CRITERIA POLLUTANTS

Air Quality Trend Analysis Report
(1980-2010)

SOUTHEAST INDIANA

Indiana Department of Environmental Management

Office of Air Quality

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Acronyms/Abbreviation List

CAA .... Clean Air Act

CAIR .... Clean Air Interstate Rule

CO .... carbon monoxide

CSAPR .... Cross-State Air Pollution Rule

D.C. .... District of Columbia

EGUs .... electric generating units

FR .... Federal Register

I .... interstate

IAC .... Indiana Administrative Code

IDEM .... Indiana Department of Environmental Management

MWe .... megawatt electrical

NAAQS .... National Ambient Air Quality Standard

NEI .... National Emissions Inventory

NO_2 .... nitrogen dioxide

NO_x .... nitrogen oxides

NSR .... New Source Review

$PM_{2.5}$ .... particulate matter less than or equal to 2.5 $\mu g/m^3$ or fine particles

PM_{10} .... particulate matter less than or equal to 10 $\mu g/m^3$ or particulate matter

ppb .... parts per billion

ppm .... parts per million

RACT .... Reasonably Available Control Technology

RVP .... Reid Vapor Pressure

SIP .... State Implementation Plan

SO_2 .... sulfur dioxide

SUVs .... sport utility vehicles

TSP .... total suspended particulate

U.S. EPA .... United States Environmental Protection Agency

$\mu g/m^3$ .... micrograms per cubic meter

VOC .... volatile organic compound

VMT .... vehicle miles traveled

Introduction

The Southeast Indiana area is composed of ten counties. The counties represented in the area shown in Figure 1 are: Clark, Crawford, Floyd, Harrison, Jefferson, Ohio, Orange, Scott, Switzerland, and Washington. Three major interstates pass through the Southeast Indiana area, Interstate (I)-65 through Clark and Scott counties, I-64 through Crawford, Floyd, and Harrison counties, and I-265 runs from I-64 in western Floyd County to I-65 in Clark County.

There are currently 5 criteria pollutant monitoring sites in Southeast Indiana collecting data for fine particles ($PM_{2.5}$), ozone, particulate matter (PM_{10}), and sulfur dioxide (SO_2). The map in Figure 1 reflects only the monitors that are currently in operation. Monitoring data for the years 2000 through 2010 for Southeast Indiana are included in the tables for each regulated criteria pollutant, if available. Monitoring data prior to the year 2000 are available upon request. Trend graphs of historical data for the years 1980 through 2010 are also provided.

The largest emission sources within the Southeast Indiana area include Indiana- Kentucky Electric Corporation Clifty Creek Station and Duke Energy Indiana- Gallagher. Emission trend graphs and pie charts are included for the precursors for each regulated criteria pollutant. Emissions information by county is available upon request.

Figure 1: Map of Southeast Indiana Counties and Monitors

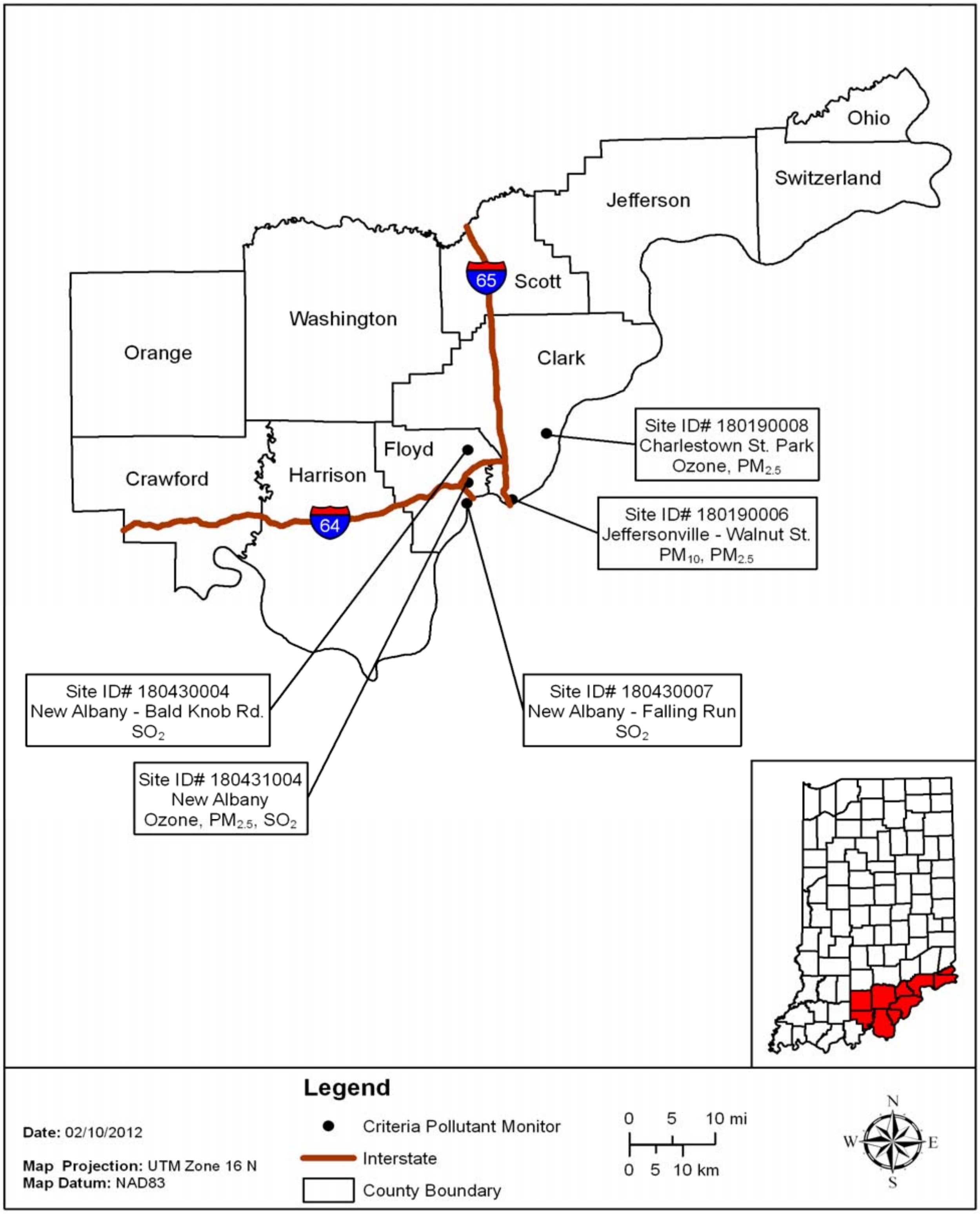


Table 1: Southeast Indiana County Population Information

COUNTY	COUNTY SEAT	LARGEST CITY	2010 NUMBER OF HOUSE-HOLDS	1980 POPU-LATION	1990 POPU-LATION	2000 POPU-LATION	2010 POPU-LATION	POPULATION PERCENT DIFFERENCE BETWEEN 1980 AND 2010
CLARK	JEFFERSONVILLE	JEFFERSONVILLE	47,776	88,838	87,777	96,472	110,232	24%
CRAWFORD	ENGLISH	MARENGO	5,520	9,820	9,914	10,743	10,713	9%
FLOYD	NEW ALBANY	NEW ALBANY	31,968	61,205	64,404	70,823	74,578	22%
HARRISON	CORYDON	CORYDON	16,534	27,276	29,890	34,325	39,364	44%
JEFFERSON	MADISON	MADISON	14,311	30,419	29,797	31,705	32,428	7%
OHIO	RISING SUN	RISING SUN	2,784	5,114	5,315	5,623	6,128	20%
ORANGE	PAOLI	PAOLI	9,176	18,677	18,409	19,306	19,840	6%
SCOTT	SCOTTSBURG	SCOTTSBURG	10,440	20,422	20,991	22,960	24,181	18%
SWITZERLAND	VEVAY	VEVAY	4,969	7,153	7,738	9,065	10,613	48%
WASHINGTON	SALEM	SALEM	12,220	21,932	23,717	27,223	28,262	29%

Table 1 shows that Harrison and Switzerland counties had the highest percent growth in population between 1980 and 2010, increasing by 44% and 48%, respectively. The population for every county in the Southeast Indiana area had an increase in population from 1980 to 2010. While Harrison and Switzerland counties are growing rapidly, the population densities of these counties are less than Clark County, which has experienced moderate growth with a population increase of 21,394 people since 1980. Changes in population size, age, and distribution affect environmental issues ranging from basic needs such as food and water, to atmospheric changes such as an increase in emissions from vehicle miles traveled (VMT), area sources, and the demand for electricity. Generally, increases in population will result in higher area source and mobile emissions. Examples of area sources that increase with higher population include household paints, lawnmowers, and consumer solvents. In addition, higher population figures indicate a secondary effect on increasing VMT if the change in population occurs away from the employment centers.

Table 2: Southeast Indiana Vehicle Miles Traveled (VMT) Information

COUNTY	2010 NUMBER OF ROADWAY MILES	2009 NUMBER OF REGISTERED VEHICLES	Back Casted 1980 DAILY VMT	2010 DAILY VMT	PERCENT DIFFERENCE BEWTEEN 1992 AND 2010 DAILY VMT
CLARK	973	107,080	1,780,737	3,096,000	74%
CRAWFORD	592	13,074	398,581	623,000	56%
FLOYD	598	76,436	551,900	2,939,000	433%
HARRISON	1,037	47,459	946,676	1,225,000	29%
JEFFERSON	745	33,973	621,690	823,000	32%
OHIO	176	7,391	201,298	140,000	-30%
ORANGE	755	23,849	456,255	477,000	5%
SCOTT	1,044	25,643	298,940	909,000	204%
SWITZERLAND	458	11,035	146,444	270,000	84%
WASHINGTON	950	33,130	817,393	753,000	-8%

Table 2 illustrates that Floyd County had the highest increase in daily VMT since 1980. The daily VMT for 8 of the 10 counties in the Southeast Indiana area have increased over time. Daily VMT data are only available as far back as 1992; data prior to that year data were not collected in a comparable manner. However, the annual change between 1992 and 2010 was applied for the years 1980 to 1992 to approximate the VMT for 1980. The United States Environmental Protection Agency (U.S. EPA) estimates that motor vehicle exhaust is a major source of emissions of CO, $PM_{2.5}$, and ozone precursors (volatile organic compounds (VOC's) and nitrogen oxides (NO_x)). Generally, increases in VMT result in subsequent increases in emissions of CO, volatile organic compounds (VOCs), and nitrogen oxides (NO_x). Generally, increases in VMT result in subsequent increases in emissions of CO, VOCs and NOx from mobile sources. These increases in VMT also result in increased evaporative emissions from more gasoline and diesel consumption. Each of these factors may be somewhat offset by fleet turn-over where newer, cleaner vehicles replace older, more polluting ones.

Table 3: 2009 Southeast Indiana Commuting Patterns

COUNTY	NUMBER WHO LIVE AND WORK IN THE COUNTY	NUMBER WHO LIVE IN COUNTY BUT WORK OUTSIDE THE COUNTY	NUMBER OF PEOPLE WHO LIVE IN ANOTHER COUNTY OR STATE BUT WORK IN COUNTY	TOP COUNTY OR STATE SENDING WORKERS INTO COUNTY	NUMBER OF PEOPLE FROM TOP COUNTY OR STATE SENDING WORKERS INTO COUNTY	TOP COUNTY OR STATE RECEIVING WORKERS FROM COUNTY	NUMBER OF PEOPLE FROM TOP COUNTY OR STATE RECEIVING WORKERS FROM COUNTY
CLARK	46,025	23,411	11,501	FLOYD	5,354	STATE OF KENTUCKY	14,696
CRAWFORD	4,174	2,621	532	HARRISON	193	HARRISON	657
FLOYD	29,532	19,173	9,665	CLARK	4,733	STATE OF KENTUCKY	10,925
HARRISON	16,328	9,415	2,641	FLOYD	714	STATE OF KENTUCKY	4,153
JEFFERSON	18,101	2,702	3,488	CLARK	882	STATE OF KENTUCKY	857
OHIO	2,362	1,798	1,030	DEARBORN	306	DEARBORN	791
ORANGE	10,276	2,139	1,597	LAWRENCE	540	LAWRENCE	552
SCOTT	11,020	3,821	1,584	WASHINGTON	336	JACKSON	966
SWITZERLAND	3,835	2,099	540	JEFFERSON	141	STATE OF KENTUCKY	669
WASHINGTON	11,859	5,492	841	ORANGE	156	CLARK	1,360

Information in Table 3 from 2009 demonstrates that the largest workforce in Southeast Indiana is found in Clark County. Commuting patterns in Southeast Indiana center on the City of Jeffersonville in Clark County. Since Clark County has the highest population and the highest commuting pattern to and from the county, emissions within Clark County are expected to be higher than surrounding counties in the Southeast Indiana area. There is also significant commuting to and from Clark and Floyd counties and the State of Kentucky. The Southeast Indiana area commuting patterns reflect that of many urban areas around the country. The largest employment county is Clark County and many of those workers commute from the outlying counties. This type of commuting pattern results in longer trips from the place of residence to the employer. Longer commutes result in increased emissions.

Improvements in Air Quality

Indiana's air quality has improved significantly in the last 30 years. The majority of air quality improvements in Southeast Indiana have stemmed from the national and regional controls outlined below. These programs have been implemented and have reduced monitored ambient air quality values in Southeast Indiana and across the state.

National Controls

Acid Rain Program

Congress created the Acid Rain Program under Title IV of the 1990 Clean Air Act (CAA). The overall goal of the program is to achieve significant environmental and public health benefits through reduction in emissions of SO_2 and NO_x, the primary causes of acid rain. To achieve this goal at the lowest cost to the public, this program employs both traditional and innovative, market-based approaches to controlling air pollution. Specifically, the program seeks to limit, or "cap," SO_2 emissions from power plants at 8.95 million tons annually starting in 2010, authorizes those plants to trade SO_2 allowances, and while not establishing a NO_x trading program, reduces NO_x emission rates. In addition, the program encourages energy efficiency and pollution prevention.

Tier II Emission Standards for Vehicles and Gasoline Sulfur Standards

In February 2000, U.S. EPA finalized a federal rule to significantly reduce emissions from cars and light duty trucks, including sport utility vehicles (SUVs). This rule requires automakers to produce cleaner cars, and refineries to make cleaner, lower sulfur gasoline. This rule was phased in between 2004 and 2009 and resulted in a 77% decrease in NO_x emissions from passenger cars, an 86% decrease from smaller SUVs, light duty trucks, and minivans, and a 65% decrease from larger SUVs, vans, and heavier duty trucks. This rule also resulted in a 12% decrease in VOC emissions from passenger cars, an 18% decrease from smaller SUVs, light duty trucks, and minivans, and a 15% decrease from larger SUVs, vans, and heavier duty trucks.

Heavy-Duty Diesel Engines

In July 2000, U.S. EPA issued a final rule for Highway Heavy-Duty Engines, a program that includes low-sulfur diesel fuel standards. This rule applies to heavy-duty gasoline and diesel trucks and buses. This rule was phased in from 2004 through 2007 and resulted in a 40% decrease in NO_x emissions from diesel trucks and buses.

Clean Air Nonroad Diesel Rule

In May 2004, U.S. EPA issued the Clean Air Nonroad Diesel Rule. This rule applies to diesel engines used in industries such as construction, agriculture, and mining. It also contains a cleaner fuel standard similar to the highway diesel program. The engine standards for nonroad engines took effect in 2008 and resulted in a 90% decrease in SO_2 emissions from nonroad diesel engines. Sulfur levels were also reduced in nonroad diesel fuel by 99.5% from approximately 3,000 parts per million (ppm) to 15 ppm.

Nonroad Spark-Ignition Engines and Recreational Engine Standards

This standard, effective in July 2003, regulates NO_x, VOCs, and CO for groups of previously unregulated nonroad engines. This standard applies to all new engines sold in the United States and imported after the standards went into effect. The standard applies to large spark-ignition engines (forklifts and airport ground service equipment), recreational vehicles (off-highway motorcycles and all terrain vehicles), and recreational marine diesel engines. When all of the nonroad spark-ignition engines and recreational engine standards are fully implemented, an overall 72% reduction in VOC, 80% reduction in NO_x, and a 56% reduction in CO emissions are expected by 2020.

Regional Controls

Nitrogen Oxides Rule

On October 27, 1998, U.S. EPA established the NO_x State Implementation Plan (SIP) Call in the Federal Register (FR), which required 22 states to adopt rules that would result in significant emission reductions from large electric generating units (EGUs)[1], industrial boilers, and cement kilns in the eastern United States (63 FR 57356). The Indiana rule was adopted in 2001 at 326 Indiana Administrative Code (IAC) 10-1. Beginning in 2004, this rule accounted for a reduction of approximately 31% of all NO_x emissions statewide compared to previous uncontrolled years.

[1] An EGU is a fossil fuel fired stationary boiler, combustion turbine, or combined cycle system that sells any amount of electricity produced.

Twenty-one other states also adopted these rules. The result is that significant reductions have occurred within Indiana and regionally due to the number of affected units within the region. The historical trend charts show that air quality has improved due to the decreased emissions resulting from this program.

On April 21, 2004, U.S. EPA published Phase II of the NO_x SIP Call that established a budget for large (emissions of greater than one ton per day) stationary internal combustion engines (69 FR 21604). In Indiana, the rule decreased NO_x emissions statewide from natural gas compressor stations by 4,263 tons during May through September. The Indiana Phase II NO_x SIP Call rule became effective in 2006, and implementation began in 2007 (326 IAC 10-4).

Clean Air Interstate Rule (CAIR)

On May 12, 2005, U.S. EPA published the following regulation: "Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (CAIR); Revisions to Acid Rain Program; Revisions to the NO_x SIP Call; Final Rule" (70 FR 25162). This rule established the requirement for states to adopt rules limiting the emissions of NO_x and SO_2 and provided a model rule for the states to use in developing their rules in order to meet federal requirements. The purpose of CAIR was to reduce interstate transport of $PM_{2.5}$, SO_2, and ozone precursors (NO_x).

Generally, CAIR applied to any stationary, fossil fuel-fired boiler or stationary, fossil fuel-fired combustion turbine, or a generator with a nameplate capacity of more than 25 megawatt electrical (MWe) for sale. This rule provided annual state caps for NO_x and SO_2 in two phases, with Phase I caps for NO_x and SO_2 starting in 2009 and 2010, respectively. Phase II caps were to become effective in 2015. U.S. EPA allowed limits to be met through a cap and trade program if a state chose to participate in the program.

In response to U.S. EPA's rulemaking, Indiana adopted a state rule in 2006 based on the model federal rule (326 IAC 24-1). Indiana's rule includes annual and seasonal NO_x trading programs, and an annual SO_2 trading program. This rule required compliance effective January 1, 2009.

SO_2 emissions from power plants in the 28 eastern states and the District of Columbia (D.C.) covered by CAIR were to be cut by 4.3 million tons by 2010 and further reduced by 5.4 million tons by 2015. NO_x emissions were to be cut by 1.7 million tons by 2009 and reduced by an additional 1.3 million tons by 2015. The D.C. Circuit court's vacatur of CAIR in July 2008 and subsequent remand without vacatur of CAIR in December 2008, directed U.S. EPA to revise or replace CAIR in order to properly address the deficiencies outlined by the court. As of May 2012, CAIR remains in effect.

Cross-State Air Pollution Rule (CSAPR)

On August 8, 2011, U.S. EPA published a final rule that helps states reduce air pollution and meet CAA standards. The Cross-State Air Pollution Rule (CSAPR) replaces U.S. EPA's 2005 CAIR, and responds to the court's concerns (76 FR 48208).

CSAPR requires 27 states in the eastern half of the United States to significantly reduce power plant emissions that cross state lines and contribute to ground-level ozone and fine particle pollution in other states.

On December 30, 2011, the U.S. Court of Appeals for the D.C. Circuit stayed CSAPR prior to implementation pending resolution of a challenge to the rule. The court ordered U.S. EPA to continue the administration of CAIR pending resolution of the current appeal. This required U.S. EPA to reinstate 2012 CAIR allowances which had been removed from the allowance tracking system as part of the transition to CSPAR. The federal rule is on hold pending the resolution of the litigation.

Reasonably Available Control Technology (RACT) and other State VOC Rules

As required by Section 172 of the CAA, Indiana has promulgated several rules requiring Reasonably Available Control Technology (RACT) for emissions of VOCs since the mid 1990's. In addition, other statewide rules for controlling VOCs have also been promulgated. The Indiana rules are found in 326 IAC 8. The following is a listing of statewide rules that assist with the reduction of VOCs in Southeast Indiana:

326 IAC 8-1-6	Best Available Control Technology for Non-Specific Sources
326 IAC 8-2	Surface Coating Emission Limitations
326 IAC 8-3	Organic Solvent Degreasing Operations
326 IAC 8-4	Petroleum Sources
326 IAC 8-5	Miscellaneous Operation
326 IAC 8-6	Organic Solvent Emission Limitations
326 IAC 8-8	Municipal Solid Waste Landfills
326 IAC 8-10	Automobile Refinishing
326 IAC 8-14	Architectural and Industrial Maintenance Coatings
326 IAC 8-15	Standards for Consumer and Commercial Products

New Source Review (NSR) Provisions

Indiana has a longstanding and fully implemented NSR program. This is addressed in 326 IAC 2. The rule includes provisions for the Prevention of Significant Deterioration permitting program in 326 IAC 2-2, and emission offset requirements for nonattainment areas in 326 IAC 2-3 for new and modified sources.

State Emission Reduction Initiatives

Outdoor Hydronic Heater Rule

Rule 326 IAC 4-3, effective May 18, 2011, regulates the use of outdoor hydronic heaters (also referred to as outdoor wood boilers or outdoor wood furnaces) designed to burn wood or other approved renewable solid fuels and establishes a particulate emission limit for new units. The rule also includes a fuel use restriction, stack height requirements, and a limited summertime operating ban for existing units.

Reinforced Plastic Composites Fabricating and Boat Manufacturing Industries Rule

Rules 326 IAC 20-48, effective August 23, 2004 and 326 IAC 20-56, effective April 1, 2006, regulate styrene emissions from the boat manufacturing and fiberglass reinforced plastic industries. The state rules implement the federal NESHAP for each of these source categories with additional requirements that were carried over from the Indiana state styrene rule (326 IAC 20-25) adopted in 2000 and now repealed.

Local Controls

Local control measures, including some RACT rules specific to Clark and Floyd counties, have helped reduce VOC emissions and other types of emissions in Southeast Indiana. These measures include:

326 IAC 4-1-4.1(c)	Ban on residential burning in Clark and Floyd counties
326 IAC 8-7	Specific VOC Reduction Requirements
326 IAC 8-9	Volatile Organic Liquid Storage Vessels
326 IAC 8-11	Wood Furniture Coatings
326 IAC 8-12	Shipbuilding or Ship Repair Operations

326 IAC 13-3 Control of Gasoline Reid Vapor Pressure

At one time a motor vehicle inspection and maintenance program (I/M) for Clark and Floyd counties in Southeast Indiana was in effect, but it was discontinued in December 2006. It was decided that the removal of the program would not cause Clark and Floyd counties to exceed health-based air quality standards and, therefore, was no longer necessary for emission reductions in the area.

Southeast Indiana Emission Inventory Data

Emission trend graphs and pie charts for each criteria pollutant are included in this report. Emission trend graphs and pie charts for any precursors that lead to the formation of a criteria pollutant are also included. Indiana's emissions inventory data are available for 1980 through 2009 for CO, $PM_{2.5}$, NO_2, PM_{10}, SO_2, and VOC. These emission estimates are reflective of U.S. EPA methodologies found in the National Emissions Inventory (NEI) Air Pollutant Emissions Trends Data. Some of the fluctuations found in the trends inventory are due to U.S. EPA not incorporating state reported data until after the submission of the 1996 Periodic Emission Inventory[1]. Further, U.S. EPA acknowledges that changes over time may be attributable to changes in how inventories were compiled[2].

The emissions have been broken down into contributions from the following individual source categories: point sources (including electric generating units (EGUs)), area sources, onroad sources, and nonroad sources. There are two EGU facilities in the Southeast Indiana area and are the top two emitters in the area. Emissions data for each county in Southeast Indiana is available upon request.

[1] http://www.epa.gov/ttn/chief/trends/trends98/trends98.pdf
[2] http://www.epa.gov/air/airtrends/2007/report/particlepollution.pdf

Point Sources

Point sources include major and minor sources, including EGUs that report emissions through Indiana's emissions reporting program. Examples include steel mills, manufacturing plants, surface coating operations, and industrial and commercial boilers.

Area Sources

Area sources are a collection of similar emission units within a geographic area that collectively represent individual sources that are small and numerous and have not been inventoried as a specific point, mobile, or biogenic source. Some of these sources include activities such as dry cleaning, vehicle refueling, and solvent usage.

Onroad Sources

Onroad sources include cars and light and heavy duty trucks.

Nonroad Sources

Nonroad sources typically include construction equipment, recreational boating, outdoor power equipment, recreational vehicles, farm machinery, lawn care equipment, and logging equipment.

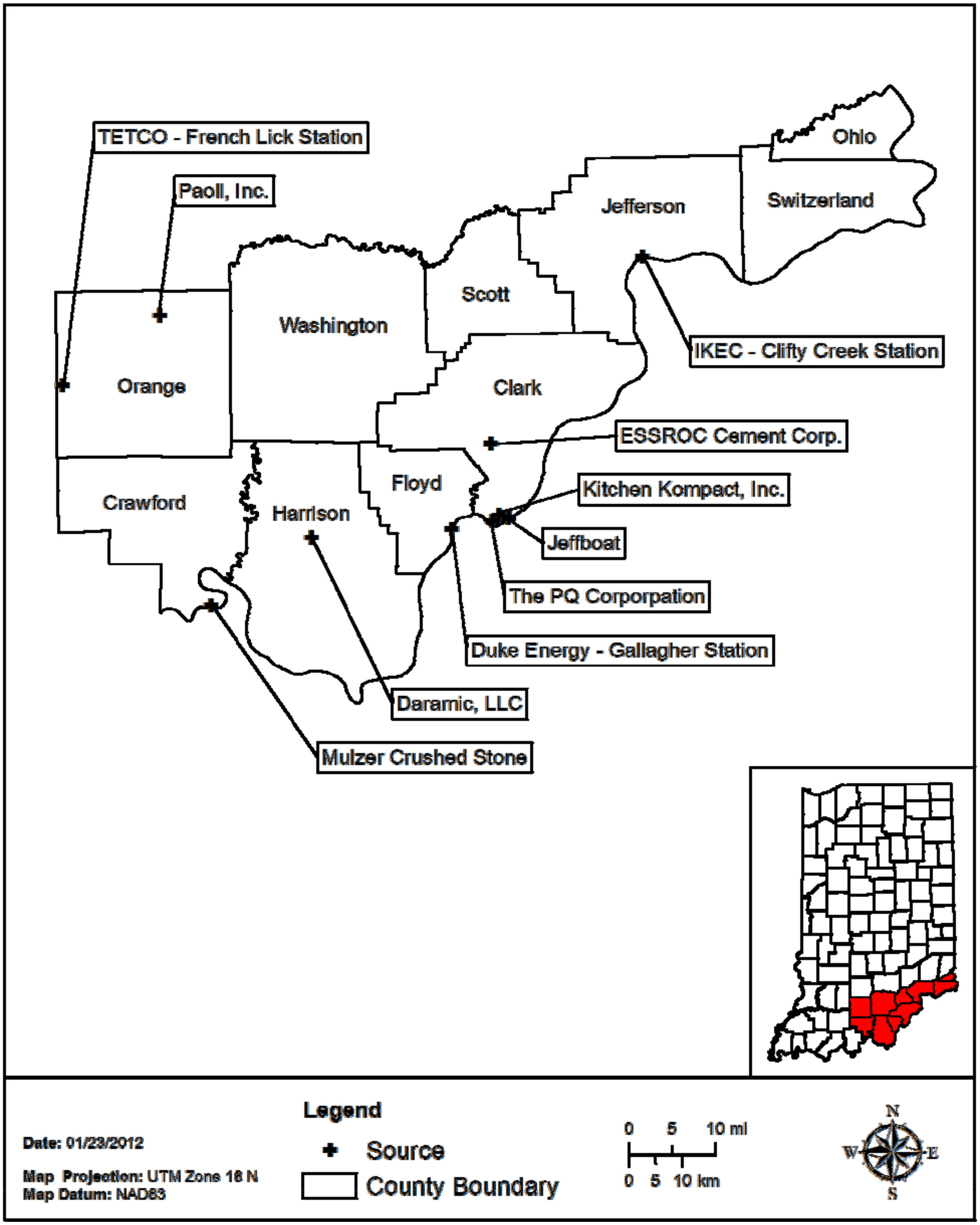
Top Ten Emission Sources

Table 4 represents the top ten sources in tons per year of emissions for the Southeast Indiana area. The top two sources on this list that have a large impact on emissions in the Southeast Indiana area are the EGUs, but with the regional controls explained previously, the emissions from the EGUs have been reduced over time and will continue to be reduced. Other large facilities in the Southeast Indiana area include a cement manufacturing facility, a natural gas compressor station, a ship manufacturer, and a cabinet manufacturing facility. Air quality in the Southeast Indiana area is partially influenced by the emissions from these top ten point sources but as new control measures are adopted, these emissions will continue to decrease. Figure 2 shows the location of these sources within the Southeast Indiana area.

Table 4: Southeast Indiana Top Ten Sources Data (Tons per Year)

INVENTORY YEAR	COUNTY	FACILITY NAME	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	TOTAL
2010	JEFFERSON	IKEC - CLIFTY CREEK STATION	1,012.5	9,118.6	473.2	269.3	68,932.0	81.0	79,886.6
2010	FLOYD	DUKE ENERGY INDIANA - GALLAGHER	279.0	3,921.6	141.7	38.7	23,088.3	33.1	27,502.5
2010	CLARK	ESSROC CEMENT CORP.	3,793.4	1,095.1	713.4	217.4	1,513.7	55.9	7,388.9
2008	ORANGE	TETCO - FRENCH LICK STATION	74.2	609.2	7.4	7.4	0.1	23.1	721.3
2010	CLARK	JEFFBOAT	0.0	0.0	198.6	198.6	0.0	164.4	561.6
2010	CLARK	KITCHEN KOMPACT, INC,	0.0	0.0	5.4	4.8	0.0	368.9	379.2
2008	CLARK	THE PQ CORPORATION	14.5	88.1	19.9	19.6	49.4	3.7	195.1
2008	CRAWFORD	MULZER CRUSHED STONE	0.0	0.0	131.6	13.6	0.0	0.0	145.1
2008	HARRISON	DARAMIC, L.L.C.	4.7	5.7	6.6	3.9	0.0	118.5	139.4
2010	ORANGE	PAOLI, INC.	0.0	0.0	0.0	0.0	0.0	128.0	128.0

Figure 2: Map of Southeast Indiana Top Ten Sources



Air Quality Trends

An area meets the standard when the monitoring values for a regulated criteria pollutant meet the applicable National Ambient Air Quality Standards (NAAQS). All counties in the Southeast Indiana area currently meet the historic NAAQS. As noted below, new 1-hour NAAQS were introduced in 2010 for NO_2 and SO_2. The 1-hour NO_2 monitoring data in Southeast Indiana, as well as elsewhere in the state, are well below the new 1-hour NO_2 NAAQS. There are three monitor violations in Floyd County for the new 1-hour SO_2 NAAQS in Southeast Indiana at the close of 2010. States are required to develop SIPs to show attainment of the 1-hour SO_2 NAAQS by 2017.

Air Monitoring and Emissions Data

Not all counties in the Southeast Indiana area have an ambient air quality monitor located within the county boundaries. Monitoring data for the years 2000 through 2010 for Southeast Indiana are included in the tables in this report for each criteria pollutant, if available. Monitoring data prior to the year 2000 is available upon request. A historical trend graph of all available data for the years 1980 through 2010 is also provided. The data were obtained from the U.S. EPA's Air Quality System (AQS).

Emission trend graphs and pie charts for the criteria pollutants and precursors that lead to the formation of a criteria pollutant are outlined in this report. Indiana's emission inventory data is available for 1980 through 2009 for CO, $PM_{2.5}$, NO_x, PM_{10}, SO_2, and VOC. The data were obtained from the U.S. EPA's National Emissions Inventory (NEI). An appendix is attached that includes county-specific emissions data for each county from 1980 through 2009.

Carbon Monoxide (CO)

There are no monitoring sites within the Southeast Indiana area that measure CO levels. U.S. EPA's NEI contains emissions information for CO which is used for Graph 1 and Chart 1. Graph 1 illustrates the emissions trend for CO in Southeast Indiana and Chart 1 shows how the average emissions are distributed among the different source categories. CO emissions in the Southeast Indiana area have trended downward over time. If monitoring data for CO were available in the Southeast Indiana area, it is expected that monitoring values would trend downward as well.

Graph 1: Southeast Indiana CO Emissions

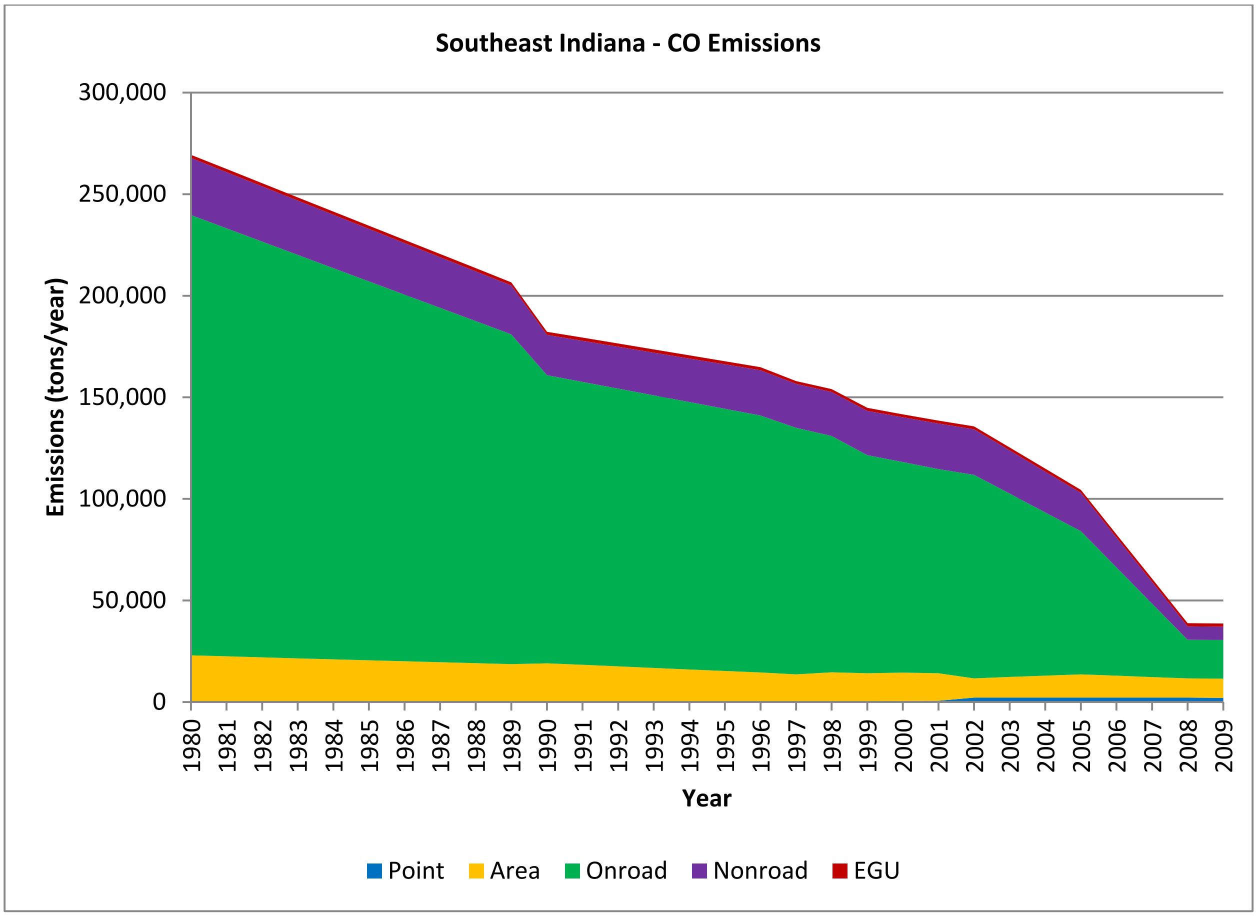
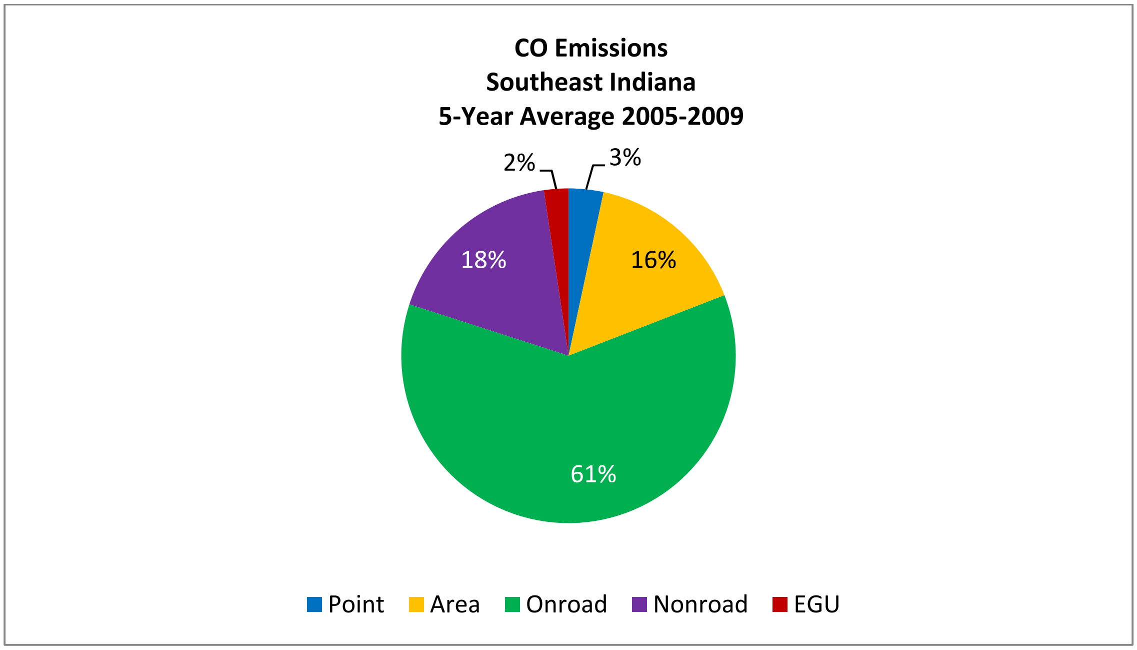


Chart 1: Southeast Indiana CO Emissions



National controls have led to a decrease in CO emissions in the Southeast Indiana area over time. As Graph 1 illustrates, CO emissions have decreased by 86% within the Southeast Indiana area since 1980. This trend is true throughout Indiana and the upper Midwest. CO is a component of motor vehicle exhaust, which the U.S. EPA estimates to be the major source of CO emissions. Levels of CO have generally declined since the mid-1980s, primarily due to stricter emission standards for onroad and nonroad engines.

For information on CO standards, sources, health effects, and programs to reduce CO, please see www.epa.gov/airqualilty/carbonmonoxide.

Fine Particles ($PM_{2.5}$)

Currently, there are three monitors in the Southeast Indiana area, two in Clark County and one in Floyd County that measure $PM_{2.5}$ levels. The trend data in Graphs 2 and 4 reflect the annual arithmetic mean (the method used to derive the central tendency of the monitoring values) for annual $PM_{2.5}$ and the 98^{th} percentile (the method used to determine the value below which a certain percent of monitored observations fall) for 24-hour $PM_{2.5}$ for each year in the Southeast Indiana area for the years 2000 through 2010. The annual arithmetic mean values for annual $PM_{2.5}$ and 98^{th} percentile values for 24-hour $PM_{2.5}$ are not used to compare to the primary and secondary annual or 24-hour $PM_{2.5}$ standards. A three-year average, also known as the design value, is used to compare to both the primary and secondary annual $PM_{2.5}$ standards of 15.0 micrograms per cubic meter ($\mu g/m^3$), as well as the primary and secondary 24-hour $PM_{2.5}$ standards of 35 $\mu g/m^3$, but the annual arithmetic mean and 98^{th} percentile for each year do provide a good indication of annual and 24-hour $PM_{2.5}$ trends over time. The primary and secondary 24-hour $PM_{2.5}$ standards were first established in July 1997 of 65 $\mu g/m^3$. U.S. EPA revised the primary and secondary 24-hour $PM_{2.5}$ standards and lowered them to 35 $\mu g/m^3$ in October 2006.

For both annual and 24-hour $PM_{2.5}$, the secondary standard is the same as the primary standard. Attainment of the annual primary and secondary $PM_{2.5}$ standards is determined by evaluating the design value of the annual arithmetic mean from a single monitor, which must be less than or equal to 15.0 $\mu g/m^3$. An exceedance of the annual $PM_{2.5}$ standards occurs when an annual arithmetic mean value is equal to or greater than 15.0 $\mu g/m^3$. A violation of the annual $PM_{2.5}$ standards occurs when the design value of the annual arithmetic mean value is equal to or greater than 15.05 $\mu g/m^3$. A monitor can exceed the annual $PM_{2.5}$ standards without being in violation. Attainment of the 24-hour $PM_{2.5}$ standards is determined by evaluating the design value of the 98^{th} percentile of the 24-hour concentrations at each population-oriented monitor within an area, which must not exceed 35 $\mu g/m^3$. An exceedance of the 24-hour $PM_{2.5}$ standards occurs when the 98^{th} percentile is equal to or greater than 35.0 $\mu g/m^3$. A violation of the 24-hour $PM_{2.5}$ standards occurs when the design value of the 98^{th} percentile is equal to or greater than 35.5 $\mu g/m^3$. A monitor can exceed the 24-hour $PM_{2.5}$ standards without being in violation.

The trend data in Graph 3 reflect the three-year design value of the annual arithmetic mean for annual $PM_{2.5}$ for each year in the Southeast Indiana area for the years 2000 through 2010. The trend data in Graph 5 reflect the three-year design value of the 98^{th} percentile values for 24-hour $PM_{2.5}$ for each year in the Southeast Indiana area for the years 2000 through 2010.

While there is some variability in the monitoring values for both annual $PM_{2.5}$ and 24-hour $PM_{2.5}$, a downward trend over time can be seen in Graphs 2, 3, 4, and 5. The design value of the annual arithmetic mean is used for comparison to the primary and secondary annual $PM_{2.5}$ standards of 15.0 µg/m^3; therefore, the one-year values shown in Graph 2 are not a true comparison to the annual $PM_{2.5}$ standards and the values in the years that are above the red line are not a violation of the primary and secondary annual $PM_{2.5}$ standards. The values in Graph 2 reflect the annual arithmetic mean and the highest value from all of the monitors in the Southeast Indiana area is plotted on the graph for each year.

The design value of the 98^{th} percentile is used for comparison to the 24-hour $PM_{2.5}$ standards; therefore, the one-year values shown in Graph 4 are not a true comparison to the 24-hour $PM_{2.5}$ standards and the values in the years that are above the red line are not a violation of the primary and secondary 24-hour $PM_{2.5}$ standards. The values in Graph 4 reflect the 98^{th} percentile and the highest value from all of the monitors in the Southeast Indiana area is plotted on the graph for each year.

The data in Tables 5, 6, 7, and 8 are from the monitoring sites that measured annual and 24-hour $PM_{2.5}$ from 2000 to 2010. Statewide monitoring for $PM_{2.5}$ began in 2000; all available data for both annual and 24-hour $PM_{2.5}$ for the Southeast Indiana area are shown in the tables. Monitoring data for both annual and 24-hour $PM_{2.5}$ show a downward trend over time.

Monitoring data in Table 5 show the annual arithmetic mean for annual $PM_{2.5}$ for the years 2000 through 2010. Monitoring data in Table 6 show the design value of the annual arithmetic mean for annual $PM_{2.5}$ for the years 2000 through 2010, which are compared to the primary and secondary annual $PM_{2.5}$ standards of 15.0 µg/m^3. Monitoring data in Table 7 show the 98^{th} percentile for 24-hour $PM_{2.5}$ for the years 2000 through 2010. Monitoring data in Table 8 show the design value of the 98^{th} percentile for 24-hour $PM_{2.5}$ for the years 2000 through 2010, which are compared to the primary and secondary 24-hour $PM_{2.5}$ standards of 35.0 µg/m^3.

Graph 2: Southeast Indiana Annual Arithmetic Mean $PM_{2.5}$ Values

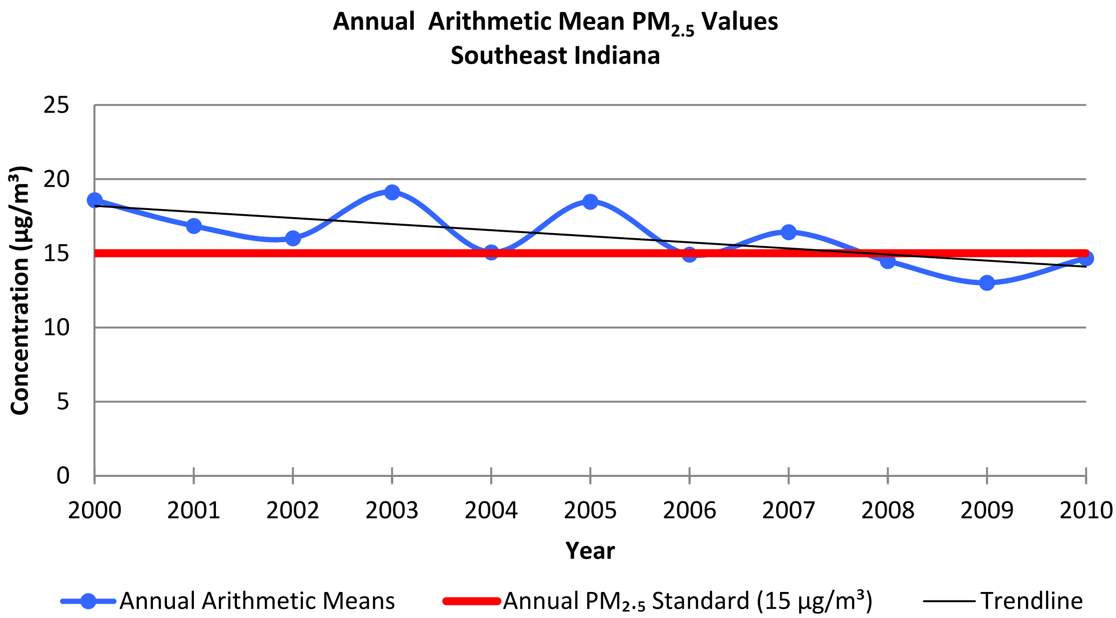


Table 5: Southeast Indiana Annual Arithmetic Mean $PM_{2.5}$ Monitoring Data Summary

County	Site #	Site Name	Annual Arithmetic Mean ($\mu g/m^3$)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Clark	180190005	Jeffersonville - Spring St	18.59	16.85	16.02	14.68							
Clark	180190005/6	Jeffersonville Combined (Spring St & Walnut St)		16.85	16.02	15.78	15.07	18.48					
Clark	180190006	Jeffersonville - Walnut St				19.12	15.07	18.48	14.91	16.43	14.48	13.01	14.67
Clark	180190008	Charlestown State Park									13.44	10.84	12.45
Floyd	180431004	New Albany	16.27	15.73	14.62	14.44	13.68	16.69	13.32	14.66	12.70	11.91	13.80

Graph 3: Southeast Indiana Annual $PM_{2.5}$ Three-Year Design Values

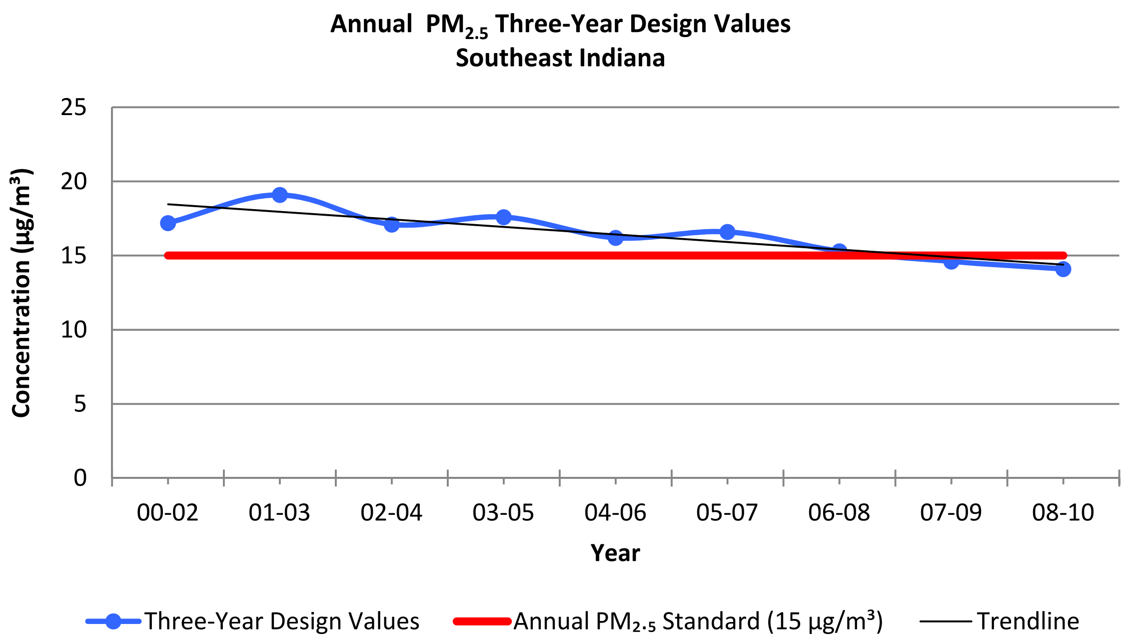


Table 6: Southeast Indiana Annual $PM_{2.5}$ Three-Year Design Value Monitoring Data Summary

County	Site #	Site Name	Three-Year Design Value (µg/m³)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Clark	180190005	Jeffersonville - Spring St	17.2	15.8							
Clark	180190005/6	Jeffersonville Combined (Spring St & Walnut St)		16.2	15.6	16.5					
Clark	180190006	Jeffersonville - Walnut St		19.1	17.1	17.6	16.2	16.6	15.3	14.6	14.1
Clark	180190008	Charlestown State Park							13.4	12.1	12.2
Floyd	180431004	New Albany	15.5	14.9	14.2	14.9	14.6	14.9	13.6	13.1	12.8

Red highlighted numbers are above the annual $PM_{2.5}$ standard of 15.0 µg/m³

Graph 4: Southeast Indiana 24-Hour $PM_{2.5}$ 98th Percentile Values

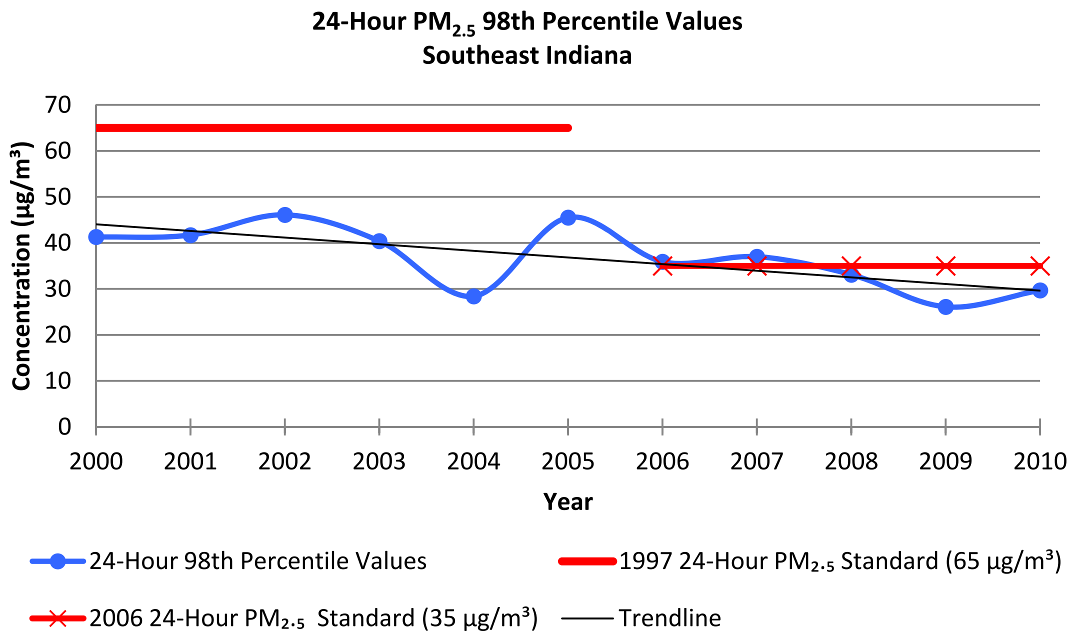


Table 7: Southeast Indiana 24-Hour 98th Percentile Value $PM_{2.5}$ Monitoring Data Summary

County	Site #	Site Name	Daily 98th Percentile Values (µg/m³)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Clark	180190005	Jeffersonville - Spring St	41.3	41.7	46.1	30.9							
Clark	180190005/6	Jeffersonville Combined (Spring St & Walnut St)		41.7	46.1	36.1	28.4	45.5					
Clark	180190006	Jeffersonville - Walnut St				40.4	28.4	45.5	35.9	37.0	33.1	26.1	29.2
Clark	180190008	Charlestown State Park									27.5	22.0	24.8
Floyd	180431004	New Albany	36.5	38.2	40.8	33.9	26.7	40.1	28.2	35.4	26.8	23.6	29.7

Graph 5: Southeast Indiana 24-Hour $PM_{2.5}$ Three-Year Design Values

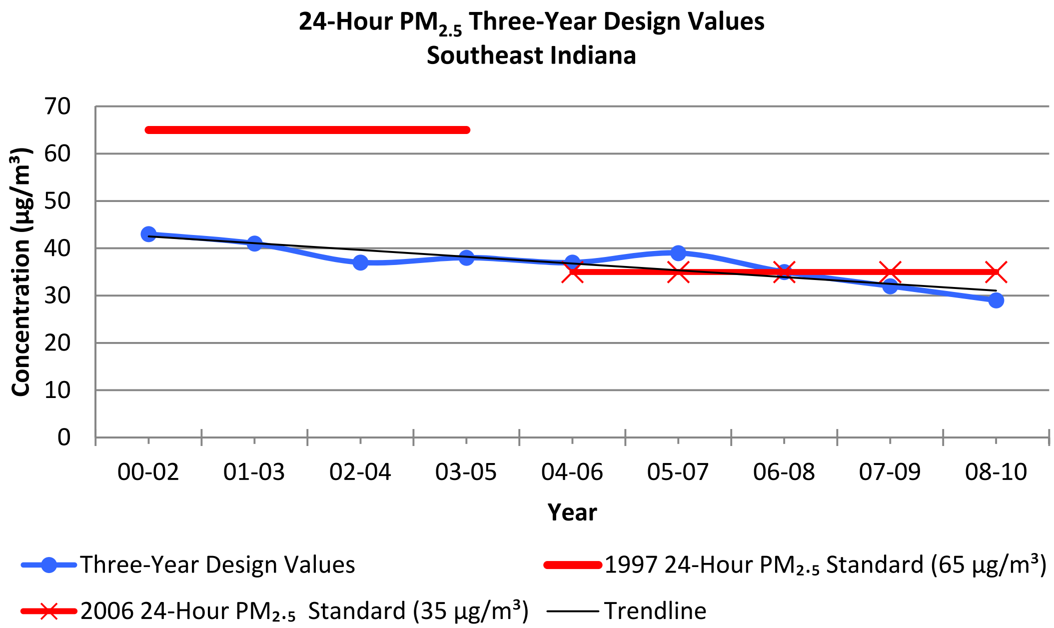


Table 8: Southeast Indiana 24-Hour Three-Year Design Value $PM_{2.5}$ Monitoring Data Summary

County	Site #	Site Name	Three-Year Design Value (µg/m³)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Clark	180190005	Jeffersonville - Spring St	43	40							
Clark	180190005/6	Jeffersonville Combined (Spring St & Walnut St)		41	37	37					
Clark	180190006	Jeffersonville - Walnut St		40	34	38	37	39	35	32	29
Clark	180190008	Charlestown State Park							28	25	25
Floyd	180431004	New Albany	39	38	34	34	32	35	30	29	27

Prior to 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 65.0 $\mu g/m^3$

Beginning in 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 35.0 $\mu g/m^3$

Tables 2, 3, 4, and 5 demonstrate that the annual and 24-hour $PM_{2.5}$ values for the Southeast Indiana area correlate with each other over time, meaning that when one monitoring site trends upward or downward, the other two sites do also. Annual $PM_{2.5}$ values in Southeast Indiana had been above the primary and secondary annual $PM_{2.5}$ standards until the end of 2008, but have remained below since then. The 24-hour $PM_{2.5}$ values in Southeast Indiana had been above the primary and secondary 24-hour $PM_{2.5}$ standards until the end of 2007, but have remained below since then. The Jeffersonville - Walnut Street $PM_{2.5}$ monitoring site has historically registered the highest $PM_{2.5}$ values in Southeast Indiana.

While fluctuations in monitoring data are shown in Graphs 2, 3, 4, and 5, monitoring data for both annual $PM_{2.5}$ and 24-hour $PM_{2.5}$ indicate a downward trend over time. $PM_{2.5}$ is influenced by meteorology (wind speed, temperature, stagnant air, etc.). Meteorological conditions can have an episodic effect on $PM_{2.5}$ concentrations as in 2005 (Graphs 2, 3, 4, and 5), where three of the four quarters of the year had high $PM_{2.5}$ values which drove the annual $PM_{2.5}$ values higher for the year. The annual value is calculated from the average of the year's four quarterly averages. A quarterly average is the average of all available data from the respective quarter. The upper Midwest experienced several episodes of unusually high $PM_{2.5}$ concentrations in 2005 caused by unusual confluences of meteorological factors. Several times during 2005, high pressure systems were held in place by jet streams which lead to a persistent, highly stable atmosphere with calm winds. Atmospheric mixing was suppressed and pollutants that form $PM_{2.5}$ were trapped near the surface and high values were measured. The longest and most wide-spread episode happened during the first week of February 2005, which lasted for nine days and affected the upper Midwest and southern Ontario where $PM_{2.5}$ daily values exceeded 70 $\mu g/m^3$.

$PM_{2.5}$ is emitted directly into the air, but is also created by a chemical reaction between SO_2 and NO_x. U.S. EPA's NEI contains emissions information for $PM_{2.5}$, SO_2, and NO_x and is used for Graphs 6, 7, and 8 and Charts 2, 3, and 4. Graphs 6, 7, and 8 illustrate the emissions trend for $PM_{2.5}$ and its precursors (SO_2 and NO_x) in Southeast Indiana. Charts 2, 3, and 4 show how the average emissions are separated among the different source categories.

Graph 6: Southeast Indiana $PM_{2.5}$ Emissions

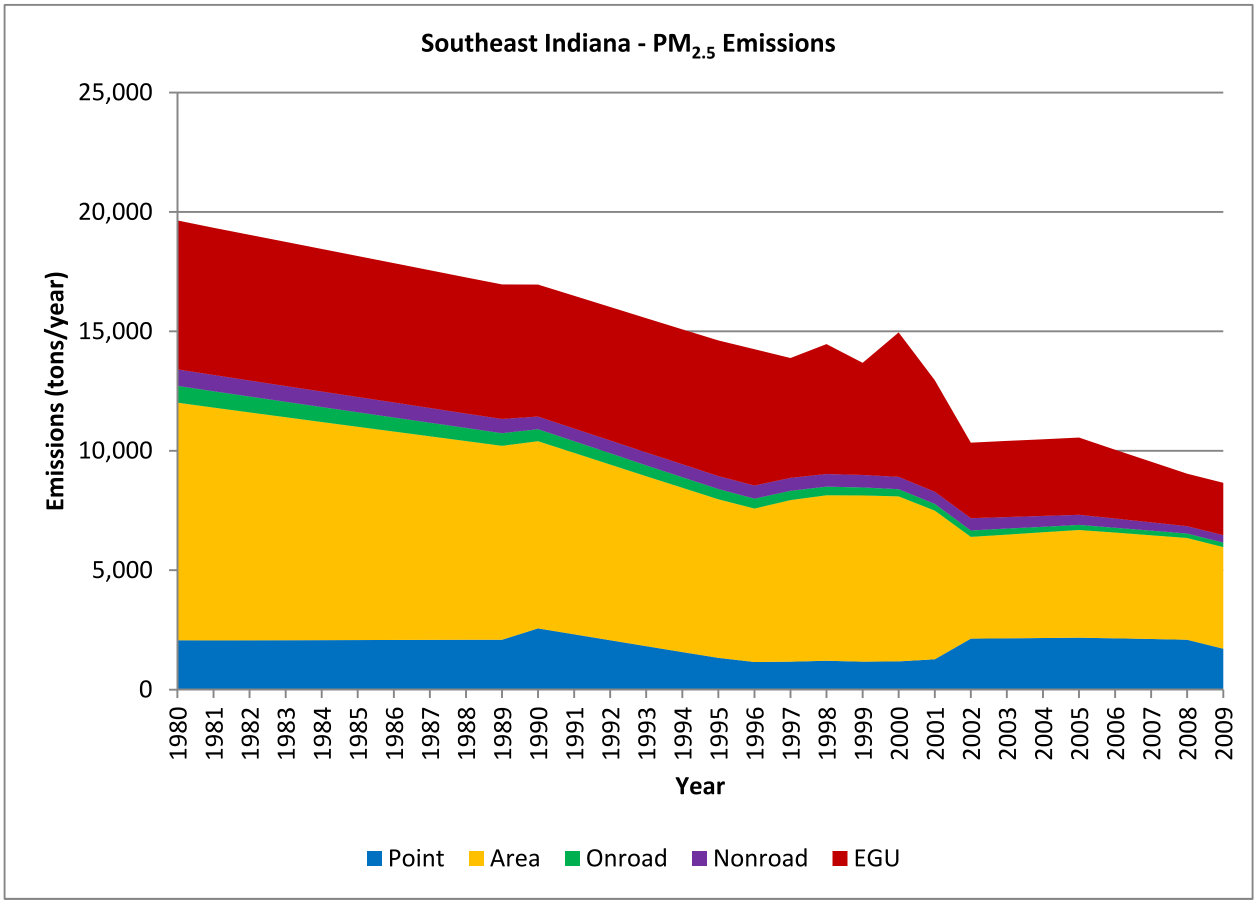
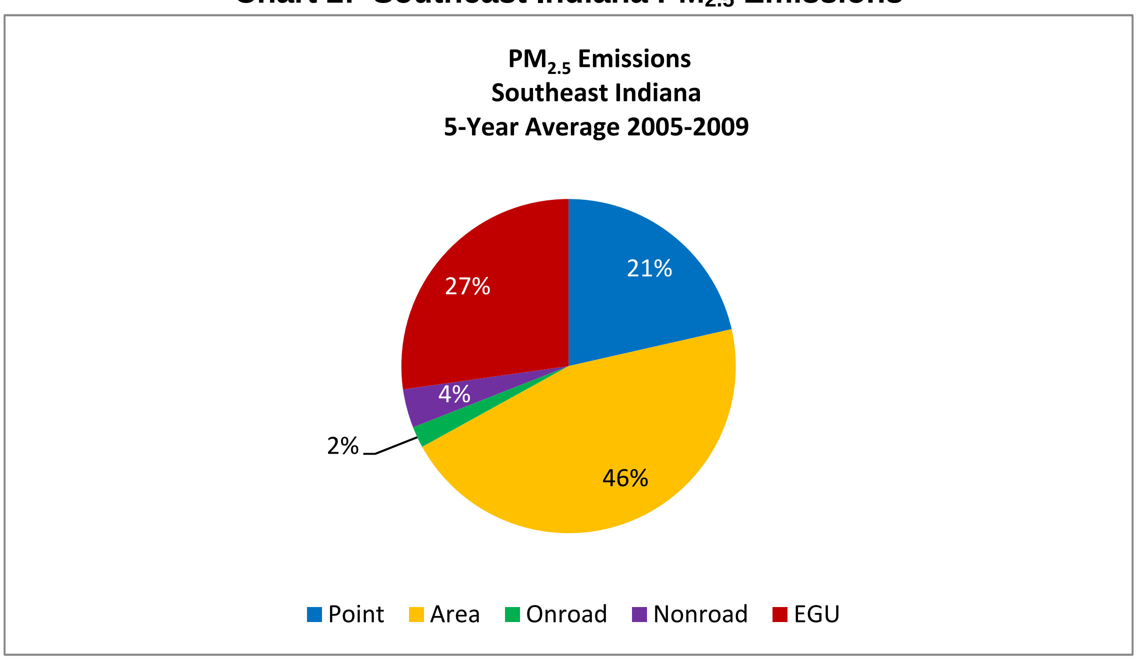


Chart 2: Southeast Indiana $PM_{2.5}$ Emissions



Graph 7: Southeast Indiana SO_2 Emissions

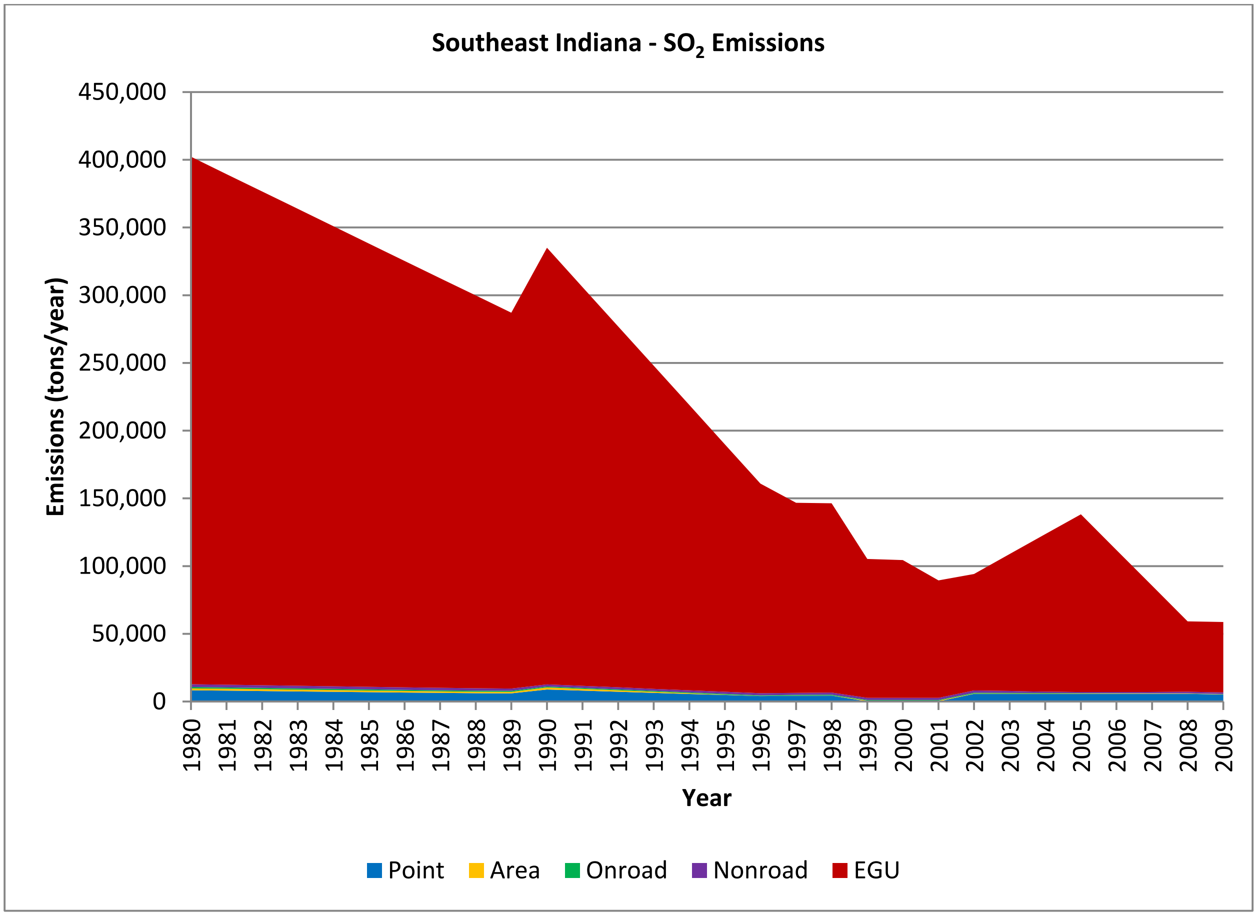
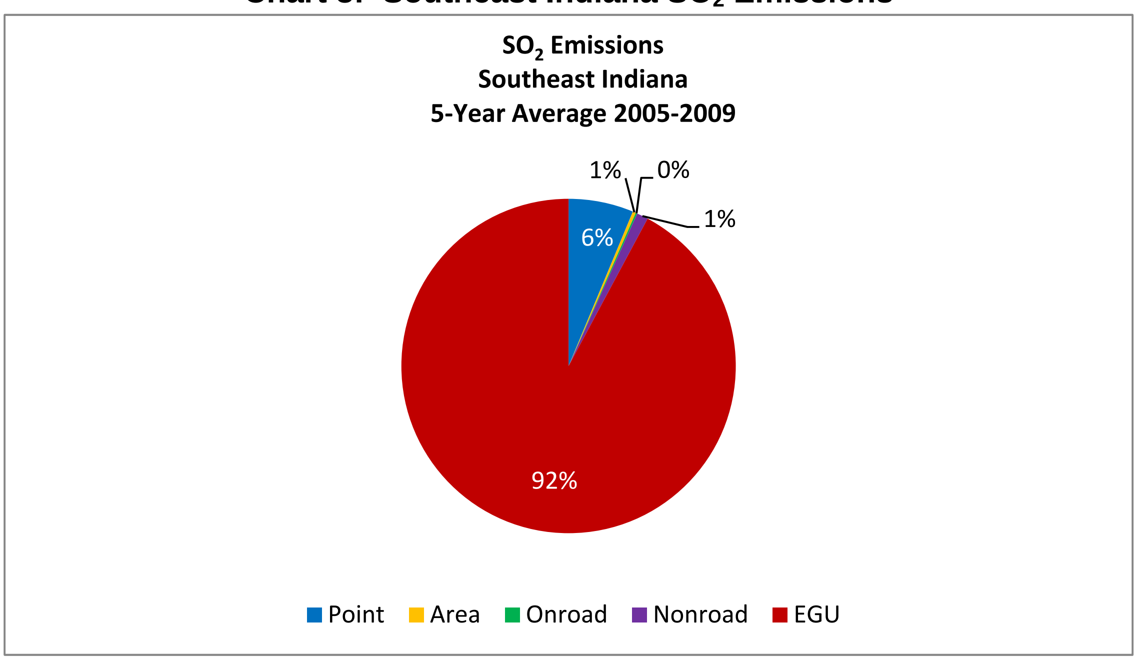


Chart 3: Southeast Indiana SO_2 Emissions



Graph 8: Southeast Indiana NO_x Emissions

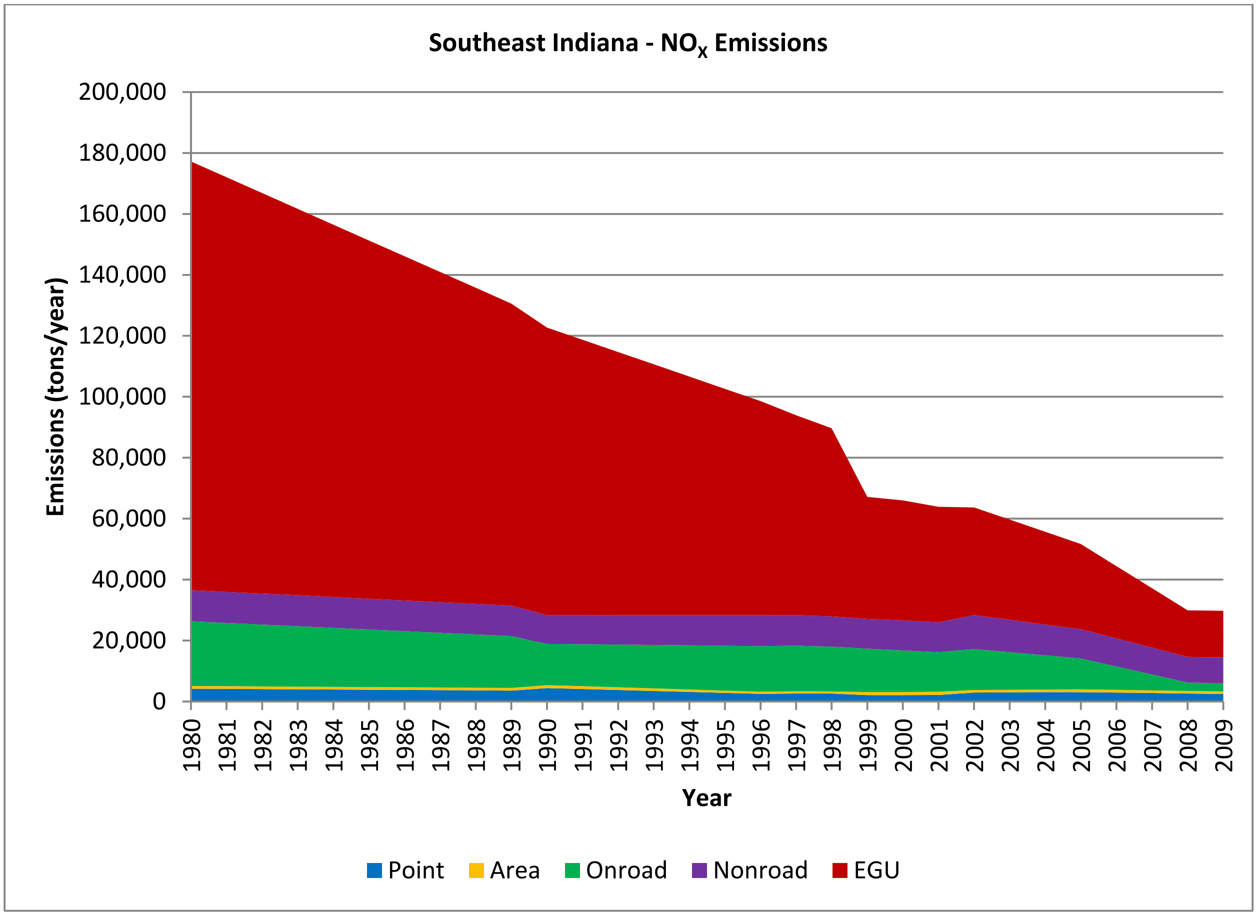
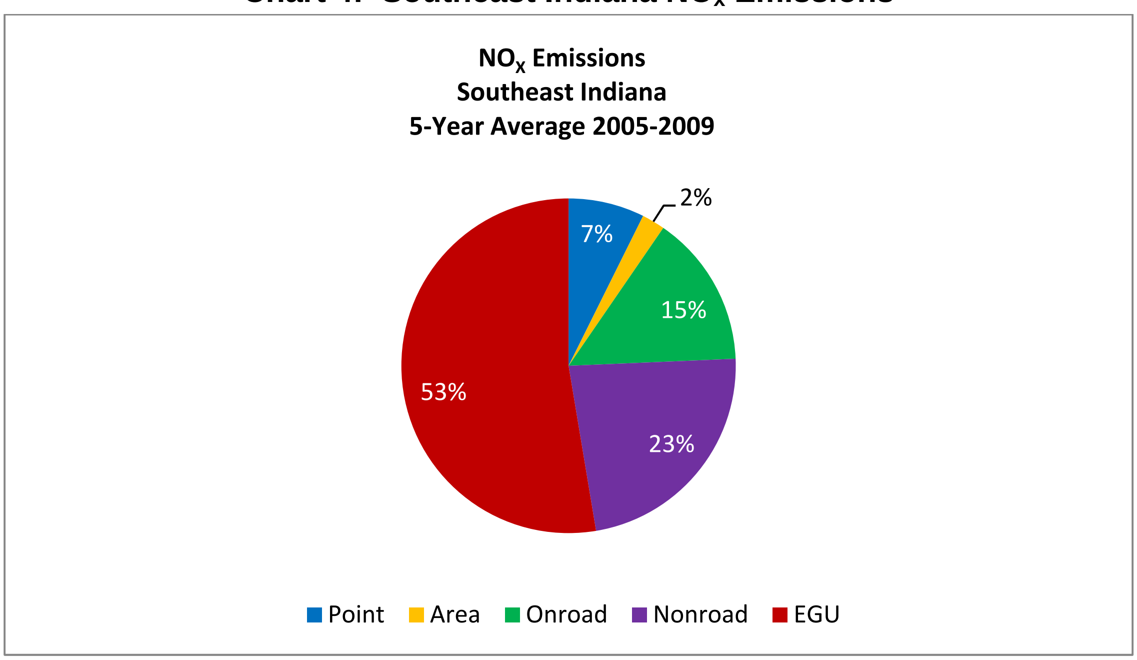


Chart 4: Southeast Indiana NO_x Emissions



National controls, such as engine and fuel standards, as well as regional controls, such as the NO_x SIP Call, have led to a decrease in $PM_{2.5}$ values over time. As Graphs 6, 7, and 8 illustrate, $PM_{2.5}$, SO_2, and NO_x emissions have decreased by 56%, 85%, and 83%, respectively, within the Southeast Indiana area since 1980. This trend is true for the key precursors of $PM_{2.5}$ throughout Indiana and the upper Midwest.

Reductions in Indiana for SO_2 are primarily attributable to the implementation of the Acid Rain Program, as well as federal engine and fuel standards for onroad and nonroad vehicles and equipment. Nationally, average SO_2 concentrations have decreased by more than 70% since 1980 due to the implementation of the Acid Rain Program. Reductions in $PM_{2.5}$ and NO_x emissions are attributable to the implementation of the federal engine and fuel standards for onroad and nonroad vehicles and equipment, as well as the NO_x SIP Call beginning in 2004.

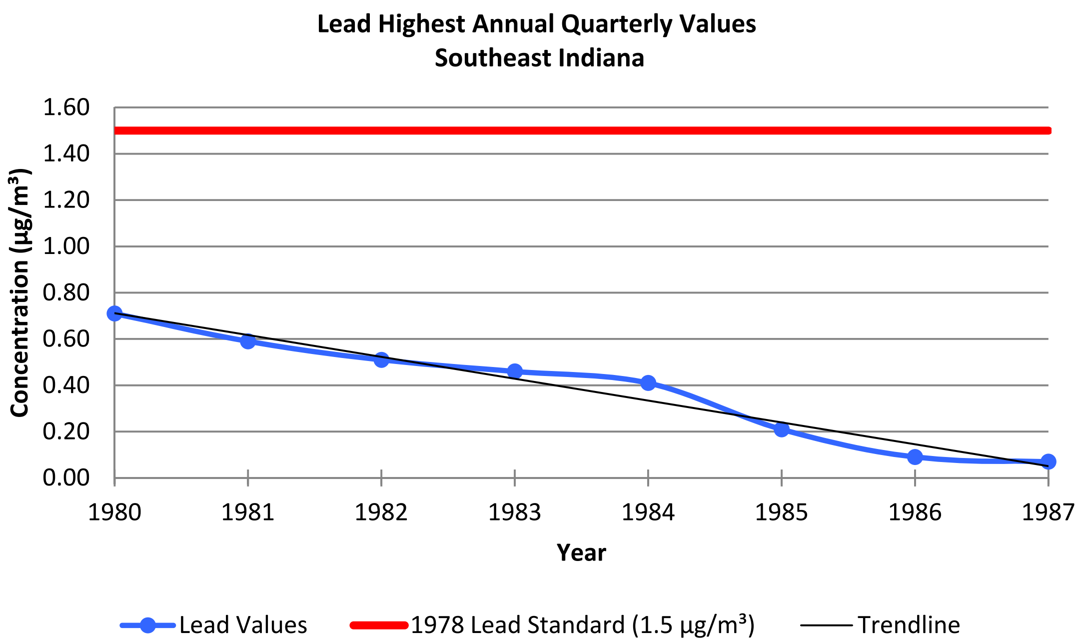
For information on $PM_{2.5}$ standards, sources, health effects, and programs to reduce $PM_{2.5}$, please see www.epa.gov/air/particlepollution.

Lead

The primary and secondary lead standards were first established in October 1978 at 1.5 µg/m^3. The primary and secondary lead standards were first established in October 1978 at 1.5 µg/m^3. Attainment was determined by evaluating each calendar quarter arithmetic average, which must not exceed 1.5 µg/m^3 over a three-year period. U.S. EPA replaced the primary and secondary 1978 lead standards with new primary and secondary lead standards of 0.15 µg/m^3 in October 2008. The trend data in Graph 9 reflect the highest annual quarterly arithmetic mean from all of the monitors in the Southeast Indiana area which area are plotted on the graph for each year. Lead data is unavailable for some years. Lead monitoring sites were discontinued in the Southeast Indiana area in 1987; therefore, a table of current monitoring data for lead values is not included in this report. However, monitoring data for lead monitors in Southeast Indiana are available upon request. Since there is no lead data beyond 1987 for the Southeast Indiana region, monitoring data for the primary and secondary 2008 lead standards and a trend chart comparing the highest three-month rolling average for each year (which is used to compare to the primary and secondary 2008 lead standards) have not been provided.

While fluctuations in monitoring data are shown in Graph 9, monitoring data for lead indicates a downward trend over time. Lead monitors are located in close proximity to major sources in the area and data fluctuates based on variability in facility operations and meteorology.

Graph 9: Southeast Indiana Lead Highest Annual Quarterly Values



Historically, the majority of lead emissions came from motor vehicle fuels. As a result of U.S. EPA's regulatory efforts to remove lead from motor vehicle gasoline, emissions of lead from the transportation sector declined by 95% between 1980 and 1999, and levels of lead in the air decreased by 94% between 1980 and 1999. As shown in Graph 9, while lead levels in the Southeast Indiana area have always been below the primary and secondary lead standards, the sharp decrease after 1985 can be attributed to the removal of lead in motor vehicle gasoline.

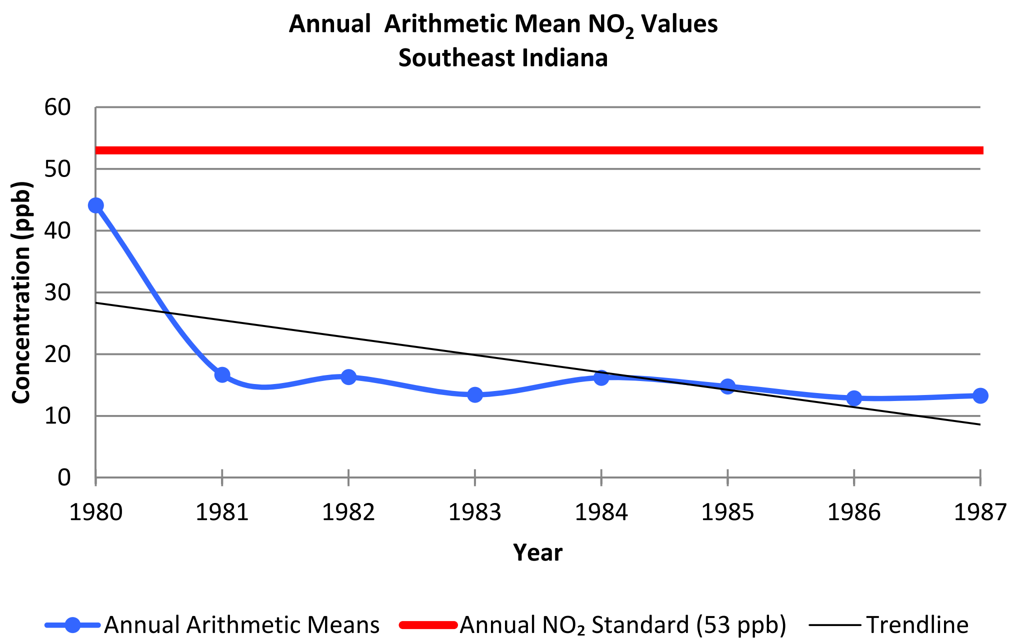
For information on lead standards, sources, health effects, and programs to reduce lead, please see www.epa.gov/air/lead.

Nitrogen Dioxide (NO_2)

At one time, there were four monitoring sites in the Southeast Indiana area that measured NO_2 levels, one each in Jefferson and Switzerland counties and two in Clark County. The trend data in Graph 10 reflect the annual arithmetic mean NO_2 values. The annual arithmetic mean is used to compare to the primary and secondary annual NO_2 standards at 53 parts per billion (ppb). The secondary annual NO_2 standard is the same as the primary NO_2 standard. Attainment of the annual NO_2 standards is determined by evaluating the annual arithmetic mean concentration in a calendar year, which must be less than or equal to 53 ppb. U.S. EPA added a primary 1-hour NO_2 standard in February 2010 at 100 ppb. Attainment of the 1-hour NO_2 standard is determined by evaluating the design value of the 98^{th} percentile of the daily maximum 1-hour averages at each monitor within an area, which must not exceed 100 ppb averaged over a three-year period.

NO_2 monitoring sites were discontinued in the Southeast Indiana area in 1987; therefore, a table of current monitoring data for the annual NO_2 values is not included in this report. However, historical monitoring data for annual NO_2 for all monitors in the Southeast Indiana area are available upon request. Monitoring data for annual NO_2 show a downward trend over time and the monitor values for the Southeast Indiana area have been below the primary and secondary annual NO_2 standards. While fluctuations in monitoring data are shown in Graph 10, monitoring data for annual NO_2 indicate a downward trend over time. NO_2 monitors are located in close proximity to major sources in the area and data fluctuates based on variability in facility operations and meteorology.

Graph 10: Southeast Indiana Annual Arithmetic Mean NO_2 Values



U.S. EPA's NEI contains emissions information for NO_x and is used for Graph 11 and Chart 5. NO_x emissions data are used as a surrogate for NO_2 in conjunction with the NO_2 NAAQS. Graph 11 illustrates the emissions trend for NO_x in the Southeast Indiana area and Chart 5 shows how the average emissions are distributed among the different source categories.

Graph 11: Southeast Indiana NO_x Emissions

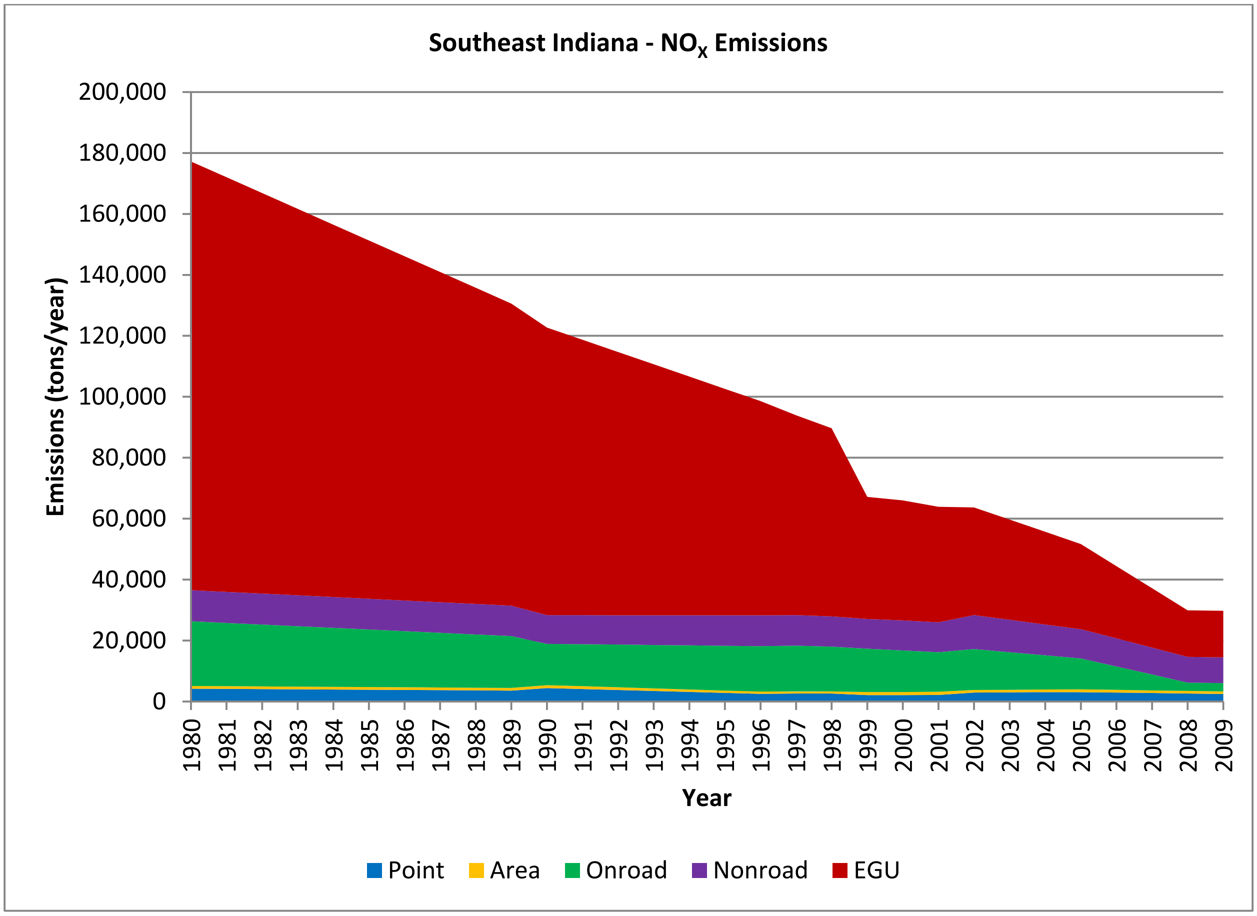
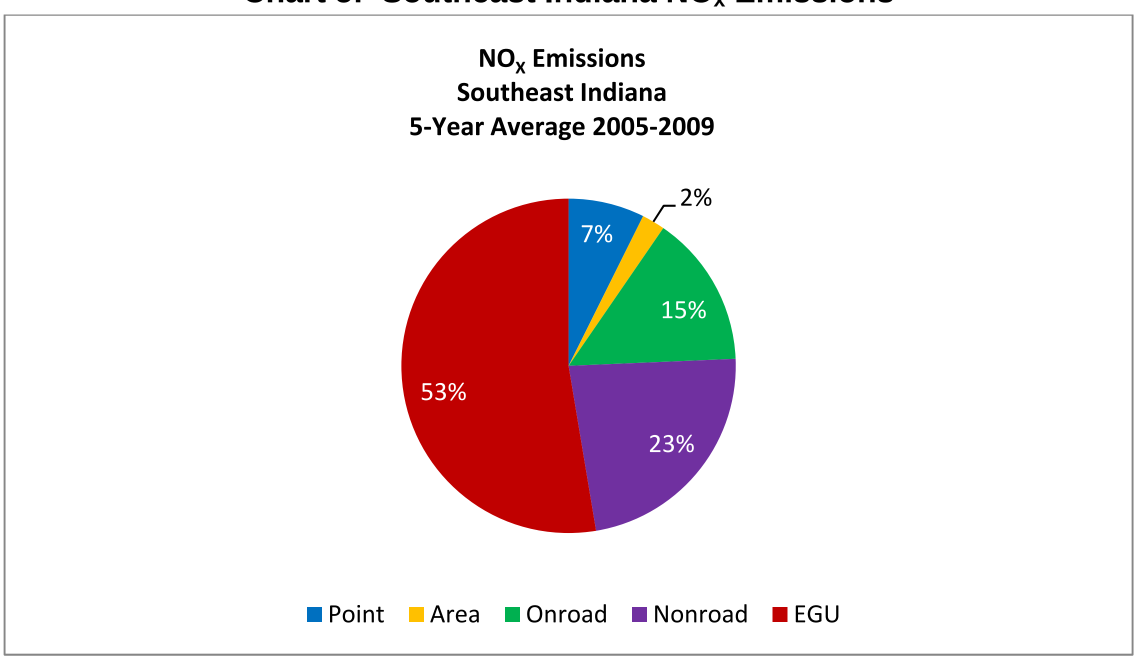


Chart 5: Southeast Indiana NO_x Emissions



National and regional controls, such as the Acid Rain Program, engine and fuel standards, and the NO_x SIP Call have led to a decrease in NO_x values over time. As Graph 11 illustrates, NO_x emissions have decreased by 83% within Southeast Indiana area since 1980. This trend is true throughout Indiana and the upper Midwest. According to U.S. EPA, average NO_x concentrations have decreased by more than 40% nationally since 1980.

For information on NO_2 standards, sources, health effects, and programs to reduce NO_2, please see www.epa.gov/airquality/nitrogenoxides/.

Ozone

Two monitoring sites within Southeast Indiana, one in Clark County and one in Floyd County measure ozone levels. Primary and secondary ozone 1-hour ozone standards were first established in April 1979 at 0.12 ppm. Based on U.S. EPA's published data guidelines, values above 0.124 ppm were deemed to be in violation of the standard. The trend data in Graph 12 reflect the 4^{th} highest monitored concentration for 1-hour ozone within a given three-year period from all of the monitors in the Southeast Indiana area is plotted on the graph for each year. These values were used to determine attainment of the primary and secondary 1-hour ozone standards before they were revoked in June 2005.

In July 1997, U.S. EPA established the primary and secondary 8-hour ozone standards at 0.08 ppm. Based on the U.S. EPA's published data handling guidelines, values above 0.084 ppm were deemed to be in violation of the standard. U.S. EPA lowered the primary and secondary 8-hour ozone standards to 0.075 ppm in March 2008. Attainment of the primary and secondary 8-hour ozone standards is determined by evaluating the design value of the 4^{th} highest 8-hour ozone concentration measured at each monitor within an area over each year, which must not exceed 0.075 ppm. An exceedance of the standards occurs when an 8-hour ozone value is equal to or greater than 0.075 ppm. A violation of the standards occurs when the design value of the three-year average of the 4^{th} highest 8-hour ozone value is equal to or greater than 0.076 ppm. A monitor can exceed the standards without being in violation.

The trend data in Graph 13 reflect the 4^{th} high and the highest 4^{th} high concentration for 8-hour ozone from all of the monitors in the Southeast Indiana area for each year. The design value of the three-year average of the 4^{th} highest 8-hour ozone values is used for comparison to the 8-hour ozone standard; therefore, the one-year values in Graph 13 are not a true comparison to the primary and secondary 8-hour ozone standards. The values in Graph 14 reflect the design value of the three-year average of the 4th highest 8-hour ozone values from the monitors for each year.

The data in Tables 9 and 10 are from all of the monitoring sites in the Southeast Indiana area that measured 1-hour ozone from 2000 through 2010. Monitoring data in Table 9 show the four highest annual concentrations for 1-hour ozone for the years 2000 through 2010. Monitoring data in Table 10 show the 4th highest concentration for 1-hour ozone in a three-year period for the years 2000 through 2010. The data in Tables 11 and 12 are from all of the monitoring sites in the Southeast Indiana area that measured 8-hour ozone from 2000 through 2010. Monitoring data in Table 11 show the 4th highest concentration for 8-hour ozone in a three-year period for the years 2000 through 2010. Monitoring data in Table 12 show the design value of the three-year average of the 4th highest 8-hour ozone values for the years 2000 through 2010, which are compared to the primary and secondary 8-hour ozone standards at 0.08 ppm.

Table 9: Southeast Indiana 1-Hour Ozone Annual 4th High Value Monitoring Data Summary

			1-Hour Ozone Value (ppm)											
County	**Site #**	**Site Name**	**1st High 2000**	**2nd High 2000**	**3rd High 2000**	**4th High 2000**	**1st High 2001**	**2nd High 2001**	**3rd High 2001**	**4th High 2001**	**1st High 2002**	**2nd High 2002**	**3rd High 2002**	**4th High 2002**
Clark	180190003/8	Charlestown / State Park	0.105	0.101	0.101	0.097	0.109	0.106	0.101	0.101	0.123	0.117	0.115	0.109
Floyd	180431004	New Albany	0.101	0.093	0.092	0.092	0.107	0.096	0.088	0.087	0.134	0.123	0.118	0.112
County	**Site #**	**Site Name**	**1st High 2003**	**2nd High 2003**	**3rd High 2003**	**4th High 2003**	**1st High 2004**	**2nd High 2004**	**3rd High 2004**	**4th High 2004**	**1st High 2005**	**2nd High 2005**	**3rd High 2005**	**4th High 2005**
Clark	180190003/8	Charlestown / State Park	0.110	0.108	0.106	0.106	0.087	0.087	0.084	0.084	0.117	0.105	0.098	0.095
Floyd	180431004	New Albany	0.123	0.116	0.116	0.101	0.095	0.085	0.084	0.078	0.104	0.103	0.097	0.096
County	**Site #**	**Site Name**	**1st High 2006**	**2nd High 2006**	**3rd High 2006**	**4th High 2006**	**1st High 2007**	**2nd High 2007**	**3rd High 2007**	**4th High 2007**	**1st High 2008**	**2nd High 2008**	**3rd High 2008**	**4th High 2008**
Clark	180190003/8	Charlestown / State Park	0.118	0.109	0.104	0.096	0.119	0.109	0.108	0.103	0.117	0.096	0.095	0.092
Floyd	180431004	New Albany	0.116	0.102	0.096	0.095	0.119	0.111	0.102	0.096	0.118	0.096	0.093	0.084
County	**Site #**	**Site Name**	**1st High 2009**	**2nd High 2009**	**3rd High 2009**	**4th High 2009**	**1st High 2010**	**2nd High 2010**	**3rd High 2010**	**4th High 2010**				
Clark	180190003/8	Charlestown / State Park	0.089	0.076	0.075	0.073	0.108	0.099	0.097	0.096				
Floyd	180431004	New Albany	0.081	0.077	0.074	0.074	0.104	0.101	0.100	0.094				

Graph 12: Southeast Indiana 1-Hour Ozone 4th Highest Value in Three-Year Period

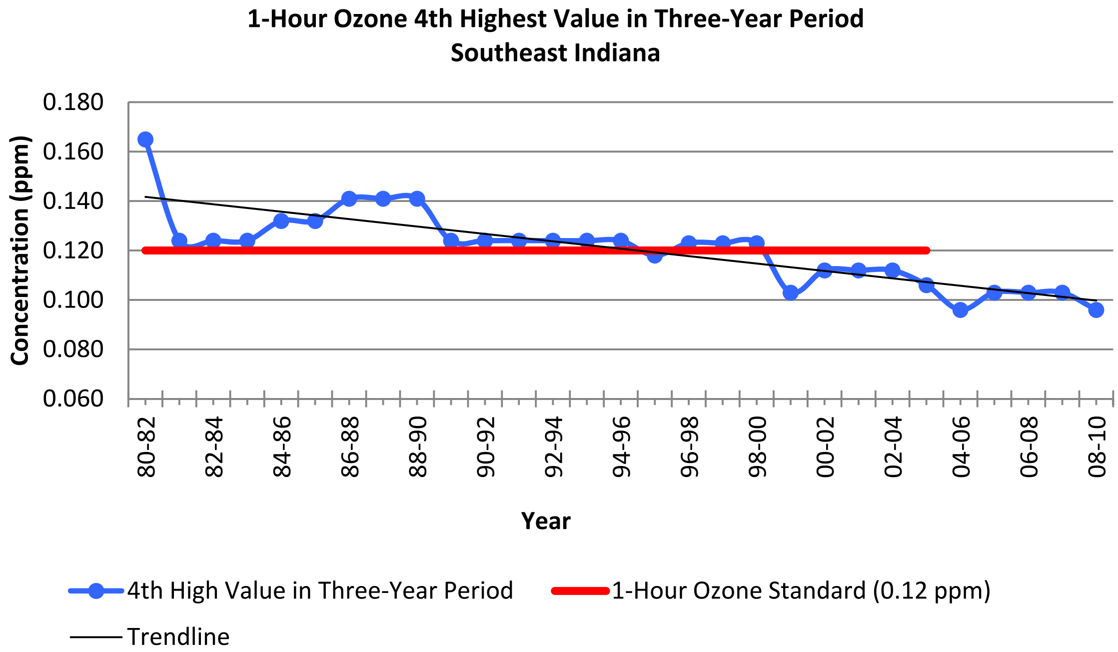


Table 10: Southeast Indiana 1-Hour Ozone 4th High Value in Three-Year Period Monitoring Data Summary

County	Site #	Site Name	4th High Value in Three-Year Period (ppm)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Clark	180190003/8	Charlestown / State Park	0.109	0.109	0.109	0.106	0.096	0.103	0.103	0.103	0.096
Floyd	180431004	New Albany	0.112	0.112	0.112	0.101	0.096	0.096	0.096	0.096	0.094

Graph 13: Southeast Indiana 8-Hour 4th High Ozone Values

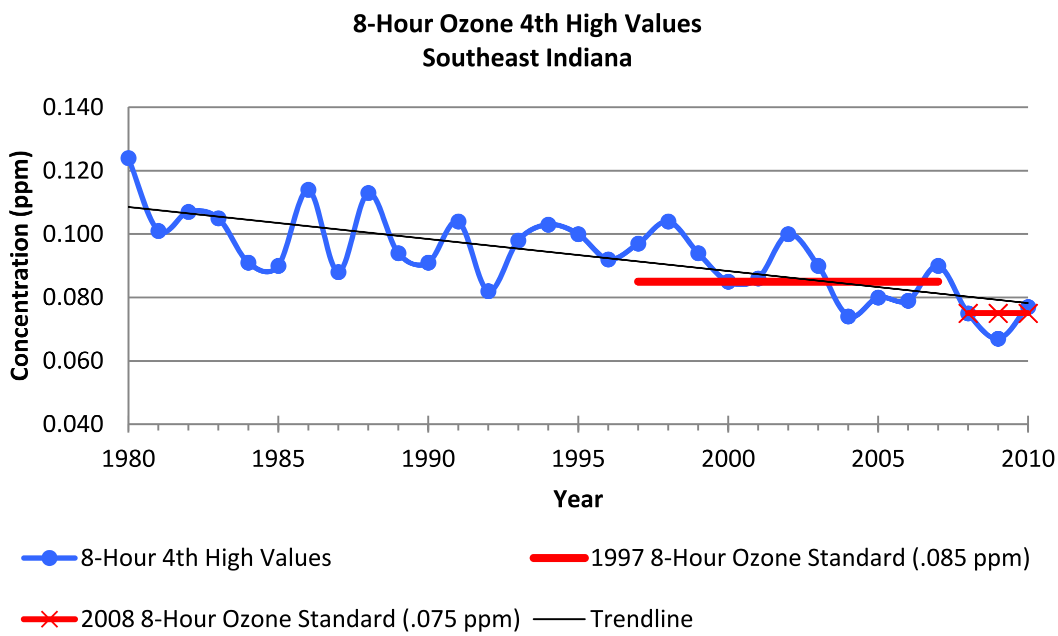


Table 11: Southeast Indiana 8-Hour Ozone 4th High Values Monitoring Data Summary

County	Site #	Site Name	4th Highest Ozone Value (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Clark	180190003/8	Charlestown / State Park	0.085	0.086	0.100	0.090	0.074	0.080	0.079	0.090	0.075	0.067	0.077
Floyd	180431004	New Albany	0.077	0.076	0.097	0.086	0.071	0.080	0.076	0.082	0.075	0.063	0.072

Graph 14: Southeast Indiana 8-Hour Ozone Three-Year Design Values

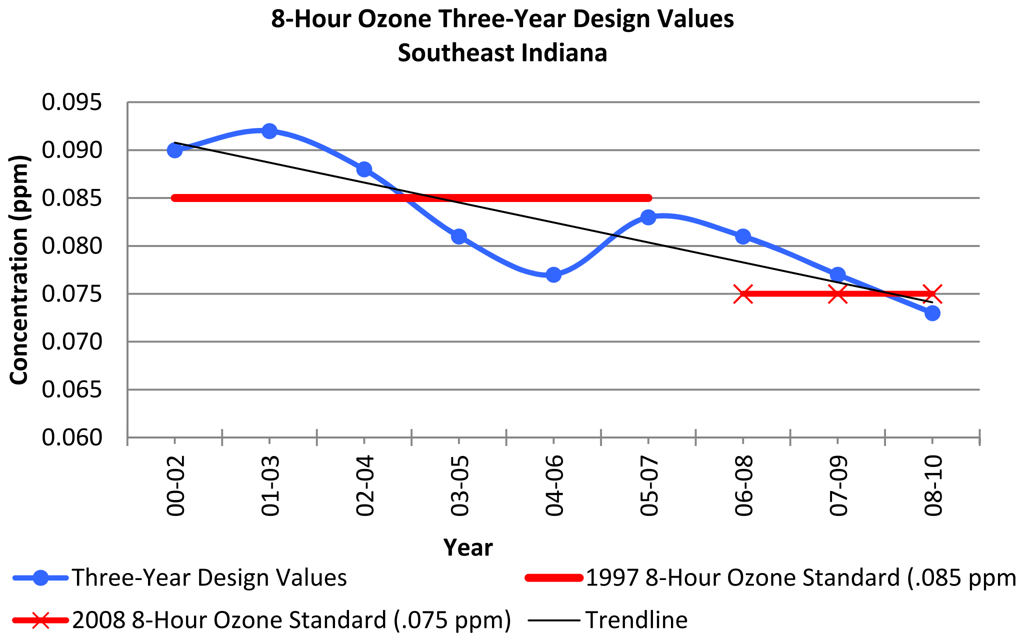


Table 12: Southeast Indiana 8-Hour Three-Year Design Value Ozone Monitoring Data Summary

County	Site #	Site Name	Three-Year Design Value (ppm)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Clark	180190003/8	Charlestown / State Park	0.090	0.092	0.088	0.081	0.077	0.083	0.081	0.077	0.073
Floyd	180431004	New Albany	0.083	0.086	0.084	0.079	0.075	0.079	0.077	0.073	0.070

Prior to 2008, highlighted red numbers are above the 8-hour O_3 standard of 0.085 ppm

Beginning in 2008, highlighted red numbers are above the 8-hour O_3 standard of 0.075 ppm

* Clark County ozone monitor was moved from Charlestown to Charlestown State Park in 2007. The 2005-2007 and 2006-2008 Design Values are calculated from both monitoring sites.

While fluctuations in monitoring data can be seen in Graphs 12, 13, and 14, monitoring data for both 1-hour and 8-hour ozone indicate a downward trend over time. Because ozone is formed by the secondary reactions of precursor pollutants, it is heavily influenced by meteorology (wind speed, temperature, stagnant air, etc.) and during an ozone season when peak meteorology conditions exist, it is not unusual to see an increase in ozone. The high spikes in ozone in 1980, 1986, 1988, 1998, 2002, 2005, 2007, and 2010 shown in Graph 13 can be traced back to high temperatures and stagnant weather conditions during the ozone seasons of those years.

Tables 9, 10, 11, and 12 demonstrate that the 1-hour and 8-hour ozone values for the Southeast Indiana area correlate with each other over time, meaning that when one monitoring site trends upward or downward, the others do as well. Monitor values for 1-hour and 8-hour ozone in the Southeast Indiana area were in violation of the 1-hour and 8-hour ozone standards, but are now below the standards. The Charlestown State Park ozone monitoring site has historically registered the highest ozone values in the Southeast Indiana area. This is expected since it is downwind of the core metropolitan area. Downwind monitors are usually the last to attain the standard because ozone and ozone precursors from the most densely populated areas have more time for photochemical reactions to build to peak levels.

Ozone is not emitted directly into the air, but is created in the lower atmosphere by a chemical reaction between NO_x and VOC in the presence of sunlight. U.S. EPA's NEI contains emissions information for NO_x and VOC and is used in the following graphs and charts. Graphs 15 and 16 illustrate the emissions trend for the ozone precursors in the Southeast Indiana area and Charts 6 and 7 show how the average emissions are distributed among the different source categories.

Graph 15: Southeast Indiana NO_x Emissions

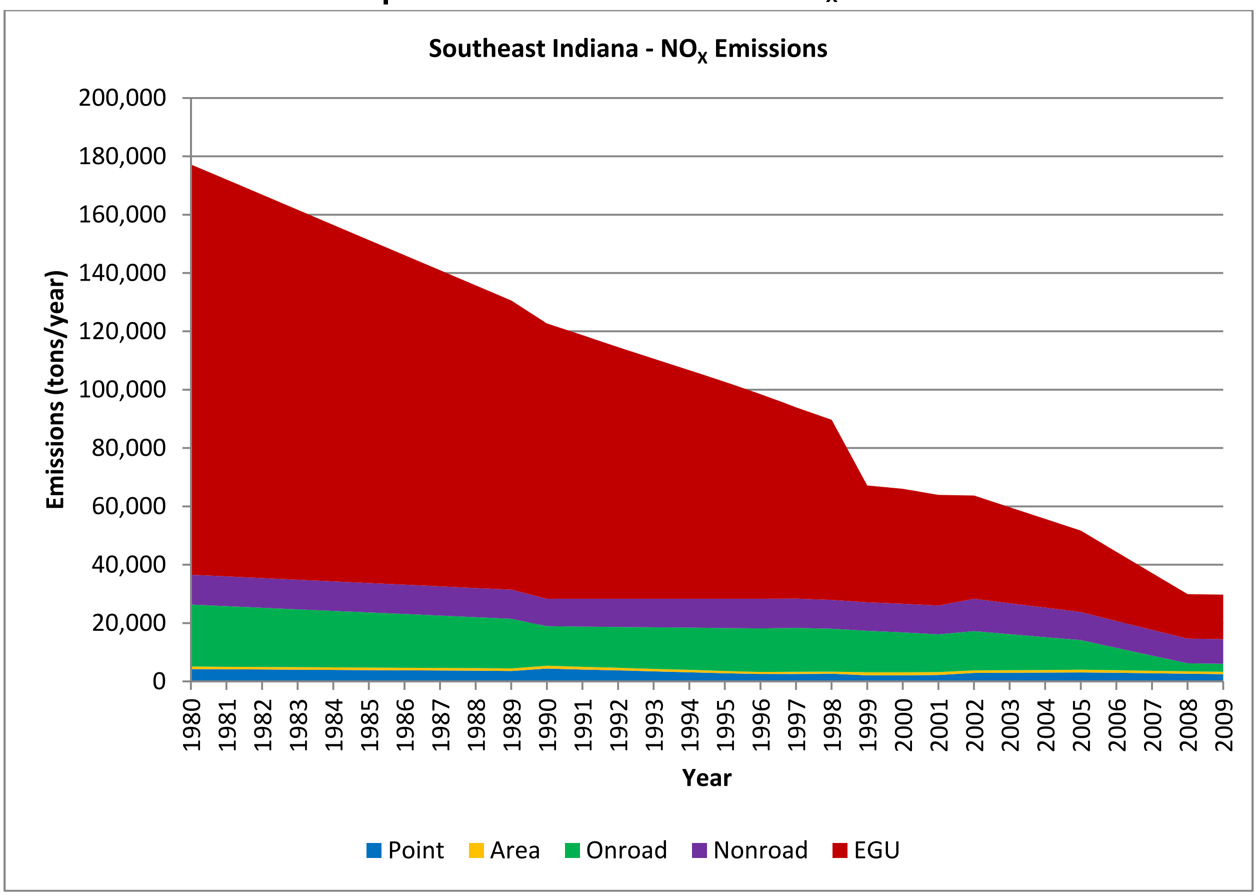
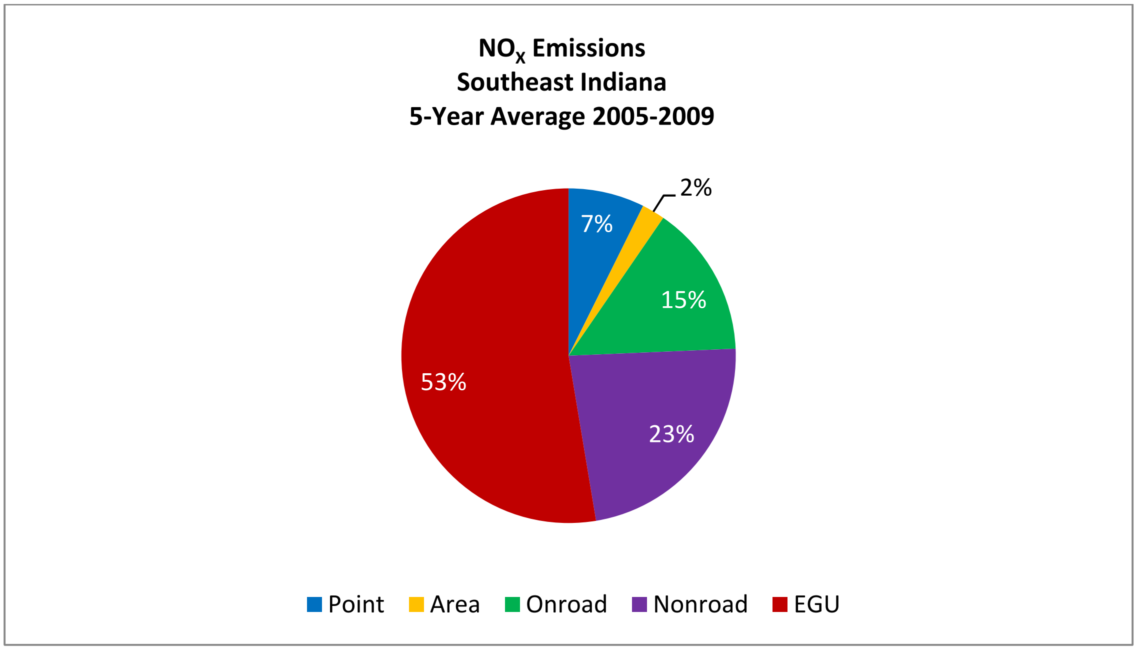


Chart 6: Southeast Indiana NO_x Emissions



Graph 16: Southeast Indiana VOC Emissions

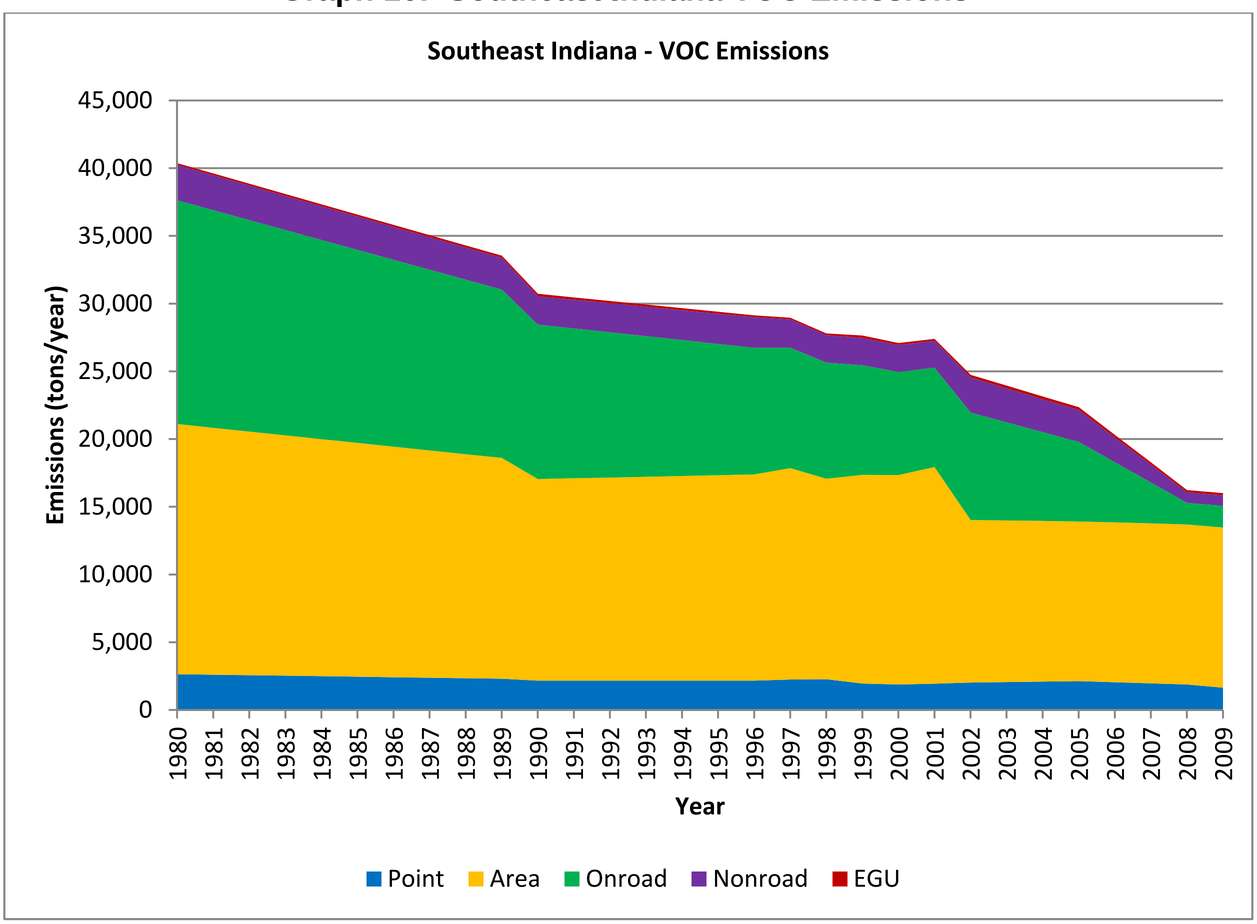
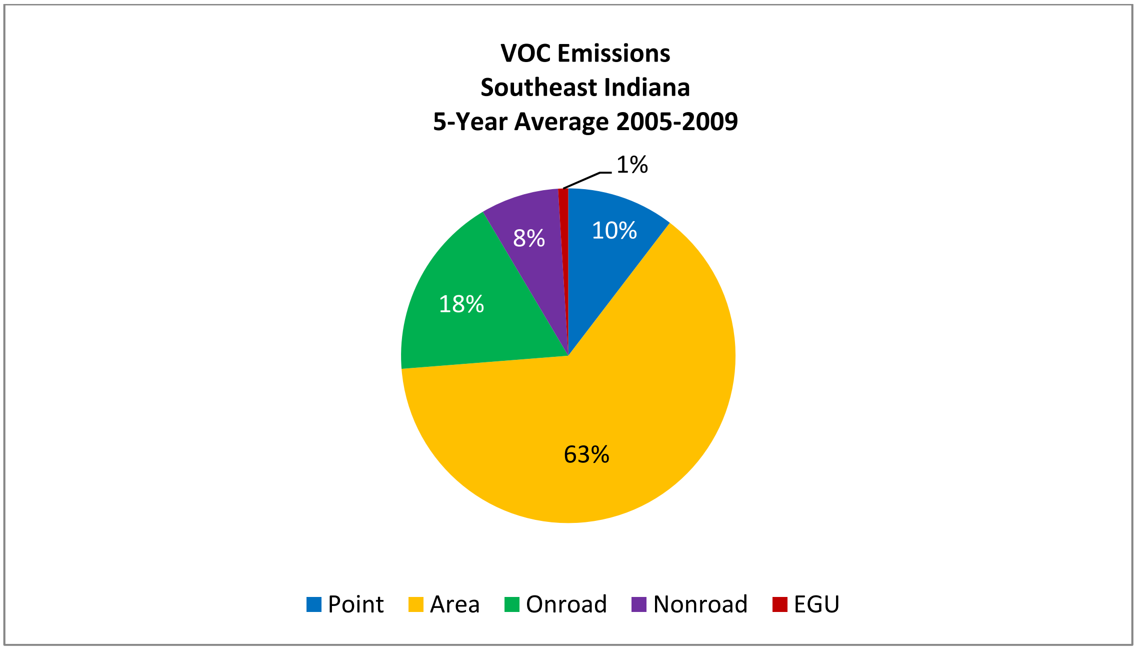


Chart 7: Southeast Indiana VOC Emissions



National controls, such as engine and fuel standards, as well as regional controls, such as the NO_x SIP Call, have led to a decrease in ozone precursor emissions over time. As Graphs 15 and 16 illustrate, NO_x and VOC emissions have decreased by 83% and 60%, respectively, within the Southeast Indiana area since 1980. This trend is true for the key precursors of ozone throughout Indiana and the upper Midwest. Reductions in NO_x and VOC emissions are also attributable to the implementation of the federal engine and fuel standards for onroad and nonroad vehicles and equipment, the NO_x SIP Call beginning in 2004, and to local controls that were necessary in reducing emissions in the Southeast Indiana area. Nationally, average ozone levels declined in the 1980's, leveled off in the 1990's, and showed a notable decline after 2004 with the implementation of the NO_x SIP Call.

For information on ozone standards, sources, health effects, and programs to reduce ozone, please see www.epa.gov/air/ozonepollution.

Particulate Matter (PM_{10})

Monitoring data for PM_{10} in Southeast Indiana are available from Clark County. The trend data in Graph 17 reflect the annual arithmetic mean which is used to compare to the primary and secondary annual PM_{10} standards of 50 µg/m^3. The highest value from all of the monitors in the Southeast Indiana area is plotted on the graph for each year. The annual PM_{10} standard was revoked in October 2006. The trend data in Graph 18 reflect the 2nd highest 24-hour PM_{10} concentration, which is used to compare to the primary and secondary 24-hour PM_{10} standards of 150 µg/m^3. Attainment of the primary and secondary 24-hour PM_{10} standards is determined by evaluating the 2nd highest 24-hour concentrations and is attained when the number of days per year with a 24-hour average above 150 µg/m^3 is equal to or less than 1 per year in a three-year period. The highest 2nd high concentration from all of the monitors in the Southeast Indiana area is plotted on the graph for each year.

While there is some variability in the monitoring data for both the annual and 24-hour PM_{10} values, a downward trend over time is demonstrated in Graphs 17 and 18. The monitoring data values in the Southeast Indiana area were above the annual PM_{10} standards in 1989, but have since been below. Monitor values in the Southeast Indiana area have always been below both the primary and secondary 24-hour PM_{10} standards. PM_{10} monitors are located in close proximity to major sources in the area and data will fluctuate based on variability in facility operations and meteorology.

The data shown in Tables 13 and 14 include the monitoring sites that measured annual and 24-hour PM_{10} from 2000 through 2010. Monitoring data for both annual and 24-hour PM_{10} prior to the year 2000 are available upon request. Monitoring data in Table 13 are compared to the primary and secondary annual PM_{10} standards of 50 µg/m^3 and show that the Southeast Indiana area has been below the standards since 1989. Monitoring data in Table 14 are compared to the primary and secondary 24-hour PM_{10} standards of 150 µg/m^3 and show that the Southeast Indiana area has always been below the standards.

Graph 17: Southeast Indiana Annual Arithmetic Mean PM_{10} Values

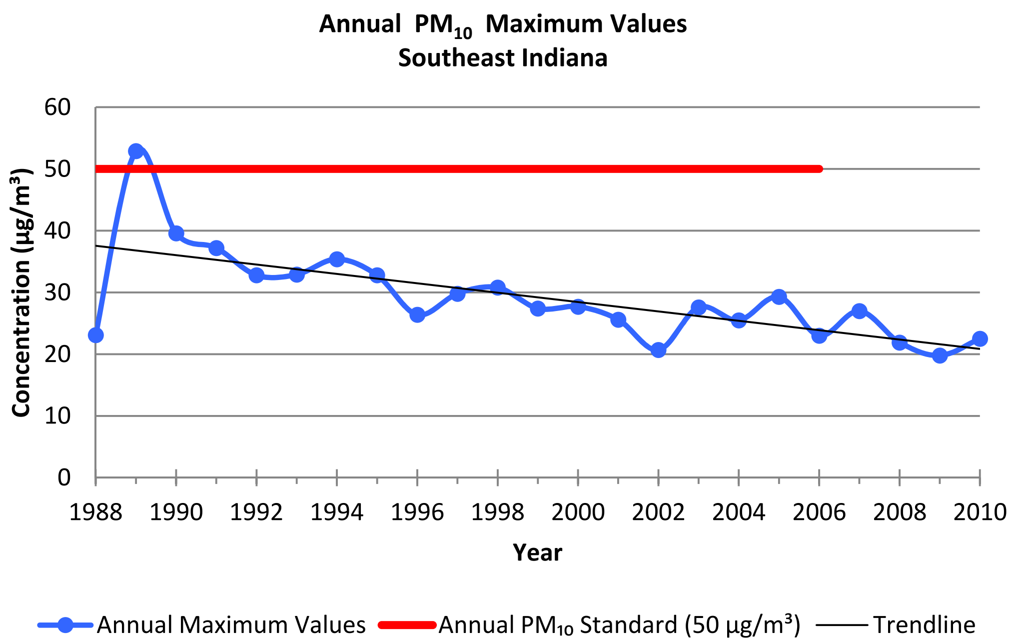


Table 13: Southeast Indiana Annual Arithmetic Mean PM_{10} Values Monitoring Data Summary

County	Site #	Site Name	Annual Arithmetic Mean (µg/m^3)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Clark	180190005	Jeffersonville - Spring St	27.7	25.6	20.7	19.1							
Clark	180190006	Jeffersonville - Walnut St				27.6	22.0	29.3	23.0	27.0	21.9	19.8	22.5
Clark	180190007	Jefferson - Jeffboat				22.2	25.5						
			Highlighted red numbers are over the annual PM_{10} standard of 50 µg/m^3										

Graph 18: Southeast Indiana 24-Hour PM_{10} 2nd High Values

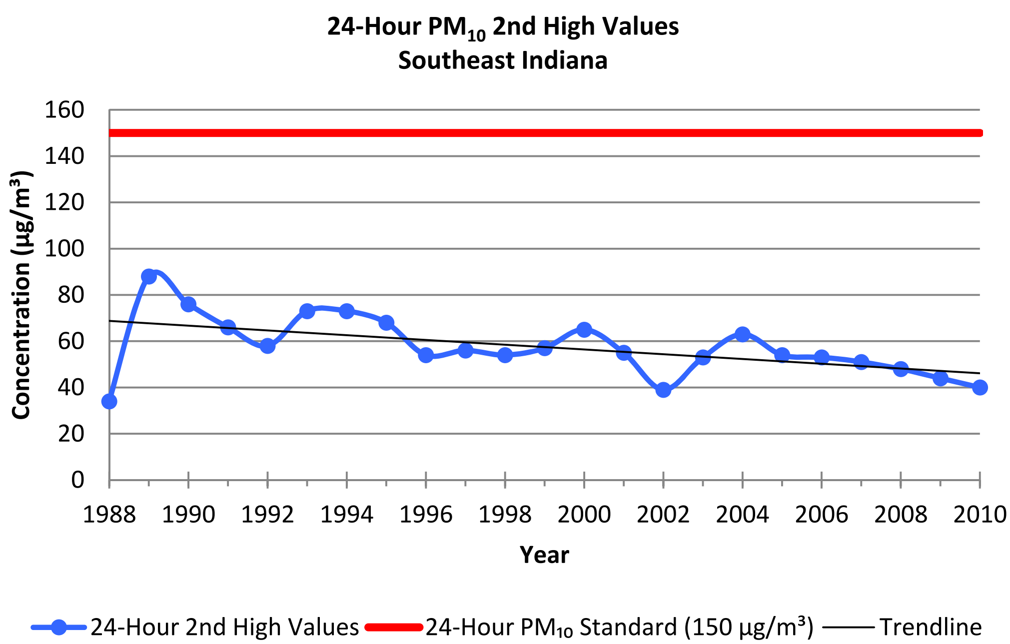


Table 14: Southeast Indiana 24-Hour PM_{10} 2nd High Values Monitoring Data Summary

County	Site #	Site Name	24-Hour 2nd High Value (µg/m³)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Clark	180190005	Jeffersonville - Spring St	65	55	39	38							
Clark	180190006	Jeffersonville - Walnut St				46	42	54	53	51	48	44	40
Clark	180190007	Jefferson - Jeffboat				53	63						

Highlighted red numbers are over the 24-hour PM_{10} standard of 150 µg/m³

U.S. EPA's NEI contains emissions information for PM_{10} and is used in Graph 19 and Chart 8. Graph 19 illustrates the emissions trend for PM_{10} in Southeast Indiana and Chart 8 shows how the average emissions are distributed among the different source categories.

Graph 19: Southeast Indiana PM_{10} Emissions

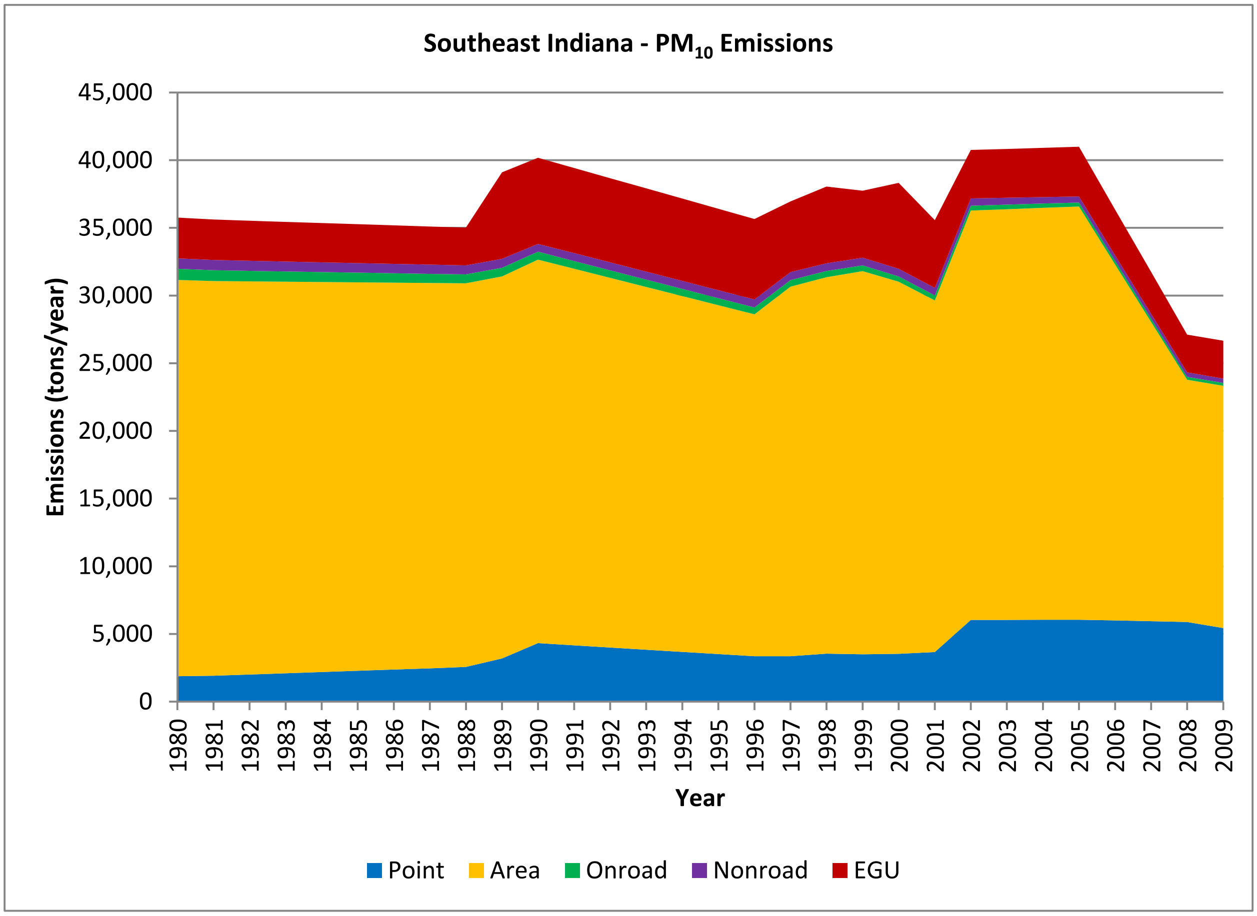
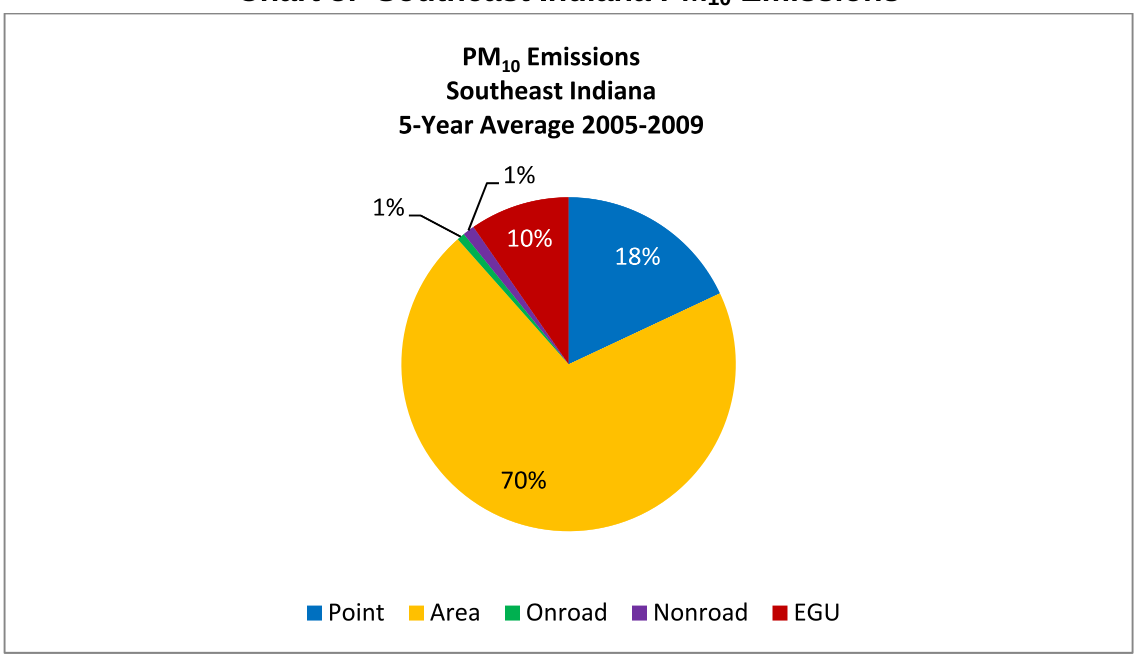


Chart 8: Southeast Indiana PM_{10} Emissions



National controls, such as engine and fuel standards, as well as regional controls, such as the NO_x SIP Call, have led to a decrease in PM_{10} values over time. As Graph 19 illustrates, total PM_{10} emissions have decreased by 20% within the Southeast Indiana area since 1980. This trend is true throughout Indiana and the upper Midwest. Reductions in PM_{10} are primarily due to better controls on local sources and secondary benefits from the implementation of federal programs to control other pollutants.

Sulfur Dioxide (SO_2)

Three monitoring sites within Southeast Indiana, located in Floyd County measure SO_2 levels. The trend data in Graph 20 reflect the annual arithmetic mean which was used to compare to the primary annual SO_2 standard at 0.03 ppm. Attainment of the primary annual SO_2 standard was determined by evaluating the annual arithmetic mean which could not exceed the standard. U.S. EPA revoked the primary annual SO_2 standard in June 2010 and replaced it with a 1-hour SO_2 standard. The highest annual arithmetic mean from all of the monitors in the Southeast Indiana area is plotted on Graph 20 for each year.

The trend data in Graph 21 reflect the 2nd highest 24-hour SO_2 concentrations, which were used to compare to the primary 24-hour SO_2 standard at 0.14 ppm. Attainment of the primary 24-hour SO_2 standard was determined by evaluating the 2nd highest 24-hour concentration, which could not exceed the standard. U.S. EPA revoked the primary 24-hour SO_2 standard in June 2010 and replaced it with a 1-hour SO_2 standard. The highest of the 2nd high 24-hour values from all of the monitors in the Southeast Indiana area is plotted on Graph 21 for each year. The trend data in Graph 22 show the 99th percentile of the 1-hour SO_2 values, which are provided for reference purposes only, because they were collected prior to the implementation of the current standard. The design value of the 99th percentile is used for comparison to the primary 1-hour SO_2 standard; therefore, the one-year values shown in Graph 22 are not a true comparison to the primary 1-hour SO_2 standard. The values in Graph 22 reflect the highest 99th percentile from all of the monitors in the Southeast Indiana area which is plotted on the graph for each year. The 1-hour SO_2 standard at 75 ppb is only listed for the year 2010 on this graph since it was not established until June 2010. Attainment of the primary 1-hour SO_2 standard is determined by evaluating the design value of the 99th percentile values of the daily maximum 1-hour averages at each monitor within an area, which must not exceed 75 ppb averaged over a three-year period. The values in Graph 23 reflect the design value of the 99th percentile of the daily maximum 1 hour average values for the years 2000 through 2010 from all of the monitors in the Southeast Indiana area is plotted on the graph for each year. An exceedance of the primary 1-hour SO_2 standard occurs when a

99th percentile value is equal to or greater than 75 ppb. A violation of the primary 1-hour SO_2 standard occurs when the three-year design value of the 99th percentile is equal to or greater than 75.5 ppb. A monitor can exceed the standard without being in violation.

The data in Tables 15, 16, 17, and 18 include the monitoring sites that measured annual, 24-hour, and 1-hour SO_2 from 2000 through 2010. Monitoring data for SO_2 prior to the year 2000 are available upon request. Monitoring data for all graphs display a downward trend over time. The monitor values for Southeast Indiana have always been historically below the primary annual and 24-hour SO_2 standards.

Monitoring data in Table 15 show the annual arithmetic mean for the years 2000 through 2010 which were compared to the primary annual SO_2 standard of 0.03 ppm. Monitoring data in Table 16 show the 2nd highest 24-hour value for the years 2000 through 2010 which was compared to the primary 24-hour SO_2 standard of 0.14 ppm.

Monitoring data in Table 17 show the 1-hour 99th percentile values for the years 2000 through 2010. Monitoring data in Table 18 show the design value of the 99th percentile for the years 2000 through 2010 which are compared to the new primary 1-hour SO_2 standard at 75 ppb. In Tables 15, 16, and 18 values above the standards have been highlighted. The 1-hour SO_2 data prior to the 2008-2010 design value were not compared to any standard and the 99th percentile and design values from 2000 to 2007 are included for reference purposes only.

Graph 20: Southeast Indiana Annual Arithmetic Mean SO_2 Values

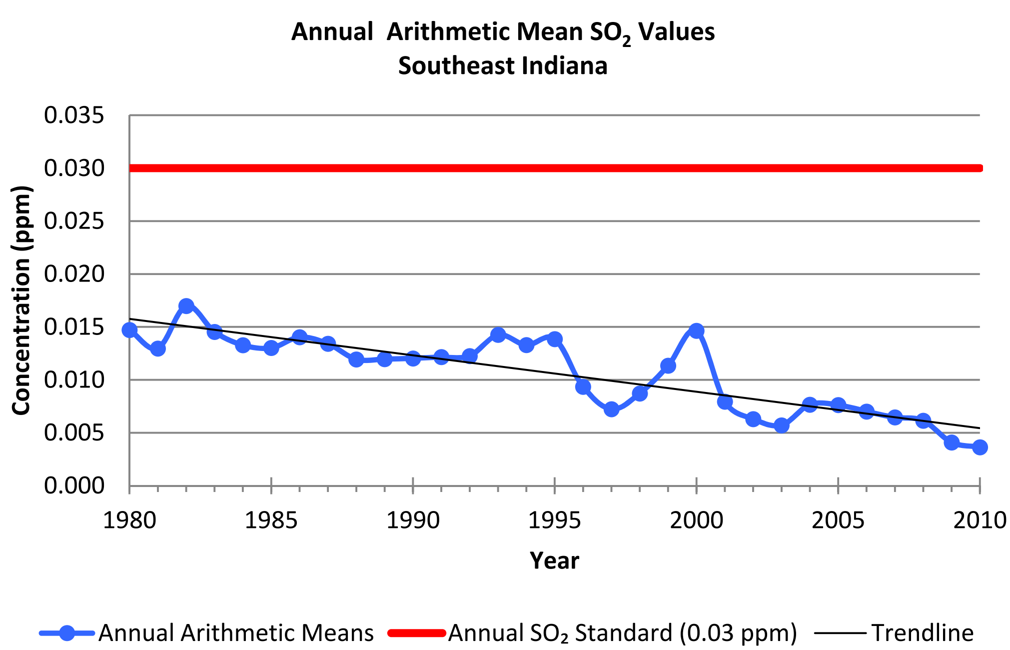


Table 15: Southeast Indiana Annual Arithmetic Mean SO_2 Values Monitoring Data Summary

County	Site ID	Site Name	Annual Arithmetic Mean (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Floyd	180430004	0.2 mile North of Bald Knob Rd at Wlky Tower	0.015	0.008	0.005	0.005	0.006	0.008	0.007	0.006	0.006	0.004	0.004
Floyd	180430007	New Albany - Falling Run	0.008	0.006	0.006	0.004	0.002	0.005	0.005	0.005	0.006	0.004	0.003
Floyd	180431004	New Albany - Green Valley Elementary Sch	0.005	0.004	0.005	0.006	0.005	0.004	0.005	0.006	0.003	0.003	0.003
Jefferson	180770004	Wilson Ave	0.007	0.006	0.006	0.006	0.008	0.007					

Highlighted red numbers are above the annual SO_2 standard of 0.03 ppm

Graph 21: Southeast Indiana 24-Hour 2nd High SO_2 Values

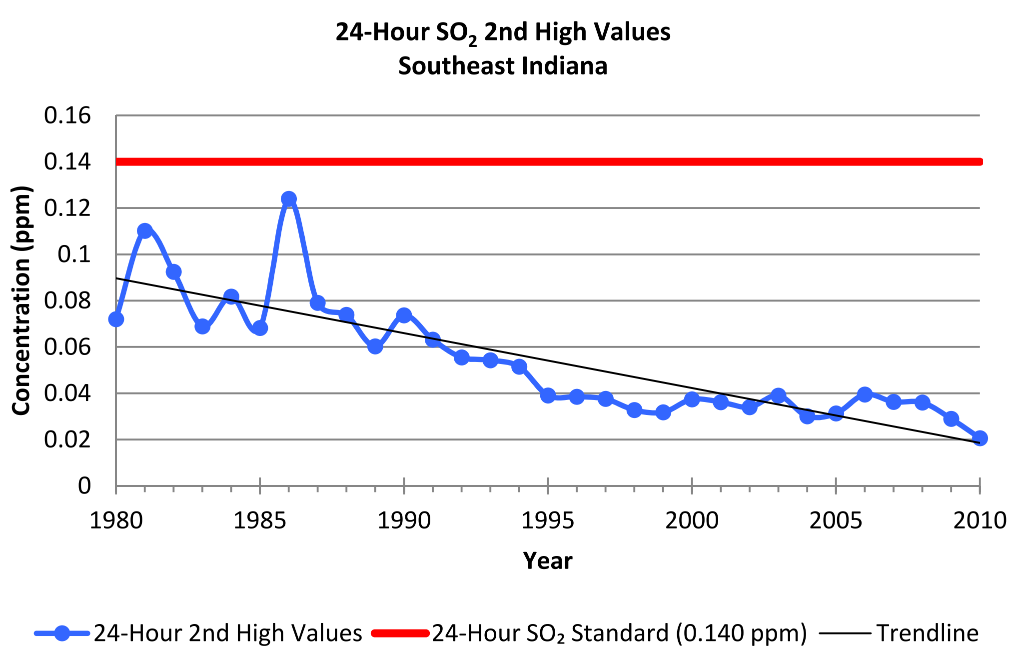


Table 16: Southeast Indiana 24-Hour SO_2 2nd High Values Monitoring Data Summary

County	Site ID	Site Name	2nd High Value (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Floyd	180430004	0.2 mile North of Bald Knob Rd at Wlky Tower	0.037	0.036	0.020	0.034	0.026	0.026	0.034	0.029	0.036	0.018	0.014
Floyd	180430007	New Albany - Falling Run	0.031	0.030	0.018	0.022	0.011	0.031	0.031	0.031	0.032	0.029	0.013
Floyd	180431004	New Albany - Green Valley Elementary Sch	0.034	0.031	0.030	0.035	0.029	0.028	0.040	0.036	0.023	0.021	0.021
Jefferson	180770004	Wilson Ave	0.027	0.026	0.034	0.039	0.030	0.029					

Highlighted red numbers are over the 24-hour SO_2 standard of 0.14 ppm

Graph 22: Southeast Indiana 1-Hour SO_2 99th Percentile Values

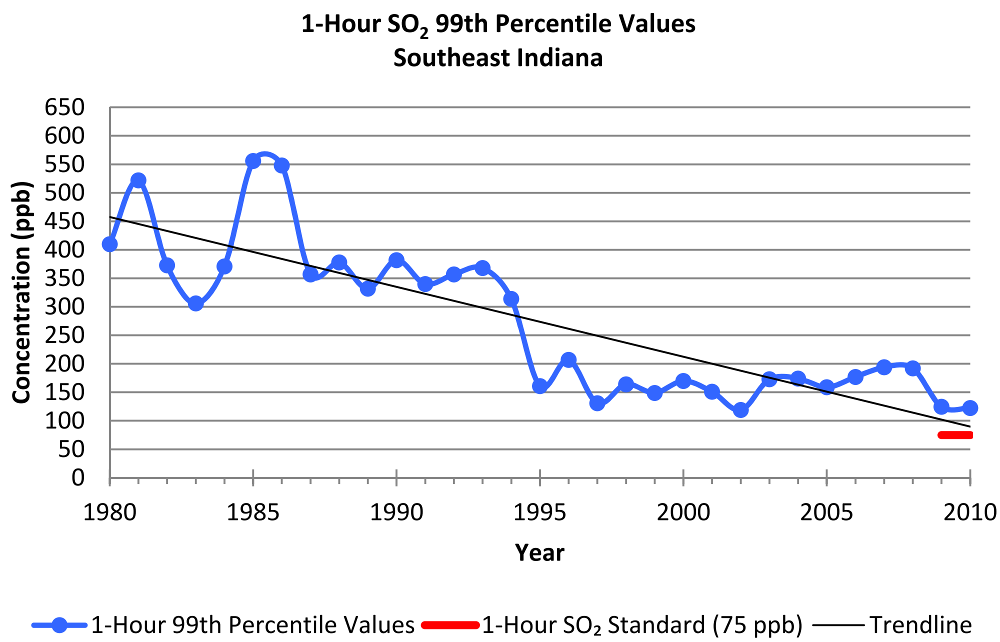


Table 17: Southeast Indiana 1-Hour 99th Percentile SO_2 Monitoring Data Summary

County	Site ID	Site Name	99th Percentile Values (ppb)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Floyd	180430004	0.2 mile North of Bald Knob Rd at Wlky Tower	130	98	115	151	152	159	123	139	117	87	72
Floyd	180430007	New Albany - Falling Run	170	120	68	67	74	157	158	164	192	68	75
Floyd	180431004	New Albany - Green Valley Elementary Sch	163	151	119	173	174	158	177	194	138	125	123
Jefferson	180770004	Wilson Ave	68	64	95	62	81	90					

Graph 23: Southeast Indiana 1-Hour SO_2 Three-Year Design Values

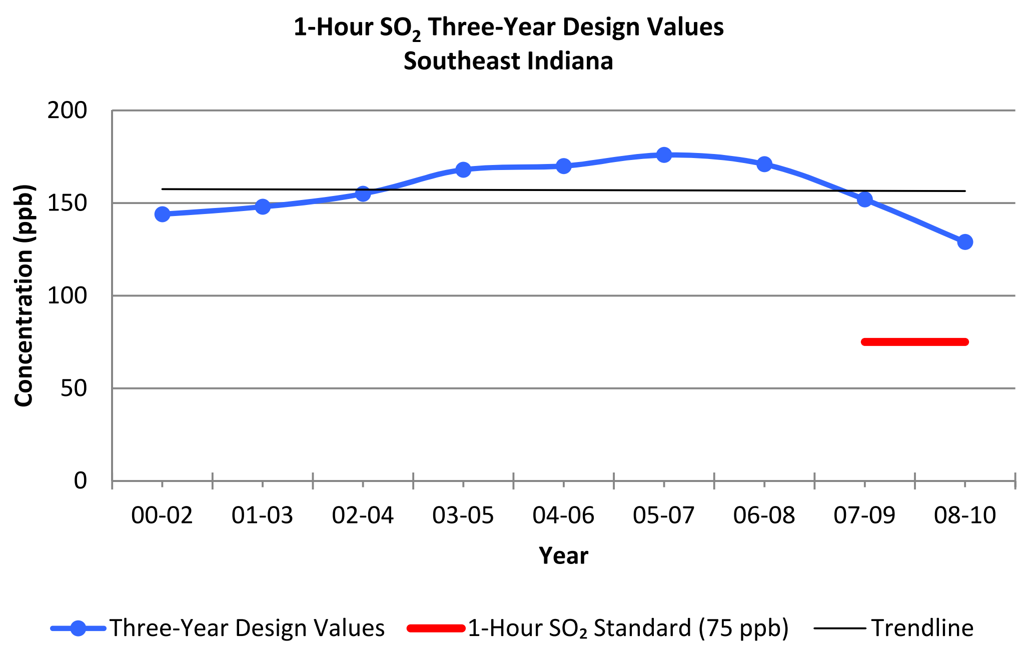


Table 18: Southeast Indiana 1-Hour SO_2 Monitoring Data Summary

County	Site ID	Site Name	Three-Year Design Value (ppb)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Floyd	180430004	0.2 mile North of Bald Knob Rd at Wlky Tower	114	121	139	154	145	140	126	114	92
Floyd	180430007	New Albany - Falling Run	119	85	70	99	130	160	171	141	112
Floyd	180431004	New Albany - Green Valley Elementary Sch	144	148	155	168	170	176	170	152	129
Jefferson	180770004	Wilson Ave	76	74	79	78					

Beginning in 2010, highlighted red numbers are above the 1-hour SO_2 standard of 75 ppb

As shown in Graphs 20 and 21, both annual and 24-hour SO_2 values for the Southeast Indiana area have historically been below their respective standards. In addition, monitoring data shown in Graph 22 indicate a downward trend in 1-hour SO_2 monitoring values over time. SO_2 monitors are located in close proximity to major sources in the area and data will fluctuate based on variability in facility operations and meteorology.

While 1-hour SO_2 values illustrated in Graph 22 for the Southeast Indiana area have been trending downward over time, the area's three-year design value in Graph 23 is currently over the new 1-hour primary standard. It is expected that 1-hour, 24-hour, and annual SO_2 values will continue to decline in the Southeast Indiana area in the future and the area will comply with the 1-hour primary SO_2 standard when CSAPR or equivalent replacement rule is implemented.

U.S. EPA's NEI contains emissions information for SO_2 and is used in Graph 24 and Chart 9. Graph 24 illustrates the emissions trend for SO_2 in Southeast Indiana and Chart 9 shows how the average emissions are distributed among the different source categories.

Graph 24: Southeast Indiana SO_2 Emissions

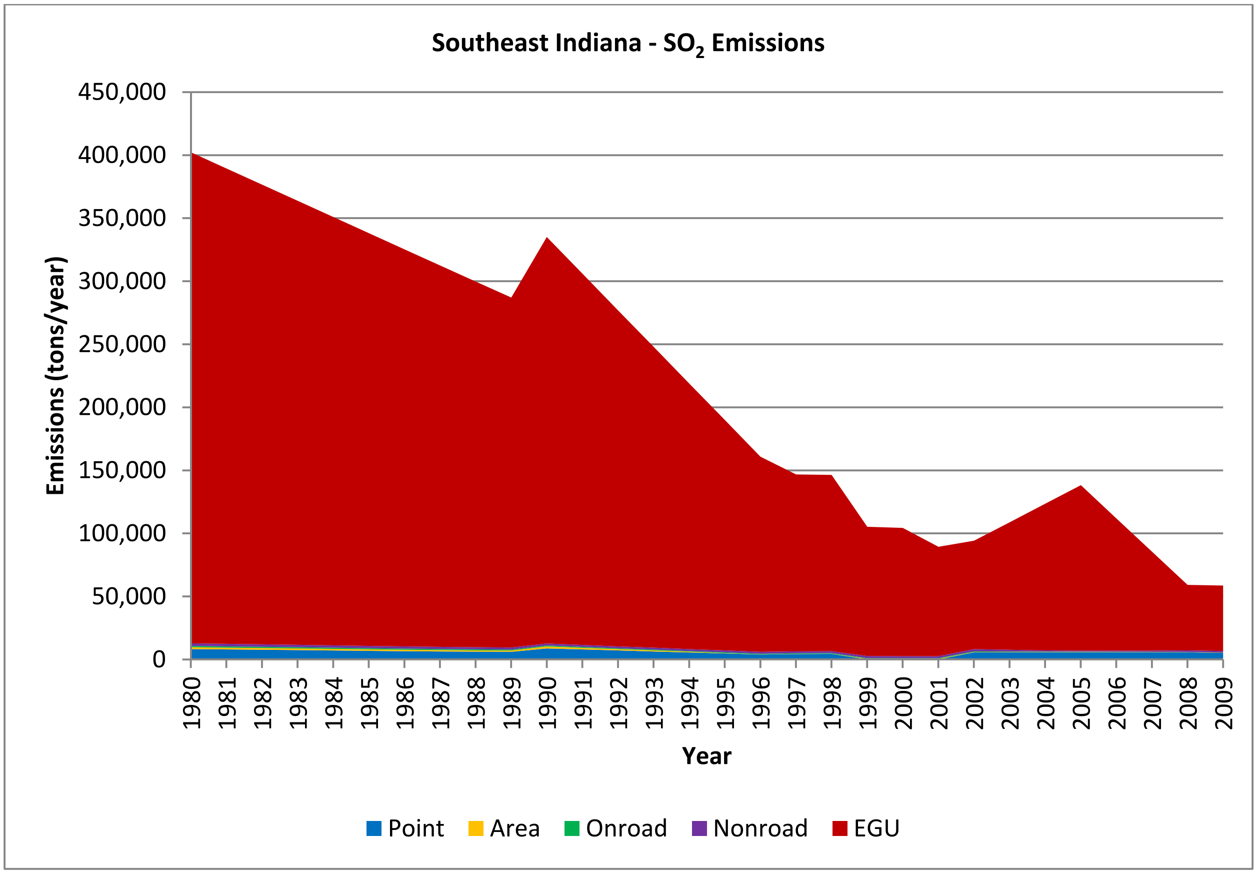
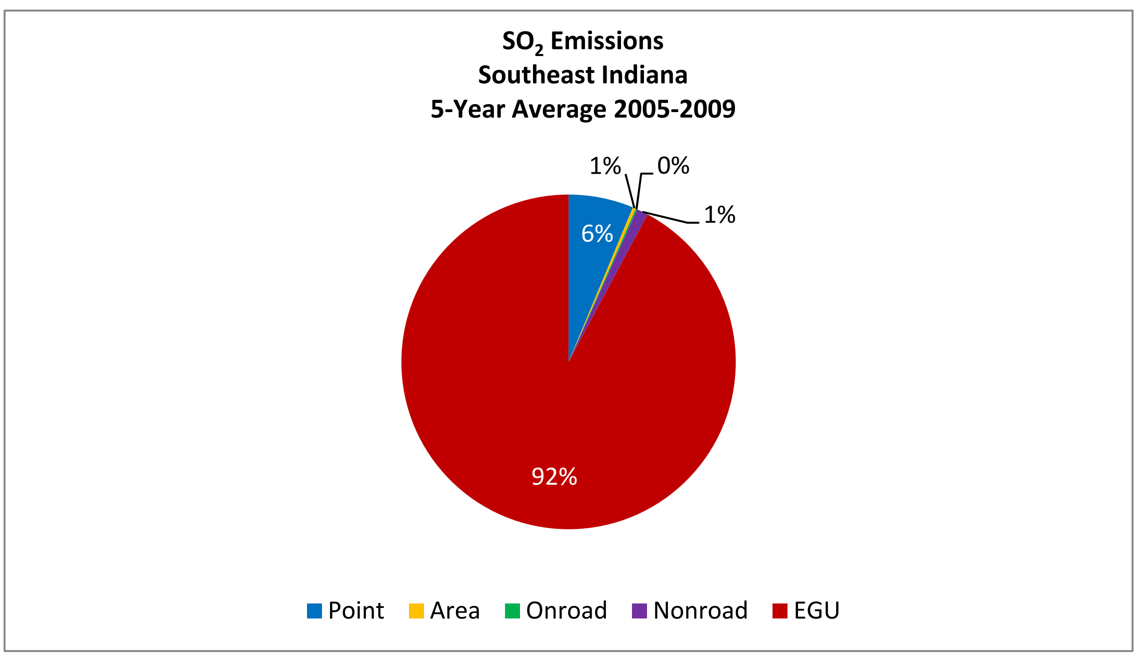


Chart 9: Southeast Indiana SO_2 Emissions



National and regional controls, such as the Acid Rain Program, engine and fuel standards, and the NO_x SIP Call have led to a decrease in SO_2 values over time. As Graph 24 illustrates, SO_2 emissions have decreased by 85% within the Southeast Indiana area since 1980. This trend is true throughout Indiana and the upper Midwest. Nationally, average SO_2 concentrations have decreased by more than 70% since 1980 due to implementation of the Acid Rain Program.

For information on SO_2 standards, sources, health effects, and programs to reduce SO_2, please see www.epa.gov/air/sulfurdioxide.

Total Suspended Particulate (TSP)

All available TSP data for Southeast Indiana are from monitors that were located in Clark, Floyd, and Jefferson counties. The trend data in Graph 25 reflect the annual geometric mean values, which were used to compare to the primary and secondary annual TSP standards of 75 $\mu g/m^3$. The highest annual geometric mean from all of the monitors in the Southeast Indiana area is plotted on the graph for each year. The trend data in Graph 26 reflect the 2^{nd} highest 24-hour TSP concentrations which were used to compare to the primary 24-hour TSP standard of 260 $\mu g/m^3$. The highest 2^{nd} high 24-hour value from all of the monitors in the Southeast Indiana area is plotted on the graph for each year.

Both the primary and secondary annual TSP standards, as well as the primary and secondary 24-hour TSP standards, were revoked in 1987. TSP monitoring sites were discontinued across Indiana in 1995 because TSP was replaced by PM_{10}. Monitoring data for both annual and 24-hour TSP show a downward trend over time. Annual TSP values violated the primary and secondary annual TSP standards in 1980 and 1982, but afterwards remained below the annual TSP standards. While occasional spikes can be seen in the 24-hour TSP values, the monitor values for Southeast Indiana have been below the primary 24-hour TSP standards with the exception of 1980. TSP monitors were located in close proximity to major sources in the area and data fluctuate based on variability in facility operations and meteorology.

The data in Tables 19 and 20 are from the monitoring sites that measured annual and 24-hour $PM_{2.5}$ from 1980 through 1988. All available data for both annual and 24-hour TSP for the Southeast Indiana area are shown in the tables. Monitoring data for both annual and 24-hour TSP show a downward trend over time.

Monitoring data in Table 19 show the annual geometric mean for annual TSP for the years 1980 through 1988 which are compared to the primary and secondary annual $PM_{2.5}$ standards of 75 µg/m^3. Monitoring data in Table 20 show the 2nd highest 24-hour TSP concentrations for the years 1980 through 1988, which are compared to the primary 24-hour TSP standard of 260 µg/m^3.

Graph 25: Southeast Indiana Annual Geometric Mean TSP Values

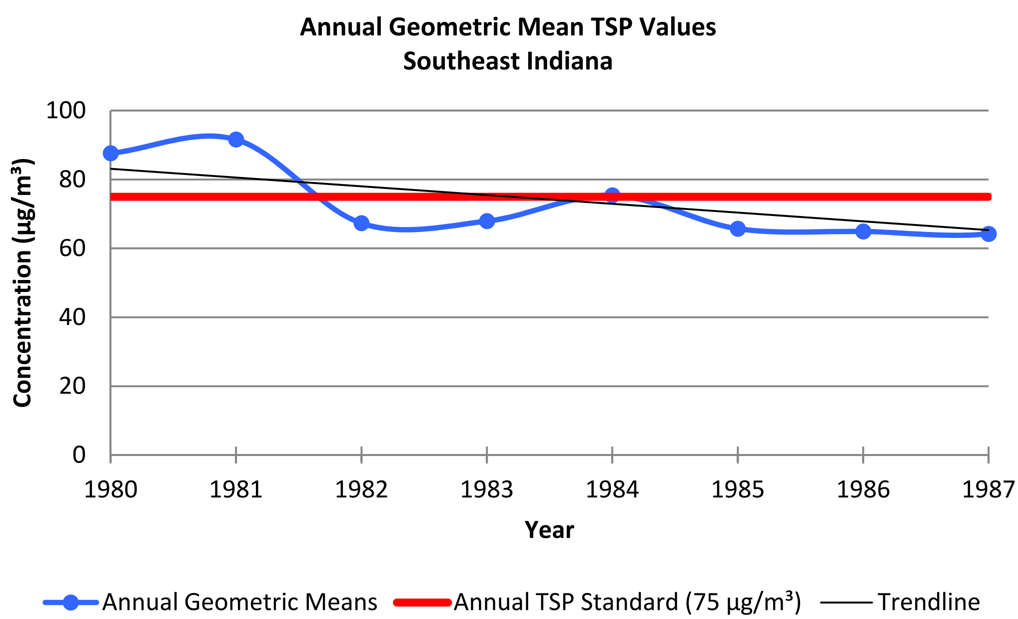


Table 19: Southeast Indiana Annual Geometric Mean TSP Values

County	Site #	Site Name	Annual Geometric Mean (µg/m^3)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Clark	180190003	Army Ammunition Plan	75	50	38	40	40	41	41	42	47			
Clark	180190004	Babb Well Field		44	35	28								
Clark	180191001	Ettels Ave	51	67	57	54	55	54	57	54				
Clark	180191002	Brown Forman		36	29	22								
Clark	180191003	Brown Forman		42	33	24								
Clark	180192001	Fire Station	88	92	67	68	75	66	65	64	72			
Floyd	180431004	Green Valley Elementary School	58	57	45	47	44	43	42	41	46			
Jefferson	180771002	Sunrise Golf Course	43											

Highlighted red numbers are above the Annual TSP Standard of 75 µg/m^3

Graph 26: Southeast Indiana 24-Hour TSP 2nd High Values

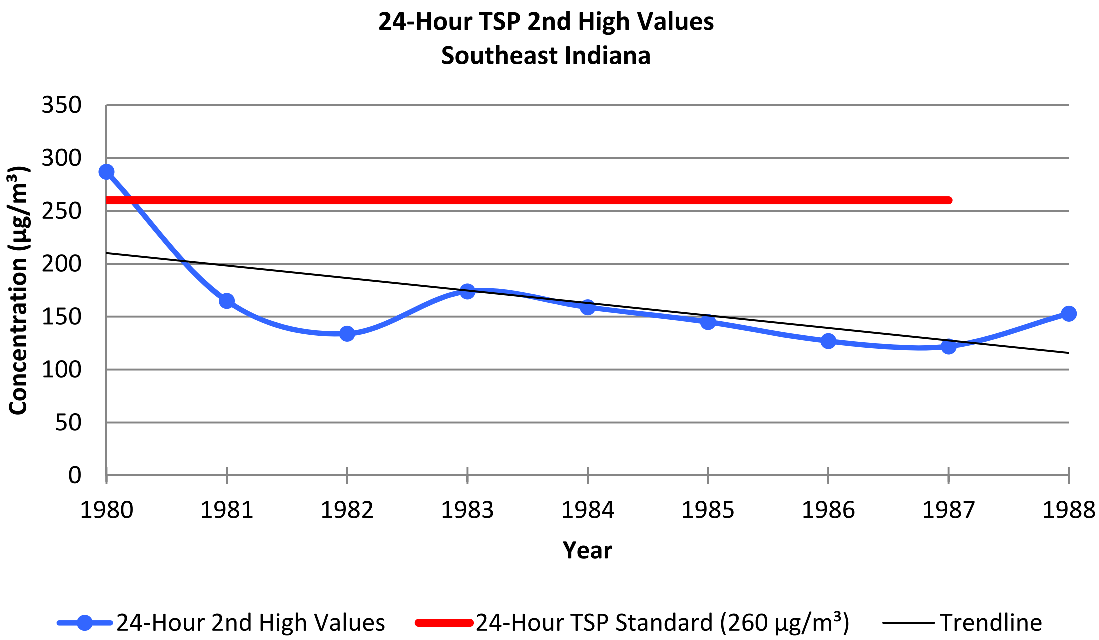


Table 20: Southeast Indiana 24-Hour TSP 2nd High Values

County	Site #	Site Name	2nd High Values (µg/m³)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Clark	180190003	Army Ammunition Plan	287	86	80	103	96	84	87	82	125			
Clark	180190004	Babb Well Field		66	77	42								
Clark	180191001	Ettels Ave	59	139	113	126	132	107	127	116				
Clark	180191002	Brown Forman		65	61	34								
Clark	180191003	Brown Forman		69	87	48								
Clark	180192001	Fire Station	161	165	134	174	159	145	127	122	153			
Floyd	180431004	Green Valley Elementary School	105	99	87	107	80	81	79	78	110			
Jefferson	180771002	Sunrise Golf Course	73											
			Highlighted red numbers are above the 24-Hour TSP Standard of 260 µg/m³											

Future of Air Quality

U.S. EPA is required by the CAA to review each criteria pollutant standard to evaluate whether it adequately protects public health. If a criteria pollutant standard is lowered in the future, the Southeast Indiana area may monitor violations of the new standard simply because the standard could be set lower than current monitored values. However, as new air programs are implemented in the future, the Southeast Indiana area will continue to see declines in monitor and emission values, which will help it meet the threshold for any new criteria pollutant standards that are implemented.

Conclusions

Although overall population and VMT has been on the increase over time, the Southeast Indiana area's monitored air quality and emission values have been trending downward and will continue to improve into the future. The overall decrease in emissions in the Southeast Indiana area can be attributed to a variety of clean air programs put in place nationally (i.e. the Acid Rain Program, Tier II Emission Standards for Vehicles and Gasoline Sulfur Standards, Heavy-Duty Diesel Engine Program, and the Clean Air Nonroad Diesel Rule), regionally (i.e. the NO_x SIP Call, CAIR, and state rules), and locally through local ordinances (i.e. open burning regulations, outdoor wood-fired heating devices, and vehicle or engine operations) over the past 30 years. It is expected that this downward trend will continue as existing clean air programs continue and new programs such as CSAPR and recently adopted state rules are implemented (e.g. the Outdoor Hydronic Heater Rule, the Consumer and Commercial Products Rule, the Architectural and Industrial Maintenance Coatings Rule, the Automobile Refinishing Operations Rule, and the Stage I Vapor Recovery Rule).

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Appendix

Southeast Indiana County-Specific Emission Inventory Data

(1980-2009)

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Clark County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	77,696.29	10,362.09	3,026.69	6,179.83	6,046.69	11,197.26
1981	75,549.20	10,141.55	2,975.36	6,122.55	5,828.84	10,980.88
1982	73,402.11	9,921.01	2,924.04	6,129.85	5,610.99	10,764.50
1983	71,255.02	9,700.47	2,872.72	6,137.14	5,393.14	10,548.27
1984	69,107.92	9,479.93	2,821.39	6,144.43	5,175.29	10,332.29
1985	66,963.82	9,259.39	2,770.14	6,151.73	4,957.44	10,116.31
1986	64,824.58	9,038.85	2,718.89	6,159.02	4,739.59	9,900.33
1987	62,685.34	8,818.31	2,667.63	6,166.35	4,521.75	9,684.34
1988	60,546.10	8,597.77	2,616.38	6,179.22	4,405.31	9,468.36
1989	58,406.88	8,377.23	2,565.12	6,391.45	4,342.49	9,252.38
1990	51,653.60	8,587.11	2,669.71	7,055.92	4,738.69	8,874.17
1991	50,543.21	8,211.96	2,557.32	6,857.65	4,662.82	8,681.94
1992	49,432.82	7,836.82	2,444.94	6,659.37	4,586.94	8,489.71
1993	48,322.43	7,461.67	2,332.55	6,461.10	4,511.07	8,297.48
1994	47,212.03	7,086.52	2,220.16	6,262.82	4,435.20	8,105.25
1995	46,101.64	6,711.38	2,107.78	6,064.55	4,394.30	7,913.02
1996	44,991.25	6,336.23	2,055.07	5,866.27	3,852.92	7,720.79
1997	43,204.71	6,476.74	2,096.39	6,087.85	5,037.93	7,679.84
1998	42,243.99	6,454.03	2,197.31	6,439.04	3,692.81	7,354.02
1999	39,618.12	5,282.74	2,125.63	6,284.90	2,391.33	7,276.12
2000	39,160.95	5,216.88	2,141.75	6,243.01	2,985.19	7,116.21
2001	37,884.41	4,959.73	1,970.31	5,834.94	2,875.90	7,125.81
2002	36,318.76	6,722.89	1,663.28	7,309.45	4,158.01	6,705.81
2003	33,209.40	6,398.43	1,695.11	7,337.08	3,831.45	6,531.36
2004	30,100.04	6,073.98	1,726.94	7,364.71	4,016.81	6,356.91
2005	26,990.68	5,749.52	1,758.76	7,392.34	4,098.85	6,182.46
2006	21,340.43	4,827.53	1,699.27	6,676.39	3,997.54	5,633.31
2007	15,690.19	3,905.54	1,639.78	5,960.44	3,962.52	5,084.17
2008	10,039.94	2,983.55	1,580.29	5,244.49	3,928.52	4,535.02
2009	9,967.94	2,950.32	1,356.77	5,203.25	3,789.96	4,516.59
%Change 1980 to 2009	-87.17%	-71.53%	-55.17%	-15.80%	-37.32%	-59.66%

Crawford County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	16,461.92	4,327.25	868.60	2,174.53	783.70	1,712.11
1981	16,085.63	4,296.23	850.92	2,164.67	767.85	1,688.48
1982	15,709.33	4,265.21	833.23	2,154.81	752.01	1,664.86
1983	15,333.04	4,234.18	815.54	2,144.96	736.16	1,641.23
1984	14,956.74	4,203.16	797.85	2,135.10	720.31	1,617.60
1985	14,580.45	4,172.14	780.16	2,125.24	704.46	1,593.97
1986	14,204.16	4,141.12	762.48	2,115.39	688.61	1,570.34
1987	13,827.86	4,110.10	744.79	2,105.53	672.76	1,546.71
1988	13,451.57	4,079.08	727.10	2,095.67	656.92	1,523.91
1989	13,075.28	4,048.06	709.41	2,086.35	641.07	1,503.21
1990	11,483.56	3,601.23	755.08	2,163.11	602.41	1,430.53
1991	11,400.73	3,677.94	716.32	2,100.60	588.44	1,422.80
1992	11,317.91	3,754.64	677.55	2,038.10	574.46	1,415.07
1993	11,235.09	3,831.35	638.79	1,975.60	560.49	1,407.35
1994	11,152.26	3,908.06	600.02	1,913.09	546.52	1,399.62
1995	11,069.44	3,984.76	561.25	1,850.59	532.54	1,391.89
1996	10,986.61	4,061.47	536.96	1,788.09	518.57	1,384.16
1997	10,504.98	4,025.72	533.14	1,851.60	520.71	1,342.89
1998	10,346.24	3,965.58	551.04	1,932.38	522.54	1,323.01
1999	9,651.11	3,900.36	532.55	1,933.30	537.65	1,262.82
2000	9,362.91	3,845.20	524.51	1,870.60	546.16	1,226.72
2001	9,490.83	3,841.52	486.52	1,789.24	535.86	1,236.89
2002	9,623.31	4,241.99	439.65	1,994.66	578.54	1,400.36
2003	9,046.88	3,971.29	442.23	2,000.10	449.99	1,360.78
2004	8,470.46	3,700.59	444.82	2,005.54	321.43	1,321.20
2005	7,894.03	3,429.89	447.41	2,010.98	192.87	1,281.63
2006	6,264.52	3,261.19	434.38	1,708.03	273.09	1,144.40
2007	4,635.02	3,092.48	421.36	1,405.07	353.31	1,007.18
2008	3,005.51	2,923.78	408.33	1,102.11	433.53	869.96
2009	3,005.51	2,923.78	408.33	1,102.11	433.53	869.96
%Change 1980 to 2009	-81.74%	-32.43%	-52.99%	-49.32%	-44.68%	-49.19%

Floyd County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	51,975.95	16,355.62	4,709.98	4,202.70	57,654.19	6,704.38
1981	50,579.13	16,043.45	4,672.93	4,196.42	57,161.20	6,577.30
1982	49,182.30	15,731.27	4,641.09	4,190.13	56,668.22	6,450.23
1983	47,785.48	15,419.09	4,609.24	4,183.85	56,175.23	6,323.16
1984	46,388.66	15,106.91	4,577.40	4,177.57	55,682.25	6,196.08
1985	44,991.83	14,794.73	4,545.55	4,171.28	55,189.26	6,069.01
1986	43,595.01	14,482.55	4,513.70	4,165.00	54,696.28	5,941.93
1987	42,198.19	14,170.38	4,481.86	4,158.72	54,203.29	5,814.86
1988	40,801.36	13,858.20	4,450.01	4,152.43	53,710.30	5,687.79
1989	39,404.54	13,546.02	4,418.17	7,941.38	53,217.32	5,560.71
1990	33,042.77	13,602.97	4,249.17	7,820.91	48,347.62	4,550.34
1991	32,868.46	13,145.12	4,317.17	7,791.04	48,726.76	4,659.04
1992	32,694.16	12,687.27	4,385.16	7,761.17	49,105.89	4,767.74
1993	32,519.85	12,229.42	4,453.16	7,731.29	49,485.03	4,876.44
1994	32,345.54	11,771.56	4,524.42	7,701.42	49,864.16	4,985.14
1995	32,171.24	11,313.71	4,595.79	7,671.55	50,243.29	5,093.84
1996	31,996.93	10,855.86	4,668.27	7,641.68	50,622.43	5,202.54
1997	30,947.31	9,674.51	4,332.45	7,632.31	47,036.57	5,140.72
1998	29,952.81	11,116.40	4,691.00	8,003.44	50,789.42	4,901.76
1999	28,314.22	10,763.86	3,213.93	6,518.09	50,168.69	4,878.09
2000	27,837.09	11,289.62	5,267.23	8,477.04	59,289.74	4,784.45
2001	27,067.98	10,282.37	4,094.71	7,133.19	47,796.28	4,789.12
2002	24,055.69	9,669.62	3,388.17	7,553.45	48,653.03	3,974.16
2003	21,780.22	9,161.84	3,389.39	7,556.36	51,596.65	3,764.75
2004	19,504.76	8,654.06	3,390.61	7,559.27	54,540.27	3,555.34
2005	17,229.29	8,146.28	3,391.82	7,562.18	57,483.89	3,345.93
2006	13,447.20	8,022.48	2,847.07	6,543.56	46,027.29	3,046.31
2007	9,665.11	7,898.67	2,302.31	5,524.94	34,570.69	2,746.70
2008	5,883.01	7,774.87	1,757.56	4,506.32	23,114.09	2,447.08
2009	5,839.03	7,707.38	1,633.12	4,187.47	22,896.84	2,344.84
%Change 1980 to 2009	-82.14%	-52.88%	-65.33%	-0.36%	-60.29%	-65.03%

Harrison County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	35,953.88	4,849.84	1,754.73	4,642.33	623.72	4,223.17
1981	34,965.44	4,779.80	1,724.94	4,647.23	618.62	4,141.56
1982	33,977.00	4,709.77	1,695.16	4,652.13	613.52	4,059.95
1983	32,988.56	4,639.73	1,665.37	4,657.03	608.41	3,978.35
1984	32,000.13	4,569.70	1,635.59	4,661.94	603.31	3,896.74
1985	31,011.69	4,499.66	1,605.80	4,666.84	598.21	3,815.13
1986	30,023.25	4,429.63	1,576.01	4,671.74	593.10	3,733.53
1987	29,034.81	4,359.59	1,546.23	4,676.64	588.00	3,651.92
1988	28,047.87	4,289.55	1,516.44	4,681.55	582.91	3,570.31
1989	27,063.57	4,219.52	1,486.66	4,699.66	577.84	3,488.71
1990	25,005.55	3,667.09	1,570.52	4,967.87	814.98	3,296.62
1991	24,198.34	3,711.08	1,492.38	4,829.75	736.27	3,238.06
1992	23,391.12	3,755.06	1,414.45	4,691.88	657.55	3,179.50
1993	22,583.91	3,799.05	1,336.51	4,554.01	578.84	3,120.95
1994	21,776.70	3,843.03	1,258.58	4,416.15	500.13	3,062.39
1995	20,969.48	3,887.01	1,180.65	4,278.28	421.41	3,003.83
1996	20,162.27	3,931.00	1,104.45	4,140.41	342.70	2,945.27
1997	19,305.51	3,921.95	1,210.45	4,770.66	345.27	2,903.30
1998	18,910.27	3,862.43	1,197.84	4,662.82	346.64	2,804.27
1999	17,970.93	3,812.27	1,246.32	4,905.59	423.68	2,696.67
2000	17,344.10	3,700.31	1,223.52	4,739.92	420.27	2,655.53
2001	17,395.01	3,676.88	1,151.12	4,570.45	418.61	2,702.10
2002	16,091.30	3,878.02	1,055.00	5,777.81	705.95	2,620.44
2003	14,817.45	3,643.42	1,047.21	5,761.51	633.61	2,553.18
2004	13,543.61	3,408.81	1,039.42	5,745.20	561.27	2,485.91
2005	12,269.76	3,174.20	1,031.63	5,728.89	488.92	2,418.65
2006	9,713.94	2,785.85	1,023.05	5,016.88	514.55	2,172.30
2007	7,158.12	2,397.50	1,014.47	4,304.86	540.18	1,925.96
2008	4,602.29	2,009.15	1,005.89	3,592.85	565.81	1,679.61
2009	4,602.29	2,009.15	1,005.89	3,592.85	565.81	1,672.94
%Change 1980 to 2009	-80.32%	-58.57%	-42.68%	-22.61%	-9.28%	-60.39%

Jefferson County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	21,940.96	132,774.61	4,773.10	6,308.61	334,534.51	3,774.85
1981	21,462.11	128,335.04	4,686.28	6,271.71	322,523.34	3,712.54
1982	20,983.27	123,895.47	4,599.46	6,234.82	310,512.18	3,650.22
1983	20,504.43	119,455.90	4,512.64	6,197.92	298,501.02	3,587.98
1984	20,028.24	115,016.33	4,425.82	6,161.03	286,489.86	3,525.76
1985	19,562.83	110,576.76	4,339.00	6,124.13	274,478.70	3,463.54
1986	19,097.41	106,137.18	4,252.18	6,087.23	262,467.54	3,401.32
1987	18,632.00	101,697.61	4,165.37	6,050.34	250,456.38	3,339.10
1988	18,166.59	97,258.04	4,078.55	6,013.44	238,445.21	3,276.89
1989	17,701.18	92,818.47	3,991.73	5,998.56	226,434.05	3,214.67
1990	15,358.12	86,770.39	3,833.82	5,811.70	277,491.39	2,819.46
1991	15,381.72	83,345.89	3,711.79	5,750.76	248,685.73	2,840.67
1992	15,405.32	79,921.38	3,589.76	5,689.82	219,880.06	2,861.87
1993	15,428.92	76,496.88	3,467.73	5,628.88	191,074.40	2,883.08
1994	15,452.52	73,072.38	3,345.70	5,567.94	162,268.73	2,904.28
1995	15,476.12	69,647.87	3,223.66	5,507.00	133,463.06	2,925.48
1996	15,499.72	66,223.37	3,101.63	5,446.06	104,657.40	2,946.69
1997	14,683.02	62,720.81	2,854.78	5,290.89	93,786.66	2,935.18
1998	14,323.10	57,320.84	2,948.23	5,613.81	89,526.93	2,842.17
1999	13,420.41	35,954.38	3,657.51	6,381.72	53,110.07	2,908.46
2000	13,180.25	34,685.20	2,910.15	5,529.84	43,117.99	2,894.23
2001	12,701.65	33,989.79	2,515.53	5,108.64	39,599.75	2,921.34
2002	13,789.90	32,070.89	1,397.60	4,684.72	38,882.63	2,460.31
2003	13,036.90	29,701.34	1,432.00	4,735.32	50,965.68	2,438.80
2004	12,283.90	27,331.78	1,466.40	4,785.92	63,048.73	2,417.29
2005	11,530.91	24,962.23	1,500.80	4,836.52	75,131.78	2,395.78
2006	9,259.85	20,117.30	1,663.82	4,583.04	60,141.82	2,122.70
2007	6,988.80	15,272.37	1,826.84	4,329.56	45,151.87	1,849.62
2008	4,717.75	10,427.44	1,989.86	4,076.08	30,161.91	1,576.54
2009	4,717.87	10,374.89	1,989.86	4,076.08	30,109.66	1,576.82
%Change 1980 to 2009	-69.38%	-92.19%	-58.31%	-35.39%	-91.00%	-58.23%

Ohio County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	3,716.74	876.04	312.58	1,004.91	150.17	448.58
1981	3,630.54	864.46	307.18	1,002.20	147.16	443.97
1982	3,544.34	852.89	301.78	999.49	144.15	439.35
1983	3,458.14	841.31	296.38	996.78	141.14	434.73
1984	3,371.93	829.74	290.98	994.07	138.13	430.12
1985	3,285.73	818.16	285.59	991.36	135.12	425.50
1986	3,199.53	806.59	280.19	988.64	132.11	420.89
1987	3,113.33	795.01	274.79	985.93	129.10	416.27
1988	3,027.13	783.44	269.39	983.22	126.09	411.66
1989	2,940.93	771.86	263.99	980.76	123.08	407.04
1990	2,521.14	671.81	216.55	849.93	116.97	330.81
1991	2,520.73	683.71	223.22	882.12	113.42	345.67
1992	2,520.31	695.61	229.90	914.31	109.87	360.53
1993	2,519.90	707.51	236.58	946.50	106.32	375.39
1994	2,519.49	719.41	243.26	978.69	102.77	390.24
1995	2,519.07	731.31	249.94	1,010.89	99.22	405.10
1996	2,518.66	743.21	256.62	1,043.08	95.67	419.96
1997	2,378.11	732.61	249.53	1,030.21	96.09	411.20
1998	2,319.68	717.60	247.88	1,017.18	96.54	409.42
1999	2,161.20	702.50	244.51	1,017.30	113.79	388.94
2000	2,131.53	703.49	230.71	950.14	115.85	386.95
2001	2,000.20	682.48	218.88	919.94	113.55	380.02
2002	2,249.18	682.19	162.21	1,025.16	107.15	388.24
2003	2,067.85	638.50	160.19	1,022.94	83.82	370.58
2004	1,886.52	594.81	158.16	1,020.73	60.49	352.91
2005	1,705.20	551.12	156.13	1,018.51	37.15	335.25
2006	1,346.49	526.93	156.08	905.80	51.58	302.08
2007	987.78	502.74	156.04	793.08	66.00	268.92
2008	629.07	478.56	155.99	680.36	80.42	235.75
2009	629.07	478.56	155.99	680.36	80.42	235.75
%Change 1980 to 2009	-83.07%	-45.37%	-50.10%	-32.30%	-46.45%	-47.45%

Orange County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	15,071.74	1,870.49	1,287.53	3,334.00	254.00	4,222.21
1981	14,694.48	1,851.21	1,263.53	3,311.94	250.17	4,121.15
1982	14,317.22	1,831.94	1,239.54	3,289.87	246.35	4,020.09
1983	13,942.39	1,812.67	1,215.55	3,267.81	242.53	3,919.03
1984	13,568.78	1,793.40	1,191.55	3,245.74	238.71	3,817.97
1985	13,195.17	1,774.13	1,167.56	3,223.68	234.89	3,716.91
1986	12,821.57	1,754.85	1,143.56	3,201.61	231.06	3,615.85
1987	12,447.96	1,735.58	1,119.57	3,179.54	227.24	3,514.79
1988	12,074.35	1,716.31	1,095.58	3,157.48	223.42	3,413.73
1989	11,700.74	1,697.04	1,071.58	3,172.53	219.60	3,314.14
1990	10,553.08	1,483.73	1,172.12	3,528.16	384.86	3,352.64
1991	10,356.14	1,496.66	1,085.62	3,371.17	331.59	3,193.64
1992	10,159.21	1,509.59	999.12	3,214.18	278.31	3,034.63
1993	9,962.28	1,522.52	912.61	3,057.19	225.04	2,875.63
1994	9,765.34	1,535.45	826.19	2,900.20	171.77	2,716.62
1995	9,568.41	1,548.38	744.48	2,743.21	118.49	2,557.61
1996	9,371.47	1,561.31	678.67	2,586.22	65.22	2,398.61
1997	9,042.40	1,551.89	710.85	2,751.57	65.84	2,429.82
1998	8,773.73	1,511.91	725.03	2,832.41	65.92	2,233.13
1999	8,260.43	2,082.25	740.82	2,949.90	89.49	2,575.64
2000	7,940.60	2,032.79	733.94	2,871.69	84.85	2,501.34
2001	7,764.80	2,016.62	699.05	2,805.40	86.50	2,599.06
2002	7,711.61	1,563.14	579.10	3,399.05	229.60	1,882.62
2003	7,320.81	1,585.02	594.36	3,415.97	226.34	1,863.65
2004	6,930.00	1,606.89	609.62	3,432.90	223.09	1,844.69
2005	6,539.19	1,628.77	624.88	3,449.82	219.84	1,825.72
2006	5,171.60	1,413.47	605.11	3,022.41	210.02	1,663.28
2007	3,804.00	1,198.16	585.35	2,594.99	200.19	1,500.84
2008	2,436.41	982.86	565.58	2,167.58	190.37	1,338.40
2009	2,436.41	982.86	565.58	2,167.58	190.37	1,264.92
%Change 1980 to 2009	-83.83%	-47.45%	-56.07%	-34.99%	-25.05%	-70.04%

Scott County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	21,246.54	2,033.08	943.40	2,395.90	1,558.54	3,069.38
1981	20,727.14	2,000.66	925.22	2,388.99	1,501.30	3,015.93
1982	20,207.74	1,968.24	907.03	2,382.09	1,444.06	2,962.49
1983	19,688.35	1,935.82	888.85	2,375.18	1,386.83	2,909.04
1984	19,168.95	1,903.40	870.67	2,368.27	1,329.59	2,855.60
1985	18,649.56	1,870.98	852.48	2,361.37	1,272.36	2,802.15
1986	18,130.16	1,838.55	834.30	2,354.46	1,215.12	2,748.71
1987	17,611.79	1,806.13	816.11	2,347.55	1,157.88	2,695.26
1988	17,095.53	1,773.71	797.93	2,340.65	1,100.65	2,641.82
1989	16,579.26	1,741.29	779.75	2,381.51	1,043.41	2,588.37
1990	14,275.61	1,399.09	795.69	2,460.76	1,734.61	2,123.74
1991	14,194.01	1,439.23	756.83	2,402.47	1,456.93	2,176.40
1992	14,112.42	1,479.36	717.97	2,344.19	1,179.24	2,229.06
1993	14,030.83	1,519.50	679.11	2,285.90	901.56	2,281.72
1994	13,949.23	1,559.63	640.25	2,227.61	623.87	2,334.38
1995	13,867.64	1,599.76	601.39	2,169.32	346.18	2,387.04
1996	13,786.04	1,639.90	562.54	2,111.03	68.50	2,439.70
1997	13,248.36	1,649.99	573.17	2,205.07	69.95	2,445.14
1998	12,896.38	1,623.03	594.03	2,306.25	70.67	2,392.77
1999	12,113.02	1,608.05	607.41	2,368.03	103.51	2,430.66
2000	11,734.57	1,536.90	603.46	2,315.81	96.93	2,381.00
2001	11,679.71	1,514.57	557.28	2,220.10	99.66	2,424.29
2002	11,733.76	1,667.07	523.67	2,774.78	341.76	2,031.08
2003	10,878.40	1,563.69	524.83	2,776.11	333.61	1,956.54
2004	10,023.05	1,460.30	526.00	2,777.44	325.46	1,882.01
2005	9,167.69	1,356.92	527.16	2,778.77	317.31	1,807.47
2006	7,125.11	1,063.06	517.79	2,456.12	306.23	1,628.35
2007	5,082.53	769.20	508.41	2,133.47	295.15	1,449.23
2008	3,039.95	475.34	499.04	1,810.82	284.07	1,270.10
2009	3,039.95	475.34	499.04	1,810.82	284.07	1,270.10
%Change 1980 to 2009	-85.69%	-76.62%	-47.10%	-24.42%	-81.77%	-58.62%

Switzerland County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	5,235.49	1,730.23	540.99	1,552.30	357.27	773.81
1981	5,141.76	1,719.21	531.48	1,546.49	350.78	771.26
1982	5,048.04	1,708.19	521.97	1,540.67	344.29	768.70
1983	4,954.31	1,697.17	512.46	1,534.86	337.79	766.15
1984	4,860.59	1,686.16	502.96	1,529.05	331.30	763.60
1985	4,766.86	1,675.14	493.45	1,523.24	324.81	761.04
1986	4,673.13	1,664.12	483.94	1,518.01	318.32	758.49
1987	4,579.41	1,653.10	474.44	1,512.20	311.82	755.94
1988	4,485.68	1,642.08	464.93	1,507.32	305.33	753.38
1989	4,391.96	1,631.07	455.42	1,502.43	298.84	750.83
1990	3,701.65	1,444.18	415.74	1,374.06	294.82	603.43
1991	3,769.03	1,481.77	411.12	1,384.65	285.41	640.54
1992	3,836.41	1,519.37	406.49	1,395.24	276.01	677.66
1993	3,903.80	1,556.96	401.87	1,405.83	266.61	714.78
1994	3,971.18	1,594.55	397.25	1,416.42	257.20	751.89
1995	4,038.56	1,632.15	392.63	1,427.01	247.80	789.01
1996	4,105.94	1,669.74	388.01	1,437.61	238.39	826.12
1997	3,846.45	1,643.76	407.38	1,581.33	239.25	814.59
1998	3,779.50	1,611.58	415.25	1,601.25	239.99	804.23
1999	3,492.90	1,577.60	411.84	1,618.17	251.50	773.54
2000	3,486.36	1,579.48	413.69	1,599.16	257.31	778.12
2001	3,285.51	1,554.31	394.24	1,555.89	251.02	776.29
2002	4,024.53	1,683.02	286.24	1,552.18	290.32	829.15
2003	3,757.38	1,579.95	281.40	1,546.95	228.31	799.83
2004	3,490.23	1,476.87	276.56	1,541.72	166.29	770.52
2005	3,223.09	1,373.80	271.72	1,536.49	104.27	741.21
2006	2,599.60	1,339.87	270.86	1,349.86	143.78	670.16
2007	1,976.12	1,305.94	270.01	1,163.22	183.28	599.11
2008	1,352.64	1,272.00	269.15	976.59	222.79	528.06
2009	1,352.64	1,272.00	269.15	976.59	222.79	528.06
%Change 1980 to 2009	-74.16%	-26.48%	-50.25%	-37.09%	-37.64%	-31.76%

Washington County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	20,082.51	2,083.75	1,431.27	3,979.92	354.77	4,252.63
1981	19,552.42	2,049.38	1,408.89	3,972.13	351.14	4,164.82
1982	19,024.03	2,015.02	1,386.50	3,964.35	347.51	4,077.00
1983	18,497.62	1,980.66	1,364.12	3,956.56	343.88	3,989.18
1984	17,971.21	1,946.29	1,341.74	3,948.77	340.25	3,901.36
1985	17,444.79	1,911.93	1,319.36	3,940.99	336.62	3,813.54
1986	16,918.38	1,877.56	1,296.98	3,933.20	332.99	3,725.73
1987	16,391.96	1,843.20	1,274.60	3,925.41	329.36	3,637.91
1988	15,865.55	1,808.83	1,252.22	3,917.62	325.73	3,550.14
1989	15,339.14	1,774.47	1,229.84	3,961.24	322.10	3,462.39
1990	14,683.59	1,538.68	1,290.35	4,154.37	594.54	3,349.11
1991	14,144.05	1,552.34	1,225.71	4,062.88	510.03	3,267.10
1992	13,604.52	1,566.00	1,161.64	3,971.42	425.53	3,185.09
1993	13,064.98	1,579.66	1,097.56	3,879.96	341.02	3,103.09
1994	12,525.44	1,593.31	1,033.49	3,788.51	256.51	3,021.08
1995	11,985.91	1,606.97	969.42	3,697.05	172.01	2,939.07
1996	11,446.37	1,620.63	905.35	3,605.59	87.50	2,857.06
1997	10,837.47	1,604.63	923.41	3,764.00	88.51	2,855.83
1998	10,507.61	1,561.95	903.81	3,658.13	88.92	2,744.93
1999	9,797.40	1,526.27	908.60	3,774.78	135.55	2,464.51
2000	9,464.63	1,473.97	912.86	3,734.23	132.28	2,374.61
2001	9,248.13	1,452.51	868.64	3,637.80	136.13	2,447.90
2002	10,107.71	1,579.24	852.33	4,691.05	380.96	2,452.92
2003	9,372.58	1,506.00	850.88	4,688.89	374.35	2,310.45
2004	8,637.44	1,432.76	849.42	4,686.73	367.75	2,167.97
2005	7,902.31	1,359.52	847.97	4,684.57	361.14	2,025.50
2006	6,302.22	1,122.10	836.31	4,111.39	345.10	1,937.33
2007	4,702.13	884.67	824.65	3,538.21	329.06	1,849.15
2008	3,102.05	647.25	812.99	2,965.02	313.03	1,760.98
2009	3,090.55	647.25	782.06	2,872.58	234.89	1,729.99
%Change 1980 to 2009	-84.61%	-68.94%	-45.36%	-27.82%	-33.79%	-59.32%