CRITERIA POLLUTANTS

Air Quality Trend Analysis Report
(1980-2010)

WEST CENTRAL 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 µg/m^3 or fine particles

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

ppb .... parts per billion

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

Introduction

The West Central Indiana area is composed of five counties. The counties represented in the area shown in Figure 1 are: Clay, Parke, Sullivan, Vermillion, and Vigo. Two major interstates pass through the West Central Indiana area, Interstate (I)-74 through the northern part of Vermillion County and I-70 through Clay and Vigo counties.

There are currently 3 criteria pollutant monitoring sites in West Central 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 West Central 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 West Central Indiana area include 3 electric generating units (EGUs) (Duke Energy Indiana-Wabash River Generating Station, Duke Energy Indiana-Cayuga Generating Station, and Hoosier Energy-Merom Generating Station), a pharmaceutical manufacturing facility, and a natural gas compressor station. 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 West Central Indiana Counties and Monitors

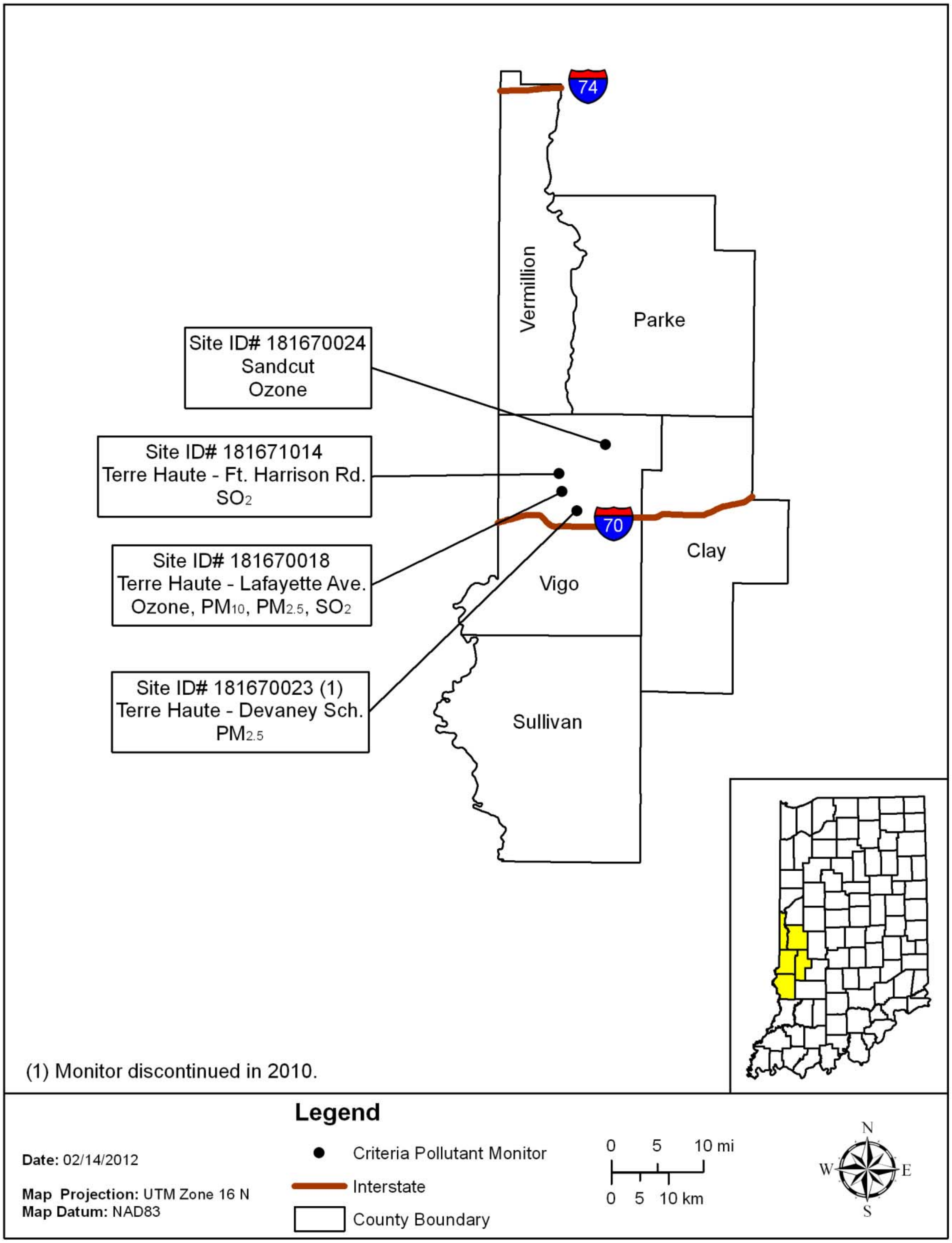


Table 1: West Central Indiana County Population Information

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
CLAY	BRAZIL	BRAZIL	11,703	24,862	24,705	26,556	26,890	8%
PARKE	ROCKVILLE	ROCKVILLE	8,085	16,372	15,410	17,241	17,339	6%
SULLIVAN	SULLIVAN	SULLIVAN	8,939	21,107	18,993	21,751	21,475	2%
VERMILLION	NEWPORT	CLINTON	7,488	18,229	16,773	16,788	16,212	-11%
VIGO	TERRE HAUTE	TERRE HAUTE	46,006	112,385	106,107	105,848	107,848	-4%

Table 1 shows that Clay County had the highest percent of growth in population between 1980 and 2010, increasing by 8%. Parke and Sullivan counties also experienced a growth in population between 1980 and 2010. Vermillion and Vigo counties experienced a decrease in population between 1980 and 2010. An increase or decrease in population within the counties in the West Central Indiana area can largely be attributed to changes in the job market and the location of jobs in the West Central Indiana area. 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 or decrease in emissions from vehicle miles traveled (VMT), area sources, and the demand for electricity. Generally, increases or decreases in population result in higher or lower area source and mobile emissions. Examples of area sources that increase with higher population include emissions such as household paints, lawnmowers, and consumer solvents. In addition, higher or lower population figures indicate a secondary effect on increasing or decreasing VMT if the change in population occurs away from the employment centers.

Table 2: West Central 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
CLAY	869	30,530	862,663	1,119,000	30%
PARKE	881	18,849	753,892	544,000	-28%
SULLIVAN	1,070	22,605	820,443	739,000	-10%
VERMILLION	578	18,846	861,418	745,000	-14%
VIGO	1,347	92,817	2,447,640	3,366,000	38%

Table 2 illustrates that Clay and Vigo counties had the only increases in daily VMT since 1980. The daily VMT for the other three counties in the West Central Indiana area experienced a decrease 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 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 carbon monoxide (CO), volatile organic compounds (VOCs), and nitrogen oxides (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 somewhat offset by fleet turn-over where newer, cleaner vehicles replace older, more polluting ones.

Table 3: 2009 West Central Indiana Commuting Patterns

COUNTY	PEOPLE WHO LIVE AND WORK IN THE COUNTY	PEOPLE WHO LIVE IN COUNTY BUT WORK OUTSIDE THE COUNTY	PEOPLE WHO LIVE IN ANOTHER COUNTY OR STATE BUT WORK IN COUNTY	TOP COUNTY OR STATE SENDING WORKERS INTO COUNTY	PEOPLE FROM TOP COUNTY OR STATE SENDING WORKERS INTO COUNTY	TOP COUNTY OR STATE RECEIVING WORKERS FROM COUNTY	PEOPLE FROM TOP COUNTY OR STATE RECEIVING WORKERS FROM COUNTY
CLAY	12,425	5,331	1,525	VIGO	392	VIGO	3,070
PARKE	6,951	2,908	804	VERMILLION	302	VIGO	1,175
SULLIVAN	9,508	3,469	1,523	GREENE	442	VIGO	2,208
VERMILLION	7,251	3,566	1,742	VIGO	501	VIGO	1,870
VIGO	60,473	2,951	12,937	CLAY	3,070	VERMILLION	501

Information in Table 3 from 2009 demonstrates that the largest workforce in West Central Indiana is found in Vigo County. Commuting patterns in West Central Indiana center on the City of Terre Haute in Vigo County. Since Vigo County has the highest population and the highest commuting pattern to and from the county, emissions within Vigo County are expected to be higher than surrounding counties in the West Central Indiana area. The West Central Indiana area commuting patterns reflect that of many urban areas around the country. The largest employment county is Vigo 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 in West Central Indiana have stemmed from the national and regional controls outlined below. These programs have been or are being implemented and have reduced ambient air quality monitor values in West Central 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 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.

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) 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

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

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 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 finalized a 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 West Central 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.

West Central 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_x, 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].

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

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 six EGU facilities in the West Central Indiana area, four of which are top ten emitters in the area. Emissions data for each county in West Central Indiana are available upon request.

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.

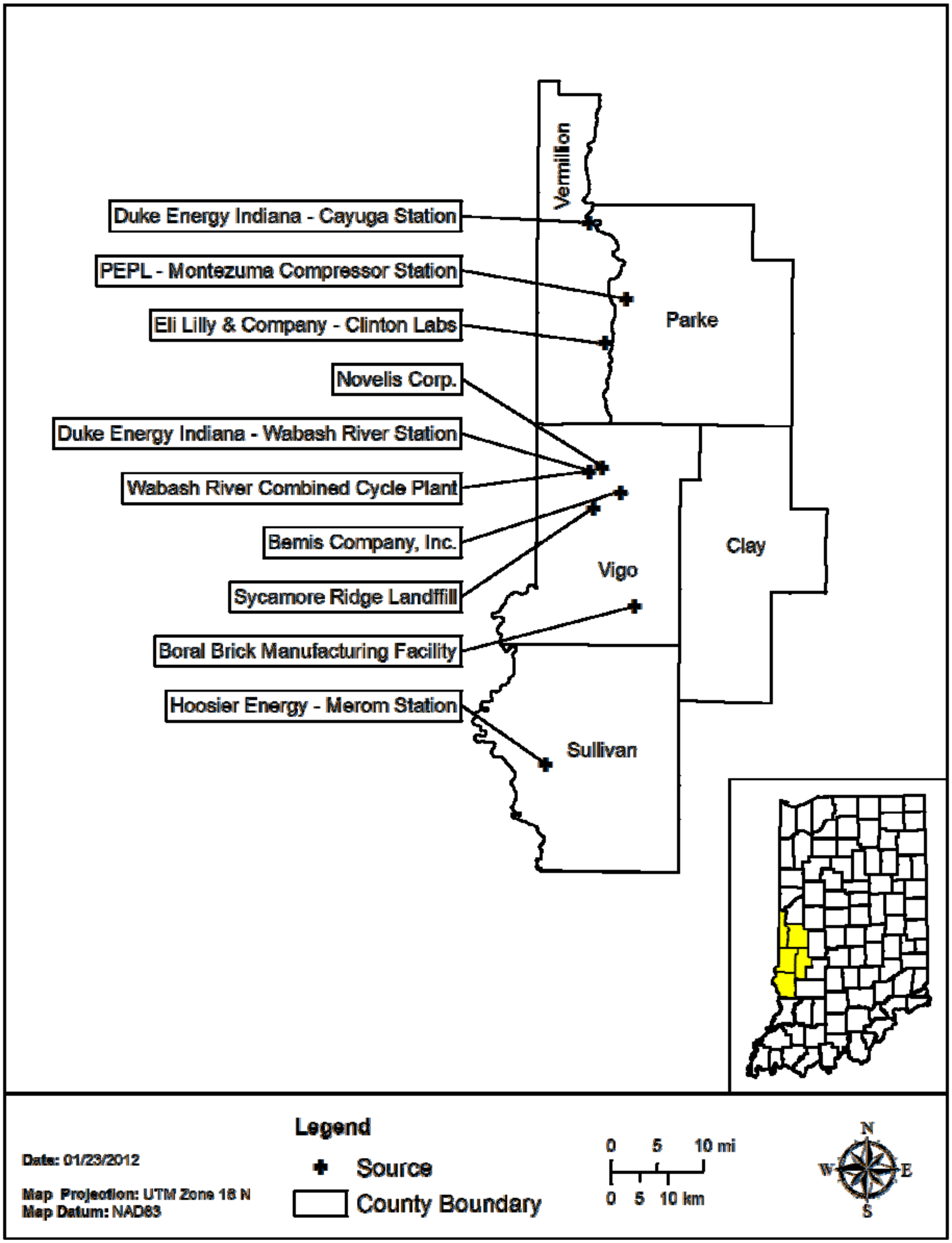
Top Ten Emission Sources

Table 4 represents the top ten sources of emissions in tons per year of emissions for West Central Indiana area. The top 3 sources on this list that have a large impact on emissions in the West Central Indiana area are EGUs, but 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 West Central Indiana area include a pharmaceutical manufacturing facility and a natural gas compressor station. The International Paper Company in Vigo County closed part of their operations in 2007 and have significantly reduced their emissions. Air quality in the West Central 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 West Central Indiana area.

Table 4: West Central 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	VIGO	DUKE ENERGY INDIANA - WABASH RIVER	346.9	4,804.6	232.2	61.1	45,683.3	42.2	51,170.3
2010	SULLIVAN	HOOSIER ENERGY - MEROM GENERATING STATION	764.0	4,016.2	151.4	24.8	11,939.7	93.7	16,989.8
2010	VERMILLION	DUKE ENERGY INDIANA - CAYUGA	689.5	8,341.2	335.0	91.6	2,016.1	82.6	11,556.0
2010	VERMILLION	ELI LILLY & COMPANY-CLINTON LABS	19.5	626.3	48.0	11.1	2,077.8	606.4	3,389.1
2009	VIGO	WABASH RIVER COMBINED CYCLE PLANT	15.3	306.7	34.9	34.9	479.1	0.8	871.8
2010	PARKE	PEPL - MONTEZUMA COMPRESSOR STATION	110.1	483.2	4.6	3.5	2.1	33.6	637.0
2010	VIGO	NOVELIS CORPORATION	4.2	5.1	0.4	0.4	0.0	506.4	516.5
2008	VIGO	SYCAMORE RIDGE LANDFILL	29.0	1.5	301.4	45.7	0.5	3.1	381.0
2010	VIGO	BEMIS COMPANY, INC.	5.3	6.3	0.5	0.5	0.0	289.5	302.1
2008	VIGO	BORAL BRICK MANUFACTURING FACILITY	48.0	15.4	42.0	14.2	81.7	2.2	203.5

Figure 2: Map of West Central 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 West Central Indiana area currently meet the historic NAAQS. New 1-hour NAAQS were introduced in 2010 for NO_2 and SO_2. The 1-hour NO_2 monitoring data in West Central Indiana, as well as elsewhere in the state, are well below the new 1-hour NO_2 NAAQS. There are two monitor violations in Vigo County of the new 1-hour SO_2 NAAQS in West Central 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 West Central Indiana area have an ambient air quality monitor located within the county boundaries. Monitoring data for the years 2000 through 2010 for West Central 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 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 West Central 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 West Central Indiana and Chart 1 shows how the average emissions are distributed among the different source categories. CO emissions in the West Central Indiana area have trended downward over time. 1-hour and 8-hour CO monitoring data across Indiana are well below the 1-hour and 8-hour CO standards. If monitoring data for CO were available in the West Central Indiana area, it is expected that monitor values would be below the 1-hour and 8-hour CO standards as well.

Graph 1: West Central Indiana CO Emissions

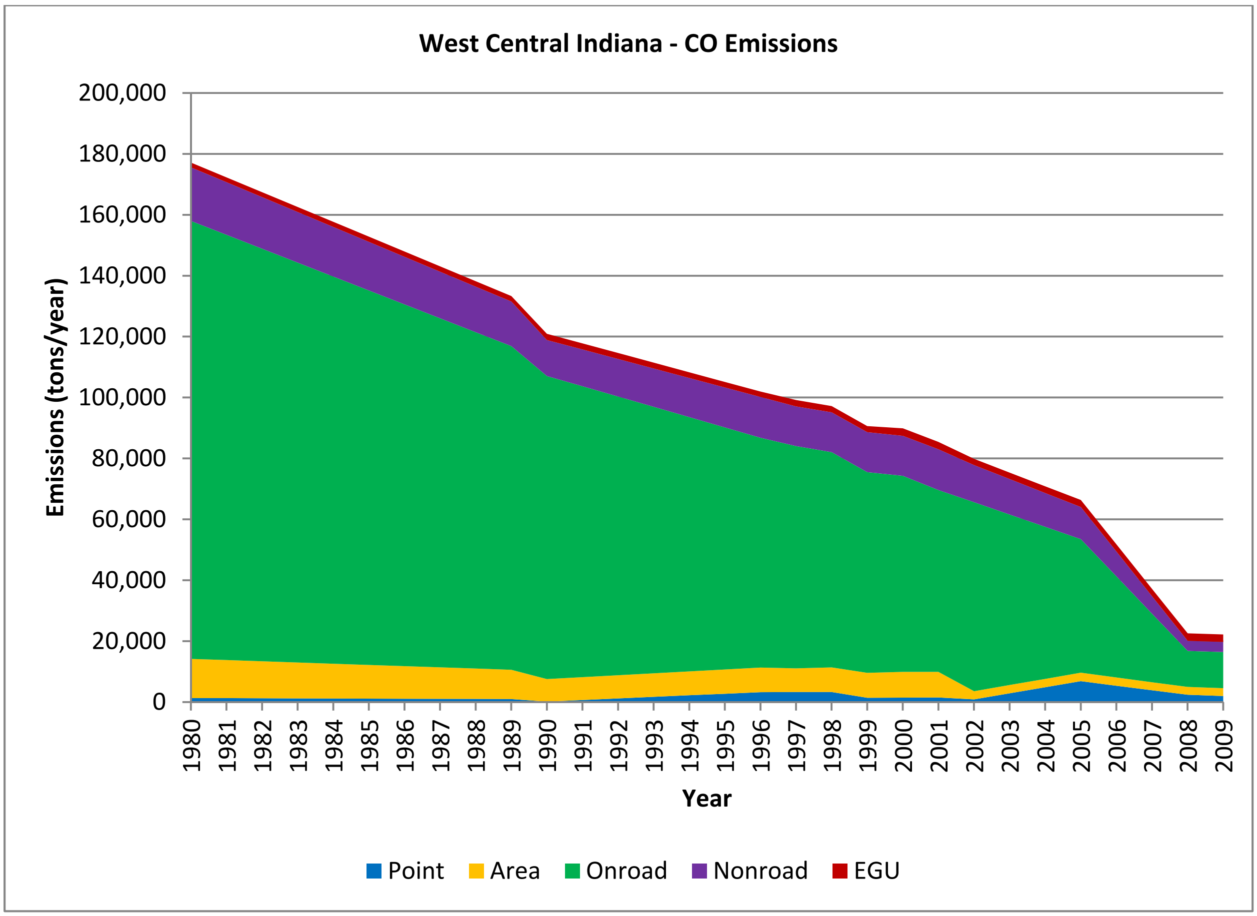
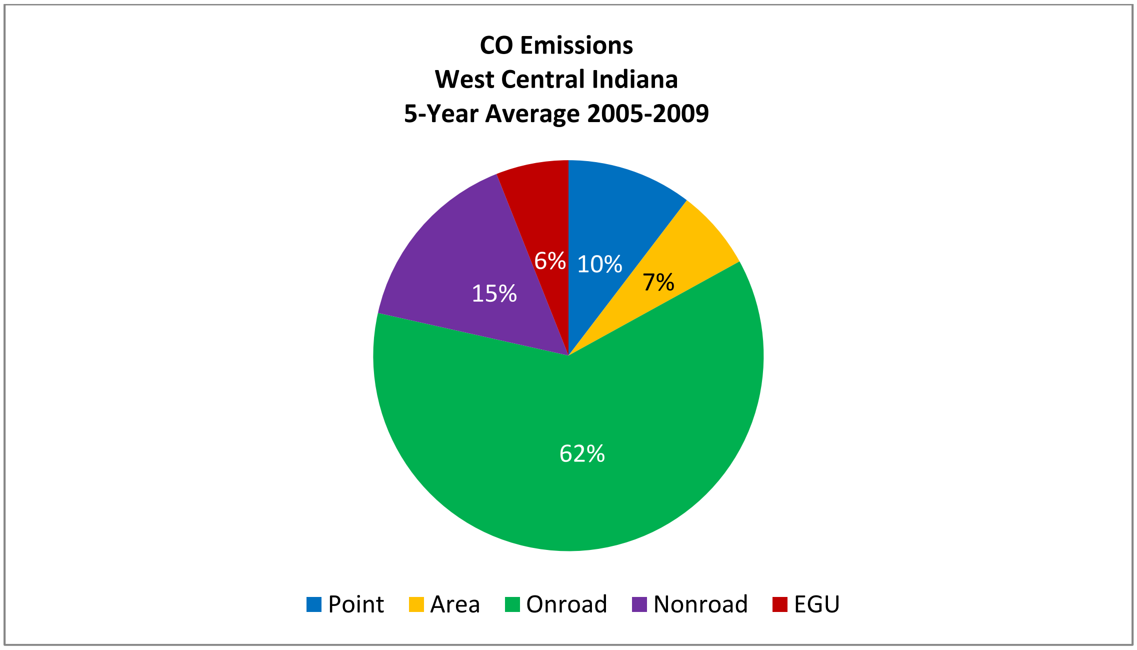


Chart 1: West Central Indiana CO Emissions



National controls have led to a decrease in CO emission in the West Central Indiana area over time. As Graph 1 illustrates, CO emissions have decreased by 87% within the West Central 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 ($PM_{2.5}$)

One monitor within West Central Indiana, located in Vigo County measures $PM_{2.5}$ levels. The Terre Haute–Devaney School monitoring site was discontinued at the end of 2011. 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 98th 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 West Central Indiana for the years 2000 through 2010. The annual arithmetic mean values for annual $PM_{2.5}$ and 98th 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 (µg/m^3), as well as the primary and secondary 24-hour $PM_{2.5}$ standards of 35 µg/m^3, but the annual arithmetic mean and 98th 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 µg/m^3. U.S. EPA revised the primary and secondary 24-hour $PM_{2.5}$ standards and lowered them to 35 µg/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 µg/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 µg/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 µg/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 98th percentile of the 24-hour concentrations at each population-oriented monitor within an area, which must not exceed 35 µg/m^3. An exceedance of the 24-hour $PM_{2.5}$ standards occurs when the 98th percentile is equal to or greater than 35 µg/m^3. A violation of the 24-hour $PM_{2.5}$ standards occurs when the design value of the 98th percentile is equal to or greater than 35.5 µg/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 West Central Indiana area for the years 2000 through 2010. The trend data in Graph 5 reflect the three-year design value of the 98th percentile values for 24-hour $PM_{2.5}$ for each year in the West Central 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 West Central Indiana area is plotted on the graph for each year.

The design value of the 98th 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 98th percentile and the highest value from all of the monitors in the West Central 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. Monitoring for $PM_{2.5}$ began in 2000; all available data for both annual and 24-hour $PM_{2.5}$ for the West Central 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 98th percentile for 24-hour $PM_{2.5}$ for the years 2000 through 2010. Monitoring data in Table 8 show the design value of the 98th 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 µg/m^3.

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

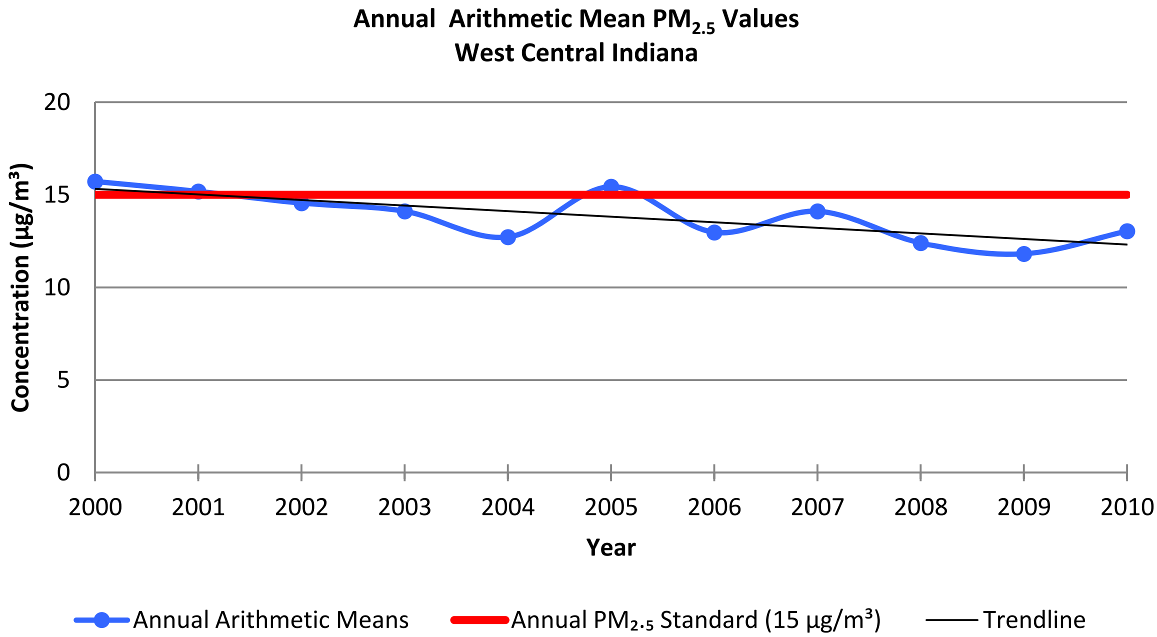


Table 5: West Central Indiana Annual Arithmetic Mean $PM_{2.5}$ Monitoring Data Summary

County	Site #	Site Name	Annual Arithmetic Mean (µg/m³)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Vigo	181670018	Terre Haute - Lafayette Ave	15.72	15.18	14.55	14.11	12.72	15.44	12.97	14.11	12.40	11.81	13.04
Vigo	181670023	Terre Haute - Devaney Sch	13.79	13.41	13.39	13.40	12.13	15.12	12.20	13.68	11.95	11.37	12.12

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

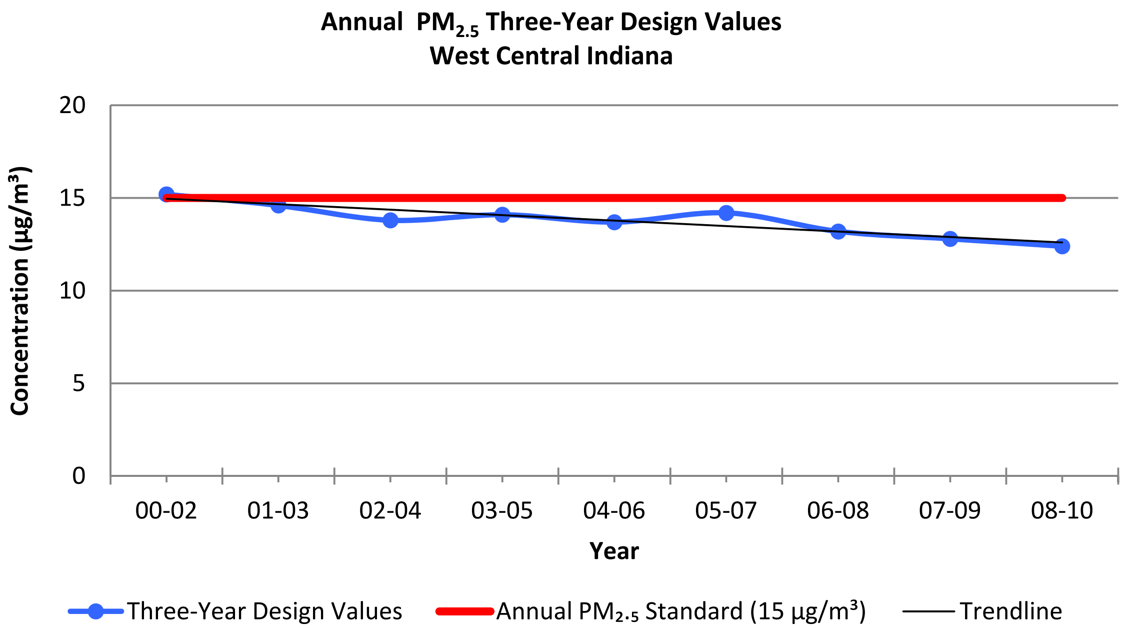


Table 6: West Central Indiana Annual $PM_{2.5}$ Three-Year Design Value Monitoring Data Summary

County	Site #	Site Name	Annual $PM_{2.5}$ Three-Year Design Value (µg/m³)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Vigo	181670018	Terre Haute - Lafayette Ave	15.2	14.6	13.8	14.1	13.7	14.2	13.2	12.8	12.4
Vigo	181670023	Terre Haute - Devaney Sch	13.5	13.4	13.0	13.5	13.1	13.7	12.6	12.3	11.8

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

Graph 4: West Central Indiana 24-Hour $PM_{2.5}$ 98[th] Percentile Values

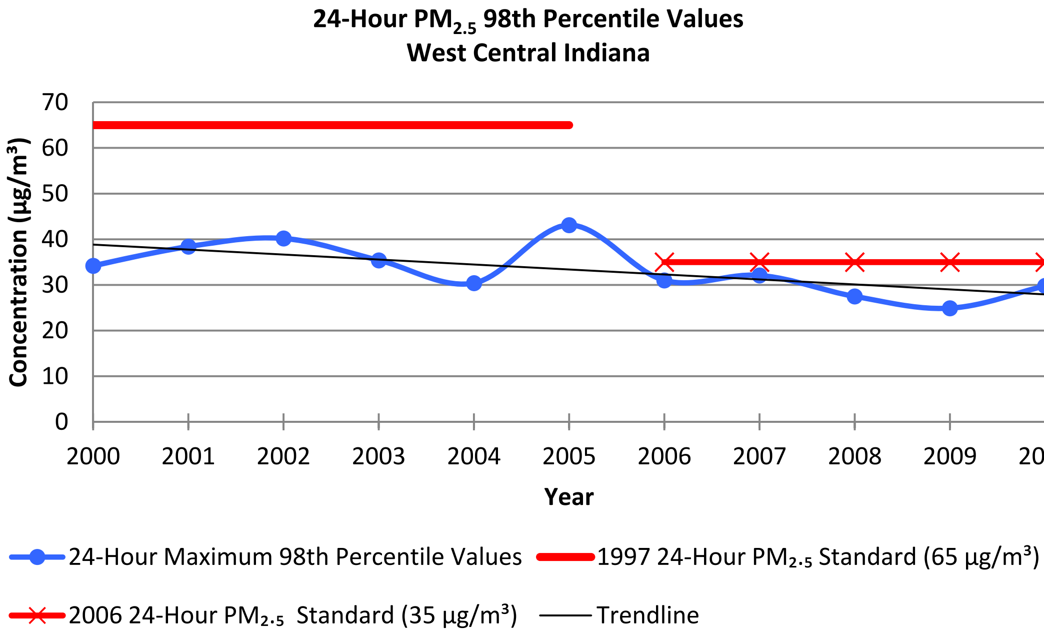


Table 7: West Central Indiana 24-Hour 98[th] Percentile Value $PM_{2.5}$ Monitoring Data Summary

County	Site #	Site Name	24-Hour 98th Percentile Values (µg/m^3)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Vigo	181670018	Terre Haute - Lafayette Ave	34.2	38.4	40.2	35.3	26.9	43.1	31.0	31.0	26.3	24.9	29.2
Vigo	181670023	Terre Haute - Devaney Sch	28.7	30.1	38.1	35.4	30.4	42.5	29.1	32.1	27.5	22.4	29.8

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

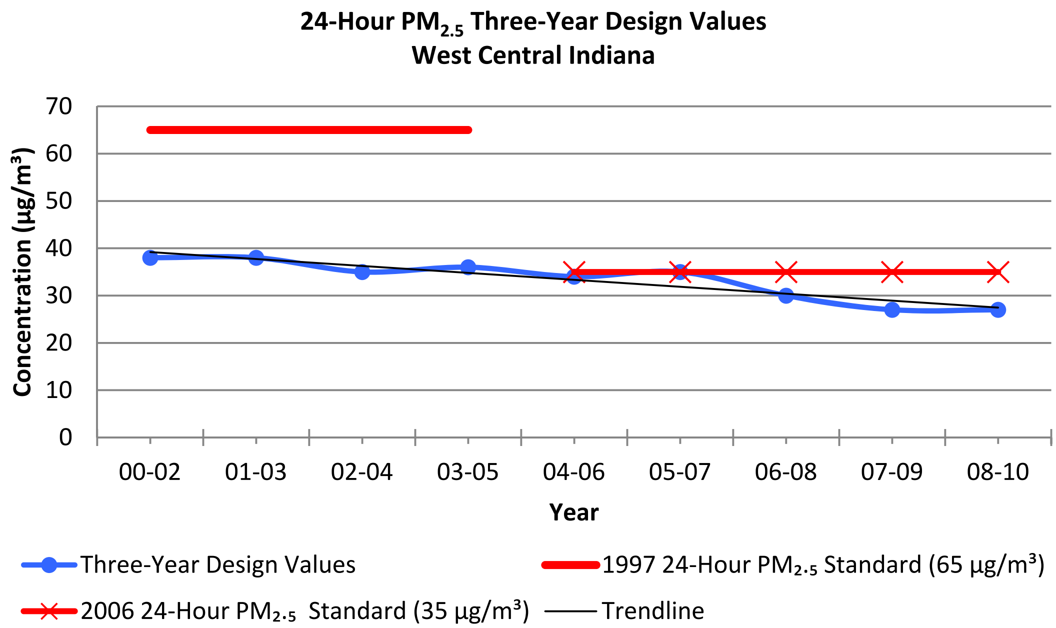


Table 8: West Central Indiana 24-Hour Three-Year Design Value $PM_{2.5}$ Monitoring Data Summary

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
Vigo	181670018	Terre Haute - Lafayette Ave	38	38	34	35	34	35	29	27	27
Vigo	181670023	Terre Haute - Devaney Sch	32	35	35	36	34	35	30	27	27

Prior to 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 65.0 µg/m³

Beginning in 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 35.0 µg/m³

Tables 5, 6, 7, and 8 demonstrate that the annual and 24-hour $PM_{2.5}$ values for the West Central Indiana area correlate with each other over time, meaning that when one monitoring site trends upward or downward, the other does also. Annual $PM_{2.5}$ values in West Central Indiana had been above the primary and secondary $PM_{2.5}$ standard until the end of 2005, but have remained below the standards since then. The Terre Haute-Lafayette Avenue $PM_{2.5}$ monitoring site has historically registered the highest $PM_{2.5}$ values in West Central Indiana. This is expected since it is the downwind site for the Terre Haute metropolitan area.

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 seen 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 daily $PM_{2.5}$ values exceeded 70 µg/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 West Central Indiana. Charts 2, 3, and 4 show how the average emissions are distributed among the different source categories.

Graph 6: West Central Indiana $PM_{2.5}$ Emissions

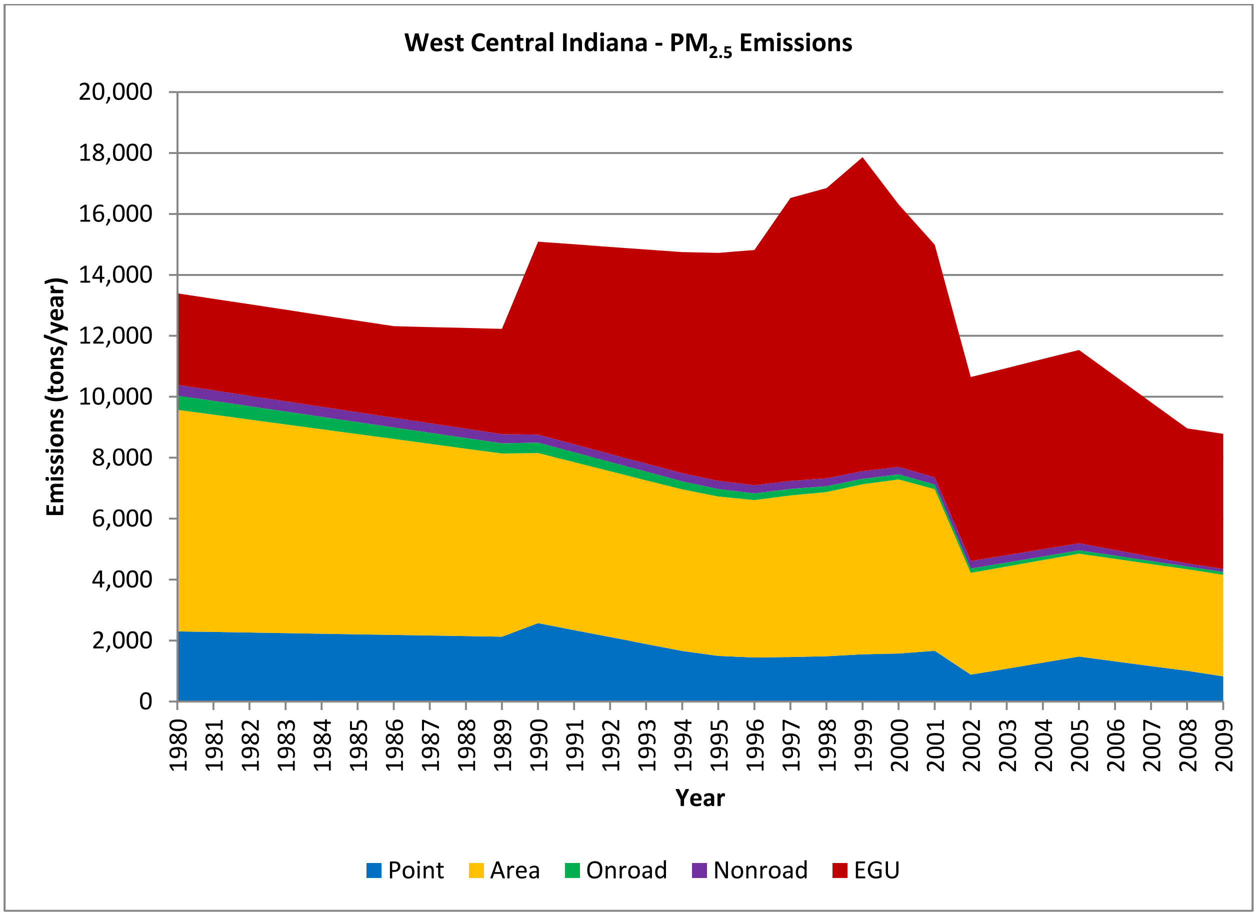
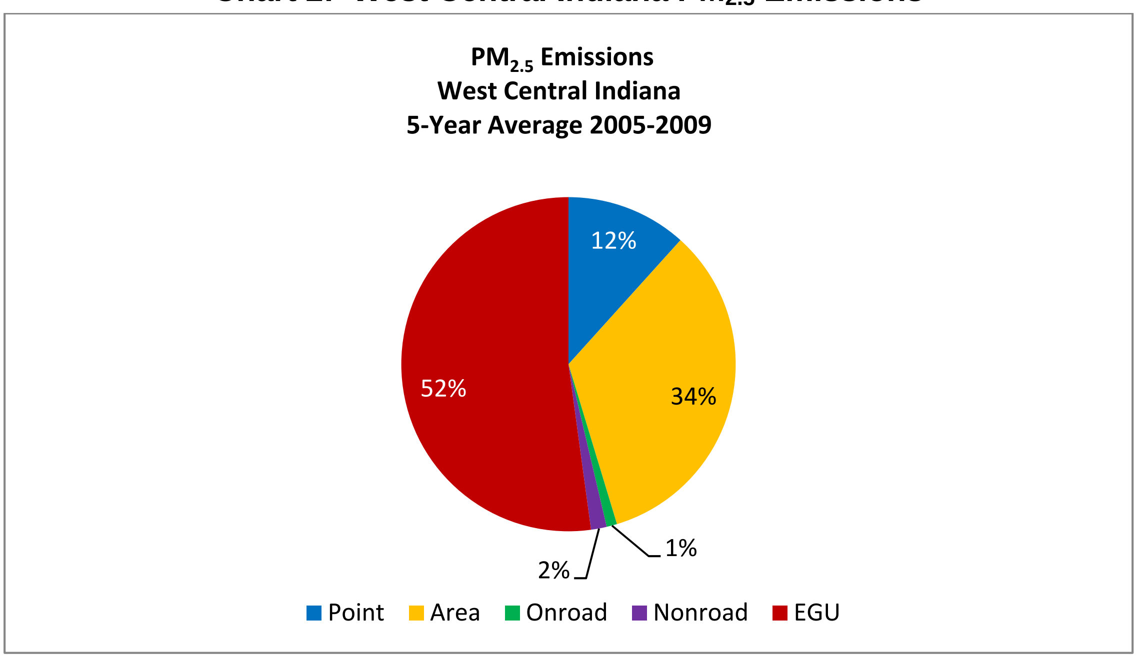


Chart 2: West Central Indiana $PM_{2.5}$ Emissions



Graph 7: West Central Indiana SO_2 Emissions

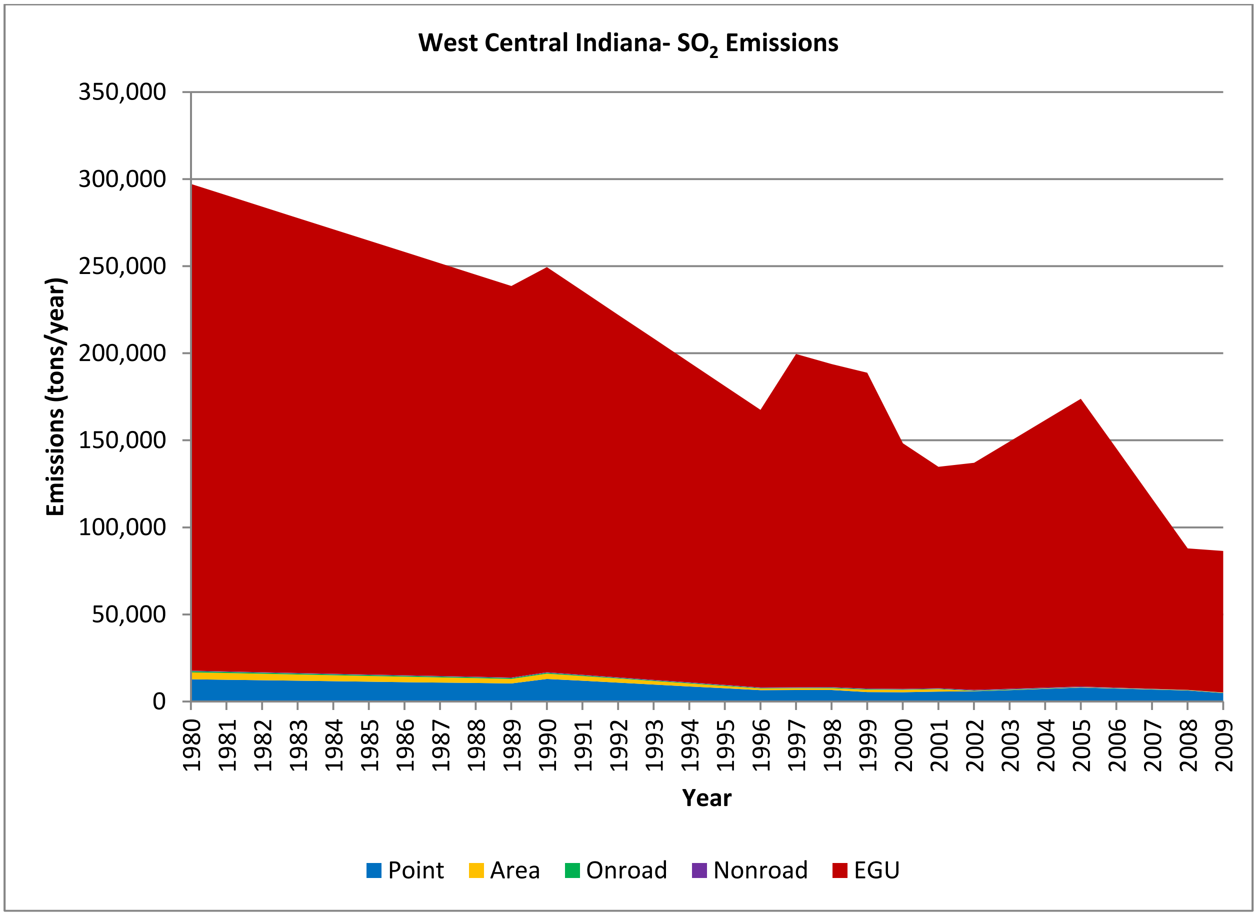
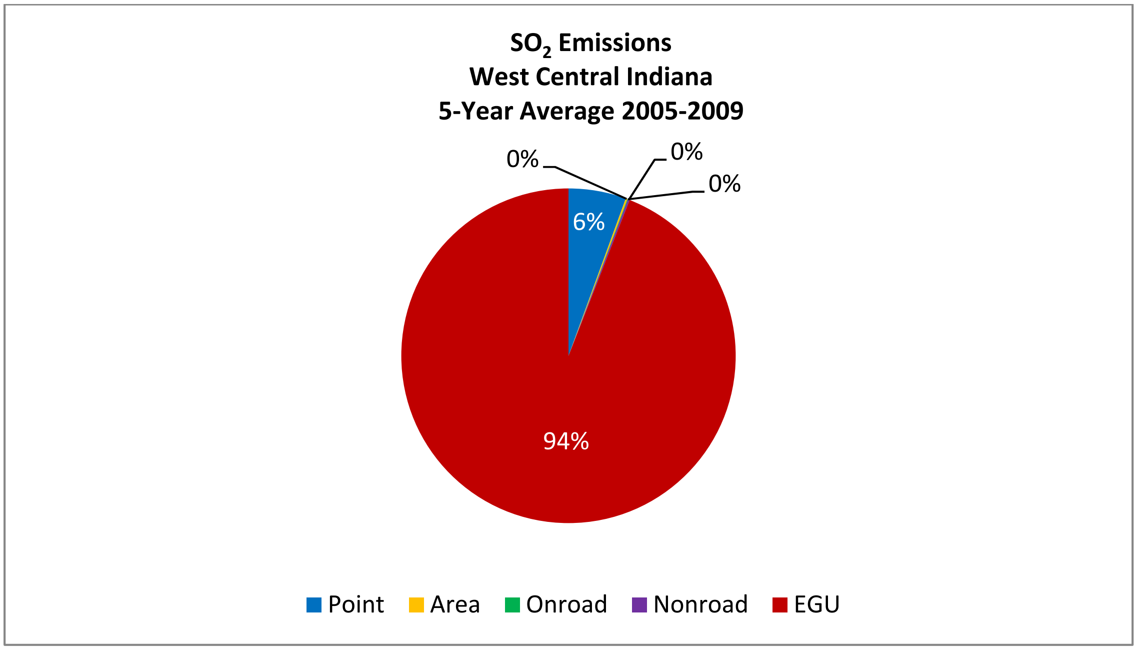


Chart 3: West Central Indiana SO_2 Emissions



Graph 8: West Central Indiana NO_x Emissions

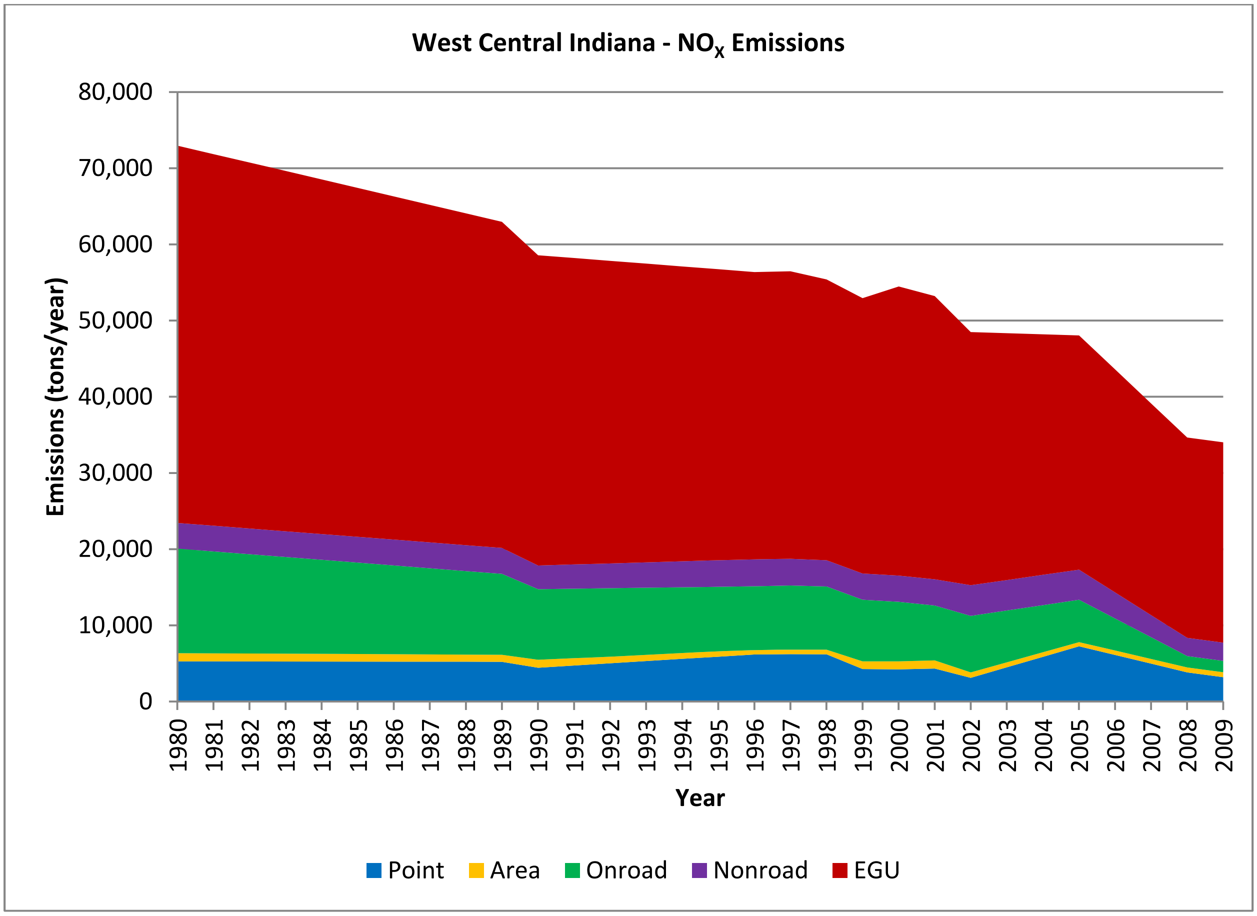
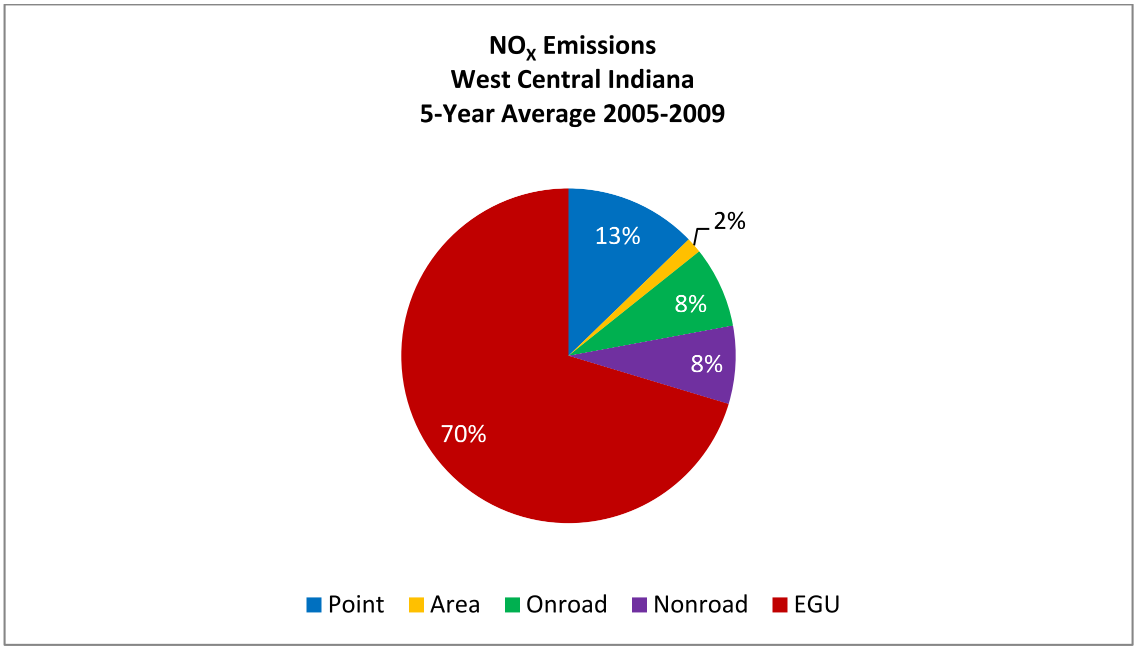


Chart 4: West Central Indiana NO_x Emissions



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 34%, 71%, and 53%, respectively, within the West Central 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)

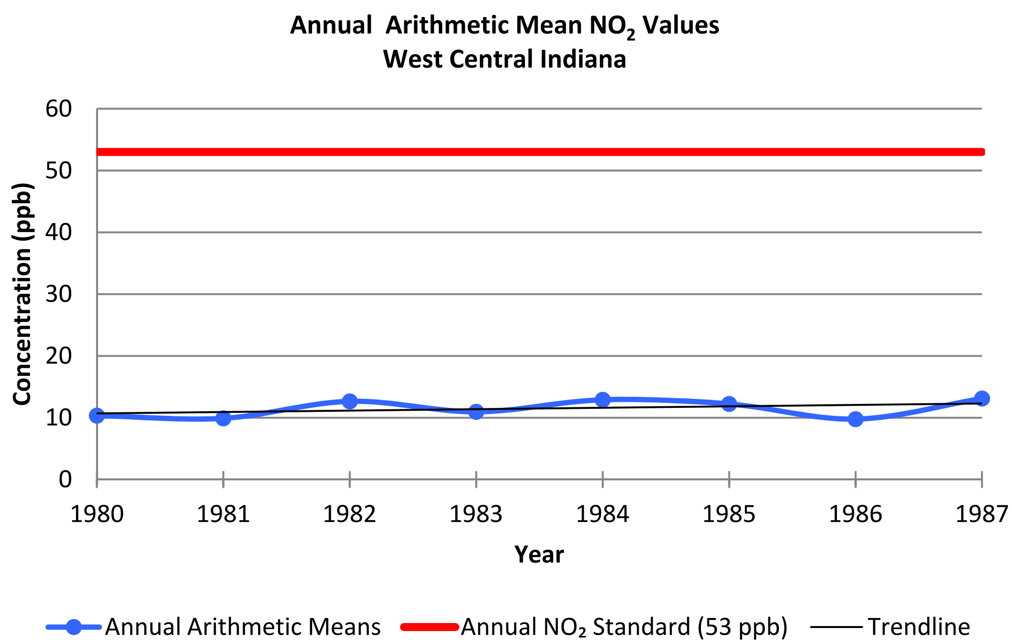
Two monitoring sites in the West Central Indiana area that were located in Sullivan and Vigo counties measured NO_2 levels. The trend data in Graph 9 reflect the annual arithmetic mean NO_2 values. The trend data in Graph 9 reflect the annual arithmetic mean NO_2 values and the highest value from all of the monitors in the West Central Indiana area are plotted on the graph for each year. 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 98th 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 West Central 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 West Central Indiana are available upon request. Monitoring data for annual NO_2 show a downward trend over time and the monitor values for West Central Indiana have been below the primary and secondary annual NO_2 standards. While fluctuations in monitoring data are shown in Graphs 9 and 10, monitoring data for both annual and 1-

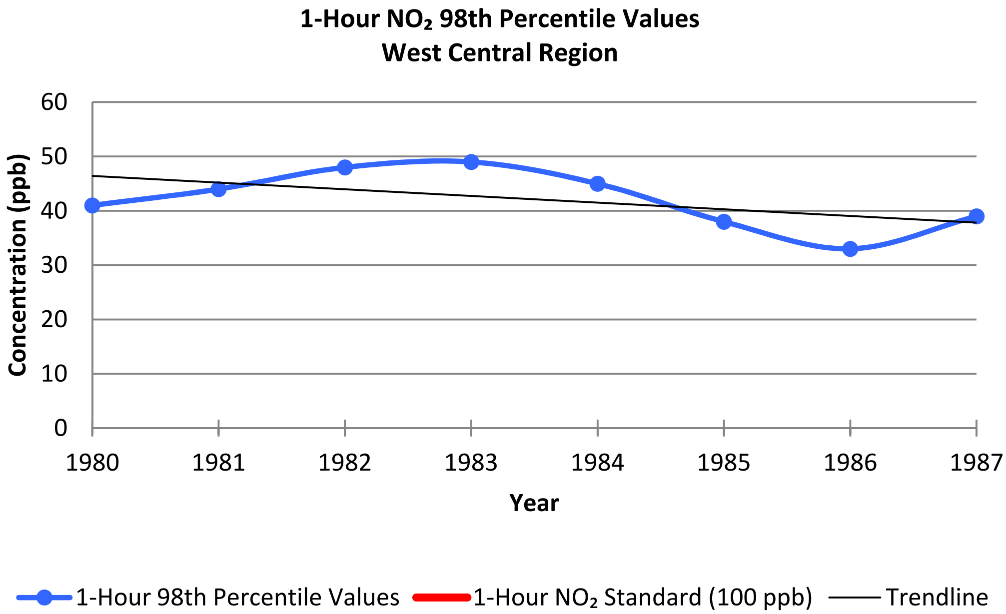
hour NO_2 indicate a downward trend over time. NO_2 monitors are located in close proximity to major sources in the area and data fluctuates based on variability in facility operations and meteorology.

The trend data in Graph 10 show the 98th percentile of the 1-hour NO_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 98th percentile is used for comparison to the primary 1-hour NO_2 standard; therefore, the one-year values shown in Graph 10 are not a true comparison to the primary 1-hour NO_2 standard. The values in Graph 10 reflect the highest 98th percentile for the years 1980 through 1997 from all of the monitors in the West Central Indiana area which is plotted on the graph for each year. Since the primary 1-hour NO_2 standard was not established until 2010 it is not listed on Graph 10. The 1-hour NO_2 standard at 100 ppb is only listed for the year 2010 on this graph since it was not established until February 2010

Graph 9: West Central Indiana Annual Arithmetic Mean NO_2 Values



Graph 10: West Central Indiana 1-Hour NO_2 98th Percentile 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 West Central Indiana and Chart 5 shows how the average emissions are distributed among the different source categories.

Graph 11: West Central Indiana NO_x Emissions

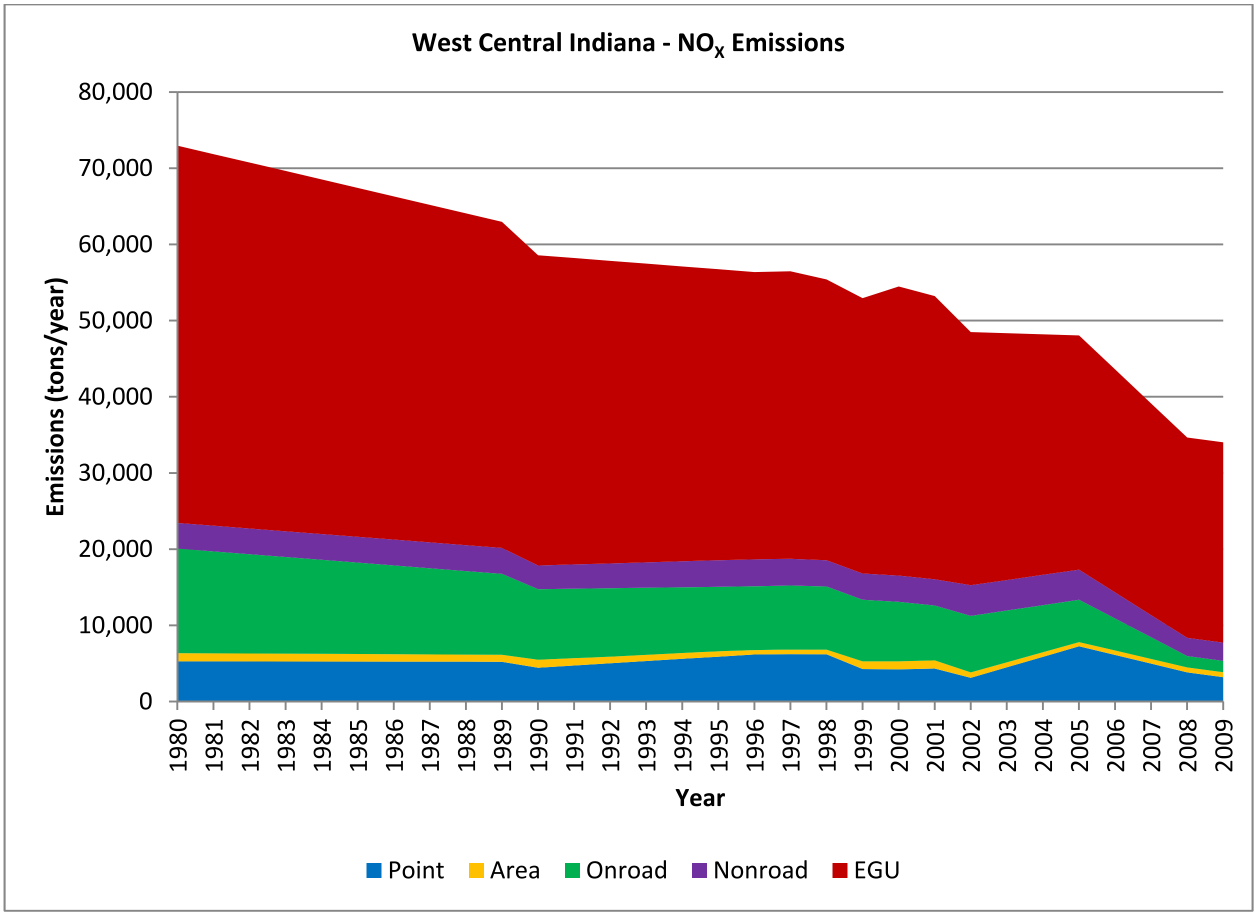
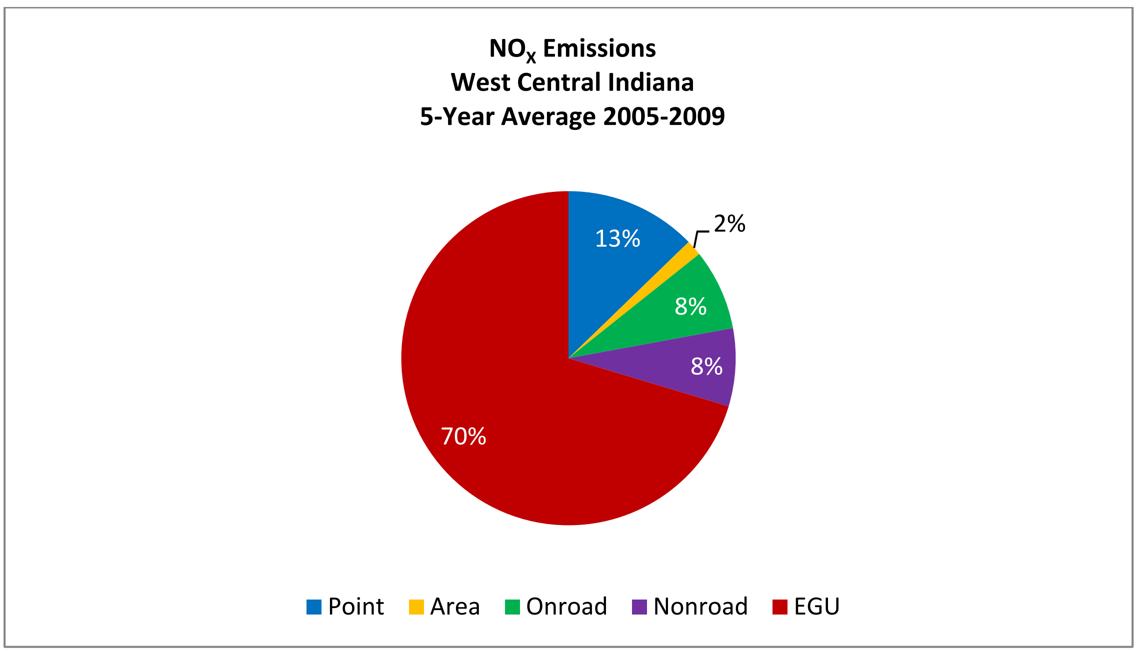


Chart 5: West Central Indiana NO_x Emissions



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 53% within the West Central Indiana area since 1980. This trend is true throughout Indiana and the upper Midwest. Nationally, average NO_x concentrations have decreased by more than 40% between 1980 and the present.

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 West Central Indiana, located in Vigo 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 West Central 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 West Central 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 4^{th} 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 West Central 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 4^{th} 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 West Central Indiana area that measured 8-hour ozone from 2000 through 2010. Monitoring data in Table 11 show the 4^{th} 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 4^{th} 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: West Central Indiana 1-Hour Ozone Annual 4^{th} 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**
Vigo	181670018	Terre Haute	0.091	0.088	0.084	0.083	0.097	0.096	0.096	0.096	0.098	0.096	0.089	0.087
Vigo	181670024	Sandcut					0.095	0.095	0.093	0.093	0.117	0.112	0.110	0.108
			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**
Vigo	181670018	Terre Haute	0.087	0.079	0.074	0.072	0.066	0.066	0.065	0.064	0.079	0.079	0.076	0.073
Vigo	181670024	Sandcut	0.101	0.097	0.089	0.086	0.084	0.082	0.080	0.079	0.101	0.100	0.089	0.088
			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**
Vigo	181670018	Terre Haute	0.072	0.068	0.067	0.067	0.092	0.088	0.085	0.084	0.073	0.072	0.070	0.067
Vigo	181670024	Sandcut	0.086	0.083	0.082	0.082	0.082	0.082	0.081	0.079	0.084	0.080	0.076	0.074
			1st High 2009	**2nd High 2009**	**3rd High 2009**	**4th High 2009**	**1st High 2010**	**2nd High 2010**	**3rd High 2010**	**4th High 2010**				
Vigo	181670018	Terre Haute	0.068	0.068	0.063	0.063	0.076	0.073	0.072	0.072				
Vigo	181670024	Sandcut	0.072	0.070	0.068	0.068	0.075	0.075	0.072	0.071				

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

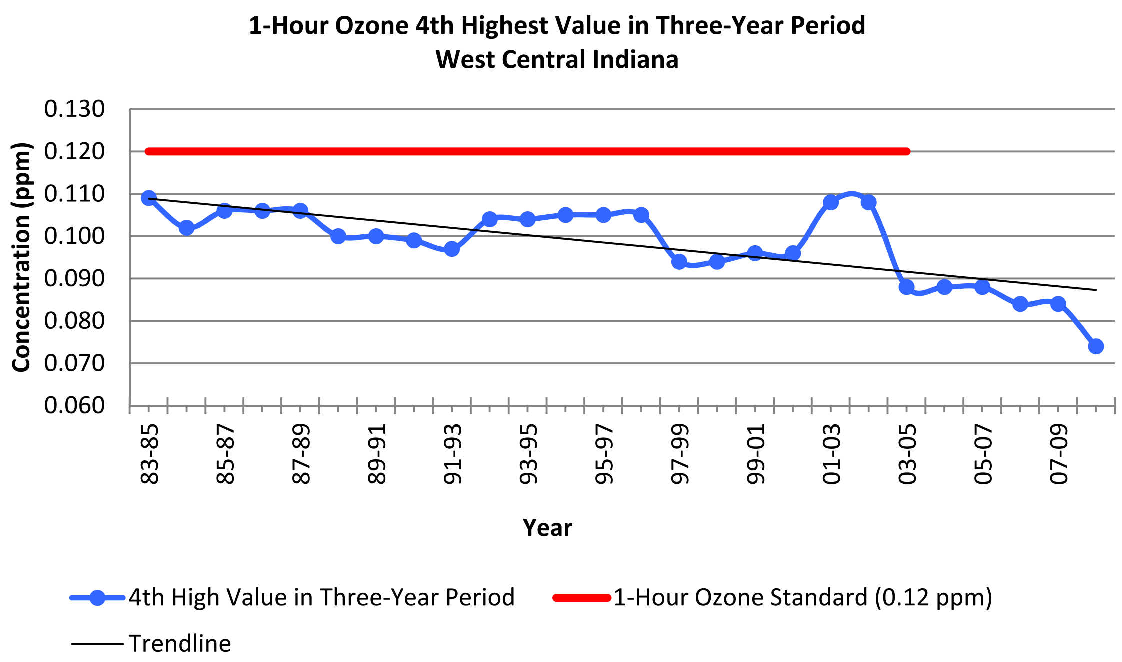


Table 10: West Central Indiana 1-Hour Ozone 4th High Value in Three-Year Period Monitoring Data Summary

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
Vigo	181670018	Terre Haute	0.096	0.096	0.087	0.073	0.073	0.084	0.084	0.084	0.072
Vigo	181670024	Sandcut		0.108	0.108	0.088	0.088	0.088	0.082	0.079	0.074

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

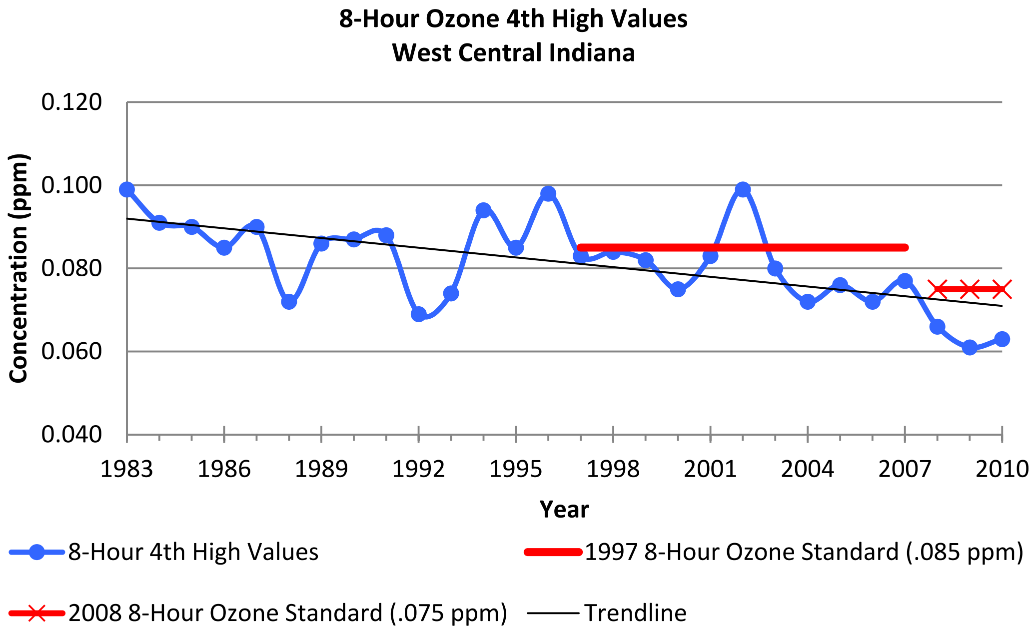


Table 11: West Central Indiana 8-Hour Ozone 4th High Values Monitoring Data Summary

County	Site #	Site Name	4th High Ozone Value (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Vigo	181670018	Terre Haute	0.075	0.082	0.082	0.066	0.057	0.064	0.060	0.077	0.059	0.058	0.063
Vigo	181670024	Sandcut		0.083	0.099	0.080	0.072	0.076	0.072	0.073	0.066	0.061	0.063

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

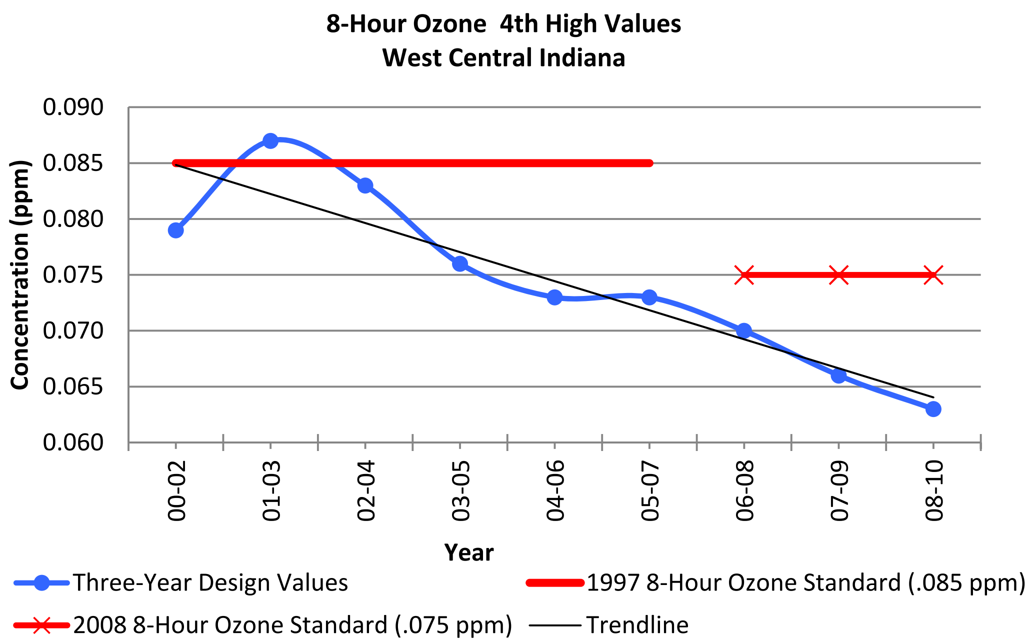


Table 12: West Central Indiana 8-Hour Ozone Three-Year Design Value Monitoring Data Summary

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
Vigo	181670018	Terre Haute	0.079	0.076	0.068	0.062	0.060	0.067	0.065	0.064	0.060
Vigo	181670024	Sandcut		0.087	0.083	0.076	0.073	0.073	0.070	0.066	0.063
			Prior to 2008, highlighted red numbers are above the 8-hour O_3 standard of 0.085 ppm								
			Beginning 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 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 the years 1994, 1996, 2002, and 2005 shown in Graphs 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 West Central 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 West Central Indiana were in violation of the 1-hour and 8-hour ozone standards, but are now below the standards. The Sandcut ozone monitoring site has historically registered the highest ozone values in West Central Indiana. 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 and NO_x and VOC in the presence of sunlight. U.S. EPA's NEI contains emissions information for NO_x and VOC and is included in this report. Graphs 15 and 16 illustrate the emissions trend for the ozone precursors in West Central Indiana and Charts 6 and 7 show how the average emissions are distributed among the different source categories.

Graph 15: West Central Indiana NO_x Emissions

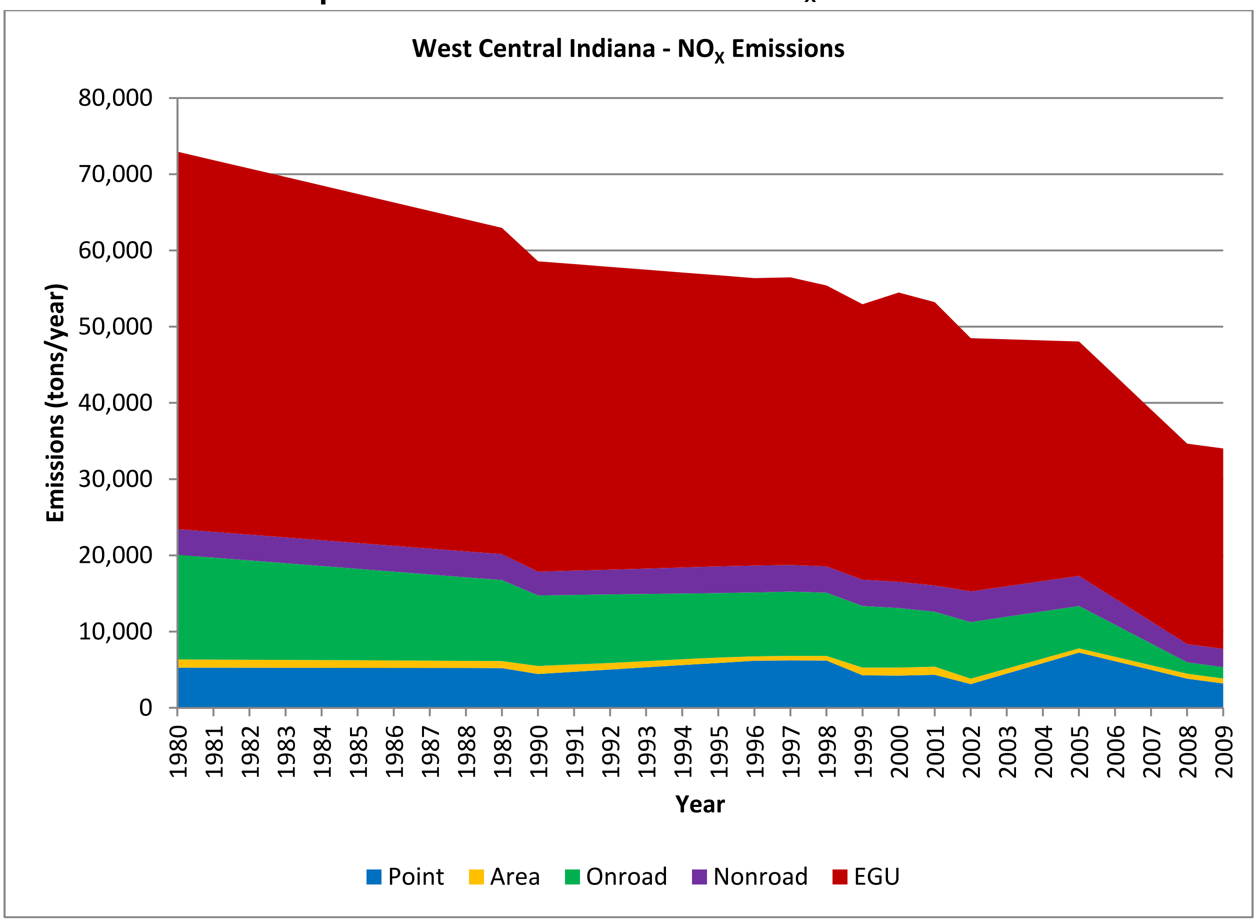
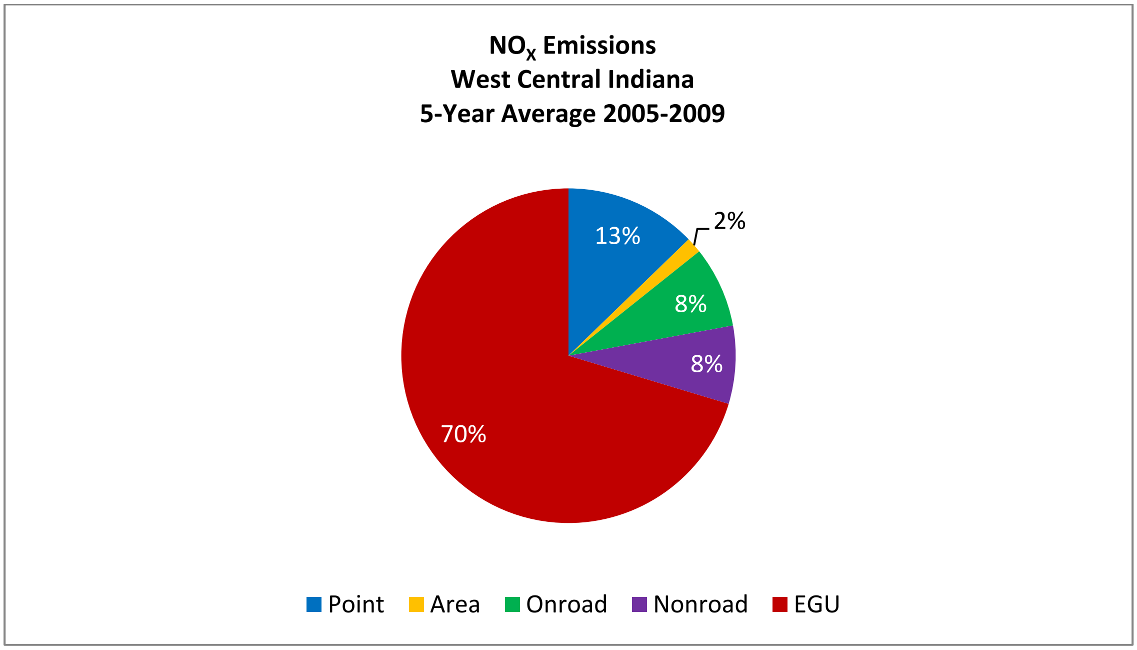


Chart 6: West Central Indiana NO_x Emissions



Graph 16: West Central Indiana VOC Emissions

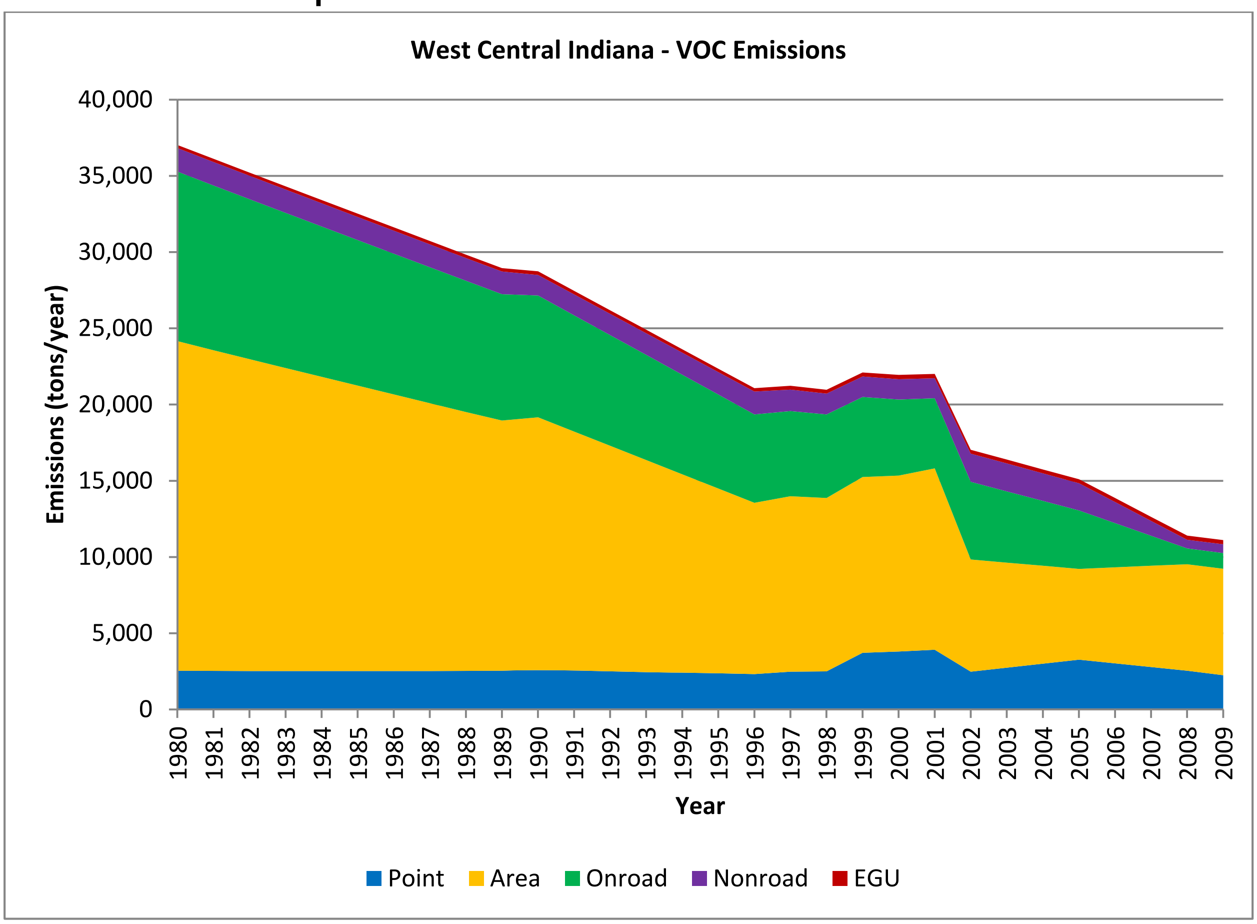
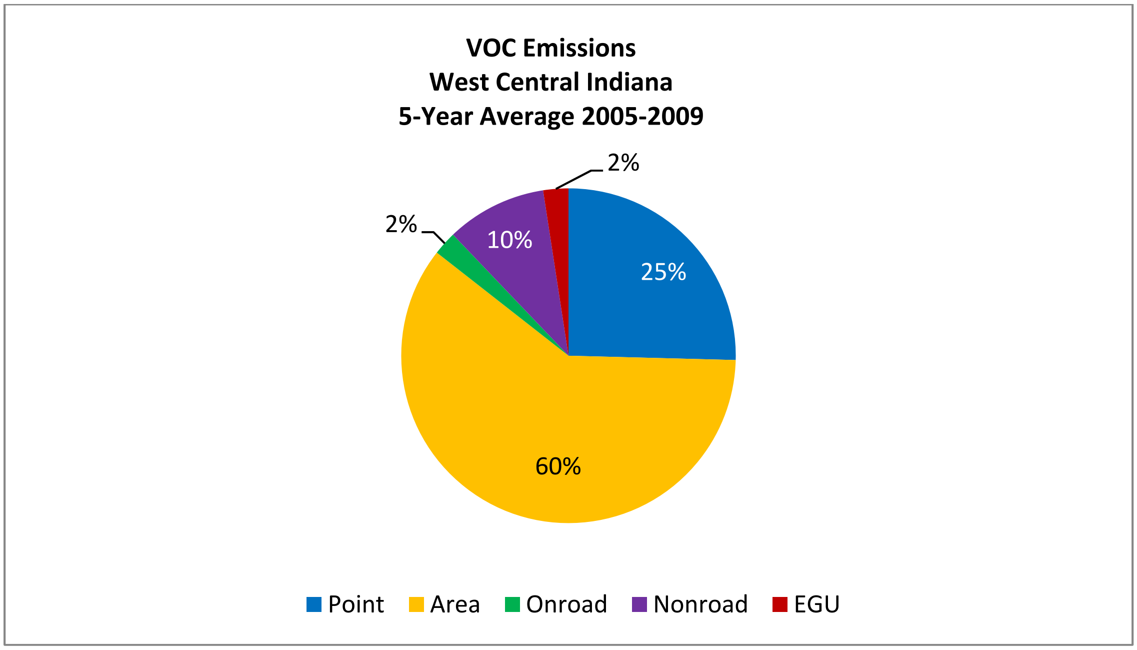


Chart 7: West Central Indiana VOC Emissions



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 70% and 53%, respectively, within the West Central 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. 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 West Central Indiana are available from three sites in Vigo 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 West Central 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 2^{nd} 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 2^{nd} 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 2^{nd} high concentration from all of the monitors in the West Central 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 in West Central Indiana have been below both the primary and secondary annual PM_{10} standards, as well as 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 West Central Indiana area has always been below the standards. 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 West Central Indiana area has always been below the standards.

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

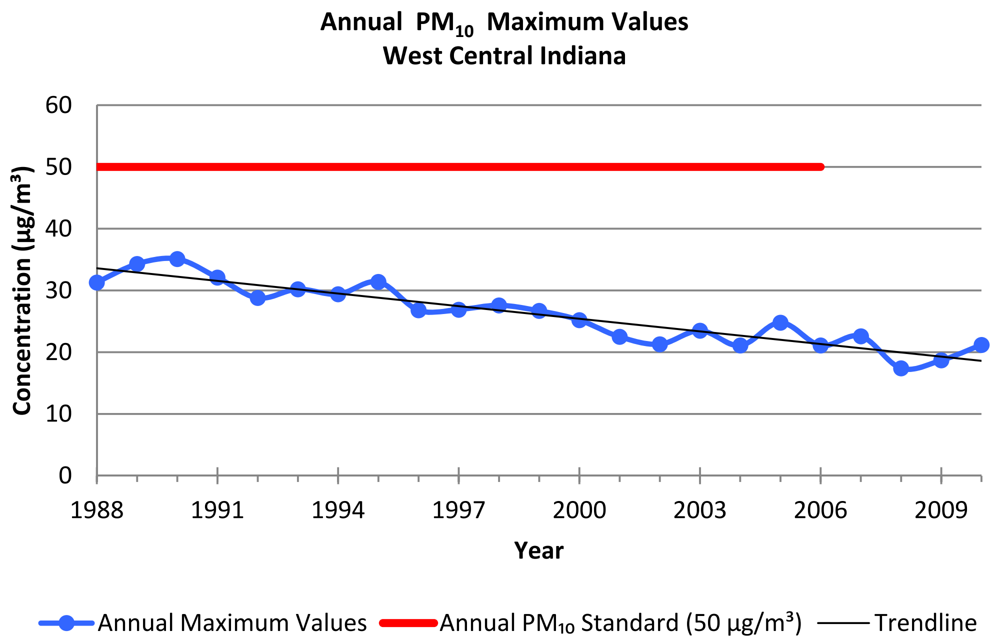


Table 13: West Central Indiana Annual Arithmetic Mean PM_{10} Values Monitoring Data Summary

County	Site #	Site Name	Annual Arithmetic Mean (µg/m³)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Vigo	181670018	Terre Haute - Lafayette Ave	23.5	21.3	21.0	23.5	21.1	24.8	19.4	22.6	17.4	18.7	21.2
Vigo	181670019	Terre Haute - Cherry St	20.9										
Vigo	181670020	Terre Haute - Hulman St	25.2	22.5	21.3	21.7	21.1	24.1	21.1	20.1			

Highlighted red numbers are over the annual PM_{10} standard of 50 µg/m³

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

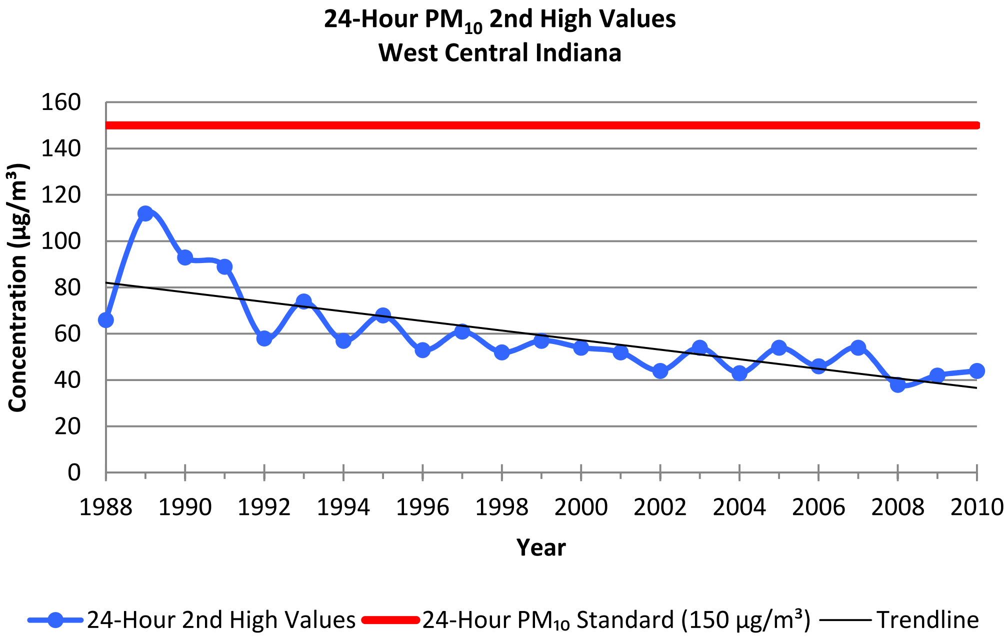


Table 14: West Central Indiana 24-Hour PM_{10} 2nd High Values Monitoring Data Summary

County	Site #	Site Name	24-Hour 2nd High Value (µg/m³)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Vigo	181670018	Terre Haute - Lafayette Ave	54	47	43	54	43	54	38	54	38	42	44
Vigo	181670019	Terre Haute - Cherry St	29										
Vigo	181670020	Terre Haute - Hulman St	52	52	44	48	42	52	46	46			
			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 West Central Indiana and Chart 8 shows how the average emissions are distributed among the different source categories.

Graph 19: West Central Indiana PM_{10} Emissions

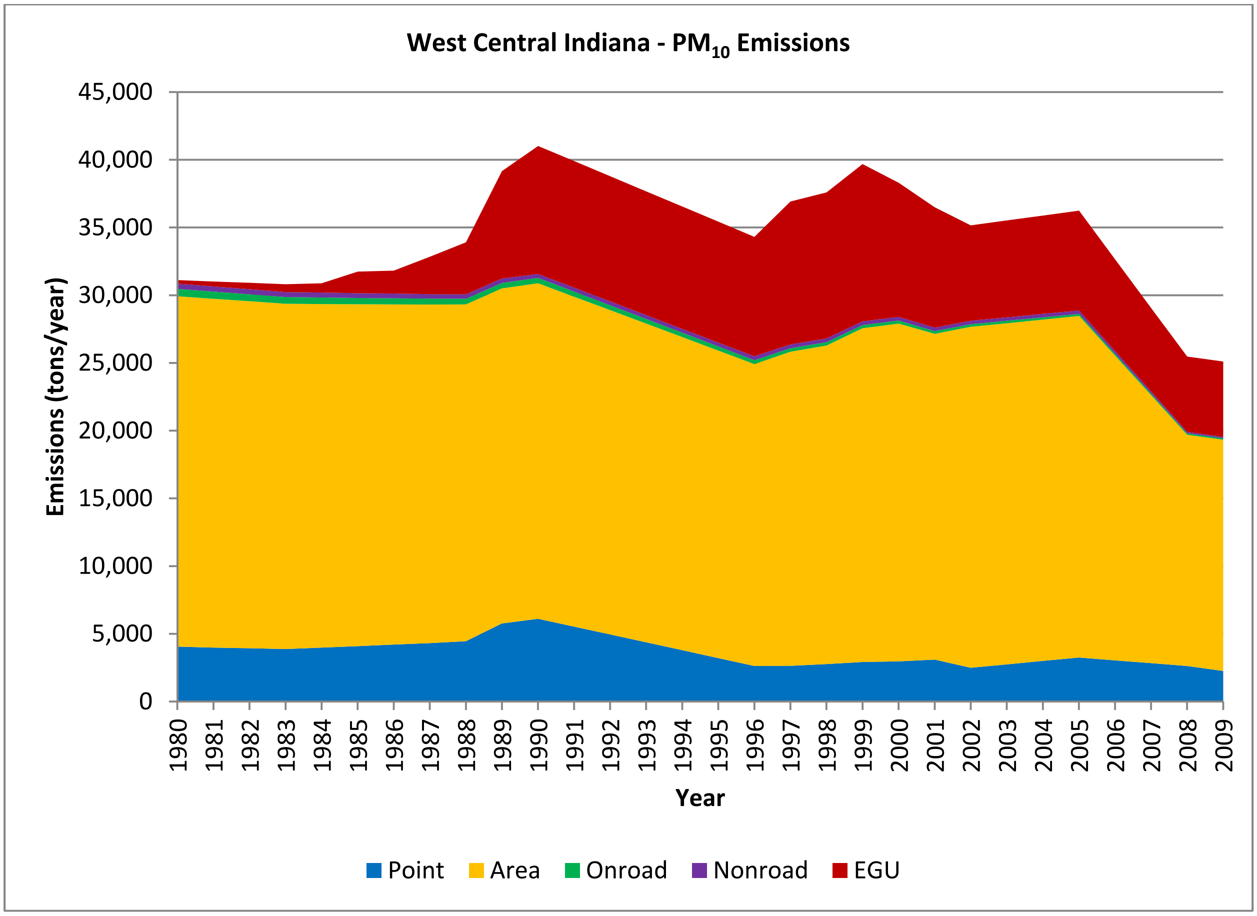
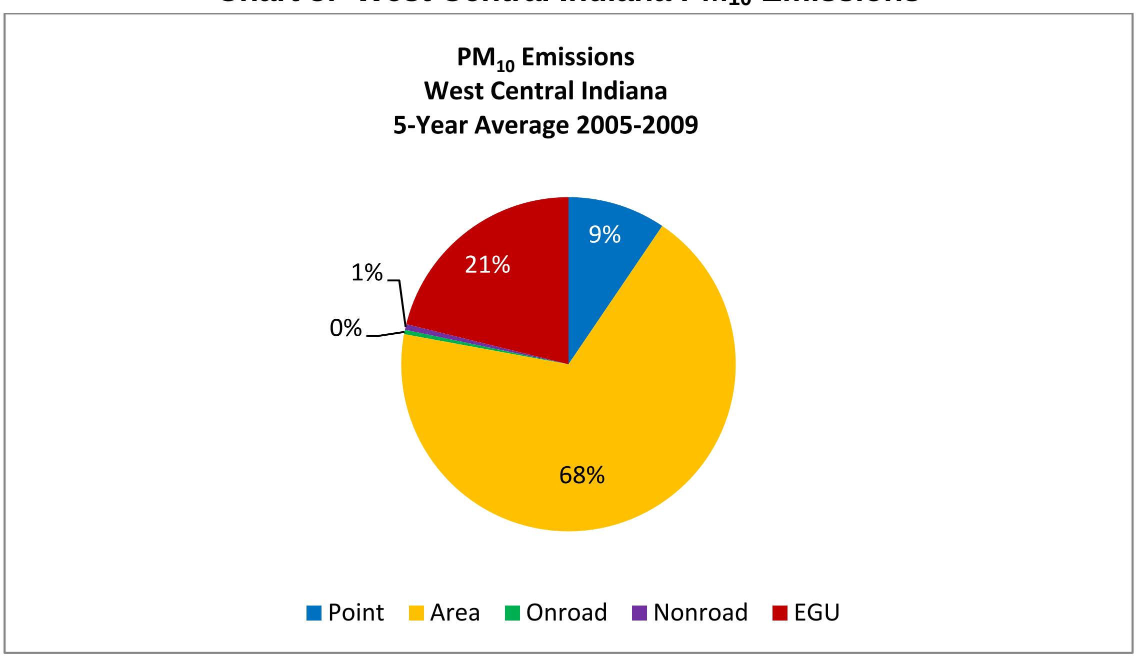


Chart 8: West Central Indiana PM_{10} Emissions



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} emissions over time. As Graph 19 illustrates, total PM_{10} emissions have decreased by 19% within the West Central 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)

Two monitoring sites within West Central Indiana, located in Vigo County measure SO_2 levels. A third monitor located in Sullivan County measured SO_2 levels until 2006. 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 West Central 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 West Central 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 West Central 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 West Central 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 West Central 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: West Central Indiana Annual Arithmetic Mean SO_2 Values

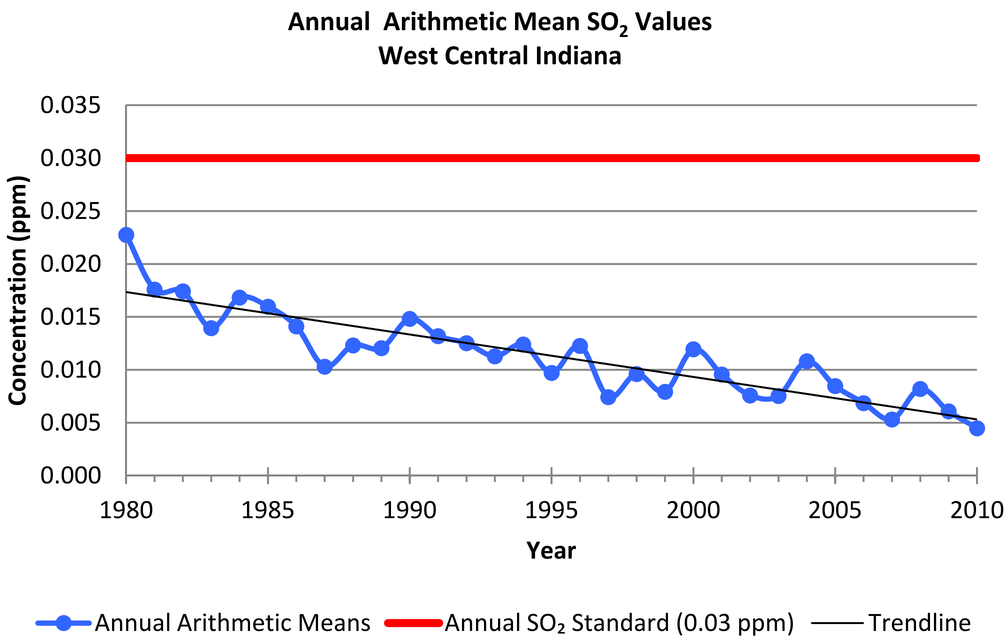


Table 15: West Central Indiana Annual Arithmetic Mean SO_2 Monitoring Data Summary

County	Site ID	Site Name	Annual Arithmetic Mean (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Sullivan	181530004	SR 154	0.008	0.008	0.008	0.008	0.011	0.008	0.007				
Vigo	181670018	Terre Haute - Lafayette Ave	0.005	0.004	0.003	0.004	0.004	0.004	0.004	0.004	0.003	0.002	0.002
Vigo	181671014	Terre Haute - Ft Harrison Rd	0.012	0.010	0.007	0.007	0.004	0.005	0.005	0.005	0.008	0.006	0.004

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

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

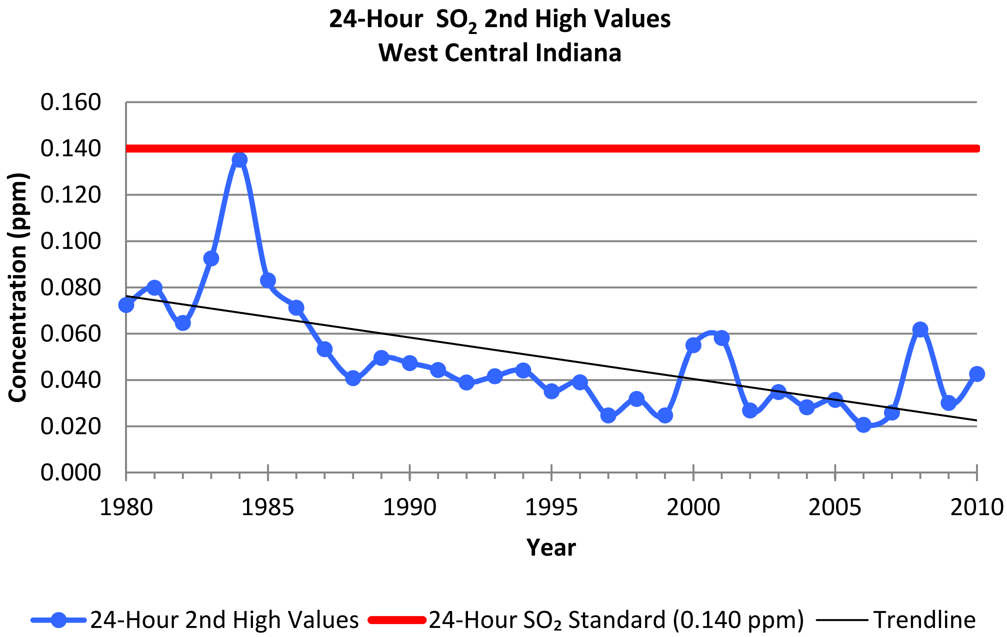


Table 16: West Central Indiana 24-Hour 2nd High SO_2 Monitoring Data Summary

County	Site ID	Site Name	99th Percentile Values (ppb)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Sullivan	181530004	SR 154	52	47	52	54	60	54	45				
Vigo	181670018	Terre Haute - Lafayette Ave	99	104	69	83	130	100	99	90	120	115	61
Vigo	181671014	Terre Haute - Ft Harrison Rd	143	204	129	143	134	138	104	133	137	142	169

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

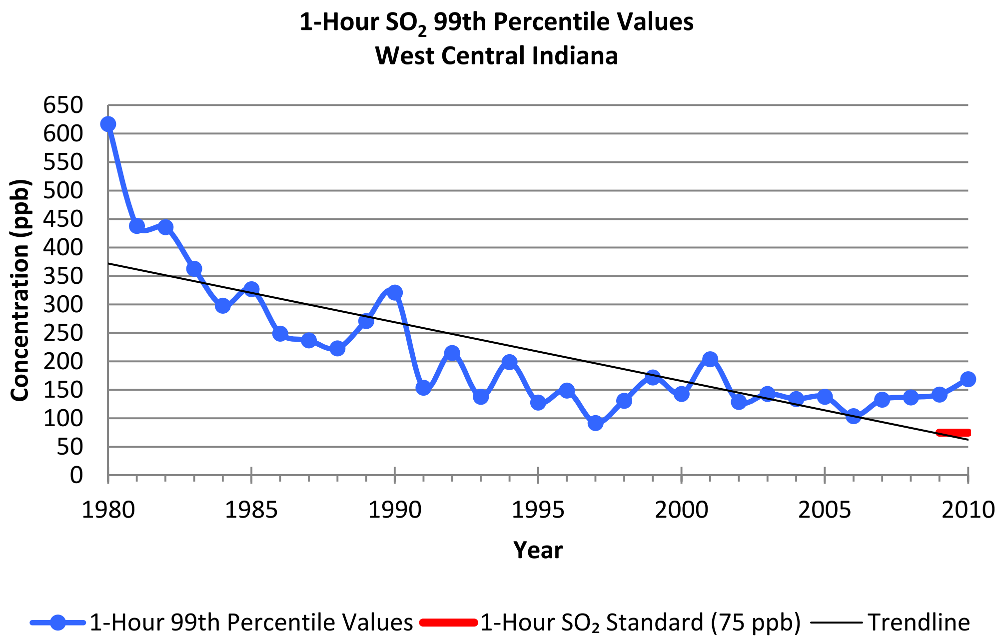


Table 17: West Central Indiana 1-Hour 99th Percentile SO_2 Monitoring Data Summary

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
Sullivan	181530004	SR 154			55	56	53				
Vigo	181670018	Terre Haute - Lafayette Ave	91	85	94	104	110	96	103	108	99
Vigo	181671014	Terre Haute - Ft Harrison Rd	159	159	135	138	125	125	125	137	149

Highlighted red numbers are above the 1-hour SO_2 standard of 75 ppb

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

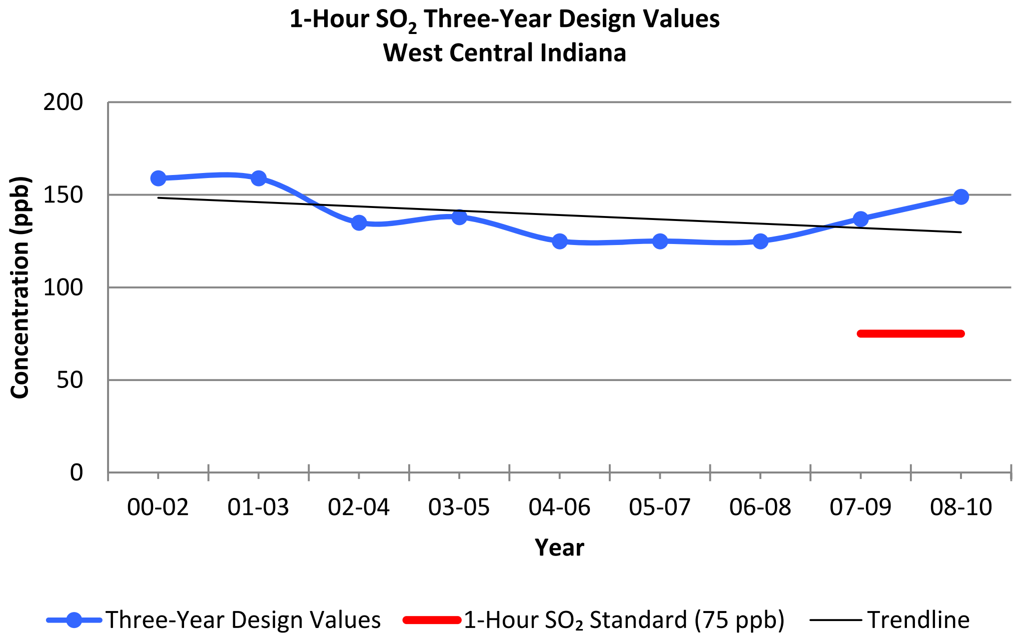


Table 18: West Central Indiana 1-Hour 99th Percentile Three-Year Design Value SO_2 Monitoring Data Summary

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
Sullivan	181530004	SR 154	50	51	55	56	53	50	45		
Vigo	181670018	Terre Haute - Lafayette Ave	91	85	94	104	110	96	103	108	99
Vigo	181671014	Terre Haute - Ft Harrison Rd	159	159	135	138	125	125	125	137	149

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 West Central Indiana area have historically been below their respective standards. In addition, monitoring data shown in Graph 22 indicate a downward trend in 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 West Central 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 West Central Indiana area in the future and the area will comply with the 1-hour primary SO_2 standard when CSAPR is implemented.

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

Graph 24: West Central Indiana SO_2 Emissions

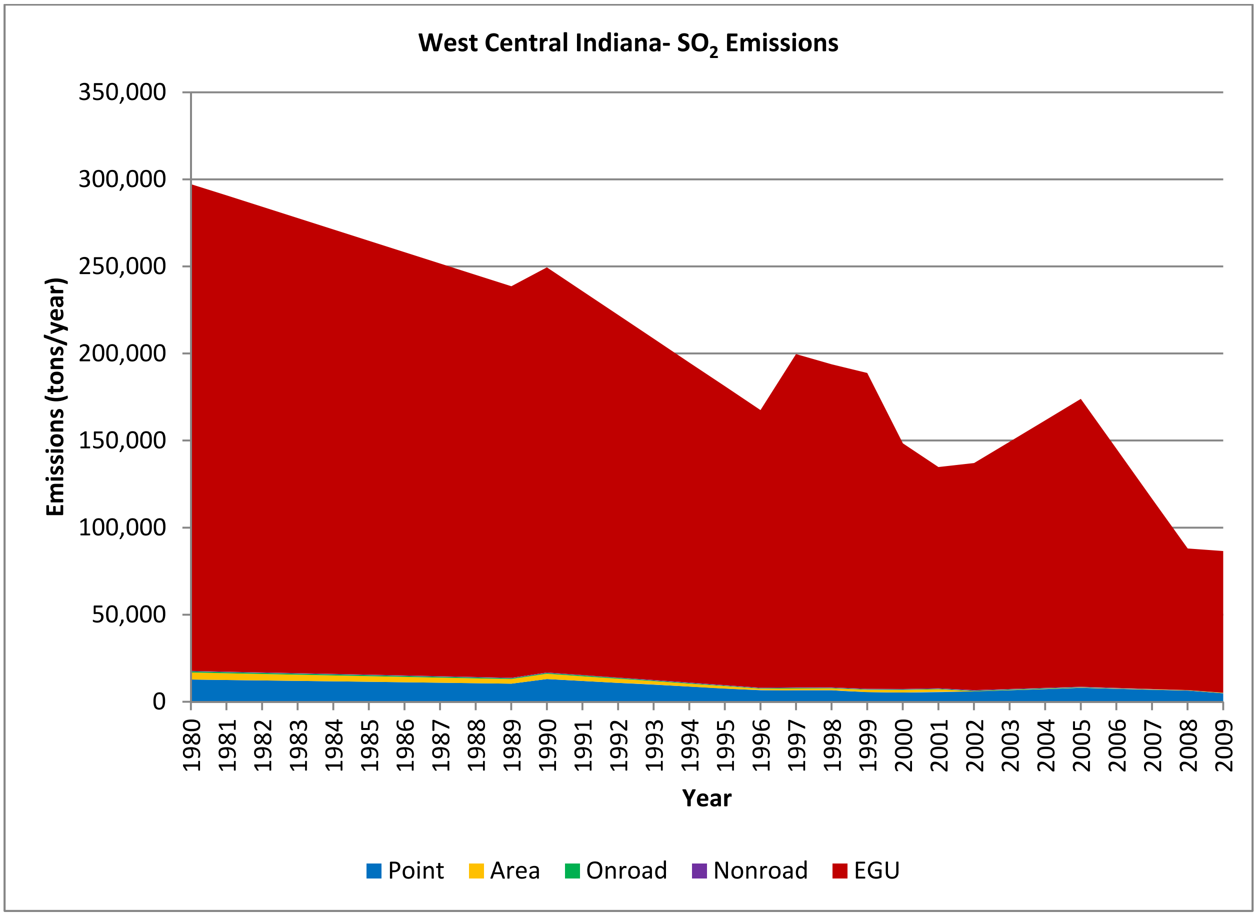
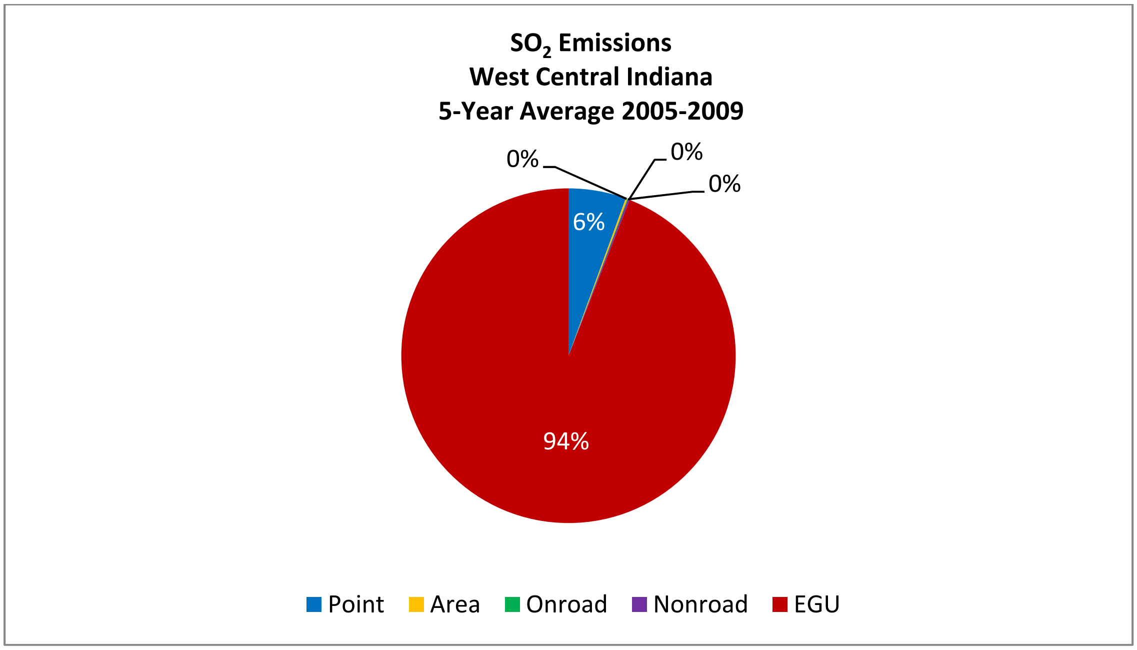


Chart 9: West Central Indiana SO_2 Emissions



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 71% within the West Central 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 the 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 West Central Indiana are from monitors that were located in Vigo County. 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 West Central 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 West Central 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 1981, but afterwards remained below the annual TSP standards. While occasional spikes can be seen in the 24-hour TSP values, the monitor values for the West Central Indiana area have always been below the primary 24-hour TSP standard. 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 West Central 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 $\mu g/m^3$. Monitoring data in Table 20 show the 2^{nd} highest 24-hour TSP concentrations for the years 1980 through 1988, which are compared to the primary 24-hour TSP standard of 260 $\mu g/m^3$.

Graph 25: West Central Indiana Annual Geometric Mean TSP Values

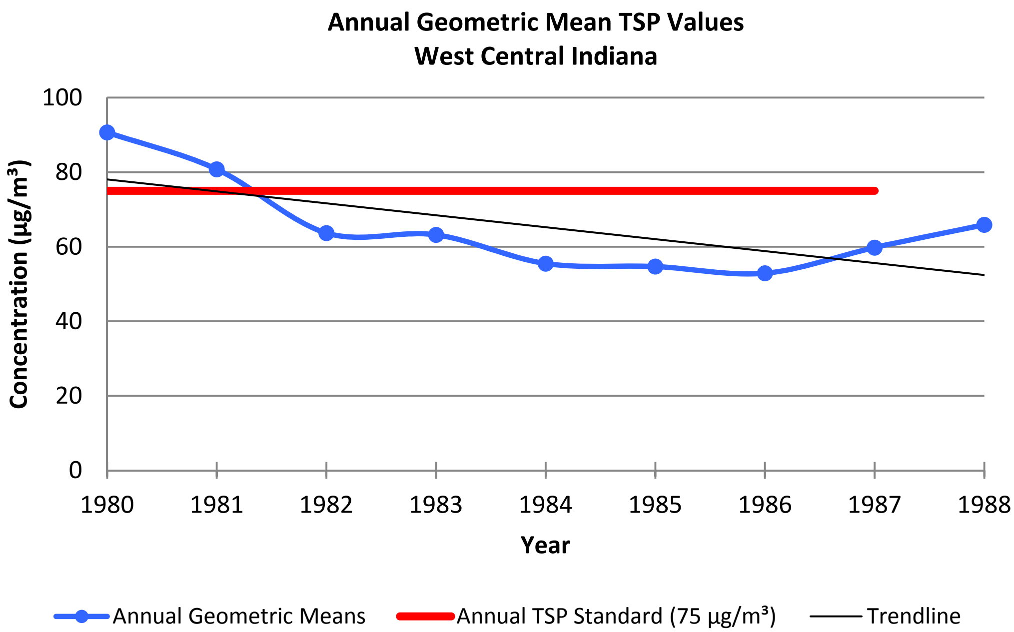


Table 19: West Central Indiana Annual Geometric Mean TSP Values

County	Site #	Site Name	Annual Geometric Mean (µg/m³)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Vigo	181670001	Federal Building	61	63	50	58	56	55	53	60	52			
Vigo	181670010	Boston Avenue	61	57	48	52	46	46	46	53	50			
Vigo	181670012	Terre Haute Fire Department	62	54	45	51	48	46	44	52	62			
Vigo	181670014	Indiana State University	91	81	64	58								
Vigo	181670016	North Vigo High School	59	54	44	46	45	42	45	48	52			
Vigo	181670017	South Vigo High School	62	57	41	48	49	46	46	53	57			
Vigo	181670018	N. Lafayette Avenue				63	53	50	49	56	66			
Vigo	181671010	West Vigo Middle School	53	50	38	40	33	38	36	44	35			
Vigo	181671011	Wabash Avenue	53	48	41	42	41	42	43	48	42			

Highlighted red numbers are above the Annual TSP Standard of 75 µg/m³

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

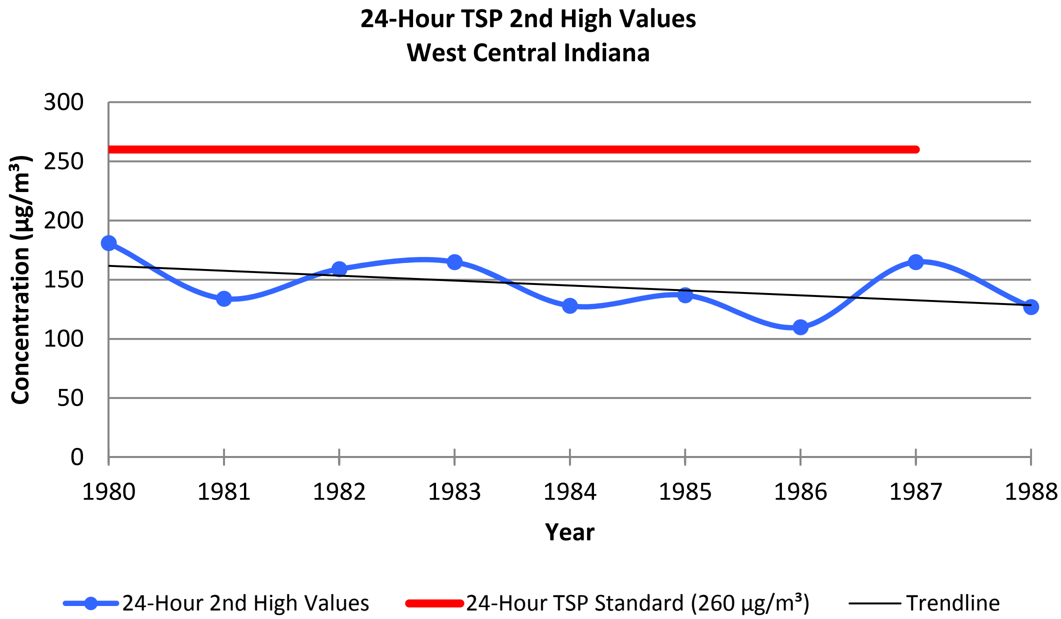


Table 20: West Central Indiana 24-Hour TSP 2nd High Values

County	Site #	Site Name	2nd High Values (µg/m³)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Vigo	181670001	Federal Building	98	109	123	138	110	113	110	122	82			
Vigo	181670010	Boston Avenue	124	108	123	149	128	115	110	165	127			
Vigo	181670012	Terre Haute Fire Department	169	117	109	123	111	137	93	160	116			
Vigo	181670014	Indiana State University	181	134	159	165								
Vigo	181670016	North Vigo High School	136	98	97	116	103	95	106	149	118			
Vigo	181670017	South Vigo High School	128	104	108	136	108	104	100	122	109			
Vigo	181670018	N. Lafayette Avenue				165	120	119	106	149	127			
Vigo	181671010	West Vigo Middle School	120	105	93	114	88	93	80	146	76			
Vigo	181671011	Wabash Avenue	119	92	139	142	105	102	106	129	77			

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 West Central Indiana area may monitor violations of such a 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 West Central 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 West Central 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 West Central 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).

Appendix

West Central Indiana County-Specific Emission Inventory Data

(1980-2009)

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Clay County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	29,710.59	3,421.16	1,590.82	5,002.88	800.19	3,861.19
1981	28,859.18	3,343.76	1,564.33	5,006.14	775.00	3,785.30
1982	28,007.77	3,266.36	1,537.84	5,009.39	749.82	3,709.40
1983	27,156.37	3,188.96	1,511.34	5,012.65	724.63	3,633.50
1984	26,304.96	3,111.56	1,484.85	5,015.91	699.44	3,557.60
1985	25,453.55	3,034.16	1,458.36	5,019.16	674.25	3,481.70
1986	24,602.15	2,956.76	1,431.87	5,022.42	649.06	3,405.80
1987	23,750.74	2,879.36	1,405.38	5,025.67	623.87	3,329.90
1988	22,899.33	2,801.96	1,378.88	5,028.93	598.68	3,254.00
1989	22,047.93	2,724.56	1,352.39	5,048.80	573.49	3,178.10
1990	20,832.23	2,426.90	1,258.42	5,106.99	890.26	2,847.18
1991	19,964.27	2,389.86	1,239.51	5,061.80	759.31	2,828.58
1992	19,096.31	2,352.82	1,220.60	5,016.60	628.36	2,809.99
1993	18,228.35	2,315.78	1,201.69	4,971.41	497.41	2,791.39
1994	17,360.38	2,278.73	1,182.78	4,926.21	366.46	2,772.79
1995	16,492.42	2,241.69	1,166.15	4,881.02	235.51	2,754.20
1996	15,624.46	2,204.65	1,150.03	4,835.83	104.56	2,735.60
1997	15,048.88	2,205.50	1,150.70	4,891.51	106.05	2,732.01
1998	14,708.79	2,165.97	1,167.61	4,986.84	106.60	2,656.31
1999	13,877.43	2,152.47	1,202.88	5,218.64	244.93	2,631.55
2000	13,589.92	2,084.39	1,225.95	5,289.59	238.74	2,619.96
2001	13,528.28	2,057.56	1,165.97	5,150.09	242.62	2,654.46
2002	12,297.75	1,996.58	889.64	5,790.74	273.89	2,194.53
2003	11,375.09	1,887.06	888.89	5,790.80	282.09	2,141.06
2004	10,452.44	1,777.53	888.14	5,790.87	290.29	2,087.58
2005	9,529.78	1,668.00	887.40	5,790.93	298.48	2,034.11
2006	7,312.79	1,309.87	875.39	5,228.76	269.23	1,795.69
2007	5,095.80	951.75	863.37	4,666.58	239.98	1,557.27
2008	2,878.81	593.62	851.36	4,104.41	210.72	1,318.85
2009	2,878.81	564.80	785.76	3,890.92	104.36	1,316.82
%Change 1980 to 2009	-90.31%	-83.49%	-50.61%	-22.23%	-86.96%	-65.90%

Parke County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	15,263.07	5,004.03	1,108.26	3,802.55	322.64	13,246.95
1981	14,820.78	4,928.41	1,099.08	3,820.81	313.04	12,742.62
1982	14,378.49	4,852.79	1,089.91	3,850.23	303.45	12,238.28
1983	13,936.20	4,777.18	1,080.73	3,868.49	293.85	11,733.95
1984	13,493.91	4,701.56	1,071.55	4,056.74	284.26	11,229.62
1985	13,051.62	4,625.94	1,062.37	4,244.99	274.66	10,725.33
1986	12,609.33	4,550.32	1,053.19	4,433.23	265.07	10,221.03
1987	12,167.04	4,474.70	1,044.02	4,621.48	255.47	9,717.72
1988	11,724.74	4,399.08	1,034.84	4,809.73	245.87	9,216.45
1989	11,282.45	4,323.46	1,025.66	4,997.97	236.28	8,715.18
1990	10,743.17	2,502.27	967.74	4,153.42	344.89	11,723.17
1991	10,304.61	2,990.19	1,019.19	4,148.82	297.91	10,160.72
1992	9,866.05	3,478.12	1,070.64	4,144.21	250.93	8,598.28
1993	9,427.49	3,966.04	1,122.09	4,139.61	203.95	7,035.83
1994	8,988.92	4,453.96	1,173.54	4,135.01	156.96	5,473.38
1995	8,550.36	4,941.89	1,224.99	4,130.40	109.98	3,910.94
1996	8,111.80	5,429.81	1,276.44	4,125.80	63.00	2,348.49
1997	7,730.83	5,428.60	1,333.75	4,470.70	63.77	2,341.09
1998	7,574.54	5,383.16	1,367.97	4,630.45	64.42	2,348.06
1999	6,371.05	3,220.45	1,397.68	4,826.00	126.09	2,361.42
2000	6,402.43	3,218.80	1,423.14	4,906.44	124.75	2,395.66
2001	6,089.72	3,140.02	1,385.67	4,818.75	124.94	2,421.15
2002	6,076.63	2,358.93	746.80	4,815.65	121.54	1,465.16
2003	5,677.65	2,761.85	749.52	4,820.52	118.53	1,449.17
2004	5,278.67	3,164.77	752.24	4,825.39	115.53	1,433.18
2005	4,879.69	3,567.69	754.96	4,830.26	112.53	1,417.19
2006	3,818.25	3,079.13	743.06	4,280.72	101.65	1,286.48
2007	2,756.80	2,590.57	731.16	3,731.17	90.77	1,155.78
2008	1,695.36	2,102.00	719.26	3,181.63	79.89	1,025.08
2009	1,684.28	2,065.95	719.26	3,181.63	79.89	1,014.17
%Change 1980 to 2009	-88.96%	-58.71%	-35.10%	-16.33%	-75.24%	-92.34%

Sullivan County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	19,307.31	31,632.04	1,733.09	6,101.37	77,717.11	2,410.83
1981	18,772.77	30,820.36	1,700.02	6,168.91	75,256.11	2,382.97
1982	18,238.24	30,008.68	1,666.95	6,236.44	72,795.10	2,355.19
1983	17,703.71	29,196.99	1,633.88	6,303.98	70,334.10	2,327.41
1984	17,169.26	28,385.31	1,600.80	6,371.51	67,873.09	2,299.64
1985	16,635.43	27,573.63	1,567.73	6,439.05	65,412.09	2,271.86
1986	16,101.60	26,761.95	1,534.66	6,506.58	62,951.08	2,244.09
1987	15,567.77	25,950.27	1,652.29	6,574.12	60,490.08	2,216.31
1988	15,033.94	25,138.59	1,769.92	6,641.65	58,029.07	2,188.53
1989	14,500.11	24,326.91	1,887.54	6,711.71	55,568.07	2,160.76
1990	13,858.24	20,723.10	2,074.23	7,037.22	55,952.80	1,860.36
1991	13,292.77	20,643.36	2,099.51	6,924.78	52,884.39	1,901.04
1992	12,727.31	20,563.63	2,124.80	6,812.33	49,815.97	1,941.73
1993	12,161.84	20,483.90	2,150.09	6,699.89	46,747.56	1,982.41
1994	11,596.37	20,404.16	2,175.38	6,587.44	43,679.14	2,023.09
1995	11,030.91	20,324.43	2,204.34	6,475.00	40,610.72	2,063.78
1996	10,465.44	20,244.69	2,259.19	6,362.55	37,542.31	2,104.46
1997	10,080.31	18,263.93	2,344.96	6,706.80	36,232.87	2,102.53
1998	9,781.50	17,800.26	2,334.32	6,795.29	37,216.91	2,079.84
1999	9,185.91	17,759.17	2,418.70	7,117.69	37,616.77	2,061.00
2000	9,060.60	17,818.15	2,445.96	7,222.30	17,078.81	2,062.94
2001	8,661.61	17,620.05	2,387.39	7,125.13	15,753.20	2,059.72
2002	8,513.65	15,787.15	1,781.26	6,909.33	13,009.11	1,892.45
2003	7,873.18	14,303.06	1,775.26	6,924.43	15,661.84	1,835.97
2004	7,232.71	12,818.96	1,769.26	6,939.54	18,314.57	1,779.50
2005	6,592.24	11,334.87	1,763.26	6,954.64	20,967.30	1,723.02
2006	5,292.21	9,183.94	1,790.17	6,388.87	18,683.12	1,578.67
2007	3,992.17	7,033.00	1,817.09	5,823.10	16,398.94	1,434.33
2008	2,692.14	4,882.06	1,844.00	5,257.33	14,114.76	1,289.98
2009	2,694.30	4,867.59	1,825.82	5,302.25	14,123.67	1,311.96
%Change 1980 to 2009	-86.05%	-84.61%	5.35%	-13.10%	-81.83%	-45.58%

Vermillion County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	23,647.42	15,085.90	2,460.17	4,826.84	149,276.38	3,806.89
1981	22,964.00	14,999.04	2,439.37	4,778.26	145,589.89	3,743.04
1982	22,280.58	14,912.17	2,418.56	4,729.68	141,903.40	3,683.47
1983	21,597.16	14,825.30	2,397.76	4,681.10	138,216.91	3,631.74
1984	20,913.74	14,738.44	2,376.96	4,632.52	134,530.42	3,582.96
1985	20,230.33	14,651.57	2,356.16	5,383.52	130,843.93	3,534.18
1986	19,546.91	14,564.70	2,335.36	5,341.79	127,157.52	3,485.39
1987	18,863.49	14,477.84	2,314.55	6,260.46	123,471.39	3,436.61
1988	18,180.29	14,390.97	2,293.75	7,206.51	119,785.27	3,387.83
1989	17,497.13	14,304.11	2,272.95	8,152.56	116,099.15	3,339.04
1990	17,766.81	15,777.50	4,954.75	9,893.82	120,455.11	2,172.43
1991	16,707.74	15,220.46	4,933.42	9,579.74	112,608.24	2,399.42
1992	15,648.68	14,663.42	4,912.08	9,265.67	104,761.36	2,626.40
1993	14,589.61	14,106.38	4,890.74	8,951.59	96,914.49	2,853.39
1994	13,530.54	13,549.34	4,870.99	8,637.51	89,067.62	3,080.38
1995	12,471.48	12,992.30	4,880.89	8,323.43	81,220.74	3,307.36
1996	11,412.41	12,435.26	4,892.01	8,009.35	73,373.87	3,534.35
1997	11,264.15	14,272.80	6,001.28	9,188.95	111,405.20	3,651.15
1998	10,805.57	12,501.17	5,277.10	8,480.40	91,618.30	3,677.23
1999	10,366.39	12,910.40	5,834.17	9,186.57	85,795.59	4,014.01
2000	10,179.76	13,052.26	4,717.55	8,072.09	68,008.87	4,099.42
2001	10,109.37	13,050.23	4,226.15	7,561.31	61,243.36	4,229.52
2002	9,628.25	10,545.54	2,877.87	5,982.02	57,559.88	2,479.24
2003	8,916.64	11,664.25	2,977.40	6,105.62	64,970.63	2,344.88
2004	8,205.03	12,782.97	3,076.93	6,229.22	72,381.38	2,210.53
2005	7,493.42	13,901.68	3,176.46	6,352.82	79,792.13	2,076.17
2006	6,004.84	13,925.41	2,789.63	5,705.31	62,286.78	1,994.18
2007	4,516.27	13,949.13	2,402.80	5,057.80	44,781.43	1,912.19
2008	3,027.69	13,972.86	2,015.97	4,410.29	27,276.08	1,830.21
2009	3,020.16	13,864.28	2,004.27	4,363.79	27,276.08	1,830.21
%Change 1980 to 2009	-87.23%	-8.10%	-18.53%	-9.59%	-81.73%	-51.92%

Vigo County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	89,254.86	17,842.02	6,508.75	11,396.69	69,214.22	13,710.94
1981	86,897.84	17,782.71	6,418.34	11,249.53	68,881.64	13,471.40
1982	84,540.81	17,723.41	6,327.93	11,102.37	68,549.05	13,231.87
1983	82,183.79	17,664.10	6,237.52	10,955.21	68,216.46	12,992.33
1984	79,826.76	17,604.79	6,147.11	10,809.19	67,883.87	12,752.79
1985	77,469.74	17,545.48	6,056.86	10,664.87	67,551.29	12,513.25
1986	75,112.71	17,486.17	5,966.60	10,520.54	67,218.71	12,273.71
1987	72,755.69	17,426.86	5,876.35	10,376.22	66,886.13	12,034.17
1988	70,398.66	17,367.55	5,786.10	10,232.43	66,553.56	11,796.66
1989	68,041.64	17,308.24	5,695.84	14,257.21	66,220.98	11,567.48
1990	57,753.92	17,162.46	5,840.03	14,840.78	71,885.94	10,140.51
1991	57,527.50	16,981.64	5,717.41	14,198.78	69,316.64	10,176.35
1992	57,301.09	16,800.82	5,594.80	13,556.77	66,747.35	10,212.20
1993	57,074.67	16,620.00	5,472.18	12,914.76	64,178.05	10,248.04
1994	56,848.25	16,439.18	5,349.56	12,272.75	61,608.75	10,283.88
1995	56,621.84	16,258.36	5,253.07	11,630.75	59,039.46	10,319.73
1996	56,395.42	16,077.54	5,244.22	10,988.74	56,470.16	10,355.57
1997	55,093.31	16,331.24	5,697.22	11,672.09	51,873.17	10,411.62
1998	54,358.34	17,562.50	6,707.11	12,710.74	64,821.70	10,212.19
1999	50,845.28	16,915.90	7,012.33	13,348.49	65,130.70	11,045.65
2000	50,682.58	18,330.01	6,498.83	12,817.70	62,972.26	10,777.00
2001	47,059.12	17,373.46	5,827.17	11,846.36	57,505.52	10,651.02
2002	43,370.31	17,830.17	4,356.12	11,669.87	66,169.46	9,008.26
2003	41,544.01	17,756.48	4,556.79	11,886.85	68,373.92	8,623.64
2004	39,717.70	17,682.79	4,757.45	12,103.83	70,578.39	8,239.02
2005	37,891.40	17,609.10	4,958.12	12,320.81	72,782.86	7,854.40
2006	29,374.89	16,113.93	4,484.49	11,055.35	63,983.92	7,219.22
2007	20,858.38	14,618.77	4,010.87	9,789.89	55,184.99	6,584.04
2008	12,341.86	13,123.60	3,537.24	8,524.43	46,386.05	5,948.86
2009	11,970.75	12,678.96	3,451.68	8,373.57	44,983.73	5,643.38
%Change 1980 to 2009	-86.59%	-28.94%	-46.97%	-26.53%	-35.01%	-58.84%

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