CRITERIA POLLUTANTS

Air Quality Trend Analysis Report
(1980-2010)

CENTRAL SOUTHWEST INDIANA

Indiana Department of Environmental Management

Office of Air Quality

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Table of Contents

Figures

Tables

Graphs

Charts

Appendix

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 µg/m^3 or fine particles

PM_{10} .... particulate matter less than or equal to 10 µg/m^3 or particulate matter

ppm .... parts per million

RACT .... Reasonably Available Control Technology

SIP .... State Implementation Plan

SO_2 .... sulfur dioxide

SUVs .... sport utility vehicles

TSP .... total suspended particulate

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

µg/m^3 .... micrograms per cubic meter

VOC .... volatile organic compound

VMT .... vehicle miles traveled

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Introduction

The Central Southwest Indiana area is composed of three counties. The counties represented in the area shown in Figure 1 are: Greene, Monroe, and Owen counties.

There are currently two criteria pollutant monitors in the Central Southwest Indiana area collecting data for fine particles ($PM_{2.5}$) and ozone. The map in Figure 1 reflects only the monitors that are currently in operation. Monitoring data for the years 2000 through 2010 for Central Southwest 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 Central Southwest Indiana area include coal-fired boilers at a local university, an animal by-product reclaiming facility, and an oil refining company. Emission trend graphs and pie charts are included for the precursors for each regulated criteria pollutant. Emission information by county is available upon request.

Figure 1: Map of Central Southwest Indiana Counties and Monitors

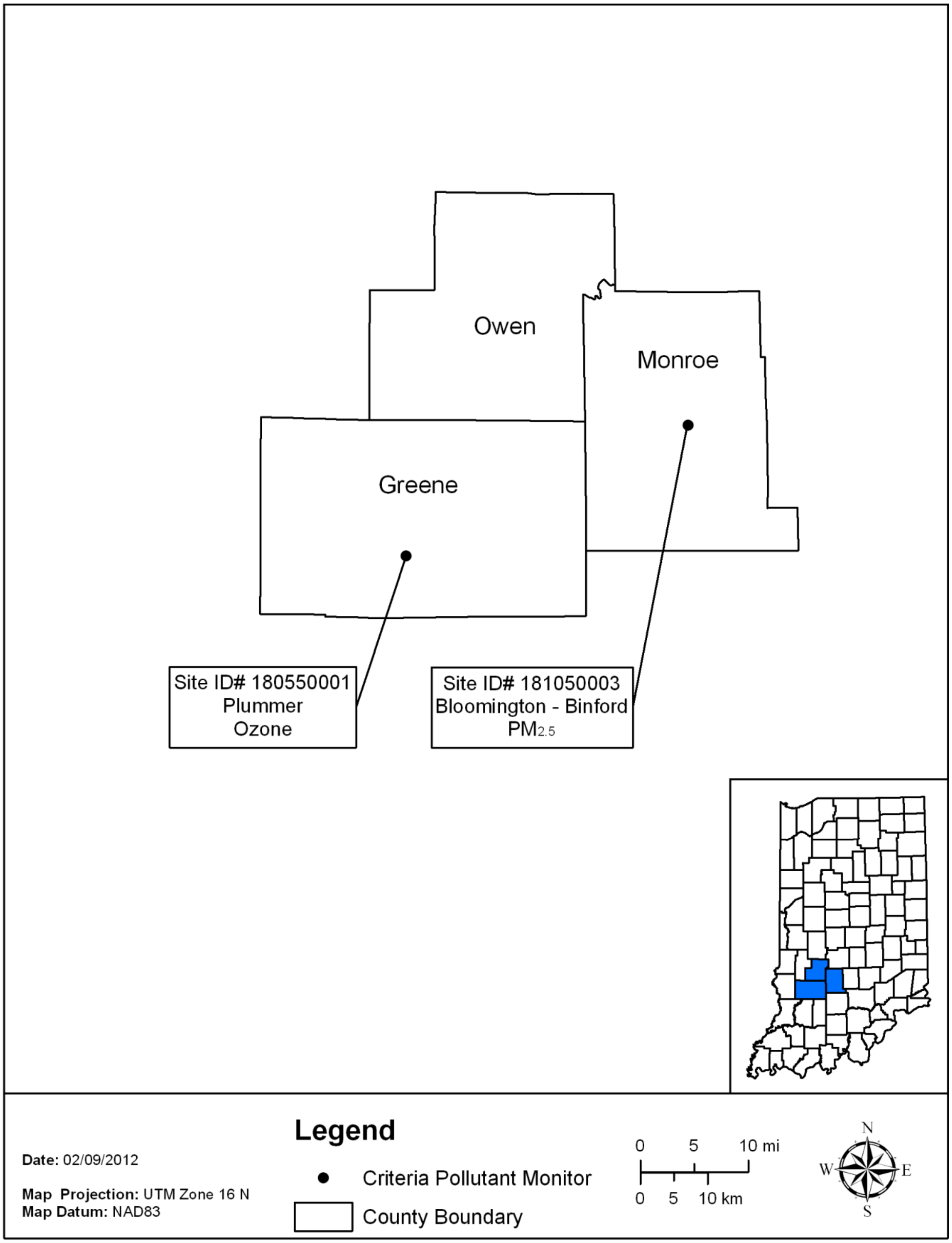


Table 1: Central Southwest Indiana County Population Information

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
GREENE	BLOOMFIELD	LINTON	15,211	30,416	30,410	33,157	33,165	9%
MONROE	BLOOMINGTON	BLOOMINGTON	59,107	98,783	108,978	120,563	137,974	40%
OWEN	SPENCER	SPENCER	10,091	15,841	17,281	21,786	21,575	36%

Table 1 shows that Monroe County has had the highest percent difference in population between 1980 and 2010, increasing by 40%. The population for all three counties in the Central Southwest Indiana area had an increase in population from 1980 compared to 2010. 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 will have a secondary effect on increasing VMT if the change in population occurs away from the employment centers.

Table 2: Central Southwest 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 1980 AND 2010 DAILY VMT
GREENE	1,151	37,427	880,832	930,000	6%
MONROE	1,065	100,646	1,376,969	2,547,000	85%
OWEN	745	25,051	414,943	538,000	30%

Table 2 illustrates that Monroe County has had the highest increase in daily VMT since 1980. The daily VMT for all three of the counties in the Central Southwest Indiana area have increased over time. Daily VMT data are only available as far back as 1992; 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 calculate 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 carbon monoxide (CO), $PM_{2.5}$, and ozone precursors (volatile organic compounds (VOCs) and nitrogen oxides (NO_x)). Generally, increases in VMT result in subsequent increases in emissions of CO, VOCs, and NO_x 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 offset by fleet turn-over where newer, cleaner vehicles replace older, more polluting ones.

Table 3: 2009 Central Southwest 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
GREENE	14,925	6,283	1,671	SULLIVAN	389	MONROE	3,102
MONROE	70,076	4,946	15,098	LAWRENCE	3,669	MARION	954
OWEN	9,144	4,573	1,292	MONROE	478	MONROE	2,175

Information in Table 3 from 2009 demonstrates that the largest workforce in Central Southwest Indiana can be found in Monroe County. Commuting patterns in Central Southwest Indiana center on the City of Bloomington in Monroe County. Since Monroe County has the highest population and the highest commuting pattern to and from the county, emissions within Monroe County are expected to be higher than surrounding counties in the Central Southwest Indiana area. The Central Southwest Indiana area commuting patterns reflect that of many urban areas around the country. The largest employment county is Monroe 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 over the last 30 years. The majority of air quality improvements have stemmed from the national and regional controls outlined below. These programs have been or are being implemented and have reduced monitored ambient air quality values in Central Southwest Indiana and across the state.

National Controls

Acid Rain Program

Congress created the Acid Rain Program under Title IV of the 1990 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 required 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 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 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 SIP Call, 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

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

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.

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).

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) producing electricity 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 included 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 from 2003 levels by 2010 and by 5.4 million tons from 2003 levels 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 address the deficiencies identified 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 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 Central Southwest 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 8-8.1	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.

Central Southwest 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 emission inventory data are available for 1980 through 2009 for CO, $PM_{2.5}$, NO_x, particulate matter (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 is one EGU facility in the Central Southwest Indiana area. The facility is one of the top eight emitters in the area. Emissions data for each county in Central Southwest Indiana are available upon request.

Point Sources

Point sources include major and minor sources, including EGUs that report emissions through Indiana's emission 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.

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

Onroad Sources

Onroad sources include cars and light 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.

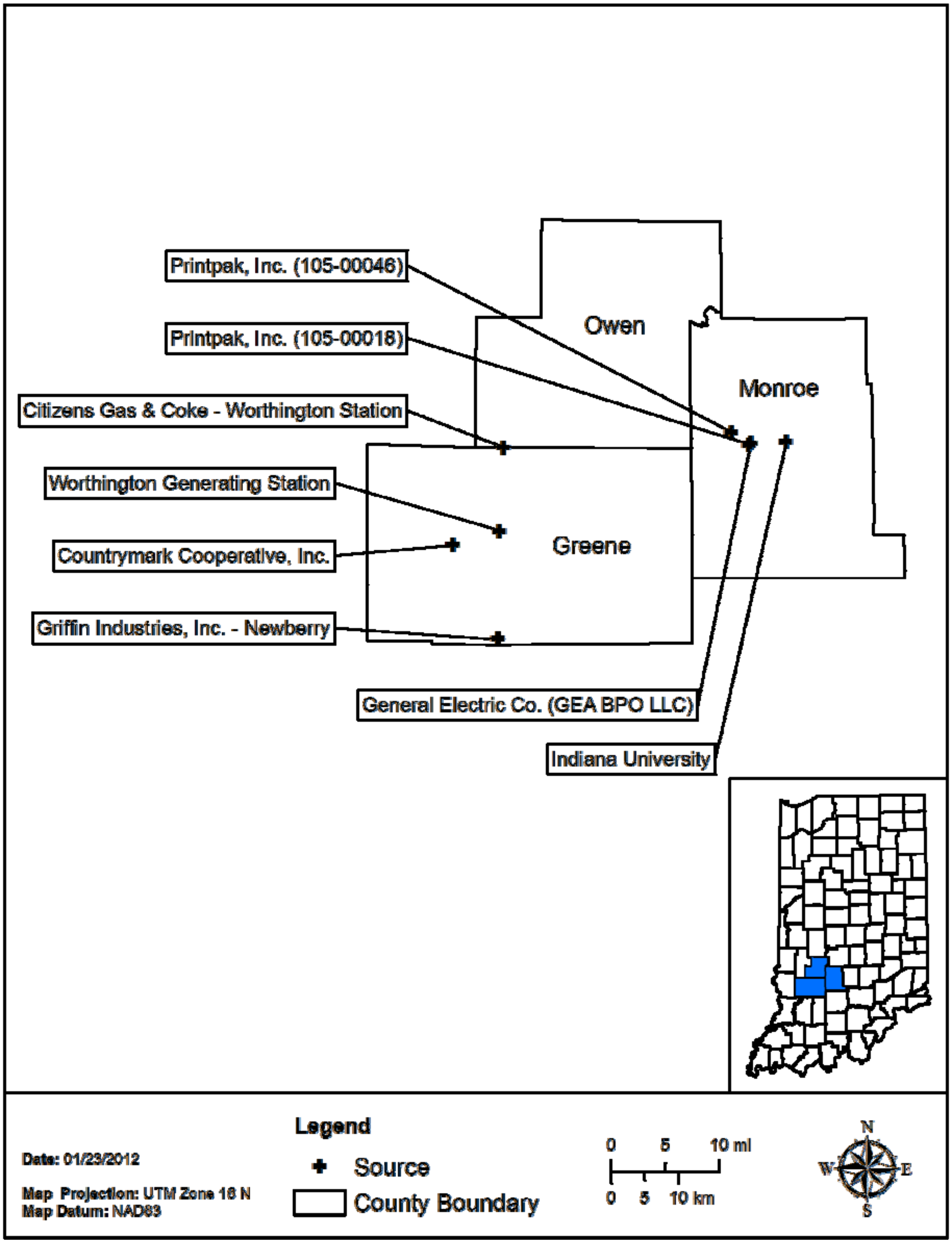
Top Eight Emission Sources

Table 4 represents the largest sources in tons per year of emissions in the Central Southwest Indiana area and includes coal-fired boilers at a local university, an animal by-product reclaiming facility, and an oil refining company. Air quality in the Central Southwest Indiana area is partially influenced by the emissions from these top eight 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 Central Southwest Indiana area.

Table 4: Central Southwest Indiana Top Eight Sources Data (Tons per Year)

INVENTORY YEAR	COUNTY	FACILITY NAME	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	TOTAL
2010	MONROE	INDIANA UNIVERSITY – CENTRAL HEATING PLANT	183.9	397.2	7.8	3.3	2,834.3	2.1	3,428.7
2010	GREENE	COUNTRYMARK COOPERATIVE, INC.	2.0	0.8	0.0	0.0	0.0	163.3	166.1
2010	MONROE	PRINTPACK, INC.	1.3	1.6	0.1	0.1	0.0	116.7	119.9
2010	MONROE	GENERAL ELECTRIC COMPANY (GEA BPO LLC)	3.6	4.3	0.6	0.6	0.3	57.0	66.3
2008	GREENE	CITIZENS GAS & COKE	0.0	0.0	0.0	0.0	62.2	0.0	62.2
2010	GREENE	GRIFFIN INDUSTRIES, INC. – NEWBERRY	12.4	14.8	1.1	1.1	0.1	0.8	30.3
2008	GREENE	HOOSIER ENERGY – WORTHINGTON GENERATING STATION	0.1	10.0	0.0	0.0	0.0	0.0	10.1
2010	MONROE	PRINTPACK INCORPORATED	1.0	1.2	0.1	0.1	0.0	2.2	4.5

Figure 2: Map of Central Southwest Indiana Top Eight 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 Standard (NAAQS). All counties in the Central Southwest Indiana area meet the NAAQS. Current monitoring data for Central Southwest Indiana are only available for annual and 24-hour $PM_{2.5}$ and 8-hour ozone. A detailed explanation of $PM_{2.5}$ and ozone will be made in the pollutant specific section of this report. New 1-hour NAAQS were introduced in 2010 for NO_2 and SO_2. The 1-hour NO_2 monitoring data across the state are well below the new 1-hour NO_2 NAAQS. There are no monitors in the Central Southwest Indiana area that measure NO_2 or SO_2.

Air Monitoring and Emissions Data

Not all counties in the Central Southwest Indiana area have an ambient air quality monitor located within the county boundaries. Monitoring data for the years 2000 through 2010 for Central Southwest Indiana are included in the tables in this report for each criteria pollutant, if available. Monitoring data prior to the year 2000 are 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.

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 are 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 Central Southwest 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 emission trends for CO in Central Southwest Indiana and Chart 1 shows how the average emissions are distributed among the different source categories. CO emissions in the Central Southwest Indiana area have been trending downward over time. If monitoring data for CO were available in the Central Southwest Indiana area, it is expected that monitor values would be trending downward as well.

Graph 1: Central Southwest Indiana CO Emissions

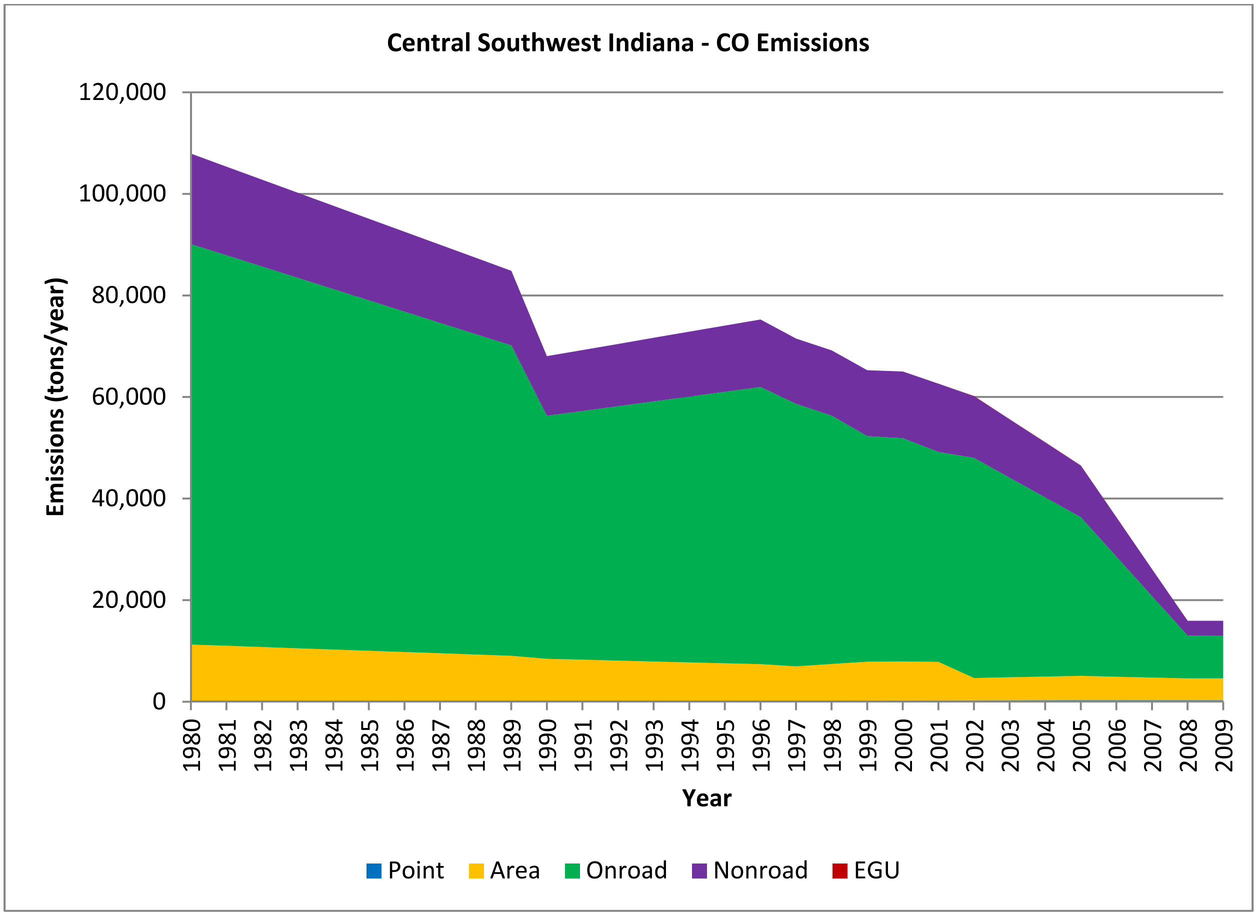
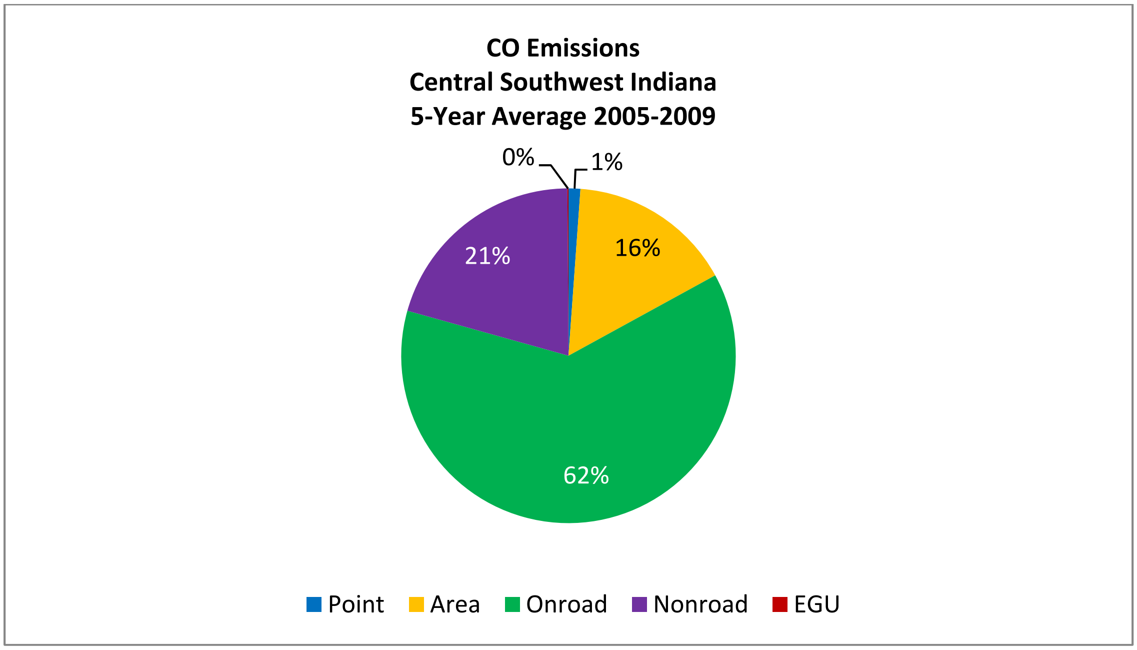


Chart 1: Central Southwest Indiana CO Emissions



National controls have led to a decrease in CO emissions in the Central Southwest Indiana area. As Graph 1 illustrates, CO emissions have decreased by 85% within the Central Southwest 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 primary 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 ($PM_{2.5}$)

One monitor within the Central Southwest Indiana area measures $PM_{2.5}$ levels. This monitor is located in Monroe County and began operation in April 2009. Since the monitor is new, and there are no historical monitoring data for $PM_{2.5}$ in the Central Southwest Indiana area, a trend graph has not been provided for $PM_{2.5}$.

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 are determined by evaluating the three-year average, also known as the design value, of the annual arithmetic mean (the method used to derive the central tendency of the monitoring values) 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 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 a 98^{th} percentile is equal to or greater than 35 $\mu g/m^3$. 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 data in Tables 5, 6, 7, and 8 are from the monitoring site that measured annual and 24-hour $PM_{2.5}$ from 2000 to 2010. Statewide monitoring data for $PM_{2.5}$ began in 2000; all available data for both annual and 24-hour $PM_{2.5}$ for the Central Southwest Indiana area are shown in the tables.

Monitoring data in Table 5 show the annual arithmetic mean for the years 2009 and 2010. Monitoring data in Table 6 show the design value of the annual arithmetic mean for the years 2009 and 2010, which are compared to the primary and secondary annual $PM_{2.5}$ standards at 15.0 $\mu g/m^3$. Monitoring data in Table 7 show the 98^{th} percentile for the years 2009 and 2010. Monitoring data in Table 8 show the design value of the 98^{th} percentile for the years 2009 and 2010, which are compared to the primary and secondary 24-hour $PM_{2.5}$ standards at 35 $\mu g/m^3$.

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

County	Site #	Site Name	Annual Arithmetic Mean (µg/m^3)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Monroe	181050003	Bloomington - Binford										10.62	11.12

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

County	Site #	Site Name	Three-Year Design Value (µg/m^3)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Monroe	181050003	Bloomington - Binford								10.6	10.9

Red highlighted numbers are above the annual $PM_{2.5}$ standard of 15.0 µg/m^3

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

County	Site #	Site Name	24-Hour 98th Percentile Value (µg/m^3)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Monroe	181050003	Bloomington - Binford										21.9	24.5

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

County	Site #	Site Name	Three-Year Design Value (µg/m^3)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Monroe	181050003	Bloomington - Binford								22	23

Prior to 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 65 µg/m^3

Beginning in 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 35 µg/m^3

Fine particulates are emitted directly into the air from combustion sources such as coal-fired power plants, motor vehicles, and open burning. In addition, fine particulate matter is formed in the air via chemical reactions. Gas pollutants, such as ammonia, SO_2, and NO_x, change chemically in the air to become either liquid or solid fine particulate matter. U.S. EPA's NEI contains emissions information for $PM_{2.5}$, SO_2, and NO_x and is used in Graphs 2, 3, and 4 and Charts 2, 3, and 4. Graphs 2, 3, and 4 illustrate the emissions trends for $PM_{2.5}$ and its precursors (SO_2 and NO_x) in Central Southwest Indiana. Charts

2, 3, and 4 show how the average emissions are distributed among the different source categories.

Graph 2: Central Southwest Indiana $PM_{2.5}$ Emissions

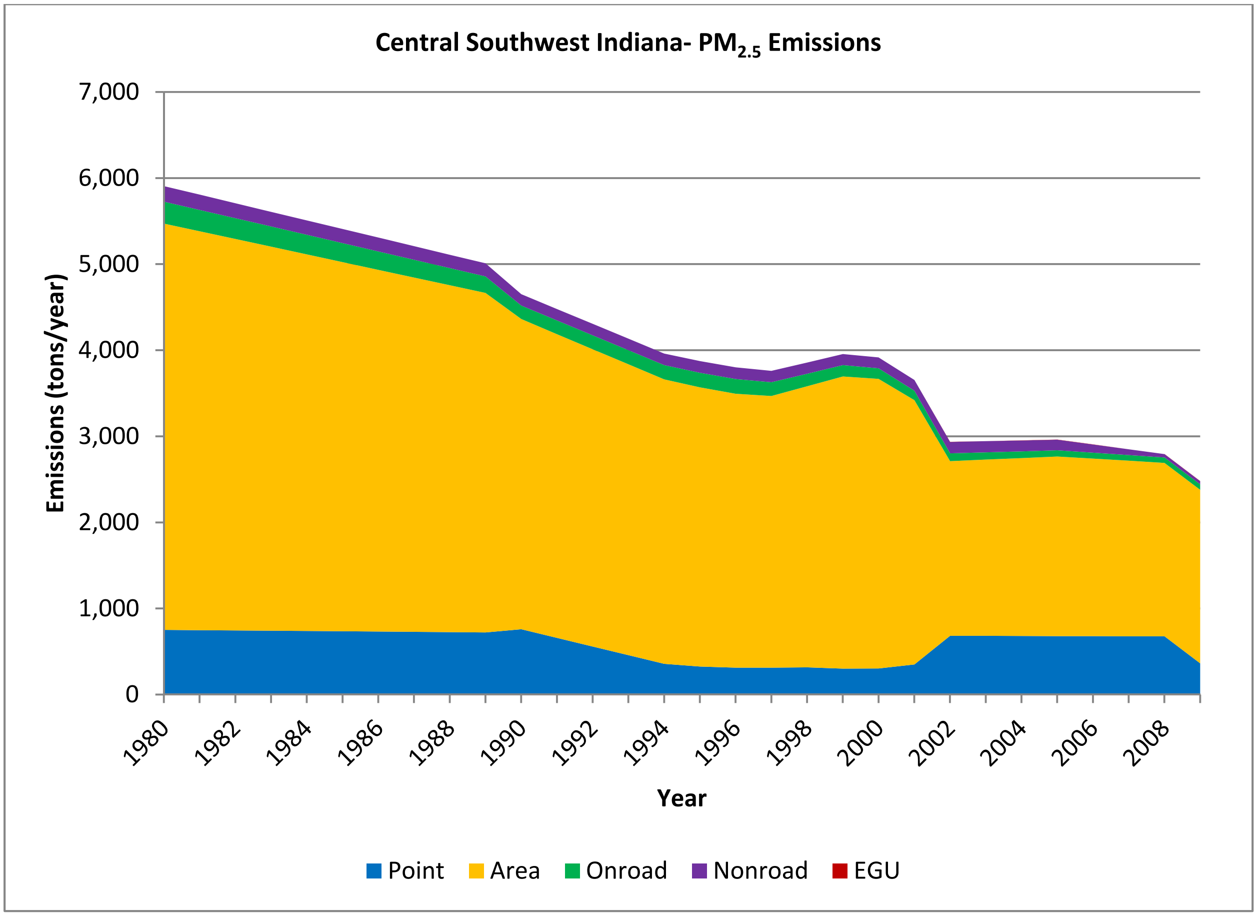
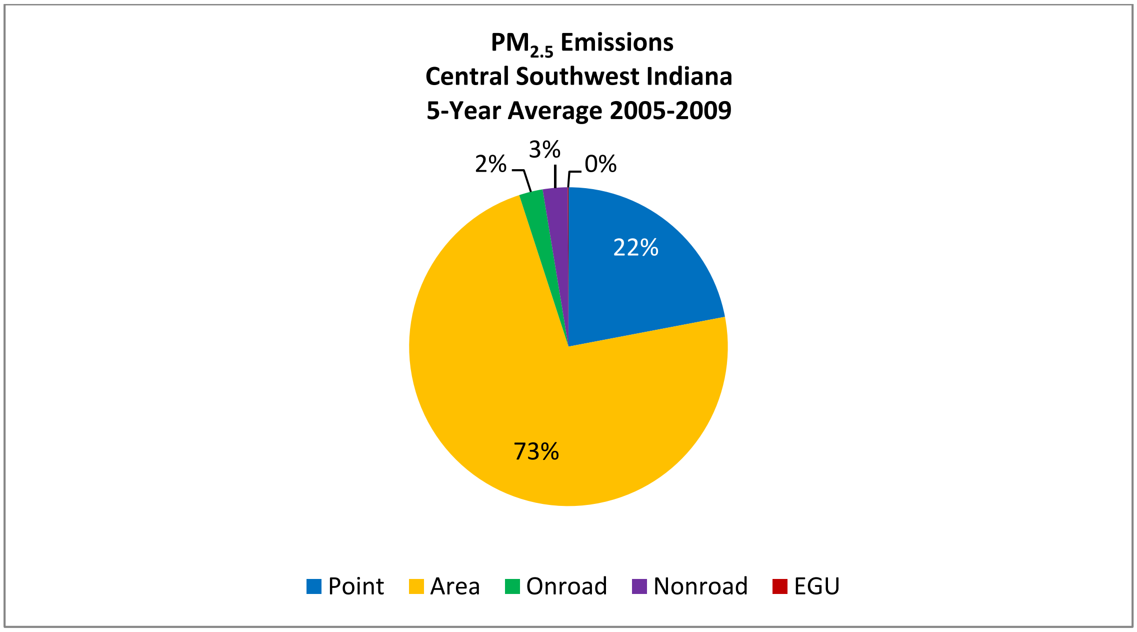


Chart 2: Central Southwest Indiana $PM_{2.5}$ Emissions



Graph 3: Central Southwest Indiana SO_2 Emissions

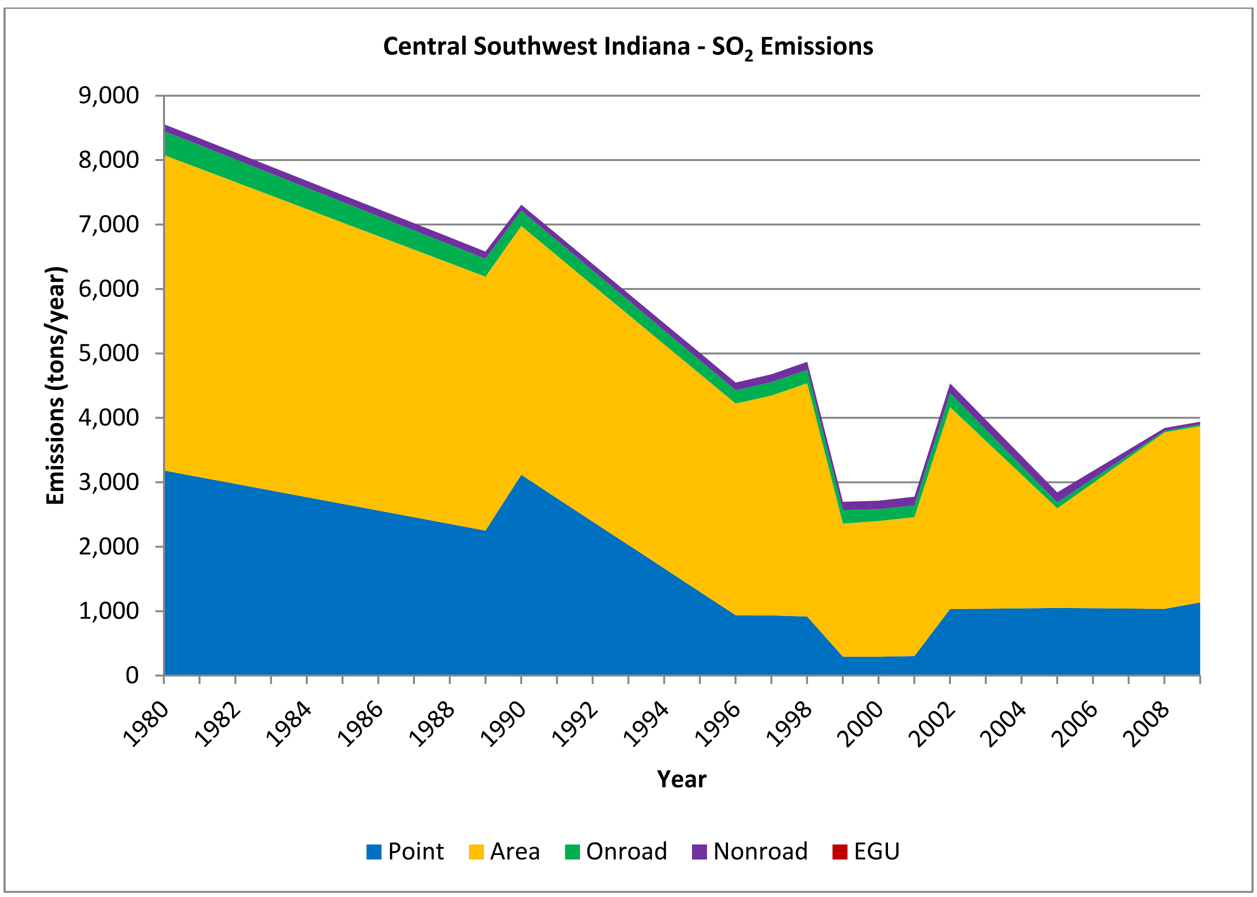
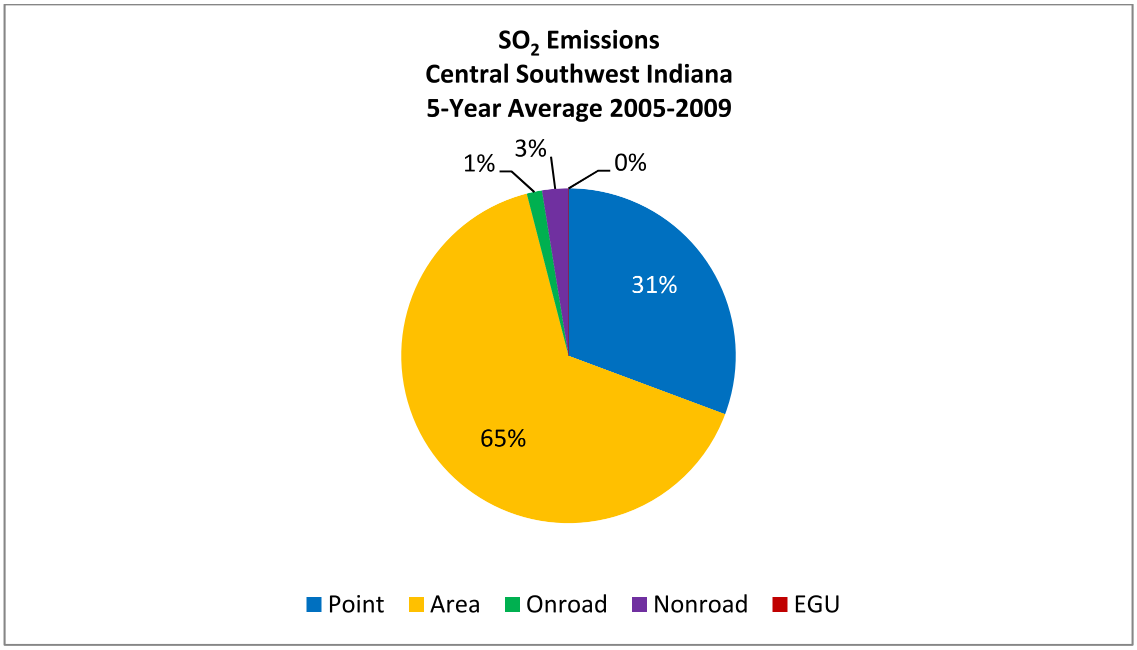


Chart 3: Central Southwest Indiana SO_2 Emissions



Graph 4: Central Southwest Indiana NO_x Emissions

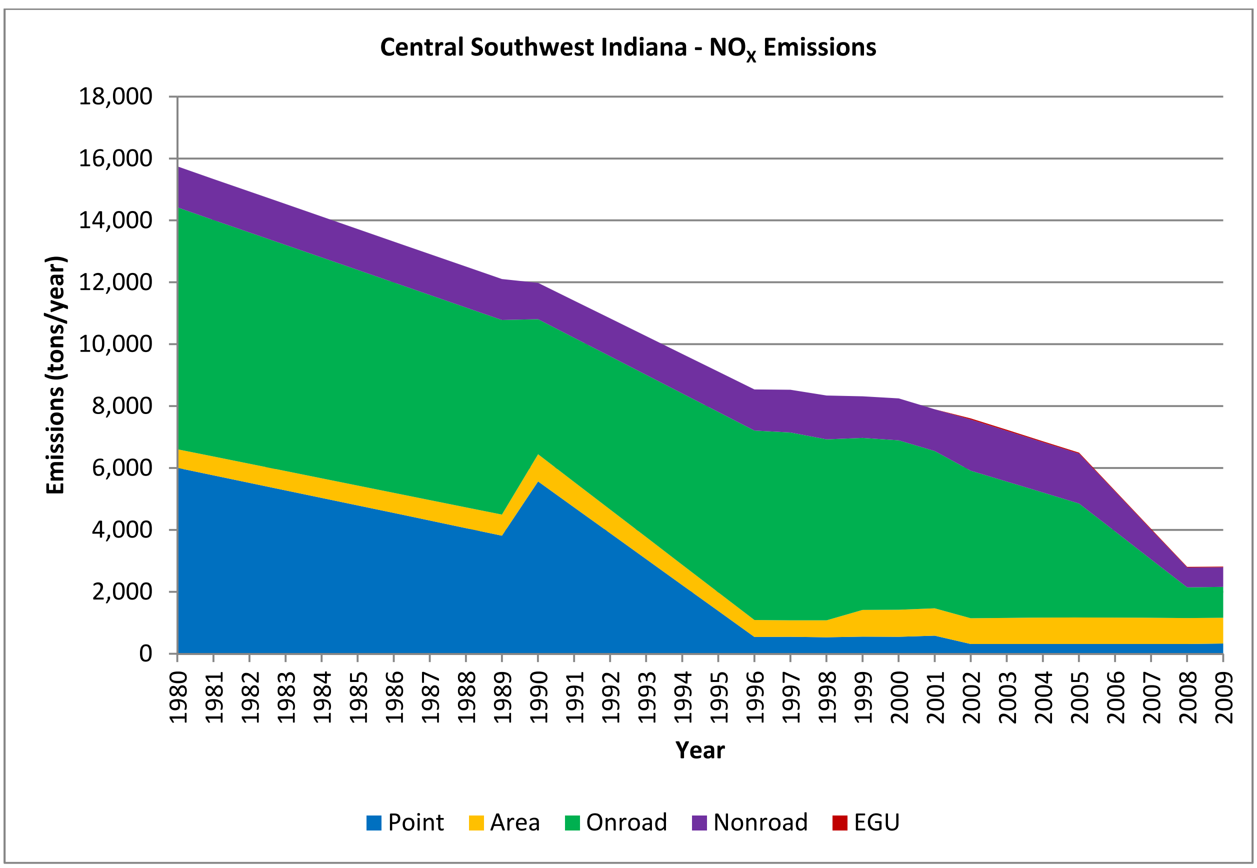
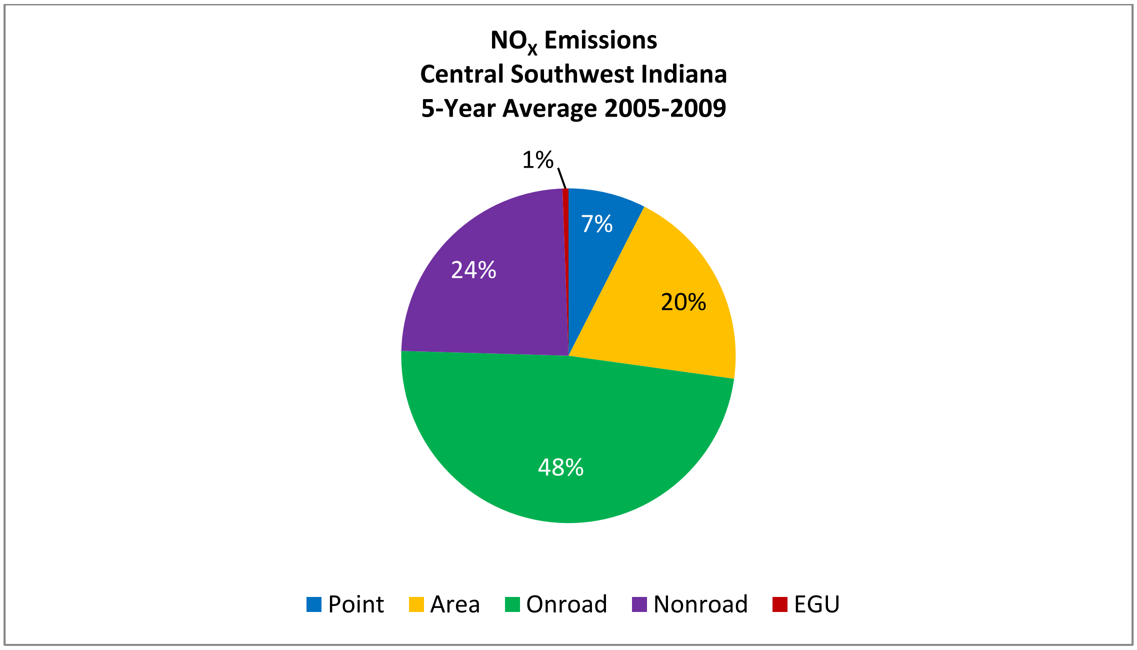


Chart 4: Central Southwest Indiana NO_x Emissions



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 2, 3, and 4 illustrate, $PM_{2.5}$, SO_2, and NO_x emissions have decreased by 58%, 54%, and 82% respectively, within the Central Southwest Indiana area since 1980. This trend is true for the key precursors of $PM_{2.5}$ throughout Indiana and the upper Midwest.

Nationally, average SO_2 concentrations have decreased by more than 70% since 1980 due to the implementation of the Acid Rain Program. 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.

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

Nitrogen Dioxide (NO_2)

There are no monitoring sites within the Central Southwest Indiana area that measure NO_2 levels. U.S. EPA's NEI contains emissions information for NO_x and is used for Graph 5 and Chart 5. NO_x emissions data are used as a surrogate for NO_2 in conjunction with the NO_2 NAAQS. Graph 5 illustrates the emissions trend for NO_x in Central Southwest Indiana and Chart 5 shows how the average emissions are distributed among the different source categories. NO_x emissions in the Central Southwest Indiana area have been trending downward over time. If monitoring data for NO_2 were available in the Central Southwest Indiana area, it is expected that monitor values would be trending downward as well.

Graph 5: Central Southwest Indiana NO_x Emissions

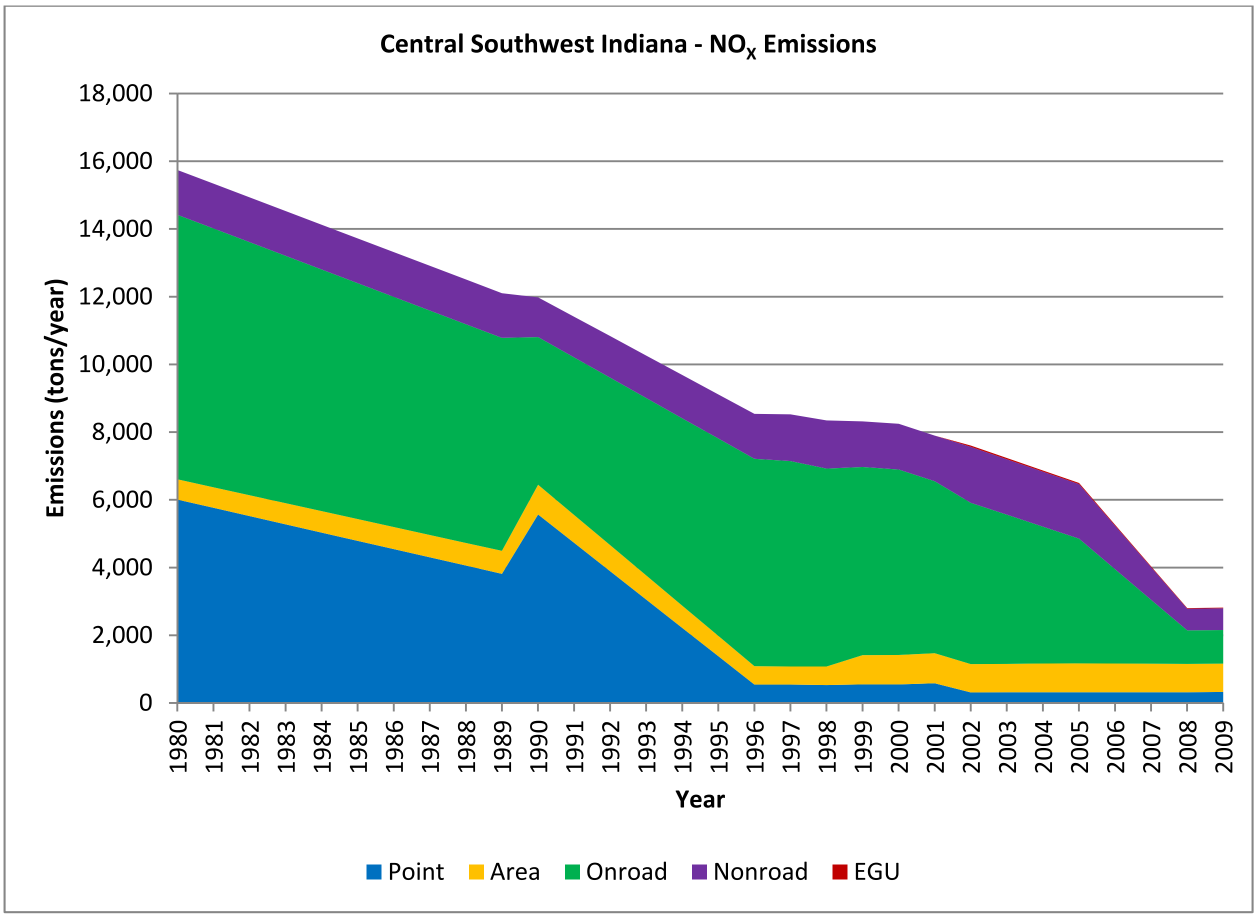
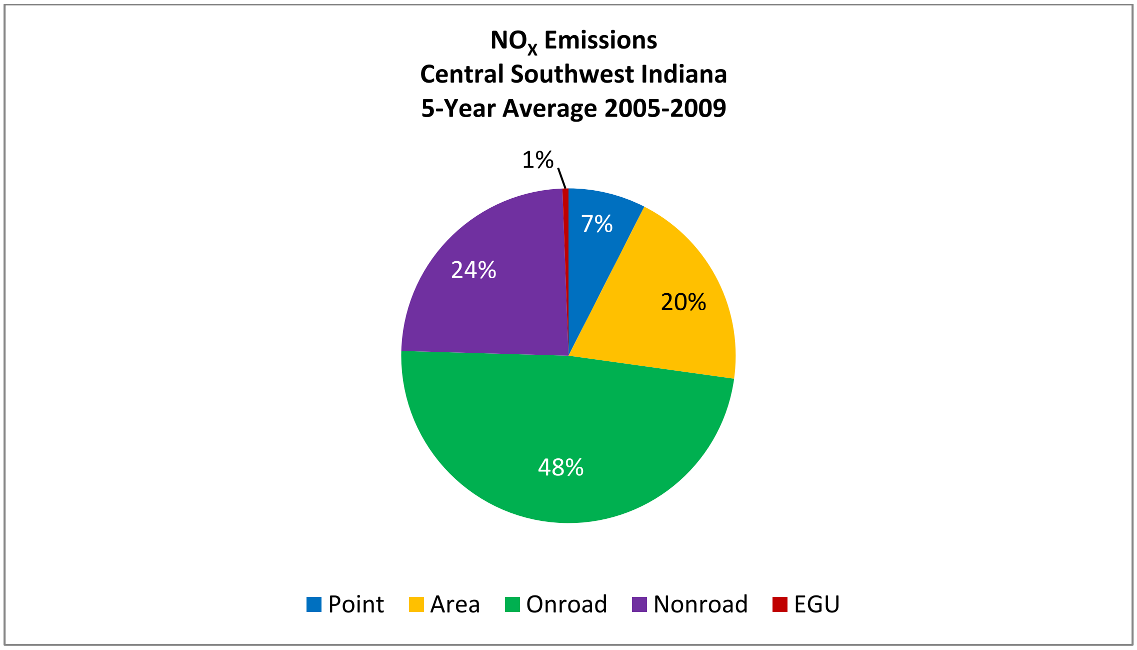


Chart 5: Central Southwest Indiana NO_x Emissions



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 5 illustrates, NO_x emissions have decreased by 82% within the Central Southwest 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

One monitoring site within the Central Southwest Indiana area, located in Greene County measures 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 6 reflect the 4th highest monitored concentration for 1-hour ozone within a given three-year period from the monitoring site located in the Central Southwest Indiana area. 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 4th 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 4th 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 7 reflect the 4th high and the highest 4th high concentration for 8-hour ozone from the monitor in the Central Southwest Indiana area for each year. The design value of the three-year average of the 4th highest 8-hour ozone values is used for comparison to the 8-hour ozone standard; therefore, the one-year values in Graph 7 are not a true comparison to the primary and secondary 8-hour ozone standards. The values in Graph 8 reflect the design value of the three-year average of the 4th highest 8-hour ozone values from the monitor for each year.

The data in Tables 9 and 10 is from the monitoring site that measured 1-hour ozone from 2000 to 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 is from the monitoring site 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: Central Southwest Indiana 1-Hour Ozone Annual 4th High Value Monitoring Data Summary

County	Site#	Site Name	1-Hour Ozone Value (ppm)											
			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
Greene	180550001	Plummer	0.101	0.099	0.099	0.093	0.102	0.098	0.098	0.096	0.105	0.102	0.102	0.100
			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
Greene	180550001	Plummer	0.108	0.105	0.099	0.099	0.083	0.082	0.080	0.079	0.096	0.092	0.091	0.085
			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
Greene	180550001	Plummer	0.088	0.087	0.085	0.084	0.098	0.096	0.093	0.093	0.083	0.079	0.079	0.079
			1st High 2009	2nd High 2009	3rd High 2009	4th High 2009	1st High 2010	2nd High 2010	3rd High 2010	4th High 2010				
Greene	180550001	Plummer	0.076	0.076	0.075	0.074	0.082	0.081	0.081	0.080				

Graph 6: Central Southwest Indiana 1-Hour Ozone 4th Highest Value in Three-Year Period

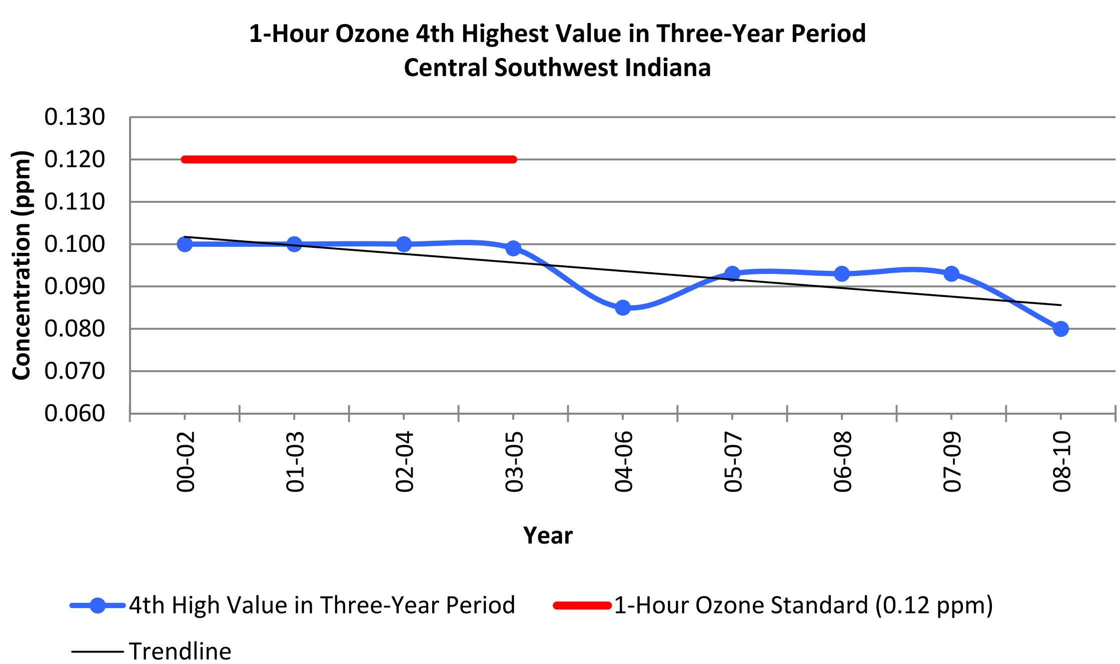


Table 10: Central Southwest Indiana 1-Hour Ozone 4th High Value in Three-Year Period Monitoring Data Summary

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
Greene	180550001	Plummer	0.100	0.100	0.100	0.099	0.085	0.093	0.093	0.093	0.080

Graph 7: Central Southwest Indiana 8-hour Ozone 4th High Values

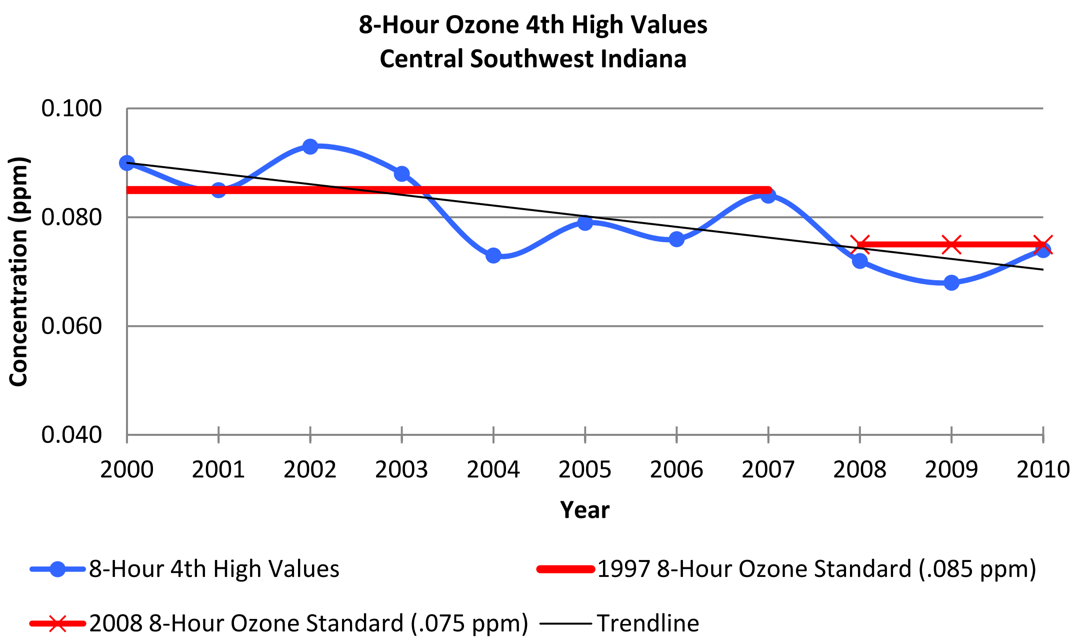


Table 11: Central Southwest Indiana 8-hour Ozone 4th High Values Monitoring Data Summary

County	Site #	Site Name	4th Highest Ozone Value (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Greene	180550001	Plummer	0.090	0.085	0.093	0.088	0.073	0.079	0.076	0.084	0.072	0.068	0.074

Graph 8: Central Southwest Indiana 8-Hour Ozone Three-Year Design Values

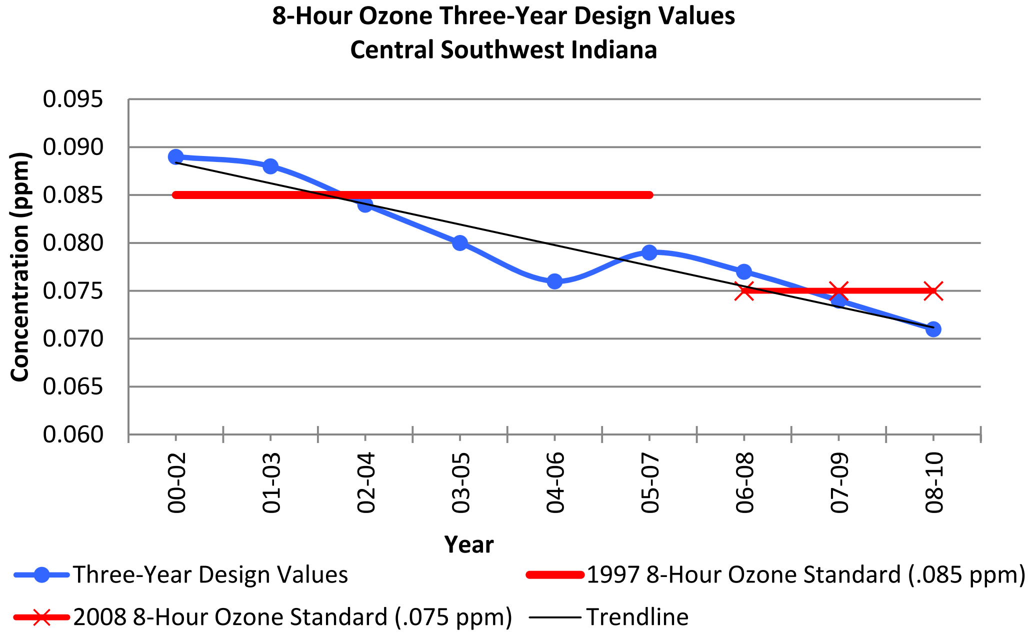


Table 12: Central Southwest Indiana 8-Hour Ozone Three-Year Design Value Monitoring Data Summary

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
Greene	180550001	Plummer	0.089	0.088	0.084	0.080	0.076	0.079	0.077	0.074	0.071
			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								

While fluctuations in monitoring data are shown in Graphs 6, 7, and 8, monitoring data for both 1-hour and 8-hour ozone indicate a downward trend over time. Because ozone is formed by the secondary reaction 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 2000, 2002-2003, 2005, and 2007 shown in Graphs 7 and 8 can be traced back to high temperatures and stagnant weather conditions during the ozone seasons of those years.

Monitor values for 8-hour ozone in Central Southwest Indiana were in violation of the 8-hour ozone standard, but are now below the 8-hour ozone standard. The Plummer monitor in Greene County is affected by overwhelming transport and has experienced some high ozone values as a result. This is expected since it is downwind of the Southwestern Indiana area. Downwind monitors are usually the last to attain the standard due to the fact that ozone and ozone precursors from the most densely populated areas and emission sources 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. NO_x and VOC chemically react individually or collectively in the presence of sunlight to form ground-level ozone. U.S. EPA's NEI contains emissions information for NO_x and VOC and is used in the following graphs and charts. Graphs 9 and 10 illustrate the emissions trend for the ozone precursors in Central Southwest Indiana and Charts 6 and 7 shows how the average emissions are distributed among the different source categories.

Graph 9: Central Southwest Indiana NO_x Emissions

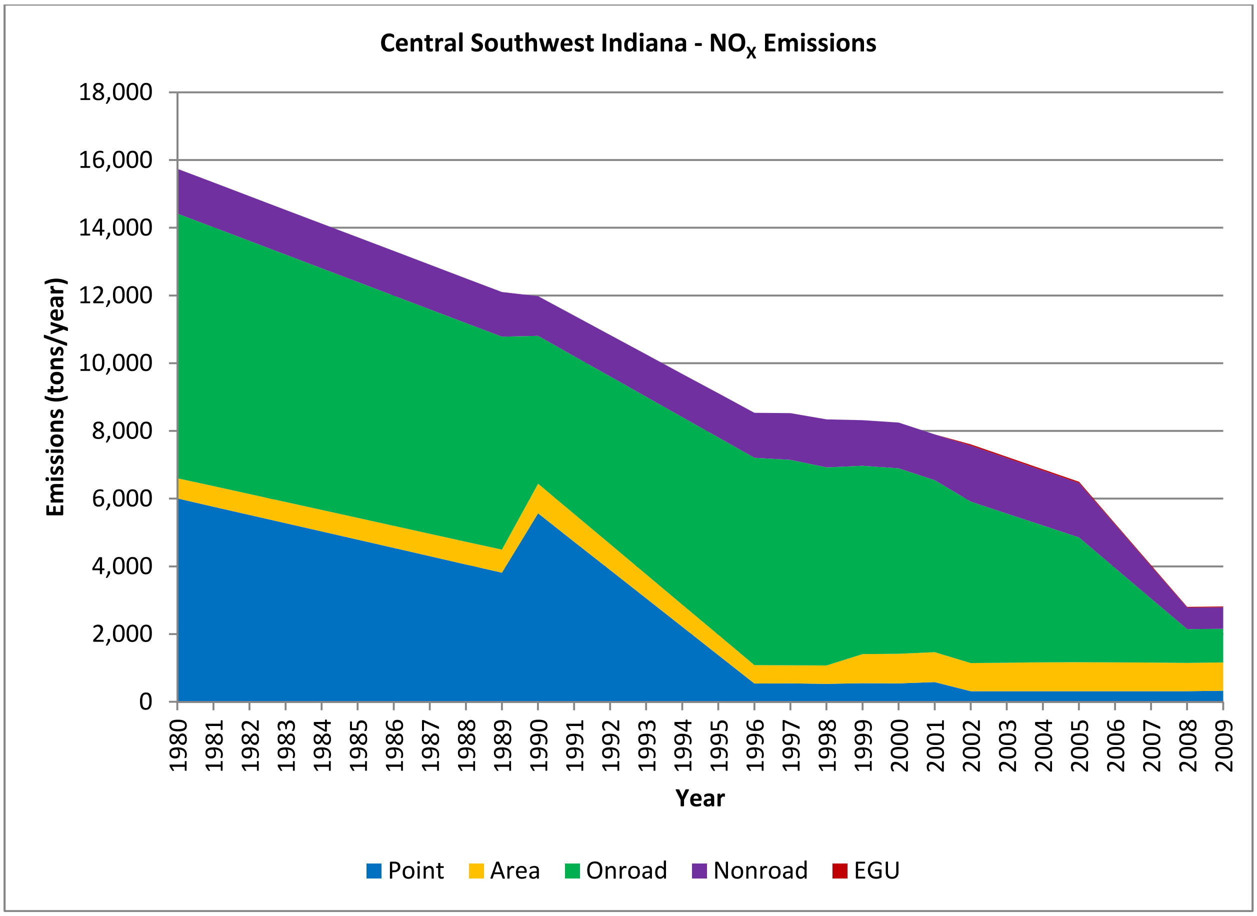
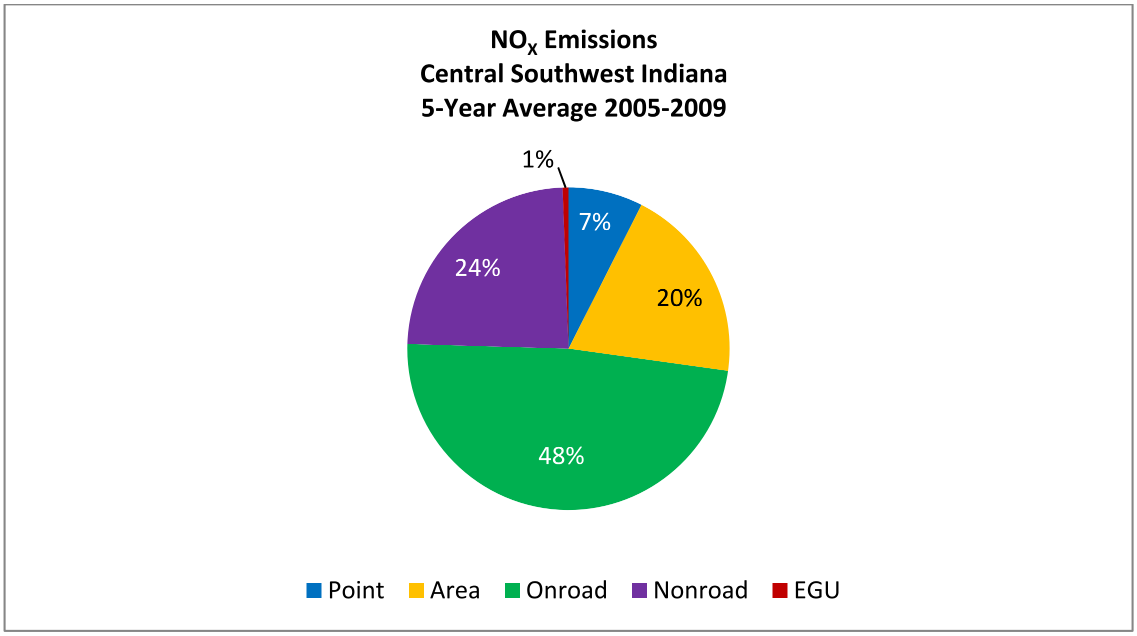


Chart 6: Central Southwest Indiana NO_x Emissions



Graph 10: Central Southwest Indiana VOC Emissions

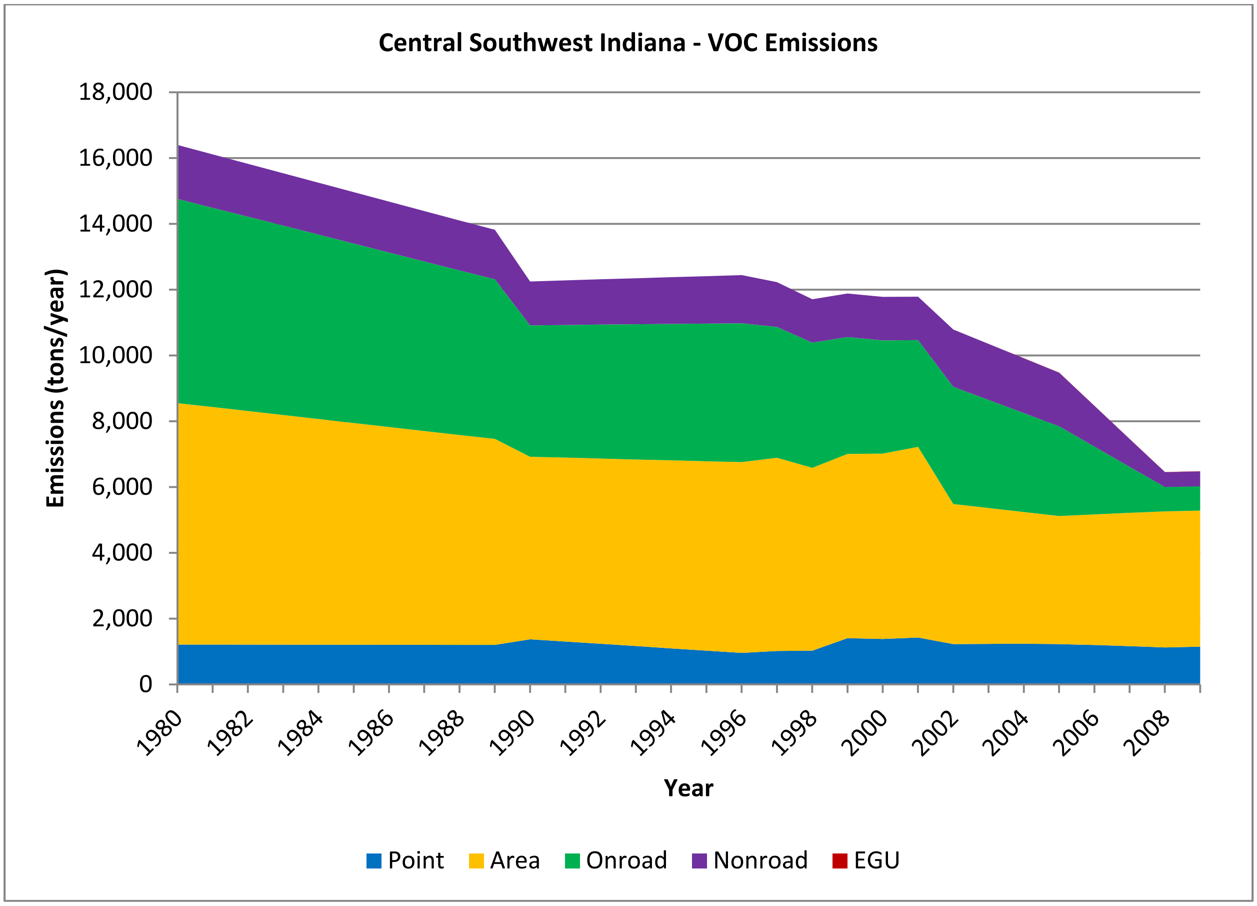
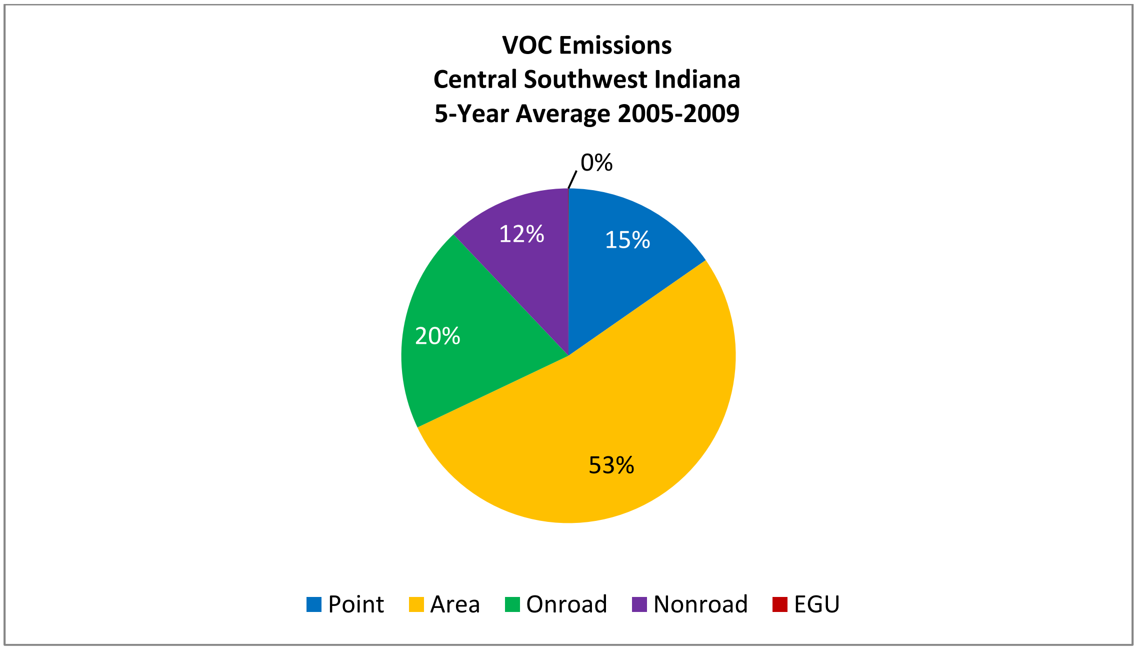


Chart 7: Central Southwest Indiana VOC Emissions



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 9 and 10 illustrate, NO_x and VOC emissions have decreased by 82% and 60%, respectively, within the Central Southwest 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, and to the NO_x SIP Call beginning in 2004. 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})

There are no monitoring sites within the Central Southwest Indiana area that measure PM_{10} levels. U.S. EPA's NEI contains emissions information for PM_{10} and is used in Graph 11 and Chart 8. Graph 11 illustrates the emissions trend for PM_{10} in Central Southwest Indiana and Chart 8 shows how the average emissions are distributed among the different source categories. PM_{10} emissions in the Central Southwest Indiana area have been trending downward over time. If monitoring data for PM_{10} were available in the Central Southwest Indiana area it is expected that monitor values would be trending downward as well.

Graph 11: Central Southwest Indiana PM_{10} Emissions

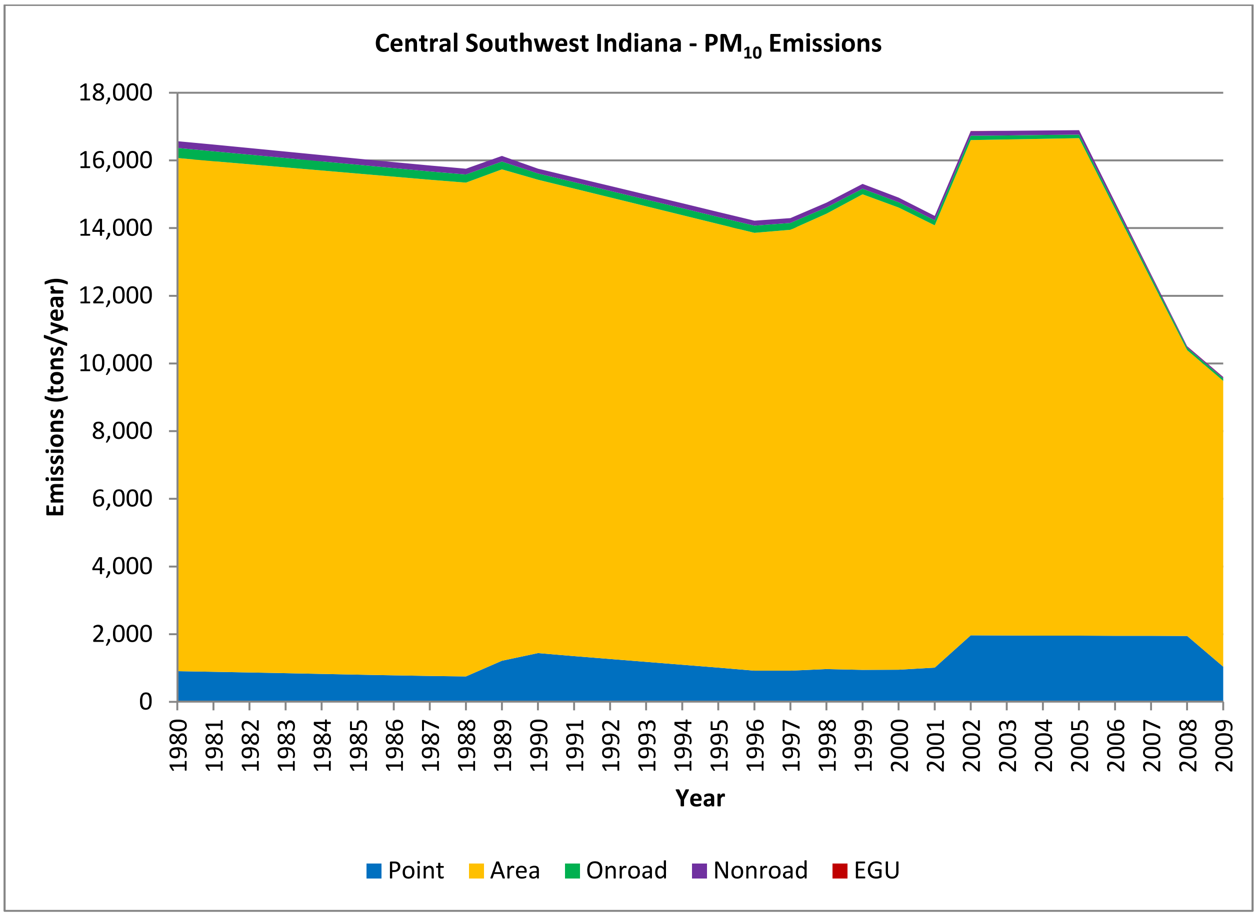
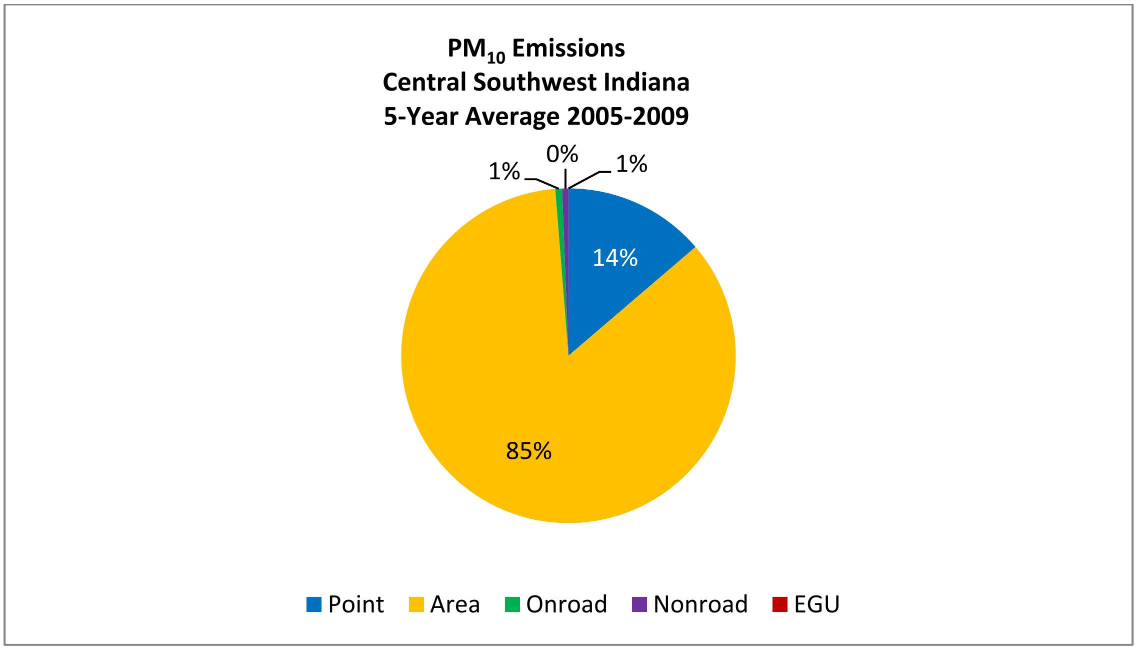


Chart 8: Central Southwest Indiana PM_{10} Emissions



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} emission values over time. As Graph 11 illustrates, total PM_{10} emissions have decreased by 42% within the Central Southwest 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)

There are no monitoring sites within the Central Southwest Indiana area that measure SO_2 levels. U.S. EPA's NEI contains emissions information for SO_2 and is used in Graph 12 and Chart 9. Graph 12 illustrates the emissions trend for SO_2 in Central Southwest Indiana and Chart 9 shows how the average emissions are distributed among the different source categories. SO_2 emissions in the Central Southwest Indiana area have been trending downward over time. If monitoring data for SO_2 were available in the Central Southwest Indiana area it is expected that monitor values would be trending downward as well.

Graph 12: Central Southwest Indiana SO_2 Emissions

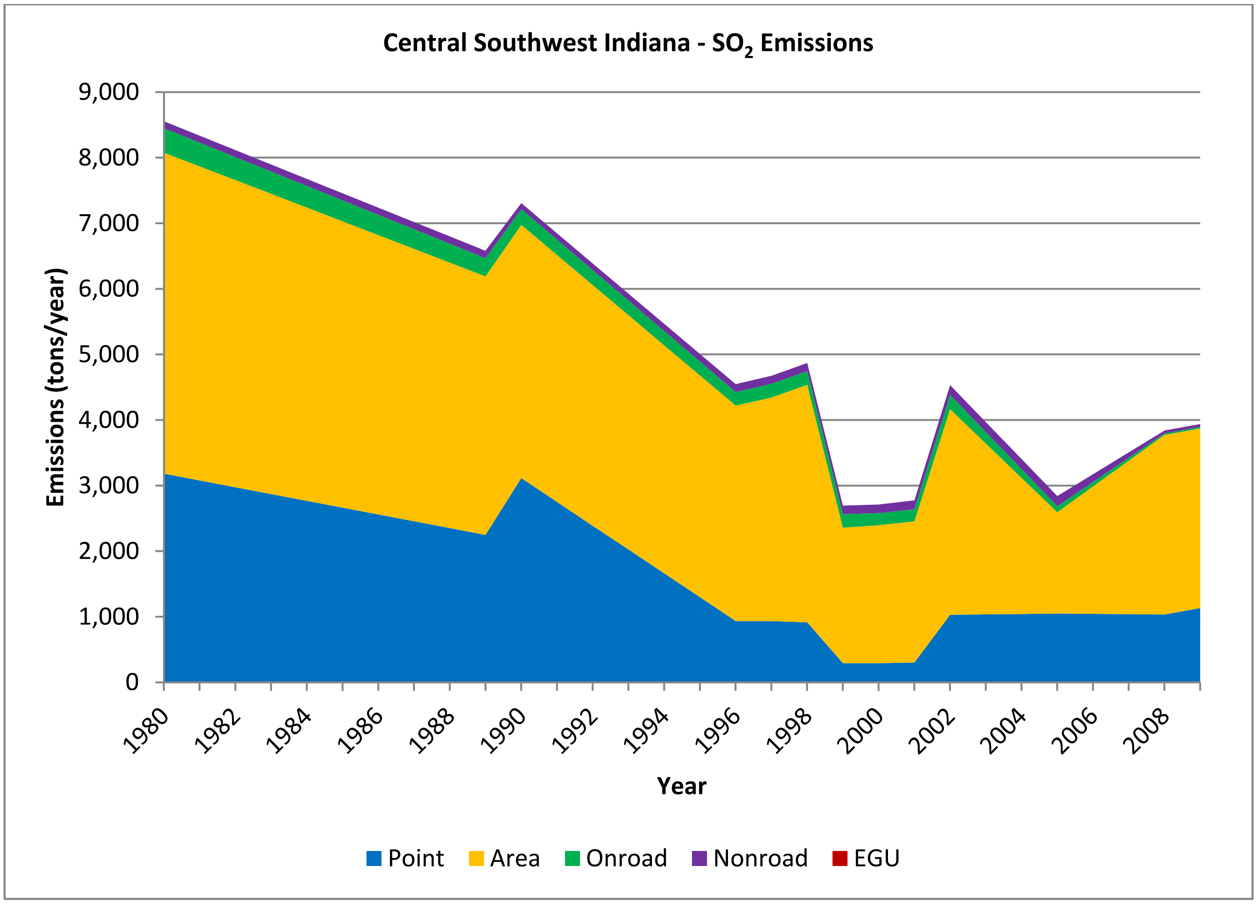
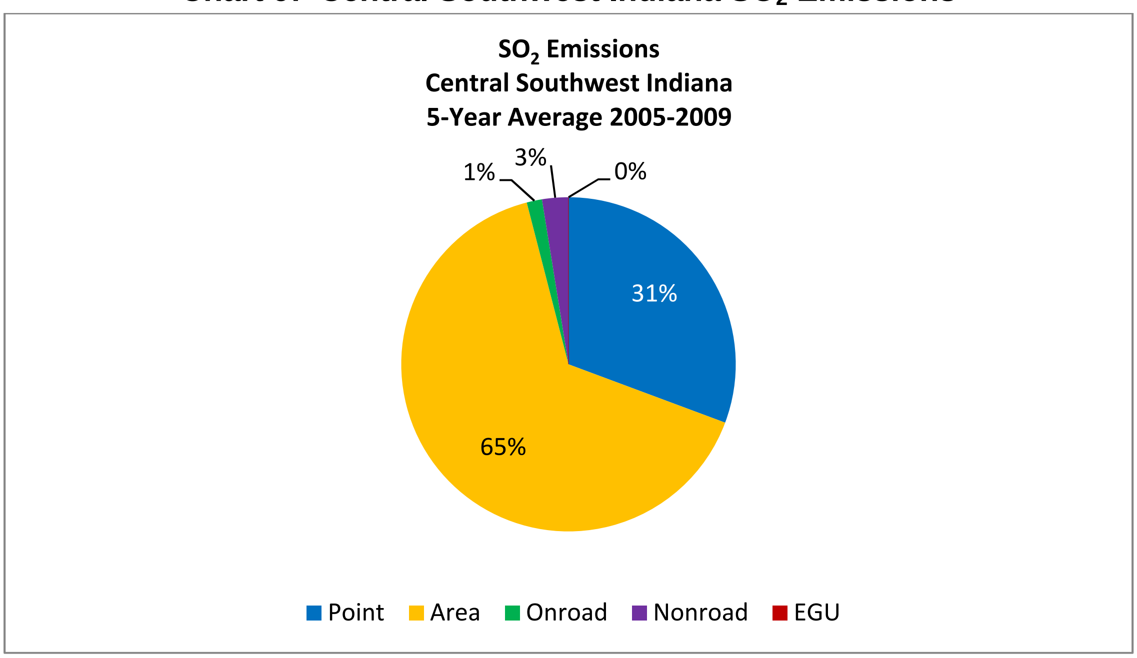


Chart 9: Central Southwest Indiana SO_2 Emissions



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 12 illustrates, SO_2 emissions have decreased 54% within the Central Southwest 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 Central Southwest Indiana are from monitors that were located in Monroe County. The trend data in Graph 13 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 Central Southwest Indiana area is plotted on the graph for each year. The trend data in Graph 14 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 Central Southwest 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 monitoring values violated the primary and secondary annual TSP standards in 1980, but afterwards remained below the annual TSP standards for the Central Southwest Indiana area. While occasional spikes can be seen in the annual and 24-hour TSP values, the monitor values for Central Southwest Indiana have historically been below the primary and secondary annual and primary 24-hour TSP standards. TSP monitors were located in close proximity to major sources in the area and data fluctuated based on variability in facility operations and meteorology.

The data in Tables 13 and 14 are from the monitoring sites that measured annual and 24-hour $PM_{2.5}$ from 1980 through 1991. All available data for both annual and 24-hour TSP for the Central Southwest 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 13 show the annual geometric mean for annual TSP for the years 1980 through 1991 which are compared to the primary and secondary annual $PM_{2.5}$ standards of 75 µg/m^3. Monitoring data in Table 14 show the 2nd highest 24-hour TSP concentrations for the years 1980 through 1991, which are compared to the primary 24-hour TSP standard of 260 µg/m^3.

Graph 13: Central Southwest Indiana Annual Geometric Mean TSP Values

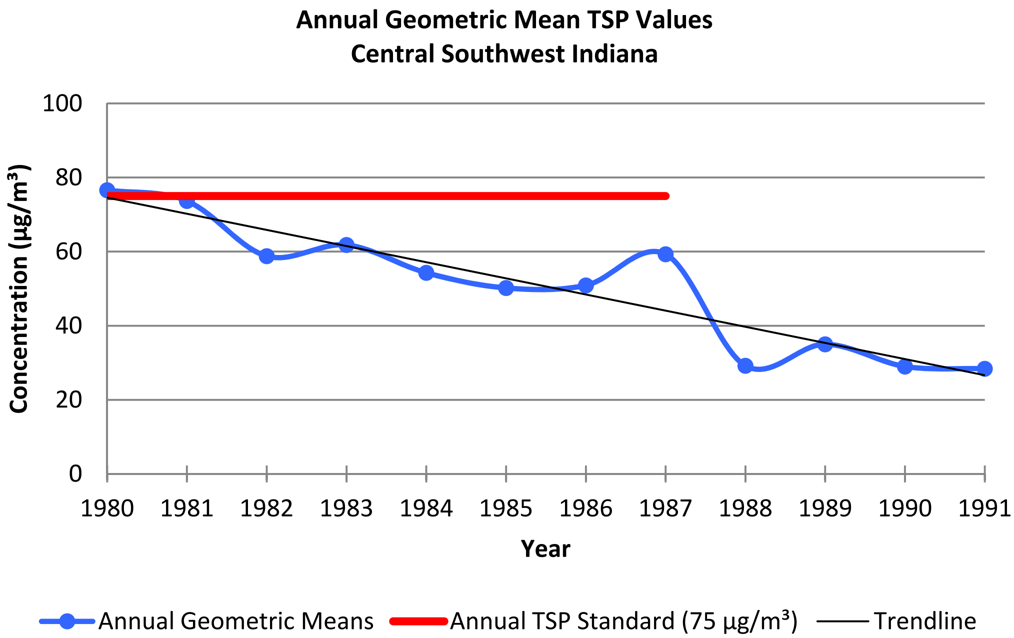


Table 13: Central Southwest Indiana Annual Geometric Mean TSP Values

County	Site #	Site Name	Annual Geometric Mean (µg/m³)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Monroe	181050001	Central Fire Station	77	74	59	62	54	50	51	59				
Monroe	181050002	Monroe State Park	36	40	27	30	28	29	27	29	29	35	29	28
Monroe	181051001	Martinsville	44	41										

Highlighted red numbers through 1987 are above the Annual TSP Standard of 75 µg/m^3

Graph 14: Central Southwest Indiana 24-Hour TSP 2nd High Values

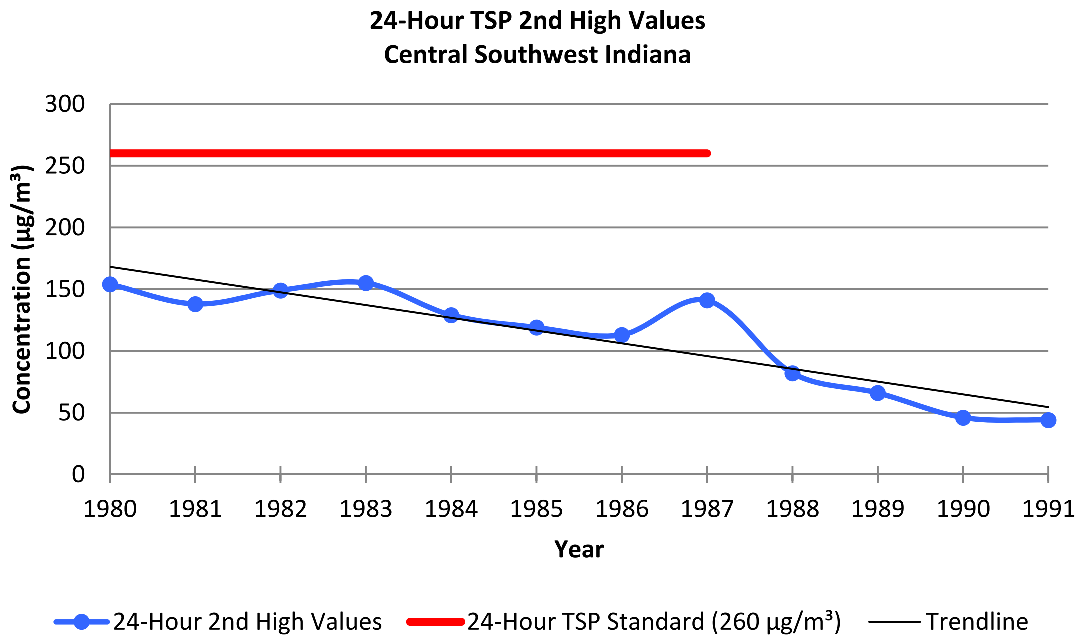


Table 14: Central Southwest Indiana 24-Hour TSP 2nd High Values

County	Site #	Site Name	2nd High Values (µg/m³)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Monroe	181050001	Central Fire Station	154	138	149	155	129	119	113	141				
Monroe	181050002	Monroe State Park	50	79	59	89	76	75	68	75	82	66	46	44
Monroe	181051001	Martinsville	96	81										

Highlighted red numbers through 1987 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 Central Southwest 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 Central Southwest 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 have been on the increase over time, the Central Southwest Indiana 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 Central Southwest 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 persist 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

Central Southwest Indiana County-Specific Emission Inventory Data

(1980-2009)

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Greene County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	25,425.47	2,911.24	1,756.36	5,554.58	1,263.37	3,449.57
1981	24,790.61	2,853.10	1,728.08	5,539.69	1,226.53	3,401.98
1982	24,155.75	2,794.95	1,699.79	5,524.80	1,189.69	3,354.38
1983	23,520.89	2,736.80	1,671.50	5,509.91	1,152.84	3,306.78
1984	22,886.04	2,678.66	1,643.21	5,495.02	1,116.00	3,259.18
1985	22,251.18	2,620.51	1,614.93	5,480.13	1,079.16	3,211.65
1986	21,616.32	2,562.36	1,586.64	5,465.24	1,042.32	3,164.15
1987	20,981.47	2,504.22	1,558.35	5,450.35	1,005.48	3,116.66
1988	20,346.61	2,446.07	1,530.07	5,443.38	968.64	3,069.16
1989	19,713.74	2,387.93	1,501.78	5,428.49	931.80	3,021.66
1990	16,420.42	1,869.64	1,322.72	4,988.22	513.64	2,647.75
1991	16,468.67	1,925.20	1,319.78	5,078.59	598.43	2,669.86
1992	16,516.93	1,980.77	1,316.83	5,168.96	683.22	2,691.97
1993	16,565.19	2,036.33	1,313.89	5,259.33	768.01	2,714.08
1994	16,613.44	2,091.89	1,310.94	5,349.70	852.79	2,736.19
1995	16,661.69	2,147.46	1,318.94	5,440.07	937.58	2,758.30
1996	16,709.95	2,203.02	1,327.26	5,530.44	1,022.37	2,780.41
1997	15,938.73	2,215.01	1,253.67	5,247.08	1,021.48	2,742.96
1998	15,495.72	2,187.71	1,305.99	5,498.16	1,004.61	2,657.38
1999	14,676.82	2,130.90	1,334.23	5,686.79	504.77	3,018.33
2000	14,439.03	2,078.01	1,325.78	5,569.52	498.06	2,987.32
2001	13,885.81	1,997.73	1,260.00	5,445.68	508.42	3,001.41
2002	13,510.31	1,839.12	892.90	5,905.10	281.49	2,543.61
2003	12,419.50	1,745.95	891.22	5,903.30	277.53	2,443.64
2004	11,328.69	1,652.77	889.53	5,901.50	273.56	2,343.66
2005	10,237.88	1,559.60	887.85	5,899.71	269.60	2,243.69
2006	8,001.71	1,260.63	876.39	5,134.33	249.84	2,026.98
2007	5,765.54	961.65	864.92	4,368.96	230.08	1,810.27
2008	3,529.38	662.68	853.46	3,603.58	210.32	1,593.56
2009	3,529.64	662.74	853.42	3,603.51	210.31	1,632.48
%Change 1980 to 2009	-78.63%	-77.24%	-51.41%	-35.13%	-83.35%	-52.68%

Monroe County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	69,698.88	11,618.42	3,079.33	7,219.17	7,099.57	11,537.11
1981	67,985.83	11,281.72	3,030.12	7,175.22	6,922.53	11,294.81
1982	66,272.79	10,945.02	2,980.90	7,131.27	6,745.48	11,052.52
1983	64,559.74	10,608.32	2,931.69	7,087.31	6,568.44	10,810.22
1984	62,846.70	10,271.62	2,882.47	7,043.36	6,391.40	10,567.93
1985	61,133.65	9,934.92	2,833.26	6,999.41	6,214.36	10,325.63
1986	59,420.61	9,598.22	2,784.04	6,955.46	6,037.32	10,083.34
1987	57,707.56	9,261.52	2,734.83	6,911.51	5,860.28	9,841.04
1988	55,994.52	8,924.82	2,685.61	6,867.55	5,683.23	9,598.74
1989	54,281.47	8,588.43	2,636.40	7,305.40	5,506.19	9,356.45
1990	42,292.88	9,288.02	2,458.14	7,346.92	6,592.48	8,273.95
1991	43,332.44	8,593.45	2,319.68	7,084.94	6,072.26	8,245.88
1992	44,371.99	7,898.88	2,181.22	6,822.97	5,552.03	8,217.82
1993	45,411.55	7,204.32	2,042.76	6,560.99	5,031.81	8,189.76
1994	46,451.11	6,509.75	1,904.29	6,299.02	4,511.58	8,161.69
1995	47,490.66	5,815.18	1,838.46	6,037.04	3,991.35	8,133.63
1996	48,530.22	5,120.61	1,774.41	5,775.06	3,471.13	8,105.56
1997	46,085.38	5,107.60	1,804.52	6,050.99	3,599.17	7,965.35
1998	44,477.70	4,985.37	1,865.99	6,348.55	3,810.70	7,560.07
1999	42,033.18	5,041.79	1,929.86	6,630.45	2,087.75	7,440.39
2000	41,865.71	5,013.80	1,888.80	6,362.15	2,115.08	7,355.81
2001	40,712.83	4,851.81	1,738.74	6,040.35	2,168.49	7,383.58
2002	35,767.54	4,428.56	1,492.94	7,750.76	4,042.33	6,385.70
2003	33,049.62	4,228.44	1,494.12	7,750.29	3,489.10	6,108.61
2004	30,331.69	4,028.32	1,495.30	7,749.82	2,935.87	5,831.51
2005	27,613.77	3,828.20	1,496.49	7,749.36	2,382.64	5,554.41
2006	21,576.83	3,144.59	1,468.26	6,811.51	2,746.61	4,943.38
2007	15,539.89	2,460.98	1,440.04	5,873.66	3,110.57	4,332.34
2008	9,502.95	1,777.37	1,411.82	4,935.82	3,474.54	3,721.31
2009	9,514.10	1,788.75	1,098.20	4,027.59	3,572.67	3,706.78
%Change 1980 to 2009	-86.35%	-84.60%	-64.34%	-44.21%	-49.68%	-67.87%

Owen County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	12,797.18	1,215.30	1,072.04	3,795.65	195.15	1,412.01
1981	12,581.39	1,205.74	1,049.85	3,751.44	189.42	1,415.01
1982	12,365.59	1,196.18	1,027.66	3,707.23	183.70	1,418.00
1983	12,149.79	1,186.62	1,005.47	3,663.03	177.97	1,421.00
1984	11,934.00	1,177.06	983.28	3,618.82	172.24	1,423.99
1985	11,718.20	1,167.49	961.09	3,574.62	166.52	1,426.99
1986	11,502.40	1,157.93	938.90	3,530.41	160.79	1,429.99
1987	11,286.61	1,148.37	916.72	3,486.21	155.07	1,432.98
1988	11,070.81	1,138.81	894.53	3,442.00	149.34	1,435.98
1989	10,856.40	1,129.24	872.34	3,398.36	143.61	1,440.87
1990	9,341.72	826.38	870.62	3,421.96	202.78	1,327.38
1991	9,456.22	891.54	839.86	3,337.41	178.12	1,365.74
1992	9,570.72	956.69	809.11	3,252.86	153.45	1,404.10
1993	9,685.22	1,021.85	778.36	3,168.31	128.79	1,442.46
1994	9,799.71	1,087.00	747.61	3,083.76	104.13	1,480.82
1995	9,914.21	1,152.15	716.86	2,999.21	79.46	1,519.18
1996	10,028.71	1,217.31	700.89	2,914.66	54.80	1,557.54
1997	9,486.26	1,206.26	703.41	2,998.03	55.45	1,520.70
1998	9,217.12	1,173.47	686.71	2,906.29	55.71	1,492.26
1999	8,575.90	1,146.65	693.03	2,989.10	103.82	1,422.56
2000	8,732.53	1,157.82	703.17	2,970.49	100.91	1,437.24
2001	8,039.02	1,052.33	656.18	2,876.73	99.85	1,399.62
2002	10,915.85	1,338.57	551.11	3,212.42	211.83	1,858.23
2003	10,173.26	1,263.11	560.51	3,223.75	204.93	1,799.28
2004	9,430.68	1,187.65	569.90	3,235.09	198.03	1,740.33
2005	8,688.09	1,112.19	579.30	3,246.42	191.14	1,681.39
2006	6,759.39	864.07	562.55	2,819.53	179.53	1,501.59
2007	4,830.70	615.95	545.81	2,392.65	167.91	1,321.80
2008	2,902.00	367.83	529.07	1,965.76	156.30	1,142.00
2009	2,902.00	367.83	529.07	1,965.76	156.30	1,142.00
%Change 1980 to 2009	-77.32%	-69.73%	-50.65%	-48.21%	-19.91%	-19.12%