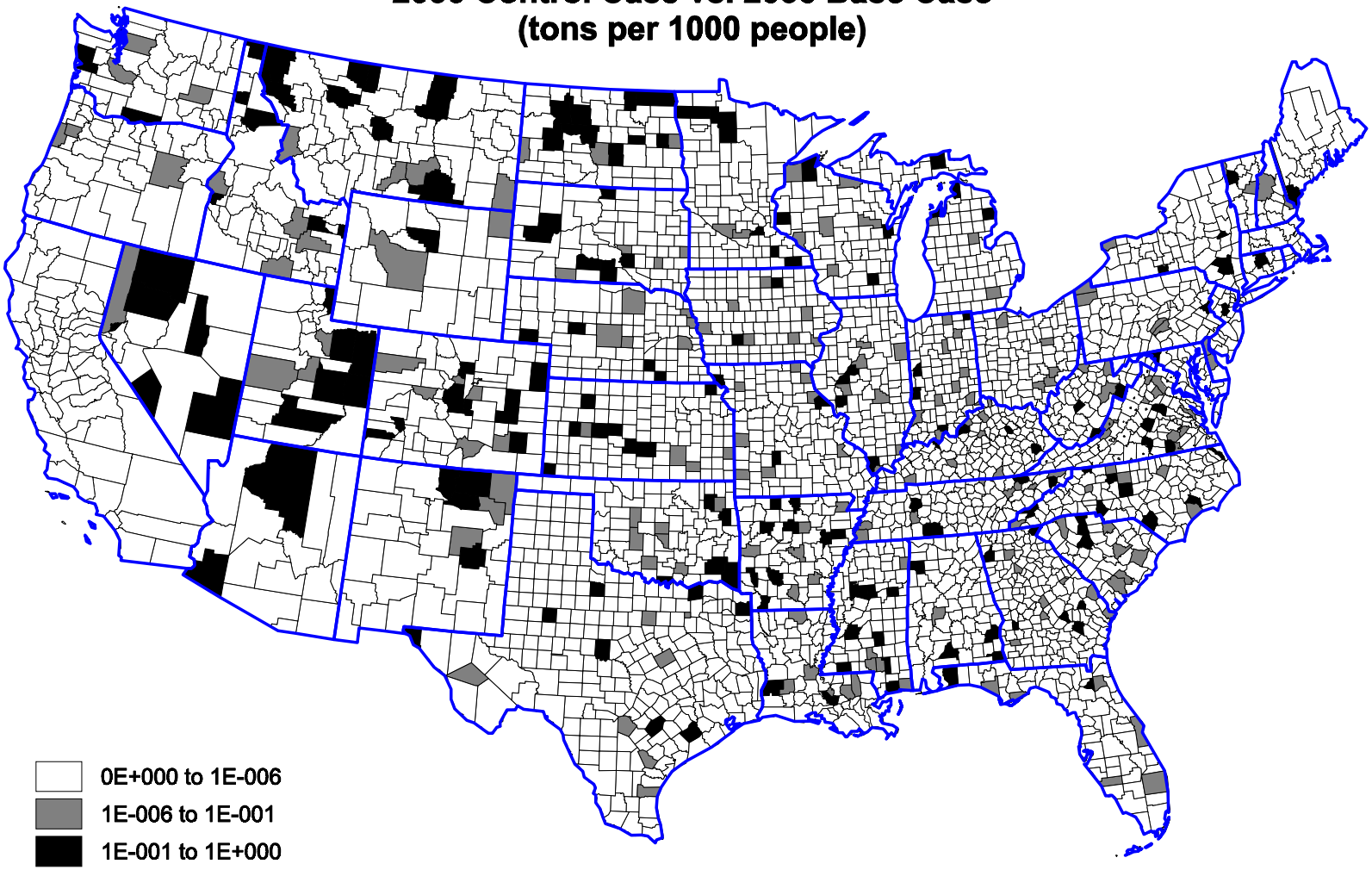


Figure VII-70
County-Level Density Map of Annual SO_2 Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons per 1000 people)

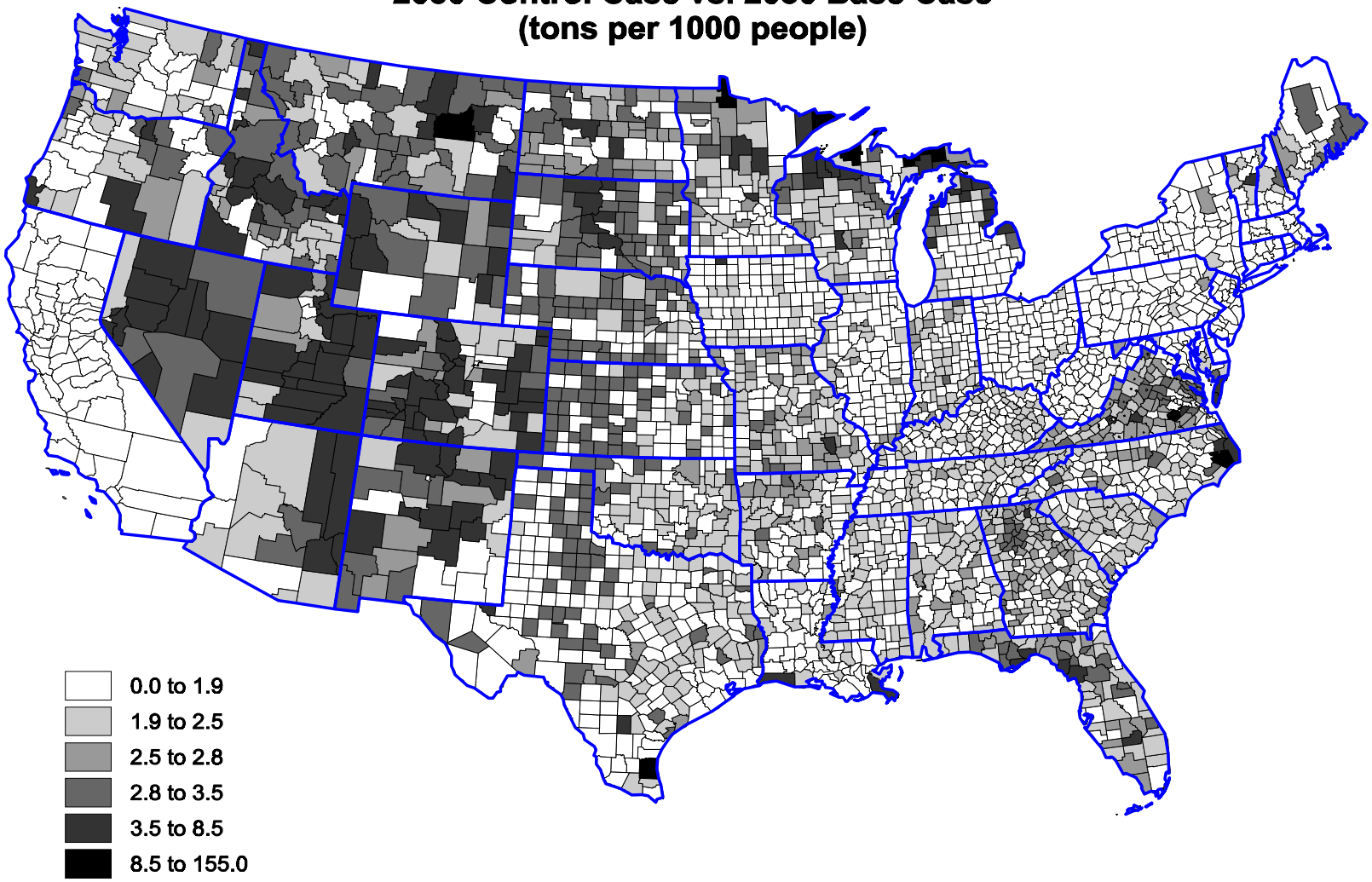


Figure VII-71
County-Level Density Map of Annual PM_{10} Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons per 1000 people)

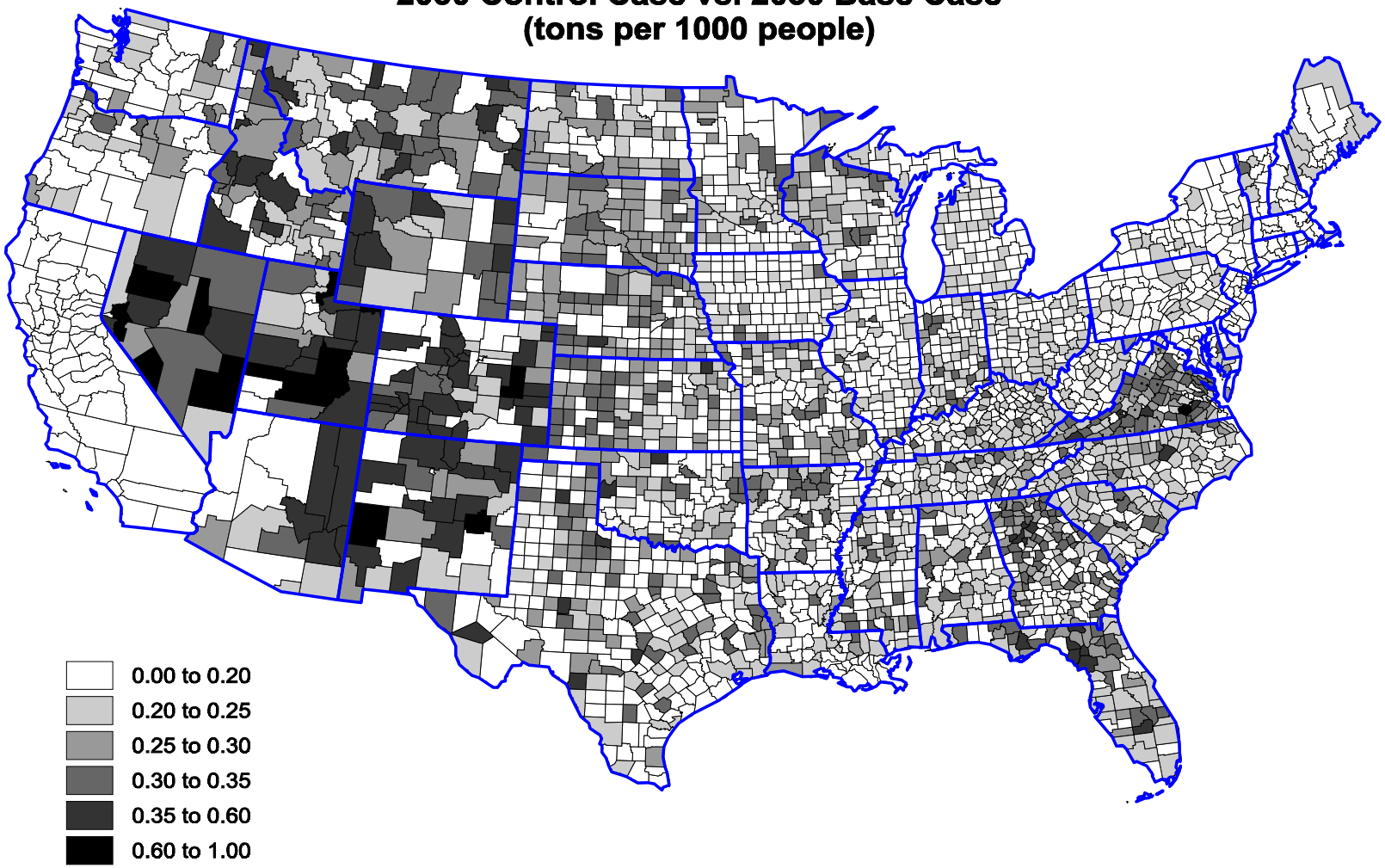
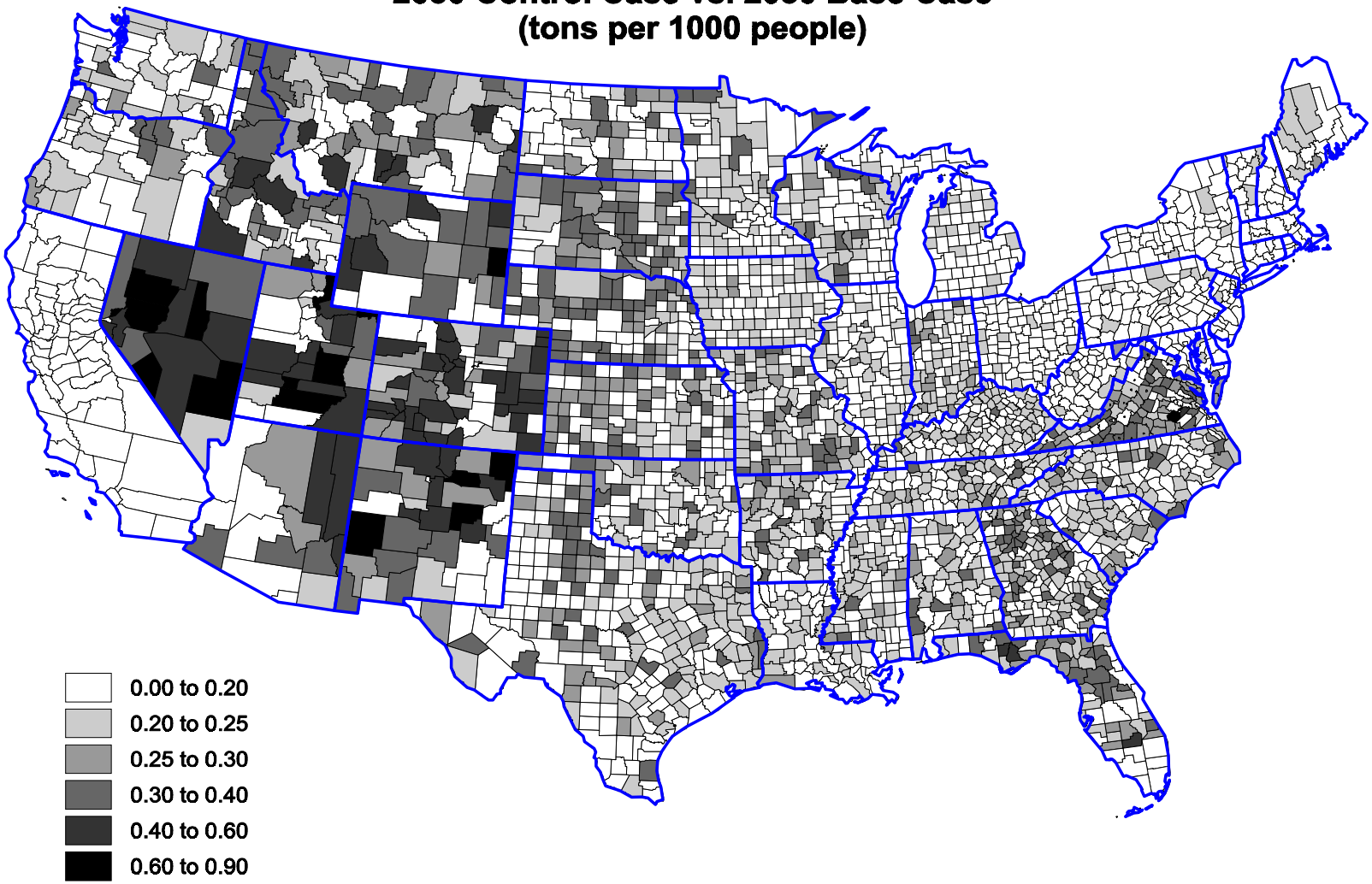


Figure VII-72
County-Level Density Map of Annual $PM_{2.5}$ Emission Reductions
2030 Control Case vs. 2030 Base Case
(tons per 1000 people)



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