CRITERIA POLLUTANTS

Air Quality Trend Analysis Report
(1980-2010)

LOWER NORTHWEST INDIANA

Indiana Department of Environmental Management

Office of Air Quality

This page was intentionally left blank.

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 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

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

VOC .... volatile organic compound

VMT .... vehicle miles traveled

Introduction

The Lower Northwest Indiana area is composed of eight counties. The counties represented in the area shown in Figure 1 are: Benton, Carroll, Clinton, Fountain, Montgomery, Tippecanoe, Warren, and White. Two major interstates pass through the Lower Northwest Indiana area, Interstate (I)-65 through Clinton, Tippecanoe, and White counties and Interstate (I)-74 through Fountain and Montgomery counties.

There are currently 3 criteria pollutant monitoring sites in Lower Northwest Indiana collecting data for fine particles ($PM_{2.5}$), ozone, 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 Lower Northwest 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 Lower Northwest Indiana area include the Purdue University – Wade Utility Plant, Tate & Lyle Lafayette South, and Tate & Lyle Sagamore Operation. 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 Lower Northwest Indiana Counties and Monitors

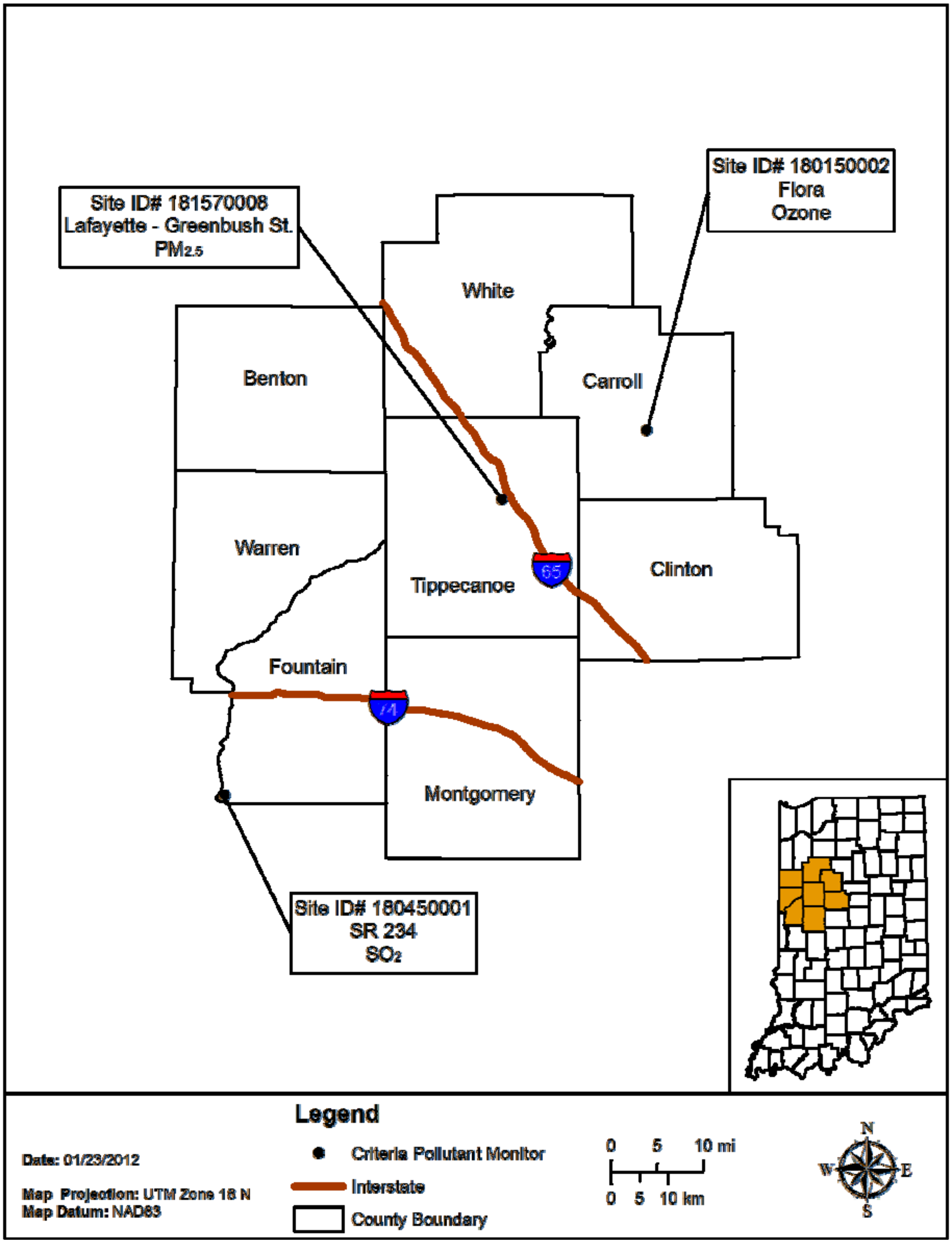


Table 1: Lower Northwest Indiana County Population Information

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
BENTON	FOWLER	FOWLER	3,937	10,218	9,441	9,421	8,854	-13%
CARROLL	DELPHI	DELPHI	9,472	19,722	18,809	20,165	20,155	2%
CLINTON	FRANKFORT	FRANKFORT	13,321	31,545	30,974	33,866	33,224	5%
FOUNTAIN	COVINGTON	ATTICA	7,865	19,033	17,808	17,954	17,240	-9%
MONTGOMERY	CRAWFORDSVILLE	CRAWFORDSVILLE	16,535	35,501	34,436	37,629	38,124	7%
TIPPECANOE	LAFAYETTE	LAFAYETTE	71,096	121,702	130,598	148,955	172,780	42%
WARREN	WILLIAMSPORT	WILLIAMSPORT	3,680	8,976	8,176	8,419	8,508	-5%
WHITE	MONTICELLO	MONTICELLO	12,970	23,867	23,265	25,267	24,643	3%

Table 1 shows that Tippecanoe County has had the highest percent growth in population between 1980 and 2010, increasing by 42%. The population in 5 of the 8 counties in the Lower Northwest Indiana area had an increase in population between 1980 and 2010. An increase or decrease in population within the counties in the Lower Northwest Indiana area can largely be attributed to changes in the job market and the location of jobs in the Lower Northwest 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 in emissions from vehicle miles traveled (VMT), area sources, and the demand for electricity. Generally, increases or decreases in population will result in higher or lower area source and mobile emissions. Examples of area sources that increase with higher population include 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: Lower Northwest 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
BENTON	837	11,080	505,067	436,000	-14%
CARROLL	912	24,884	640,639	631,000	-2%
CLINTON	1,001	35,091	1,229,789	1,309,000	6%
FOUNTAIN	882	20,490	666,820	699,000	5%
MONTGOMERY	1,103	40,559	1,373,823	1,342,000	-2%
TIPPECANOE	1,439	132,025	2,266,496	3,985,000	76%
WARREN	681	11,458	536,448	418,000	-22%
WHITE	1,140	30,506	1,099,881	1,363,000	24%

Table 2 illustrates that Tippecanoe County had the highest increase in daily VMT since 1980. The daily VMT for 4 of the 8 counties in the Lower Northwest 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 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 (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 somewhat offset by fleet turn-over where newer, cleaner vehicles replace older, more polluting ones.

Table 3: 2009 Lower Northwest 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	2009 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
BENTON	3,827	1,889	835	TIPPECANOE	245	TIPPECANOE	1,301
CARROLL	8,329	5,214	1,263	TIPPECANOE	302	TIPPECANOE	2,687
CLINTON	16,354	5,002	2,201	TIPPECANOE	603	TIPPECANOE	2,442
FOUNTAIN	8,250	3,493	1,527	WARREN	636	MONTGOMERY	927
MONTGOMERY	21,826	2,780	3,113	FOUNTAIN	927	TIPPECANOE	888
TIPPECANOE	91,540	4,711	17,558	CARROLL	2,687	MARION	793
WARREN	3,324	2,421	663	FOUNTAIN	282	TIPPECANOE	957
WHITE	13,069	3,873	2,226	CARROLL	772	TIPPECANOE	2,412

Information in Table 3 from 2009 demonstrates that the largest workforce in Lower Northwest Indiana is found in Tippecanoe County. Commuting patterns in Lower Northwest Indiana center on the cities of Lafayette and West Lafayette in Tippecanoe County. Since Tippecanoe County has the highest population and the highest commuting pattern to and from the county, emissions within Tippecanoe County are expected to be higher than surrounding counties in the Lower Northwest Indiana area. The Lower Northwest Indiana area commuting patterns reflect that of many urban areas around the country. The largest employment county is Tippecanoe 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 Lower Northwest Indiana 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 Lower Northwest 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 heavy 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 heavy 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 56% reduction in CO emissions are expected by 2020.

Regional Controls

Nitrogen Oxides (NO_x) Rule

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

Twenty-one other states also adopted this rule. 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, the 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). IDEM'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 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 pending 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 Lower Northwest 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.

Lower Northwest 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_2, PM_{10}, SO_2, and VOC. These emission estimates are reflective of U.S. EPA methodologies found in the National Emissions Inventory (NEI) Air Pollutant Emissions Trends Data. Some of the fluctuations found in the trends inventory are due to U.S. EPA not incorporating state reported data until after the submission of the 1996 Periodic Emission Inventory[1]. Further, U.S. EPA acknowledges that changes over time may be attributable to changes in how inventories were compiled[2].

The emissions have been broken down into contributions from the following individual source categories: point sources (including electric generating units (EGUs)), area sources, onroad sources, and nonroad sources. There is one small municipal EGU facility in the Lower Northwest Indiana area. The facility is not one of the top ten

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

emitters in the area. Emissions data for each county in Lower Northwest 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.

Onroad Sources

Onroad sources include cars and light and heavy duty trucks.

Nonroad Sources

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

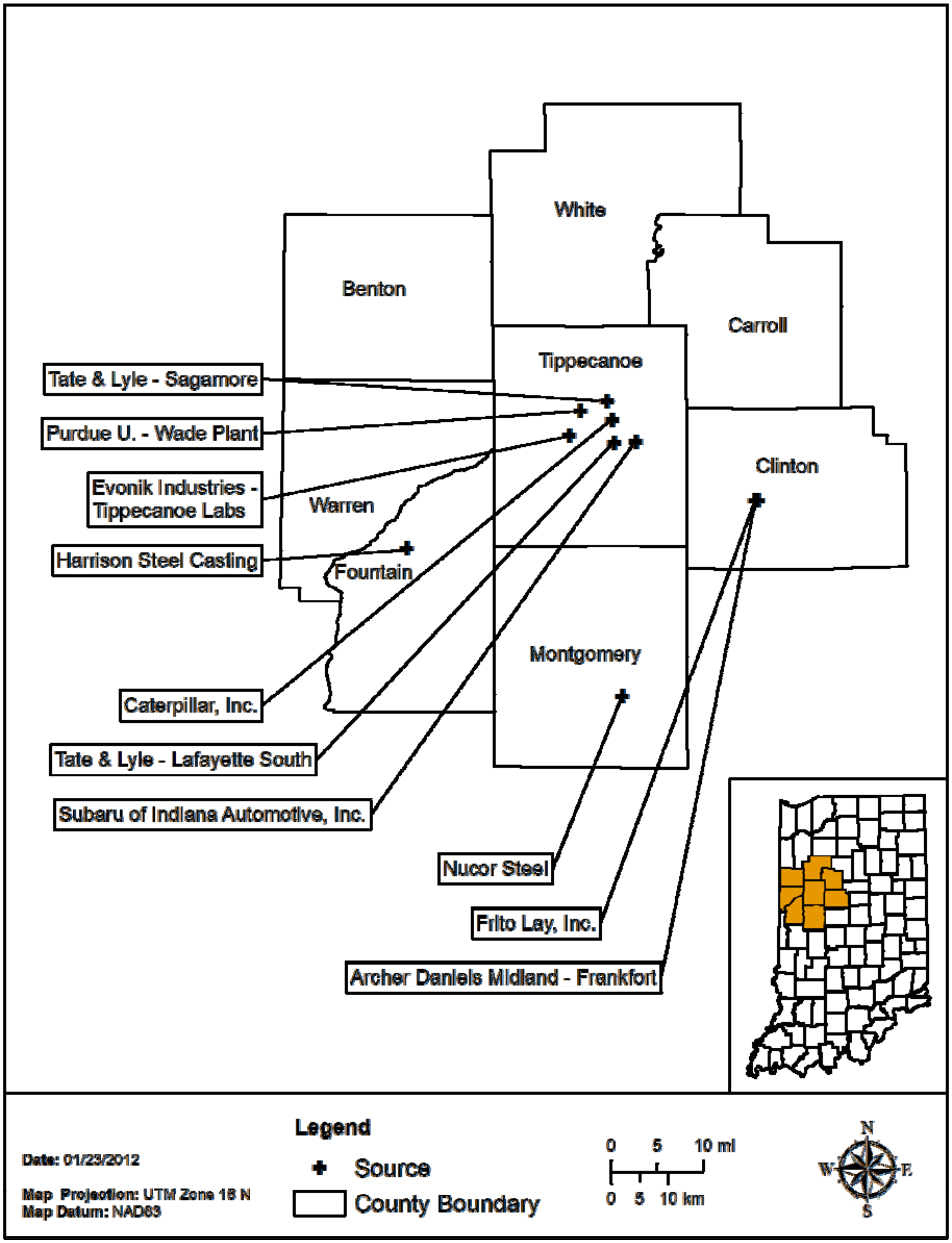
Top Ten Emission Sources

Table 4 represents the top ten sources in tons per year of emissions for the Lower Northwest Indiana area. Sources includes coal-fired boilers at a local university, a corn wet milling processor, and a steel manufacturing facility. Air quality in the Lower Northwest 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 Lower Northwest Indiana area.

Table 4: Lower Northwest 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	TIPPECANOE	TATE & LYLE, LAFAYETTE SOUTH (33)	258.4	508.1	454.0	93.2	2,135.1	931.3	4,380.0
2010	TIPPECANOE	PURDUE UNIVERSITY – WADE UTILITY PLANT	312.7	680.3	290.7	178.3	2,151.5	7.2	3,620.8
2010	TIPPECANOE	EVONIK INDUSTRIES – TIPPECANOE LABS	134.7	456.1	241.1	128.8	1,920.7	48.9	2,930.3
2010	TIPPECANOE	TATE & LYLE SAGAMORE OPERATION	86.0	593.2	234.5	86.9	1,050.7	345.5	2,396.9
2010	MONTGOMERY	NUCOR STEEL	1,237.2	256.0	252.7	246.7	292.5	44.9	2,330.1
2010	TIPPECANOE	SUBARU OF INDIANA AUTOMOTIVE, INC.	30.5	36.3	7.0	7.0	0.2	708.8	789.8
2010	CLINTON	ADM FRANKFORT	46.9	63.5	120.3	41.1	78.5	249.5	599.6
2010	TIPPECANOE	CATERPILLAR INC.	65.2	342.4	5.4	4.9	22.0	39.4	479.3
2010	FOUNTAIN	HARRISON STEEL CASTING	114.9	21.8	68.9	62.3	7.5	181.9	457.3
2010	CLINTON	FRITO-LAY, INC.	67.0	124.4	54.6	47.2	117.9	6.1	417.2

Figure 2: Map of Lower Northwest 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 Lower Northwest Indiana area 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 across the state are well below the new 1-hour NO_2 NAAQS. There are no monitors in the Lower Northwest Indiana area that measure NO_2. The 1-hour SO_2 monitoring data in Lower Northwest Indiana is currently above the new 1-hour SO_2 NAAQS.

Air Monitoring and Emissions Data

Not all counties in the Lower Northwest Indiana area have an ambient air quality monitor located within the county boundaries. Monitoring data for the years 2000 through 2010 for Lower Northwest 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 VOCs. 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 Lower Northwest Indiana 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 Lower Northwest Indiana and Chart 1 shows how the average emissions are distributed among the different source categories. CO emissions in the Lower Northwest Indiana area have been trending downward over time. If monitoring data for CO were available in the Lower Northwest Indiana area, it is expected that monitor values would be trending downward as well.

Graph 1: Lower Northwest Indiana CO Emissions

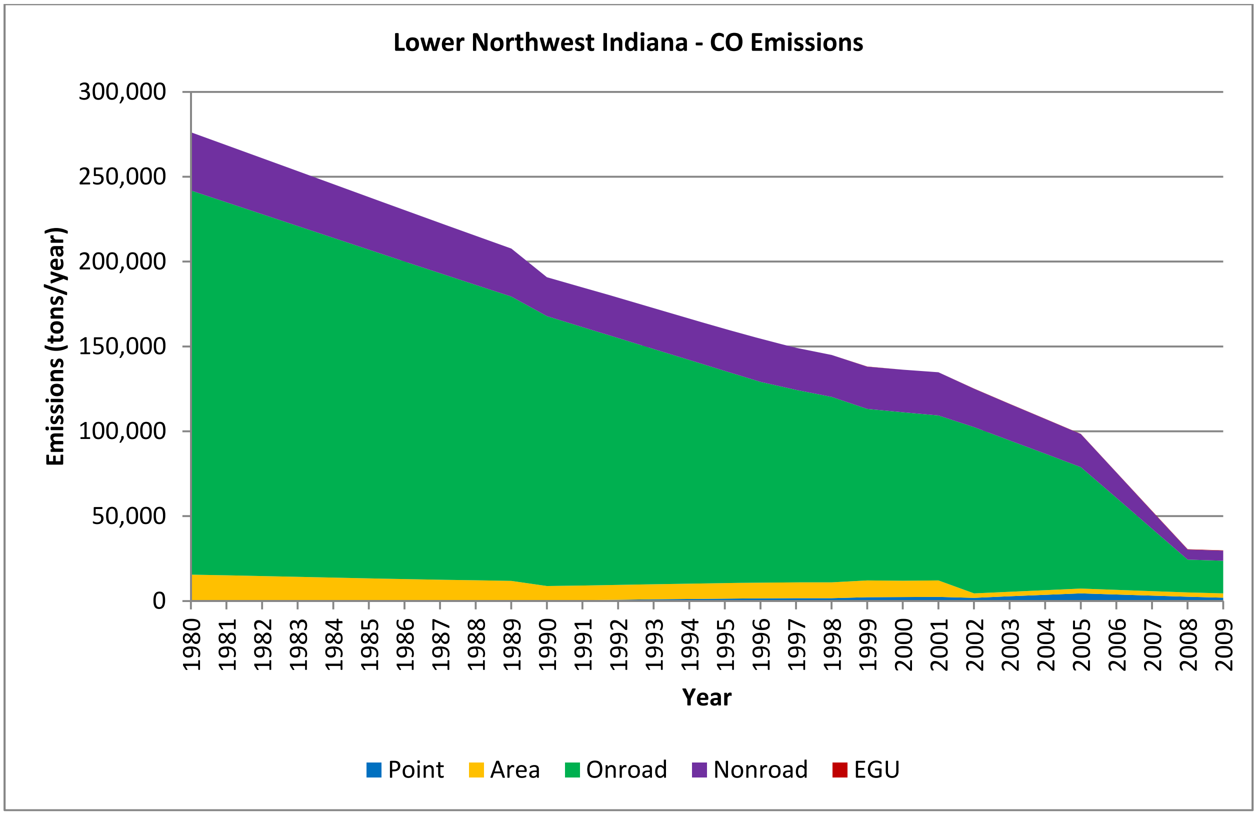
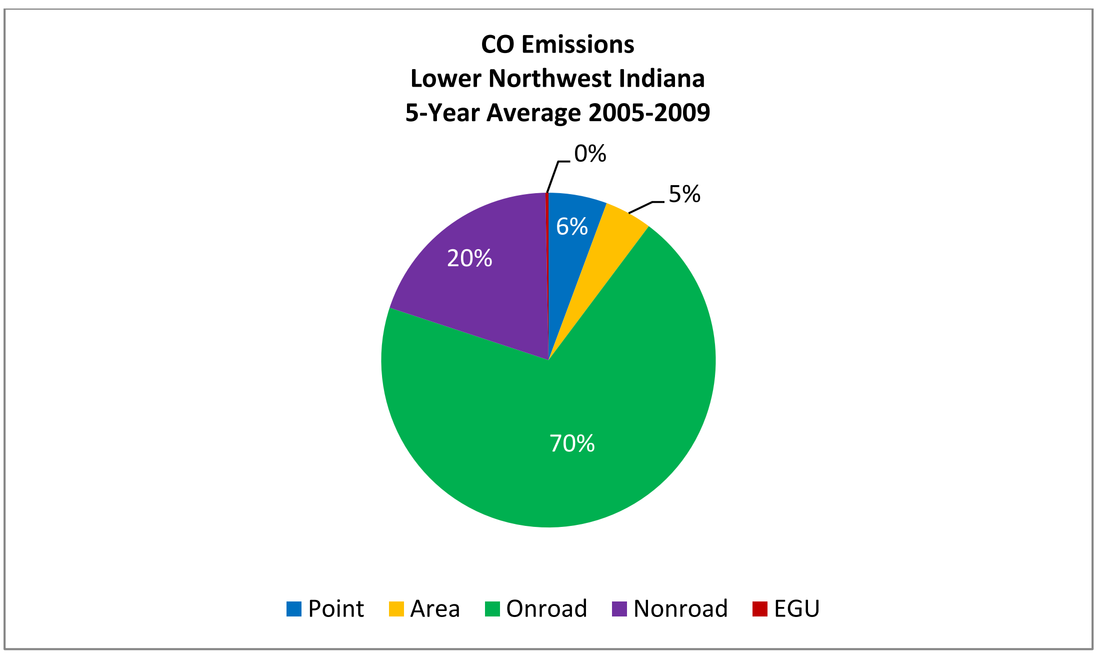


Chart 1: Lower Northwest Indiana CO Emissions



National controls have led to a decrease in CO emissions in the Lower Northwest Indiana area. As Graph 1 illustrates, CO emissions have decreased by 89% within the Lower Northwest 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 ($PM_{2.5}$)

There is one monitoring site within Lower Northwest Indiana, located in Tippecanoe County that measures $PM_{2.5}$ levels. The trend data in Graphs 2 and 4 reflect the annual arithmetic mean (the method used to derive the central tendency of the monitoring values) for annual $PM_{2.5}$ and the 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 the Lower Northwest Indiana area 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 ($\mu g/m^3$), as well as the primary and secondary 24-hour $PM_{2.5}$ standards of 35 $\mu g/m^3$, but the annual arithmetic mean and 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 $\mu g/m^3$. U.S. EPA revised the primary and secondary 24-hour $PM_{2.5}$ standards and lowered them to 35 $\mu g/m^3$ in October 2006.

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

The trend data in Graph 3 reflect the three-year design value of the annual arithmetic mean for annual $PM_{2.5}$ for each year in the Lower Northwest Indiana area for the years 2000 through 2010. The trend data in Graph 5 reflect the three-year design value of the 98^{th} percentile values for 24-hour $PM_{2.5}$ for each year in the Lower Northwest 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 $\mu g/m^3$; 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 Lower Northwest Indiana area is plotted on the graph for each year.

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

The data in Tables 5, 6, 7, and 8 are from the monitoring sites that measured annual and 24-hour $PM_{2.5}$ from 2000 to 2010. Statewide monitoring for $PM_{2.5}$ began in 2000; all available data for both annual and 24-hour $PM_{2.5}$ for the Lower Northwest 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 at 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 at 35 µg/m^3.

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

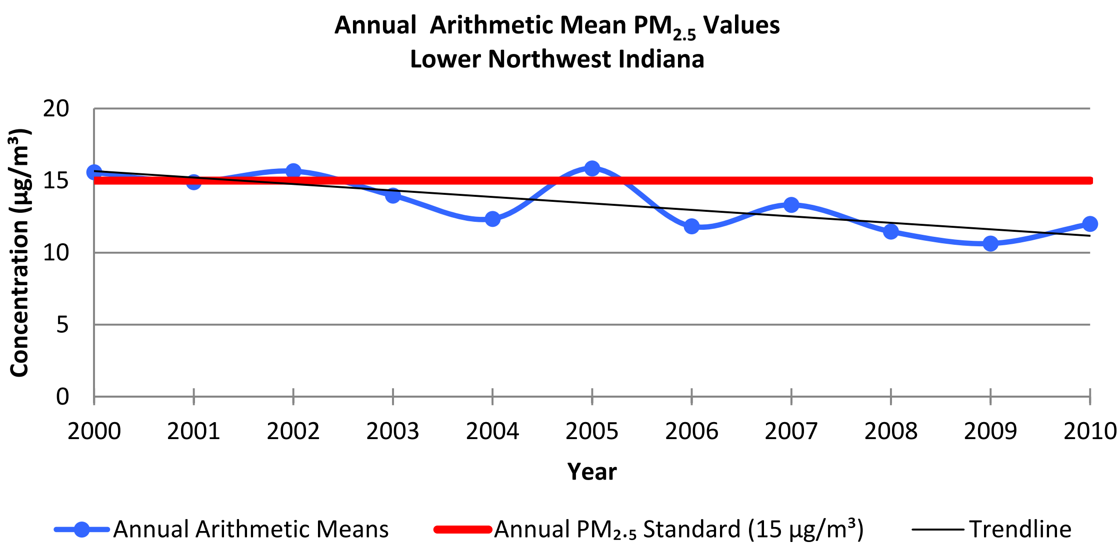


Table 5: Lower Northwest Indiana Annual Arithmetic Mean $PM_{2.5}$ Monitoring Data Summary

County	Site #	Site Name	Annual Arithmetic Mean (µg/m³)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Tippecanoe	181570007	Lafayette - Fire Station	15.58	14.90	15.66								
Tippecanoe	181570008	Lafayette - Greenbush St			14.07	13.97	12.35	15.85	11.83	13.32	11.47	10.64	12.00

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

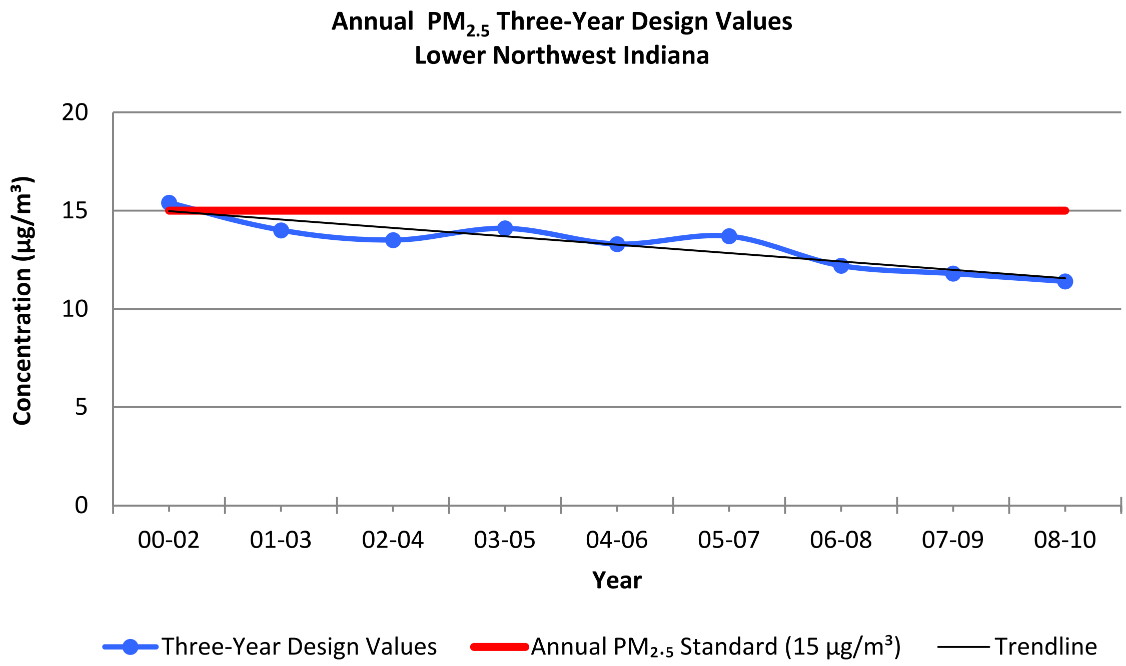


Table 6: Lower Northwest Indiana Annual $PM_{2.5}$ Three-Year Design Value Monitoring Data Summary

County	Site #	Site Name	Three-Year Design Value ($\mu g/m^3$)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Tippecanoe	181570007	Lafayette - Fire Station	15.4								
Tippecanoe	181570008	Lafayette - Greenbush St	14.1	14.0	13.5	14.1	13.3	13.7	12.2	11.8	11.4

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

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

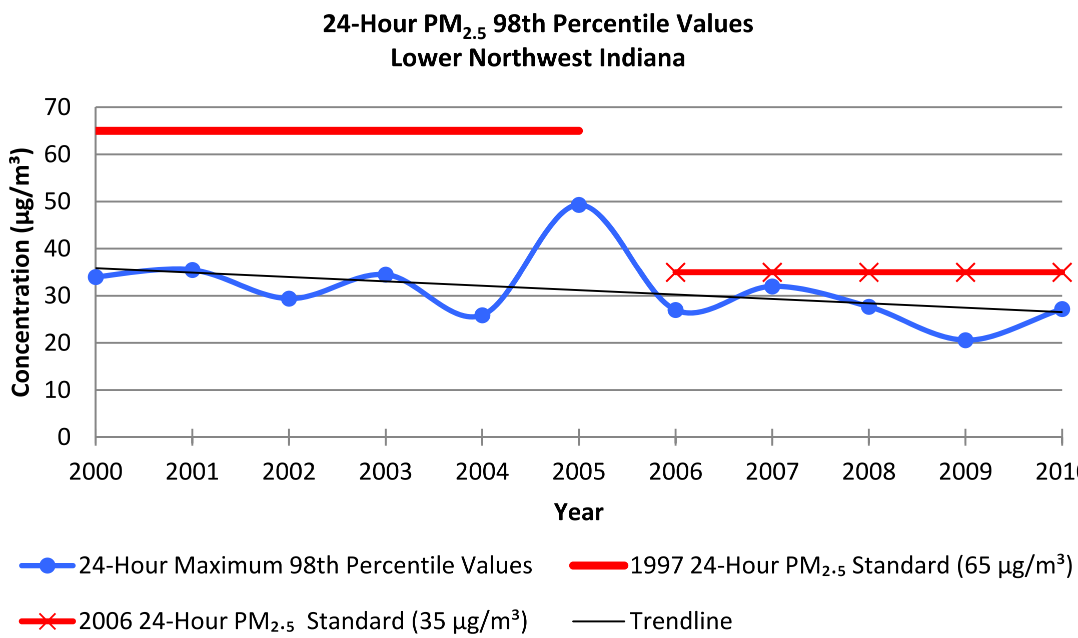


Table 7: Lower Northwest Indiana 24-Hour $PM_{2.5}$ 98th Percentile Value Monitoring Data Summary

County	Site #	Site Name	Daily 98th Percentile Values (µg/m³)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Tippecanoe	181570007	Lafayette - Fire Station	34.0	35.5	27.7								
Tippecanoe	181570008	Lafayette - Greenbush Street			29.4	34.5	26.4	49.3	27.0	32.0	27.7	20.6	27.2

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

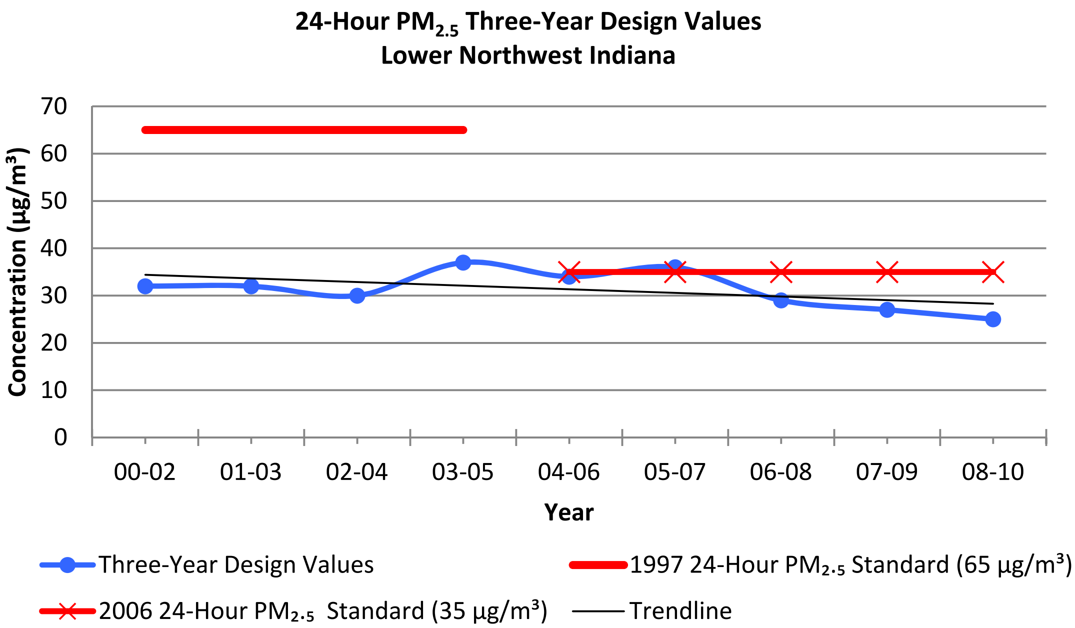


Table 8: Lower Northwest Indiana 24-Hour $PM_{2.5}$ Three-Year Design Value Monitoring Data Summary

County	Site #	Site Name	Three-Year Design Value ($\mu g/m^3$)								
			00-02	01-03	02-04	03-05	04-06	05-07	06-08	07-09	08-10
Tippecanoe	181570007	Lafayette - Fire Station	32								
Tippecanoe	181570008	Lafayette - Greenbush Street	29	32	30	37	34	36	29	27	25
			Prior to 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 65.0 $\mu g/m^3$								
			Beginning in 2006, highlighted red numbers are above the 24-hour $PM_{2.5}$ standard of 35.0 $\mu g/m^3$								

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. Annual and 24-hour $PM_{2.5}$ values in the Lower Northwest Indiana area were above the primary and secondary annual $PM_{2.5}$ standards and the primary and secondary 24-hour $PM_{2.5}$ standards until the end of 2002 and 2007, but have remained below the standards since then. $PM_{2.5}$ is influenced by meteorology (wind speed, temperature, stagnant air, etc.). Meteorological conditions can have an episodic effect on $PM_{2.5}$ concentrations as 2005 (Graphs 2, 3, 4, and 5), when three of the four quarters of the year had high $PM_{2.5}$ values which drove the annual $PM_{2.5}$ values higher for the year. The annual value is calculated from the average of the year's four quarterly averages. A quarterly average is the average of all available data from the respective quarter. The upper Midwest experienced several episodes of unusually high $PM_{2.5}$ concentrations in 2005 caused by unusual confluences of meteorological factors. Several times during 2005 high pressure systems were held in place by jet streams which lead to a persistent, highly stable atmosphere with calm winds. Atmospheric mixing was suppressed and pollutants that form $PM_{2.5}$ were trapped near the surface and high values were measured. The longest and most wide spread episode happened during the first week of February 2005 which lasted for nine days and affected the upper Midwest and southern Ontario where $PM_{2.5}$ daily values exceeded 70 $\mu g/m^3$.

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

Graph 6: Lower Northwest Indiana $PM_{2.5}$ Emissions

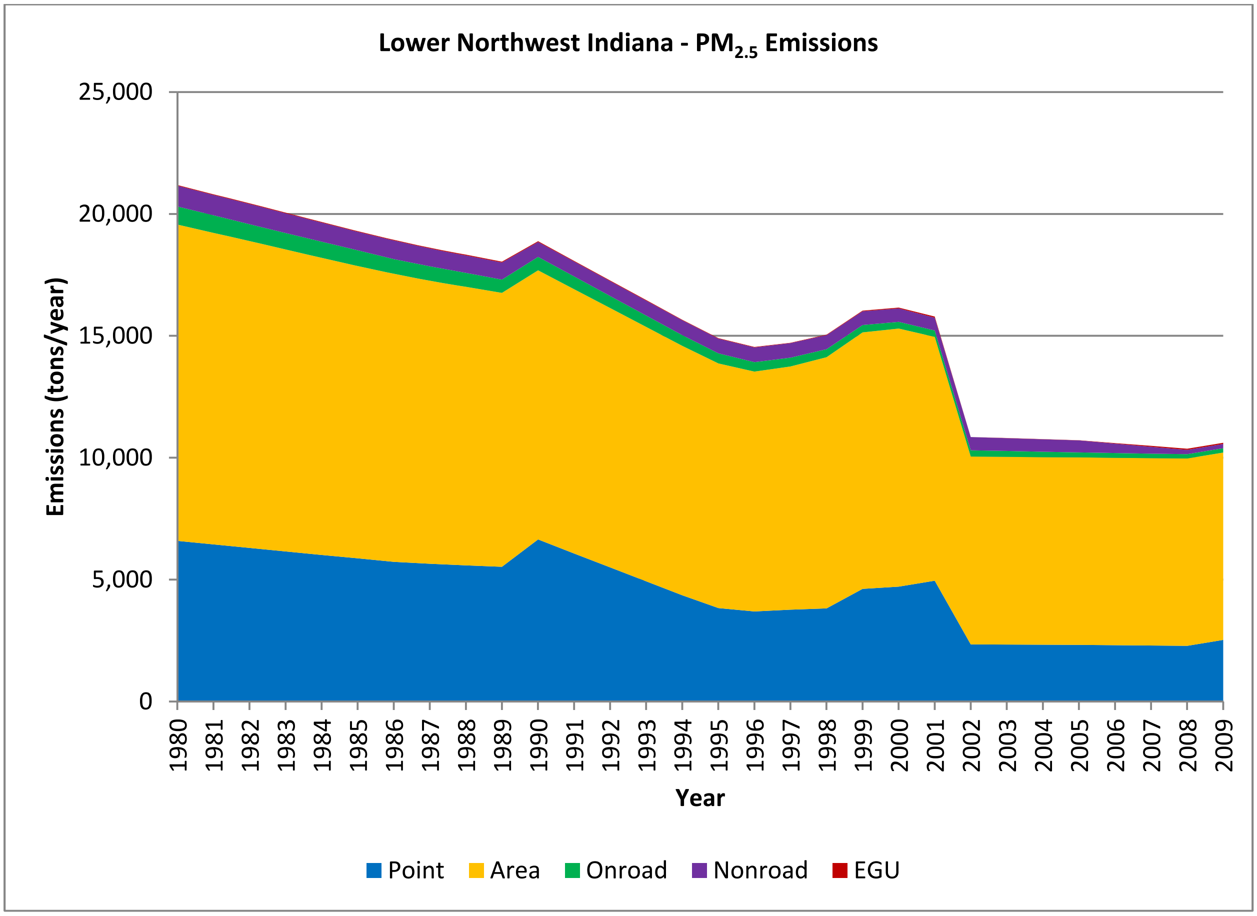
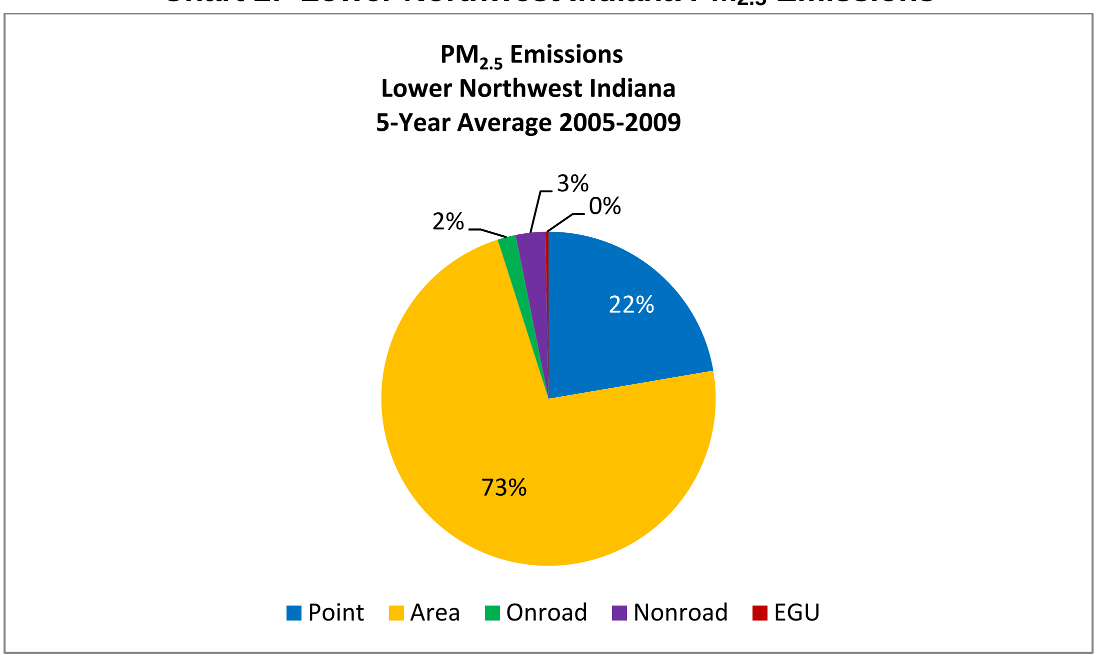


Chart 2: Lower Northwest Indiana $PM_{2.5}$ Emissions



Graph 7: Lower Northwest Indiana SO_2 Emissions

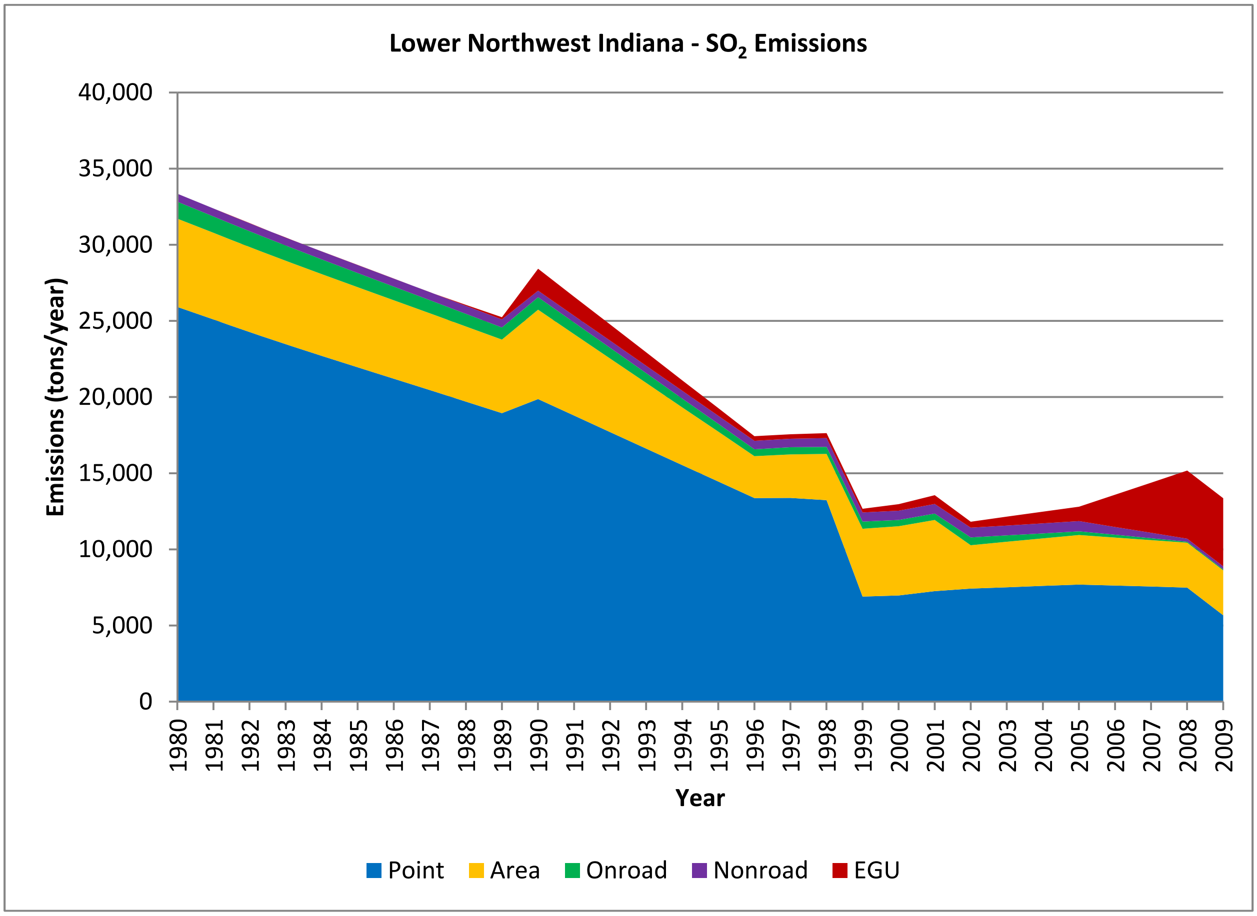
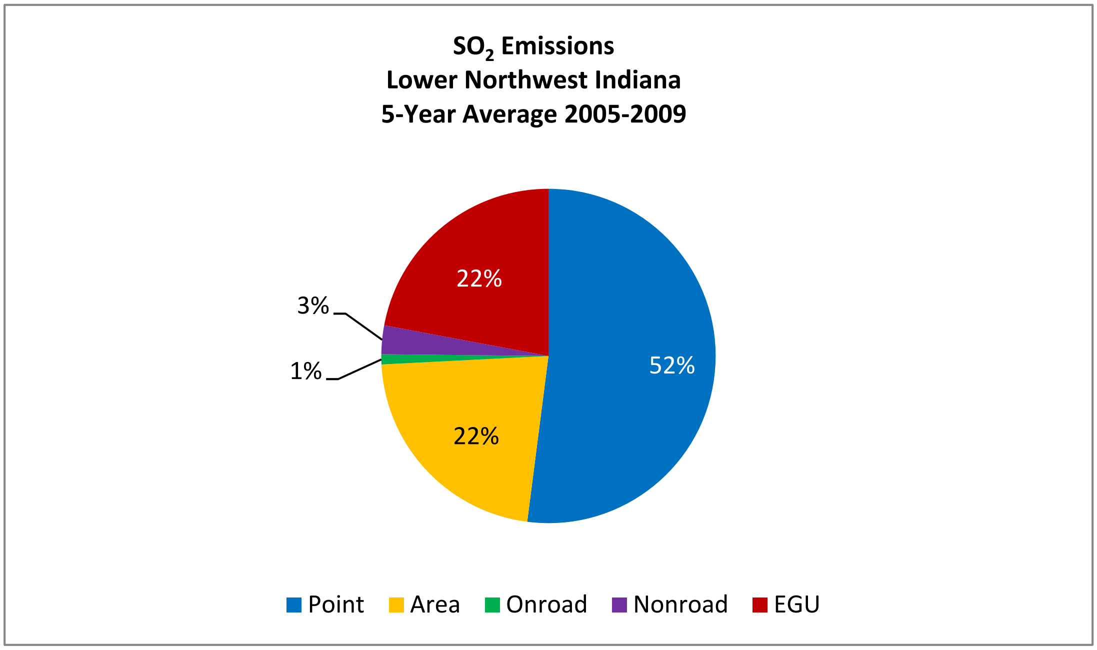


Chart 3: Lower Northwest Indiana SO_2 Emissions



Graph 8: Lower Northwest Indiana NO_x Emissions

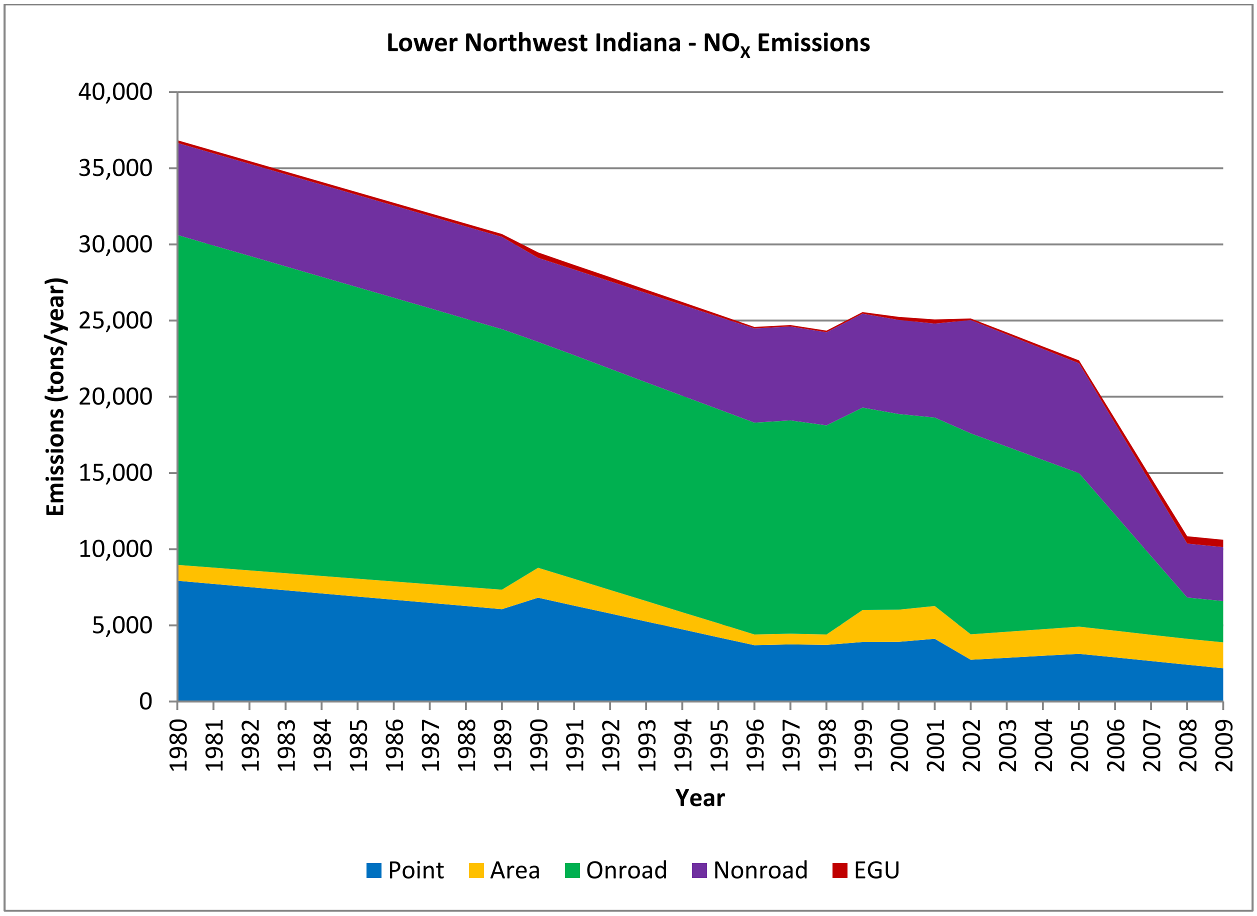
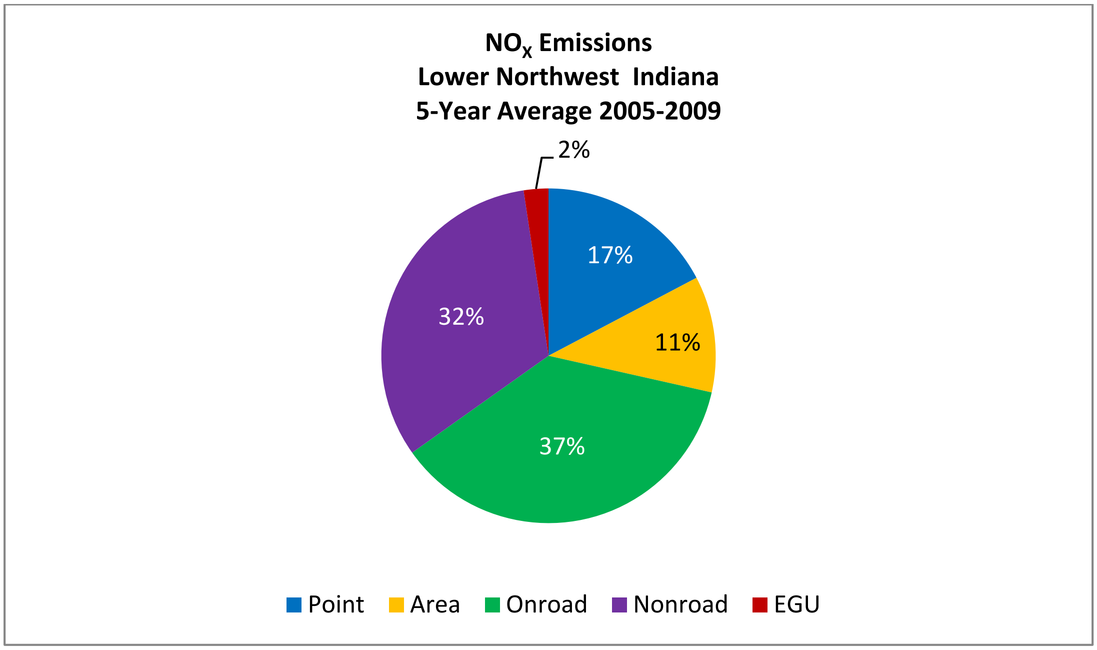


Chart 4: Lower Northwest Indiana NO_x Emissions



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 50%, 60%, and 71%, respectively, within the Lower Northwest 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 Lower Northwest Indiana area that measure NO_2 levels. U.S. EPA's NEI contains emissions information for NO_x and is used for Graph 9 and Chart 5. NO_x emissions data are used as a surrogate for NO_2 in conjunction with the NO_2 NAAQS. Graph 9 illustrates the emissions trend for NO_x in Lower Northwest Indiana and Chart 5 shows how the average emissions are distributed among the different source categories. NO_x emissions in the Lower Northwest Indiana area have been trending downward over time. If monitoring data for NO_2 were available in the Lower Northwest Indiana area, it is expected that monitor values would be trending downward as well.

Graph 9: Lower Northwest Indiana NO_x Emissions

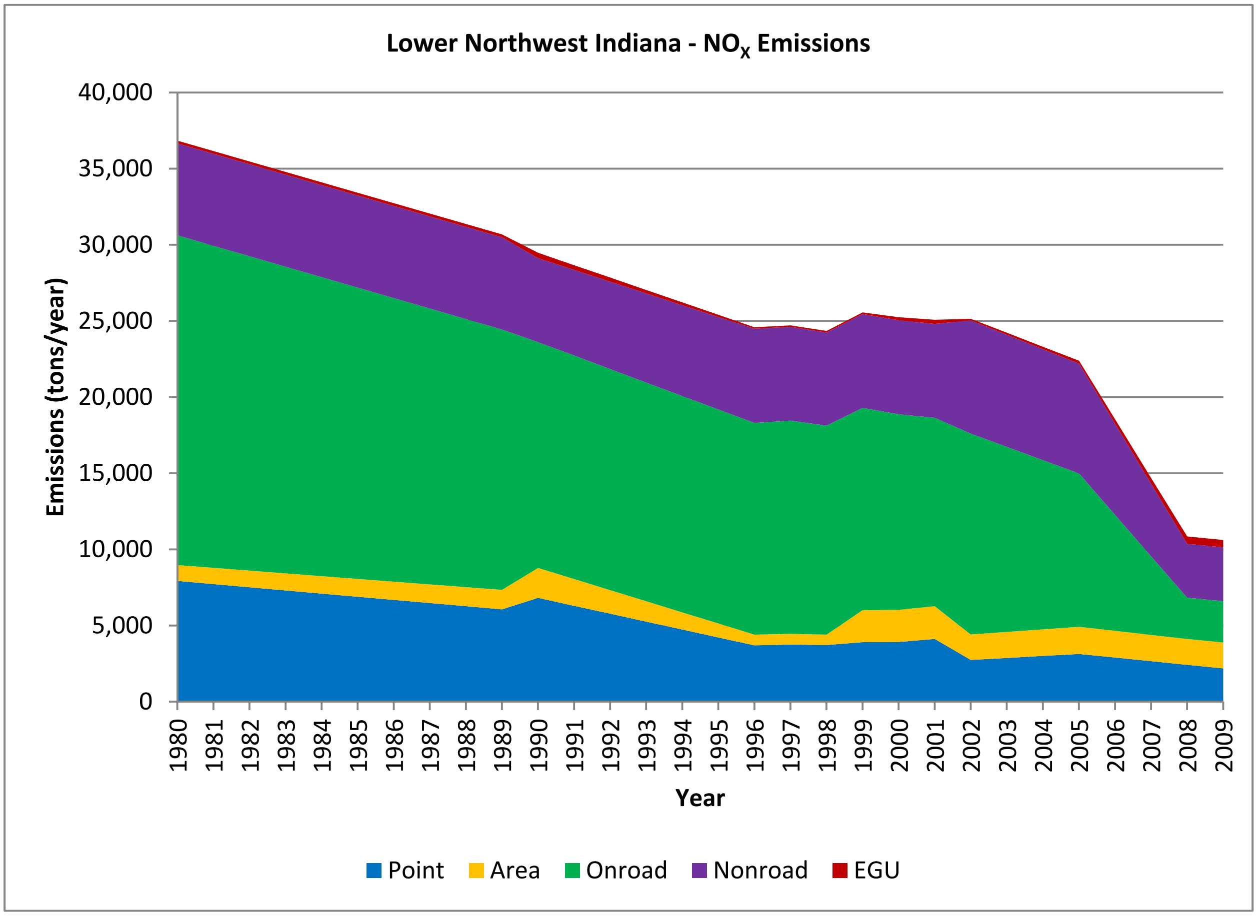
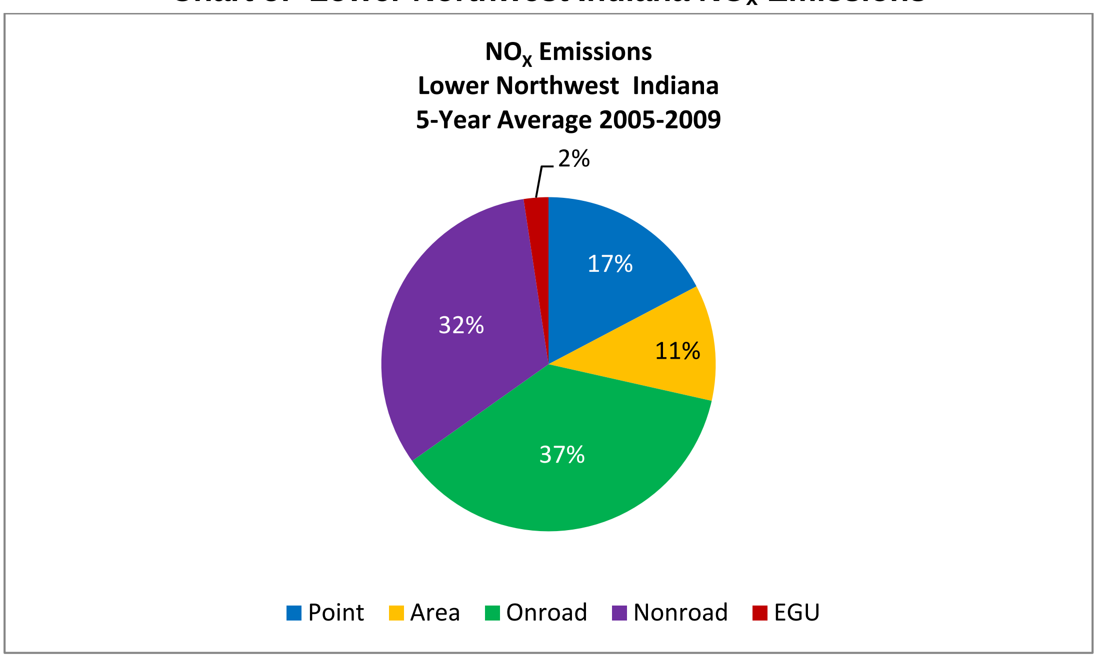


Chart 5: Lower Northwest Indiana NO_x Emissions



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 9 illustrates, NO_x emissions have decreased by 71% within the Lower Northwest 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

There is one monitoring site within Lower Northwest Indiana that measures ozone levels. This monitor is located in Carroll County. 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 10 reflect the 4^{th} highest monitored concentration for 1-hour ozone within a given three-year period from the monitoring site located in Carroll County. 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 11 reflect the 4^{th} high and the highest 4^{th} high concentration for 8-hour ozone from the monitor in the Lower Northwest 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 11 are not a true comparison to the primary and secondary 8-hour ozone standards.

The values in Graph 12 reflect the design value of the three-year average of the 4th highest 8-hour ozone values from the monitor in the Lower Northwest Indiana area for each year.

The data in Tables 9 and 10 are from the monitor in the Lower Northwest Indiana area that measured 1-hour ozone from 2000 through 2010. Monitoring data in Table 9 show the four highest annual concentrations for 1-hour ozone for the years 2000 through 2010. Monitoring data in Table 10 show the 4th highest concentration for 1-hour ozone in a three year period for the years 2000 through 2010. The data in Tables 11 and 12 are from the monitor in the Lower Northwest Indiana area that measured 8-hour ozone from 2000 through 2010. Monitoring data in Table 11 show the 4th highest concentration for 8-hour ozone in a three-year period for the years 2000 through 2010. Monitoring data in Table 12 show the design value of the three 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: Lower Northwest 1-Hour Ozone Annual 4th High Value Monitoring Data Summary

			1-Hour Ozone Value (ppm)											
County	**Site #**	**Site Name**	**1st High 2000**	**2nd High 2000**	**3rd High 2000**	**4th High 2000**	**1st High 2001**	**2nd High 2001**	**3rd High 2001**	**4th High 2001**	**1st High 2002**	**2nd High 2002**	**3rd High 2002**	**4th High 2002**
Carroll	180150002	Flora					0.097	0.093	0.092	0.090	0.109	0.107	0.106	0.103
			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**
Carroll	180150002	Flora	0.091	0.089	0.084	0.084	0.082	0.080	0.076	0.076	0.084	0.084	0.082	0.082
			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**
Carroll	180150002	Flora	0.080	0.080	0.079	0.078	0.092	0.090	0.085	0.084	0.081	0.075	0.073	0.073
			1st High 2009	**2nd High 2009**	**3rd High 2009**	**4th High 2009**	**1st High 2010**	**2nd High 2010**	**3rd High 2010**	**4th High 2010**				
Carroll	180150002	Flora	0.077	0.070	0.069	0.069	0.087	0.084	0.079	0.077				

Graph 10: Lower Northwest Indiana 1-Hour Ozone 4th Highest Value in Three-Year Period

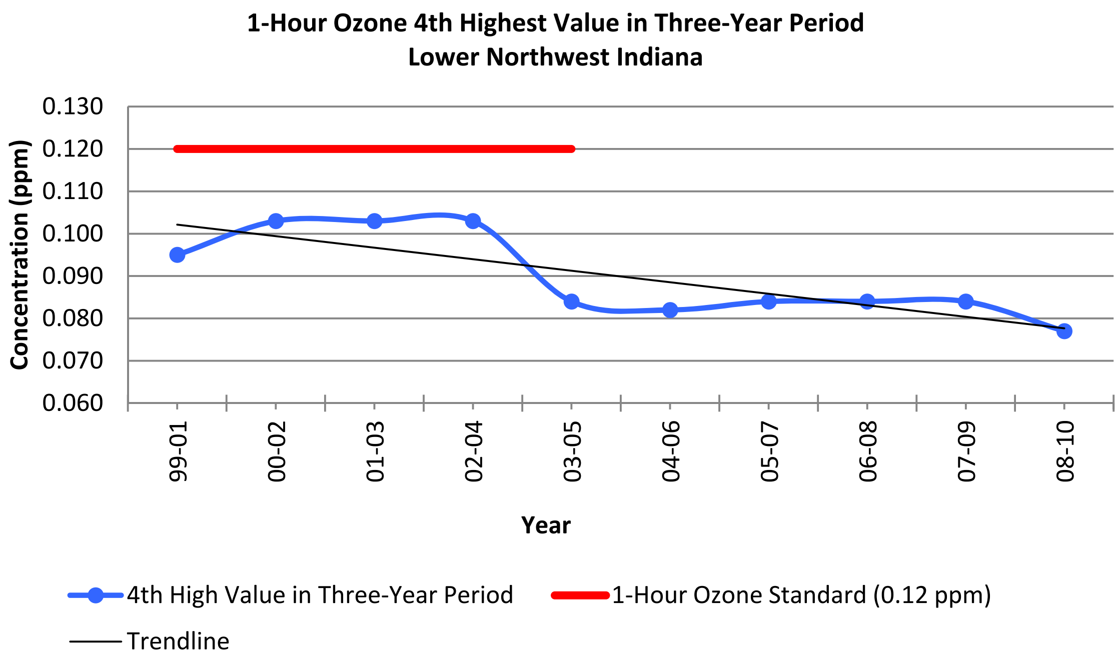


Table 10: Lower Northwest Indiana 1-Hour Ozone 4th High Value in Three-Year Period Monitoring Data Summary

			4th High Value in Three-Year Period (ppm)								
County	**Site #**	**Site Name**	**00-02**	**01-03**	**02-04**	**03-05**	**04-06**	**05-07**	**06-08**	**07-09**	**08-10**
Carroll	180150002	Flora		0.103	0.103	0.084	0.082	0.084	0.084	0.084	0.077

Graph 11: Lower Northwest Indiana 8-Hour Ozone 4th High Values

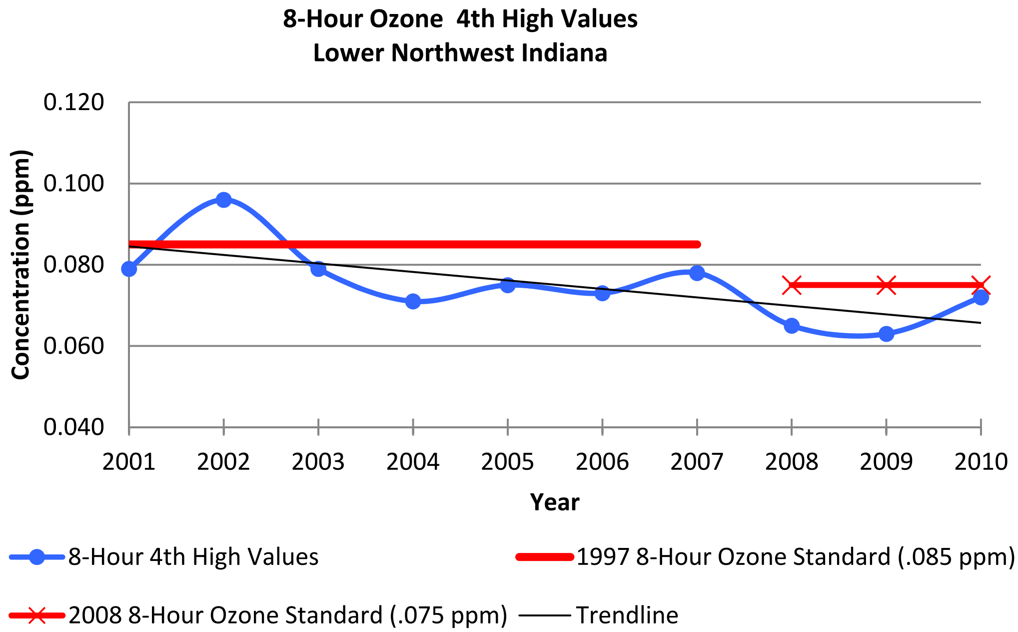


Table 11: Lower Northwest Indiana 8-Hour Ozone 4th High Values Monitoring Data Summary

County	Site #	Site Name	4th Highest Ozone Value (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Carroll	180150002	Flora		0.079	0.096	0.079	0.071	0.075	0.073	0.078	0.065	0.063	0.072

Graph 12: Lower Northwest Indiana 8-Hour Ozone Three-Year Design Values

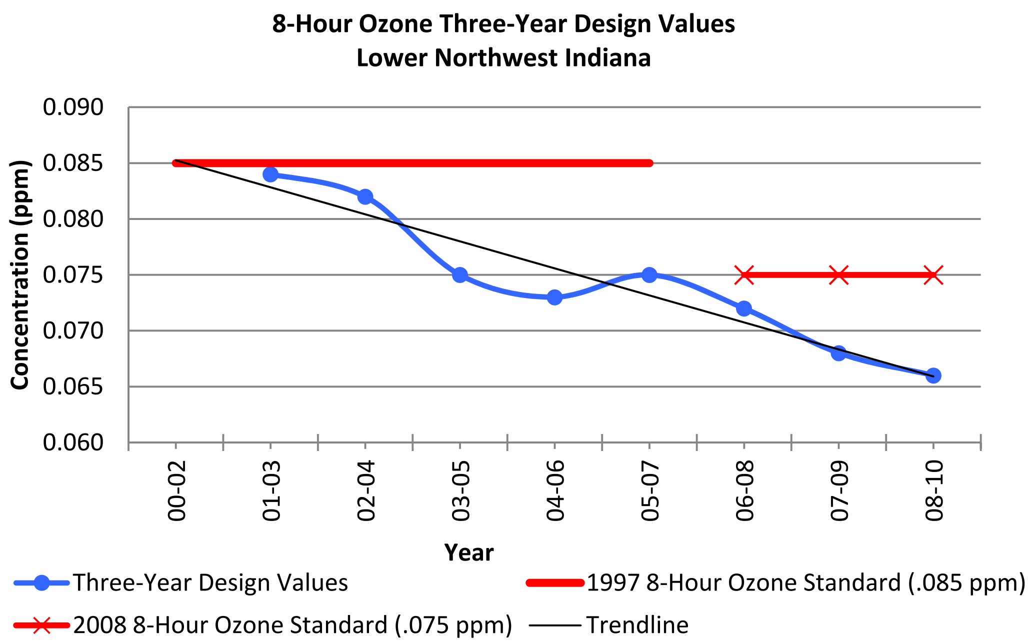


Table 12: Lower Northwest Indiana 8-Hour Ozone Three-Year Design Value Monitoring Data Summary

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
Carroll	180150002	Flora		0.084	0.082	0.075	0.073	0.075	0.072	0.068	0.066
			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 can be seen in Graphs 10, 11, and 12, 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 2002, 2005, 2007, and 2010 shown in Graph 11 can be traced back to high temperatures and stagnant weather conditions during the ozone seasons of those years.

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 13 and 14 illustrate the emissions trend for the ozone precursors in Lower Northwest Indiana and Charts 6 and 7 shows how the average emissions are distributed among the different source categories.

Graph 13: Lower Northwest Indiana NO_x Emissions

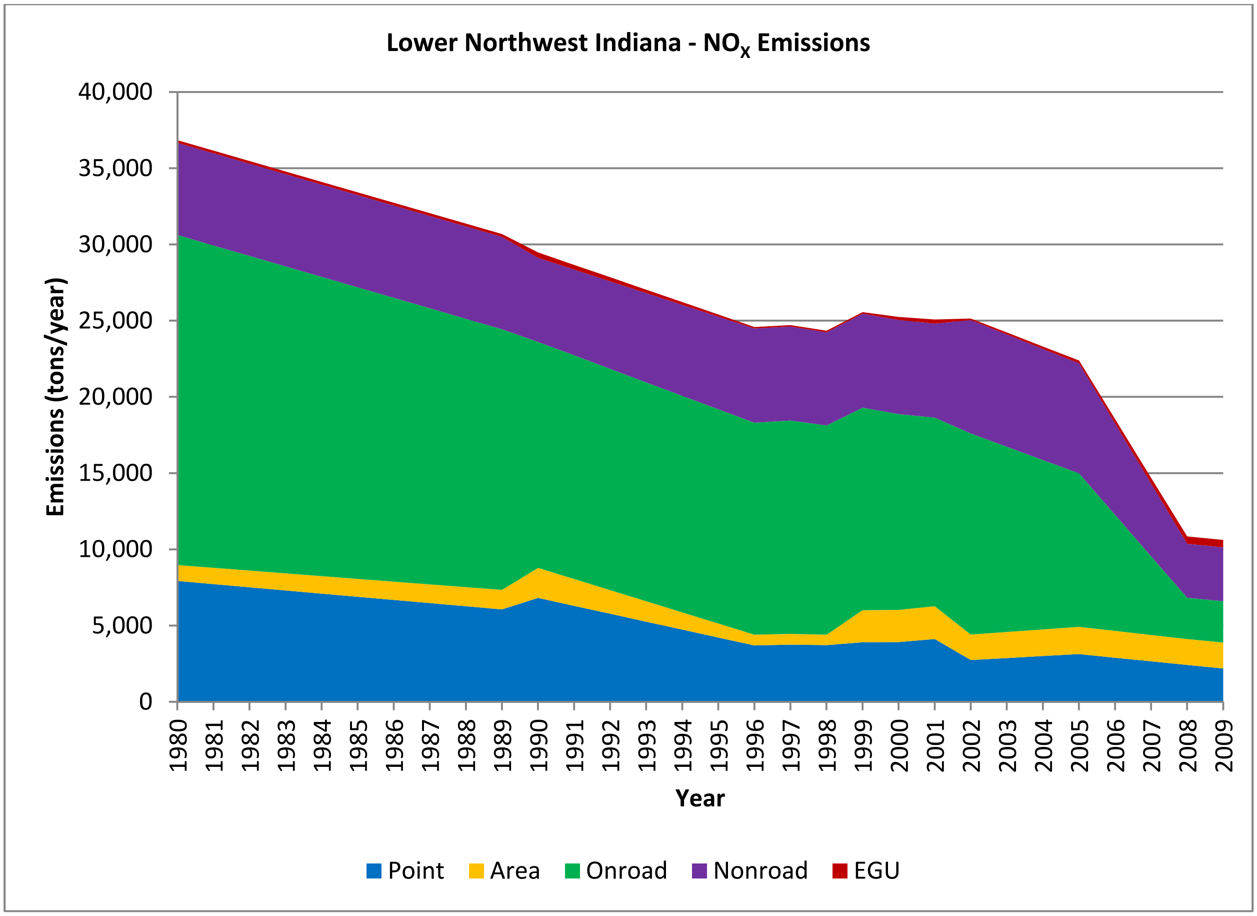
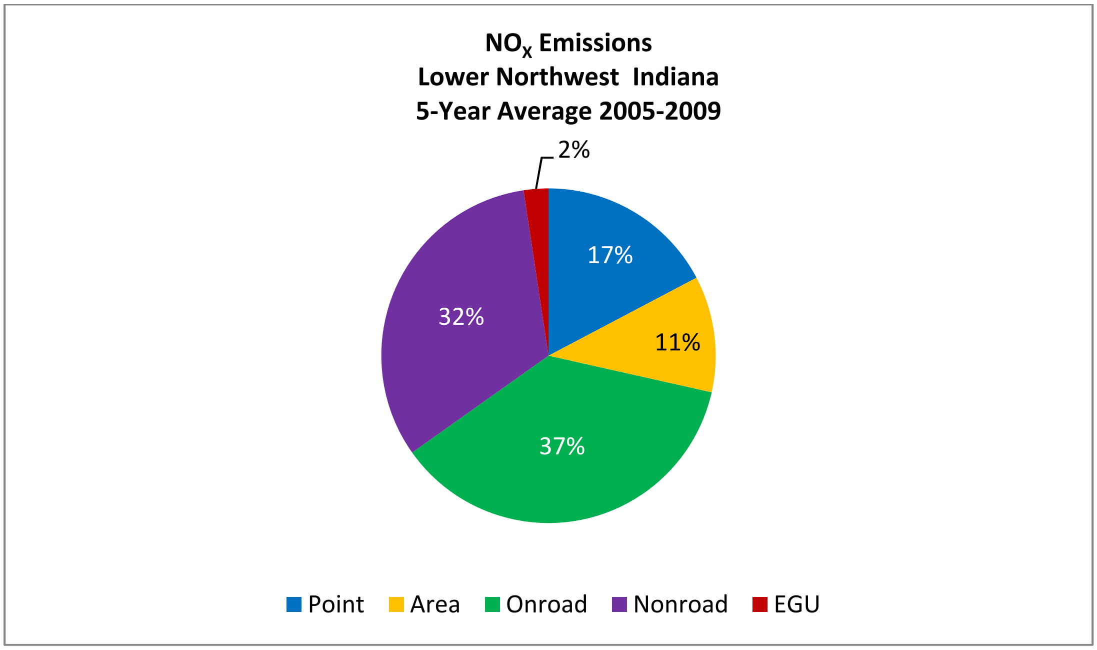


Chart 6: Lower Northwest Indiana NO_x Emissions



Graph 14: Lower Northwest Indiana VOC Emissions

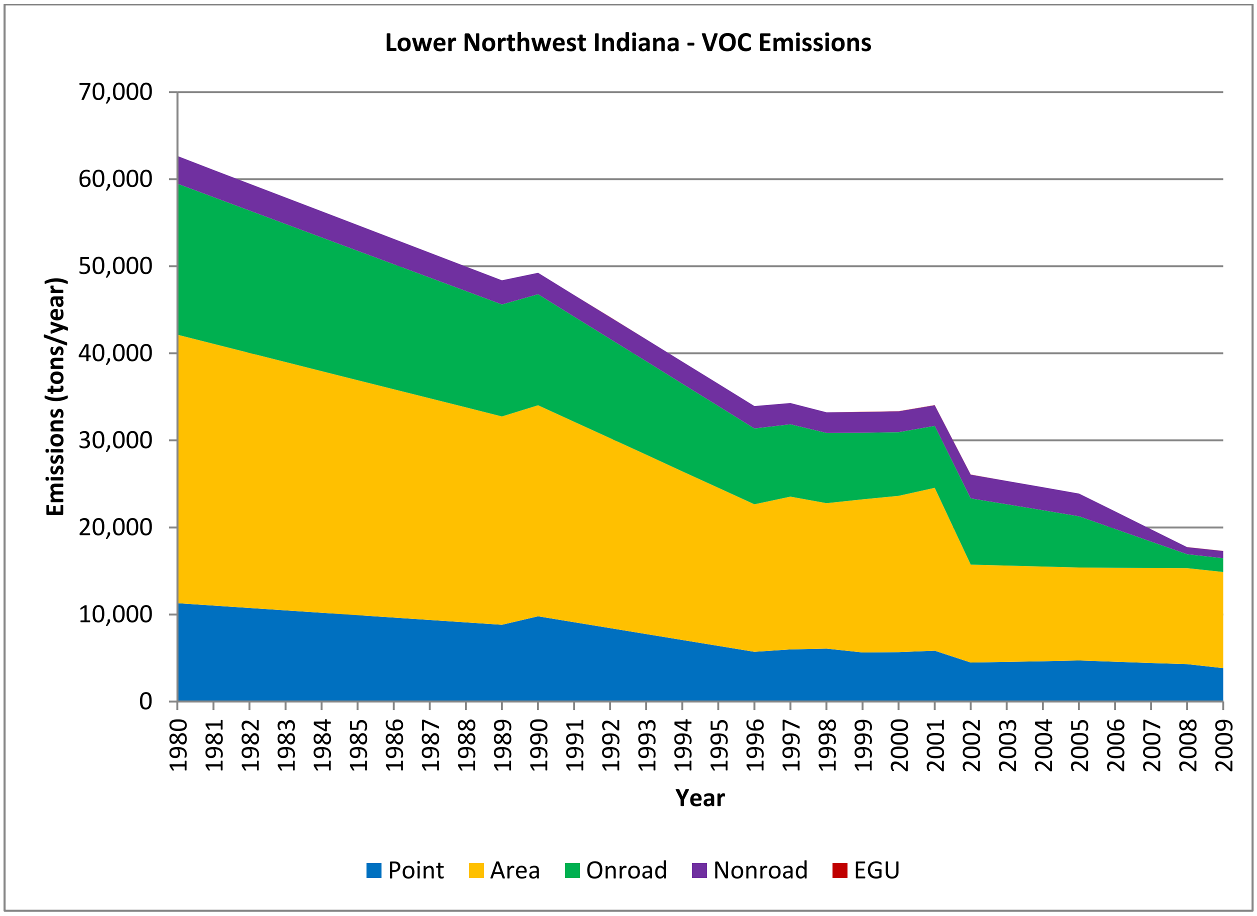
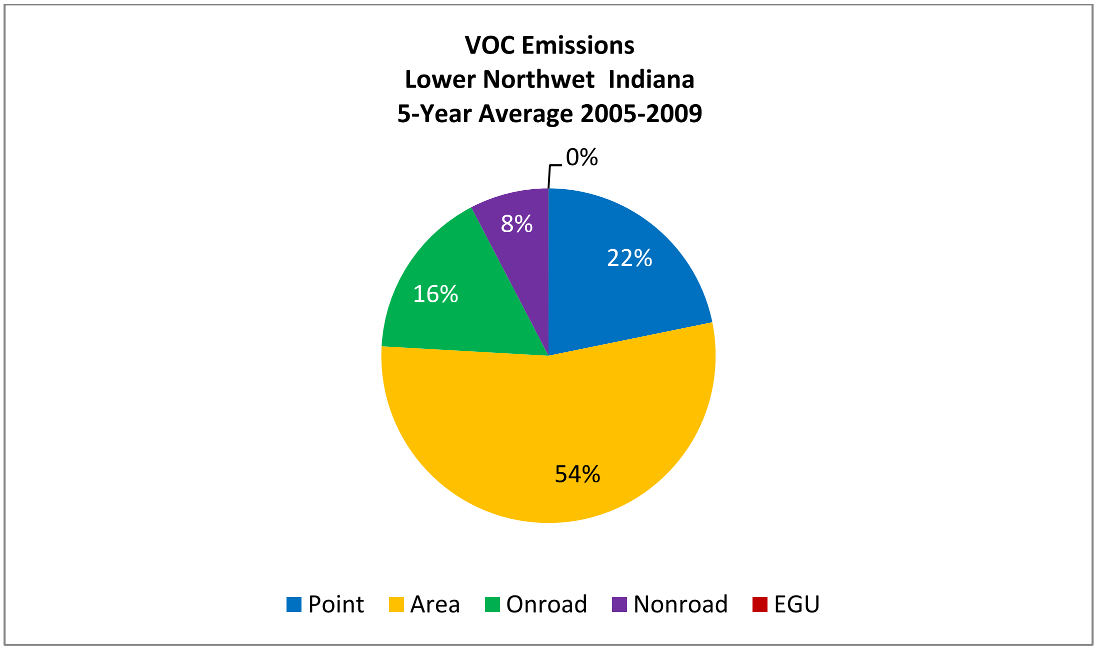


Chart 7: Lower Northwest Indiana VOC Emissions



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 13 and 14 illustrate, NO_x and VOC emissions have decreased by 71% and 72%, respectively, within the Lower Northwest 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 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 Lower Northwest Indiana area that measure PM_{10} levels. U.S. EPA's NEI contains emissions information for PM_{10} and is used in Graph 15 and Chart 8. Graph 15 illustrates the emissions trend for PM_{10} in Lower Northwest Indiana and Chart 8 shows how the average emissions are distributed among the different source categories. PM_{10} emissions in the Lower Northwest Indiana area have been trending downward over time. If monitoring data for PM_{10} were available in the Lower Northwest Indiana area, it is expected that monitor values would be trending downward as well.

Graph 15: Lower Northwest Indiana PM_{10} Emissions

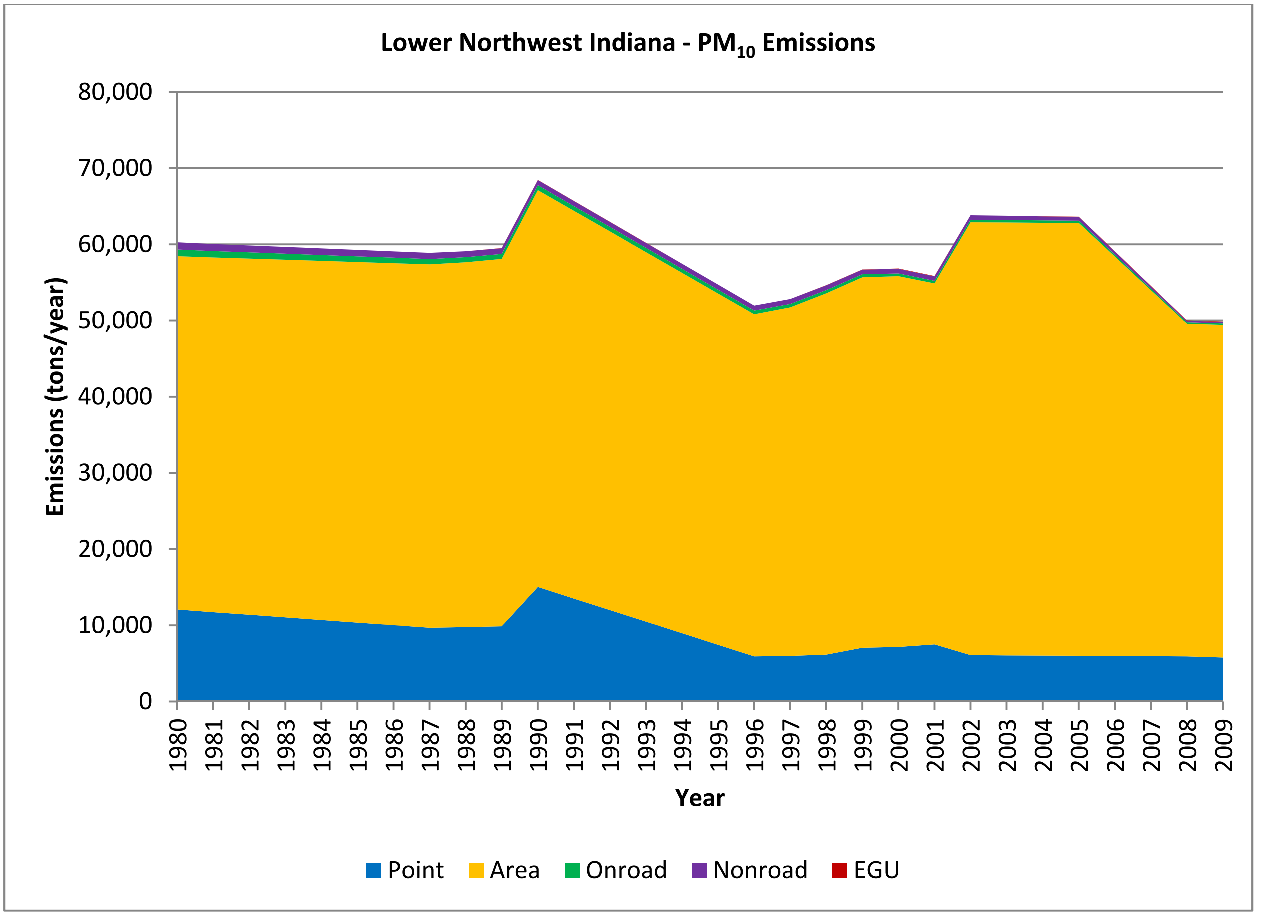
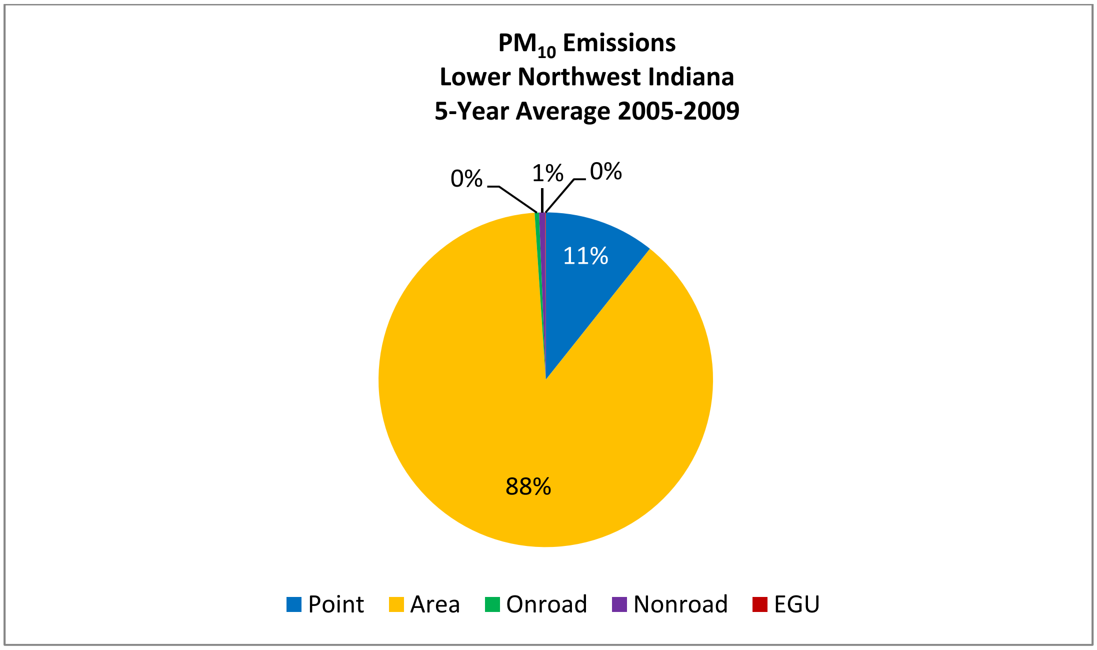


Chart 8: Lower Northwest Indiana PM_{10} Emissions



National controls, such as engine and fuel standards, as well as regional controls, such as the NO_x SIP Call, have led to a decrease in PM_{10} values over time. As Graph 15 illustrates, total PM_{10} emissions have decreased by 17% 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 is one monitoring site within Lower Northwest Indiana, located in Fountain County that measures SO_2 levels. The trend data in Graph 16 reflect the annual arithmetic mean which was used to compare to the primary annual SO_2 standard of 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 the monitor in the Lower Northwest Indiana area is plotted on Graph 16 for each year.

The trend data in Graph 17 reflect the 2nd highest 24-hour SO_2 concentrations, which were used to compare to the primary 24-hour SO_2 standard of 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 the monitor in the Lower Northwest Indiana area monitor is plotted on Graph 17 for each year. The trend data in Graph 18 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 18 are not a true comparison to the primary 1-hour SO_2 standard. The values in Graph 18 reflect the highest 99th percentile from the monitor in the Lower Northwest 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 19 reflect the three-year design value of the 99th percentile of the daily maximum 1 hour average values for the years 2000 through 2010 from the monitor in the Lower Northwest 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 13, 14, 15, and 16 are from the monitor in the Lower Northwest Indiana area 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 Lower Northwest Indiana have always been historically below the primary annual and 24-hour SO_2 standards.

Monitoring data in Table 13 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 14 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 15 show the 1-hour 99th percentile values for the years 2000 through 2010. Monitoring data in Table 16 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 13, 14, and 16 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 16: Lower Northwest Indiana Annual Arithmetic Mean SO_2 Values

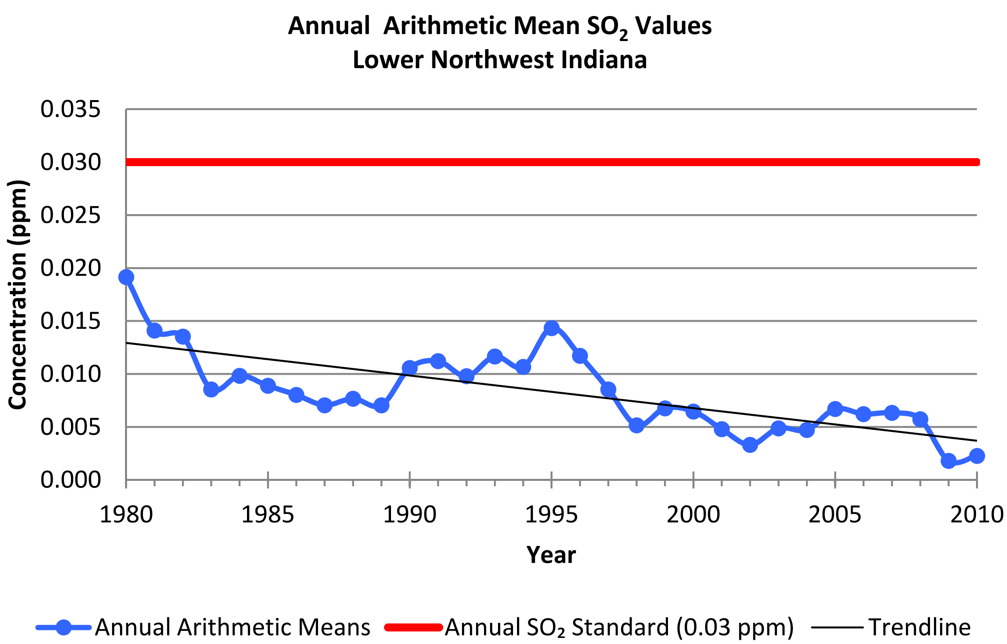


Table 13: Lower Northwest Indiana Annual Arithmetic Mean SO_2 Values Monitoring Data Summary

County	Site ID	Site Name	Annual Arithmetic Mean (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fountain	180450001	N of SR 234, E of Wabash River	0.006	0.005	0.003	0.005	0.005	0.007	0.006	0.006	0.006	0.002	0.002
			Highlighted red numbers are above the annual SO_2 standard of 0.03 ppm										

Graph 17: Lower Northwest Indiana 24-Hour SO_2 2nd High Values

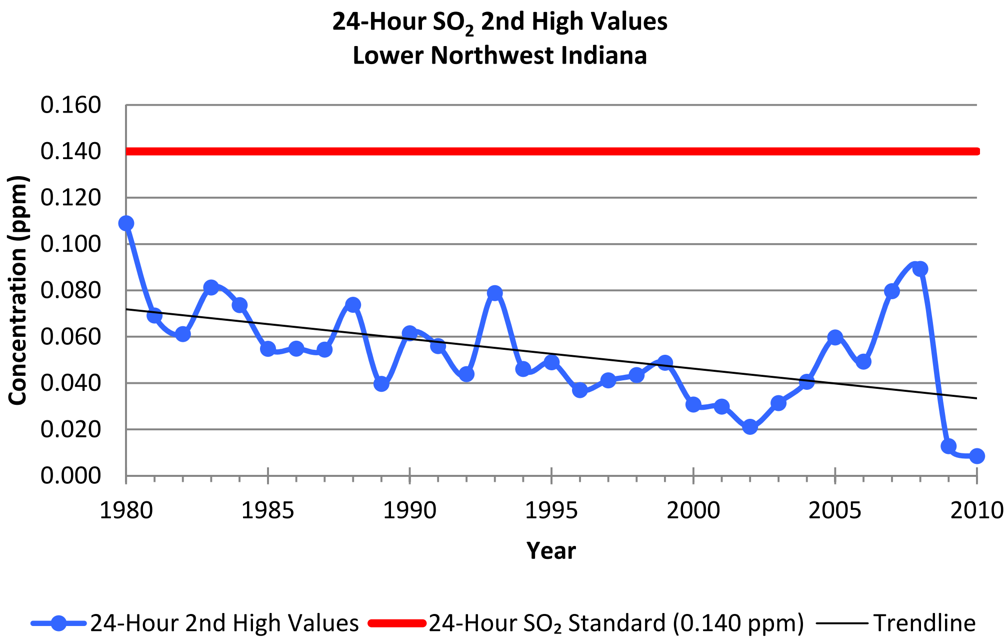


Table 14: Lower Northwest Indiana 24-Hour SO_2 2nd High Values Monitoring Data Summary

County	Site ID	Site Name	2nd High Value (ppm)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fountain	180450001	N of SR 234, E of Wabash River	0.031	0.030	0.021	0.031	0.041	0.060	0.049	0.080	0.089	0.013	0.009
			Highlighted red numbers are over the 24-hour SO_2 standard of 0.14 ppm										

Graph 18: Lower Northwest Indiana 1-Hour SO_2 99th Percentile Values

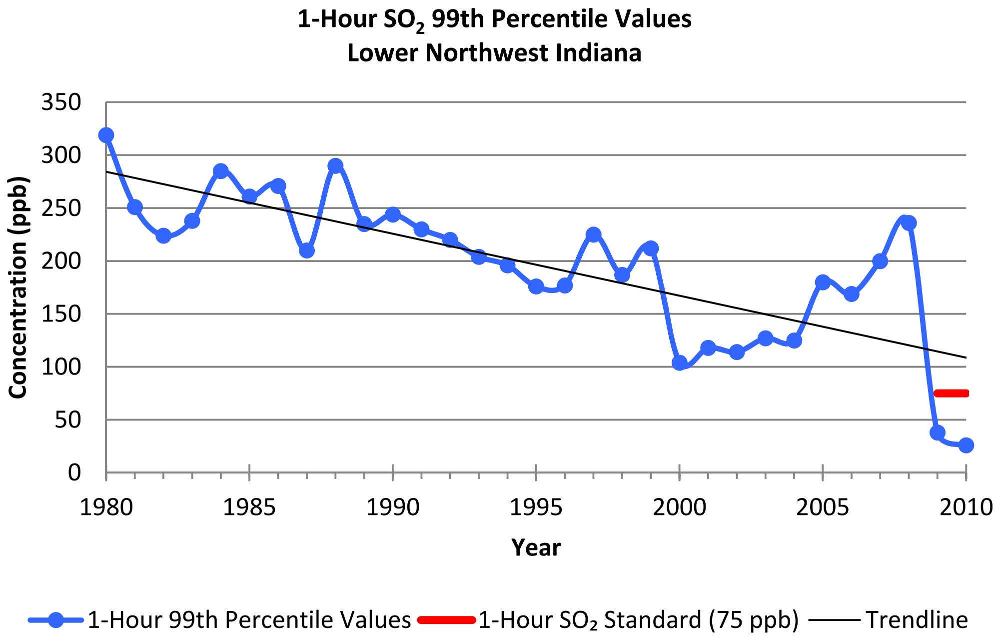


Table 15: Lower Northwest Indiana 1-Hour 99th Percentile SO_2 Monitoring Data Summary

County	Site ID	Site Name	99th Percentile Values (ppb)										
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fountain	180450001	N of SR 234, E of Wabash River	104	118	114	127	125	180	169	200	236	38	26

Graph 19: Lower Northwest Indiana 1-Hour SO_2 Three-Year Design Values

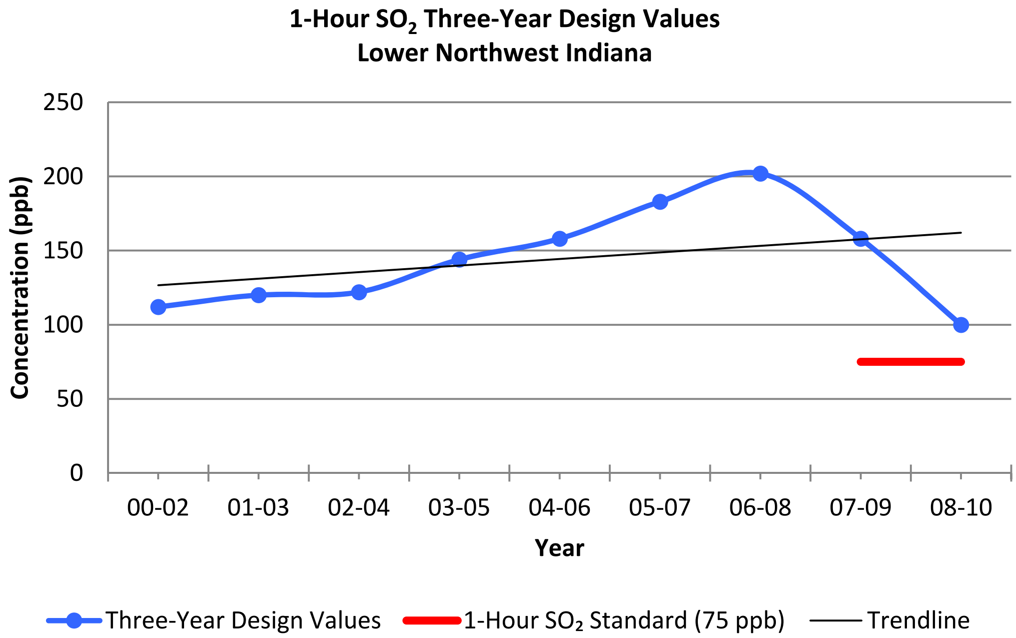


Table 16: Lower Northwest Indiana 1-Hour SO_2 Three-Year Design Values Monitoring Data Summary

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
Fountain	180450001	N of SR 234, E of Wabash River	112	120	122	144	158	183	202	158	100
			Beginning in 2010, highlighted red numbers are above the 1-hour SO_2 standard of 75 ppb								

As shown in Graphs 16 and 17, both annual and 24-hour SO_2 values for the Lower Northwest Indiana area have historically been below their respective standards. In addition, monitoring data shown in Graph 18 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 19 for the Lower Northwest Indiana area have been trending downward over time, the area's three-year design value is currently over the new 1-hour primary standard. A large decrease in 1-hour SO_2 values for the years 2009 and 2010, as shown in Graphs 18 and 19 and Tables 15 and 16, is due to the fact that the Duke Energy – Cayuga Generating Station installed a Flue-Gas

Desulfurization scrubber in 2008, which has drastically reduced the SO_2 emissions at the facility. It is expected that 1-hour, 24-hour, and annual SO_2 values will continue to decline in the Lower Northwest Indiana area in the future and the area will comply with the 1-hour primary SO_2 standard when CSAPR or an equivalent rule is implemented.

U.S. EPA's NEI contains emissions information for SO_2 and is used in Graph 20 and Chart 9. Graph 20 illustrates the emissions trend for SO_2 in Lower Northwest Indiana and Chart 9 shows how the average emissions are distributed among the different source categories.

Graph 20: Lower Northwest Indiana SO_2 Emissions

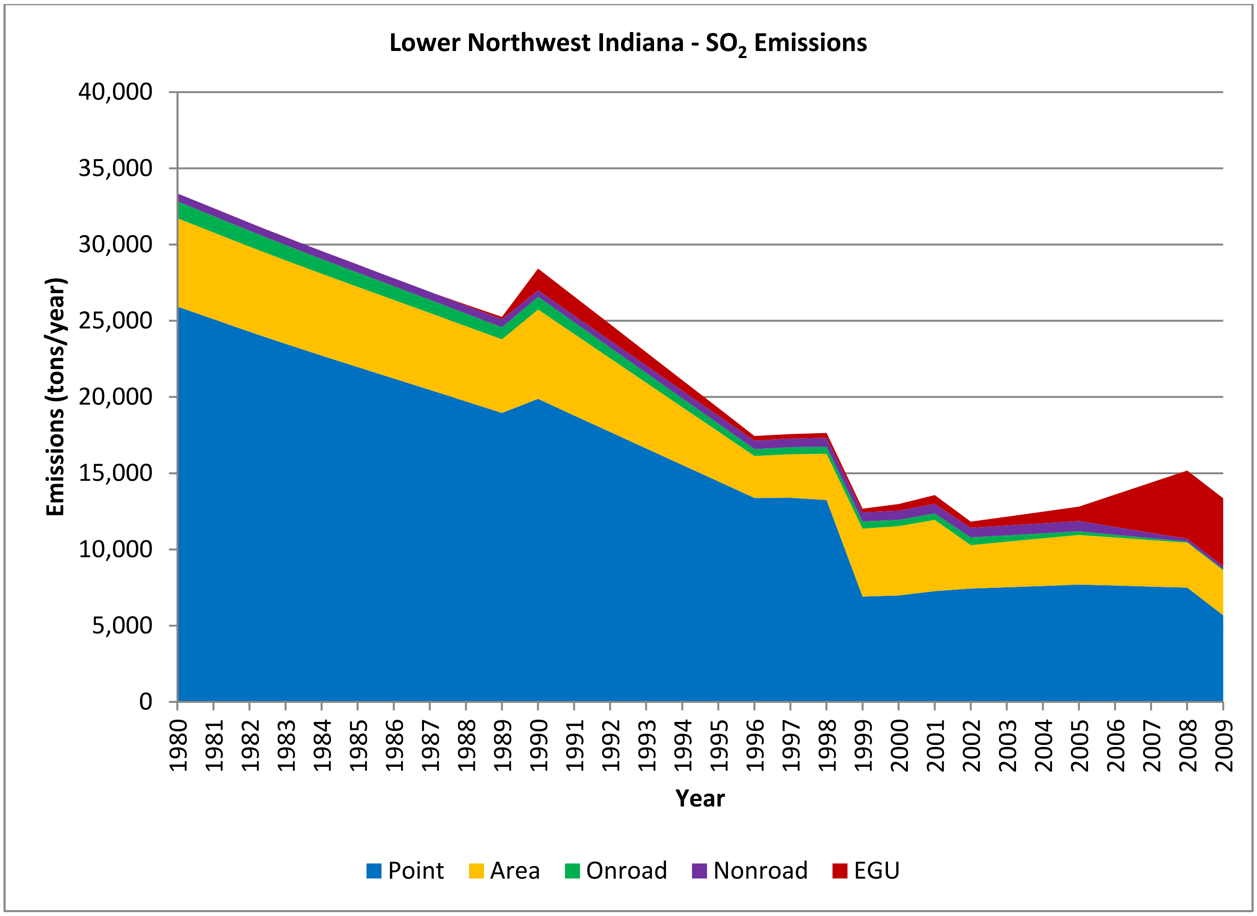
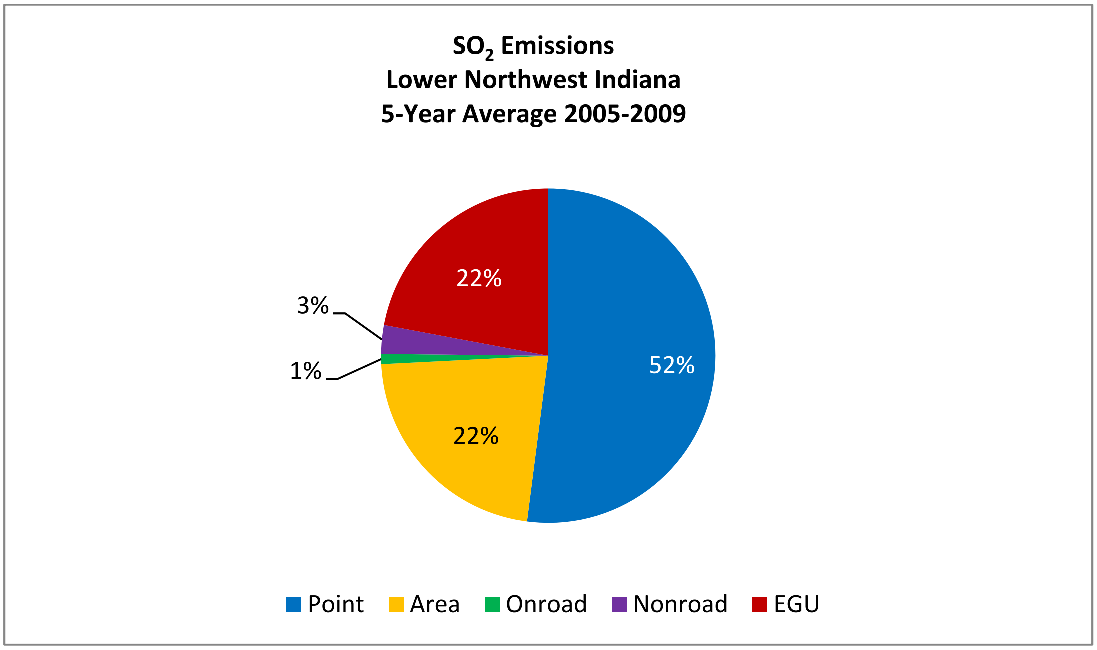


Chart 9: Lower Northwest Indiana SO_2 Emissions



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 20 illustrates, SO_2 emissions have decreased by 60% within the Lower Northwest 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 Lower Northwest Indiana are from a monitor that was located in Tippecanoe County. The trend data in Graph 21 reflect the annual geometric mean values, which were used to compare to the primary and secondary annual TSP standards of 75 µg/m^3. The highest annual geometric mean from the Tippecanoe County monitor is plotted on the graph for each year. The trend data in Graph 22 reflect the 2^{nd} highest 24-hour TSP concentrations which were used to compare to the primary 24-hour TSP standard of 260 µg/m^3. The highest 2^{nd} high 24-hour value from the monitor 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 displays a downward trend over time. While occasional spikes can be seen in the annual and 24-hour TSP values, the monitor values for Lower Northwest 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 fluctuate based on variability in facility operations and meteorology.

The data in Tables 17 and 18 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 Lower Northwest 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 17 show the annual geometric mean for annual TSP for the years 1980 through 1988 which are compared to the primary and secondary annual $PM_{2.5}$ standards of 75 µg/m^3. Monitoring data in Table 18 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 µg/m^3.

Graph 21: Lower Northwest Indiana Annual Geometric Mean TSP Values

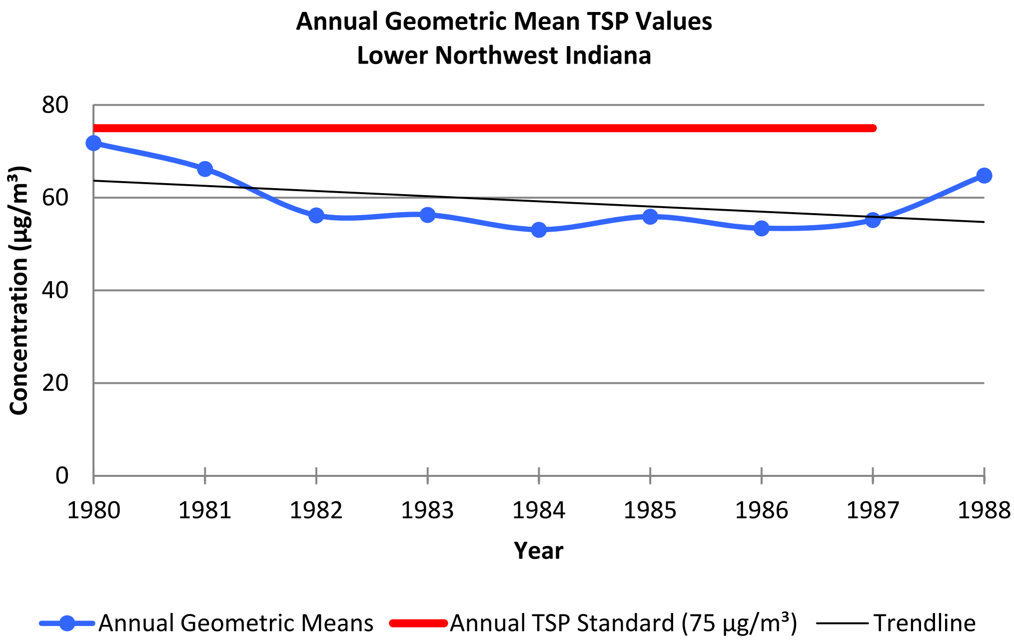


Table 17: Lower Northwest Indiana Annual Geometric Mean TSP Values

County	Site #	Site Name	Annual Geometric Mean (µg/m^3)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Tippecanoe	181570001	City Hall	72	66	56	56	53	56	53	55	65			

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

Graph 22: Lower Northwest Indiana 24-Hour TSP 2nd High Values

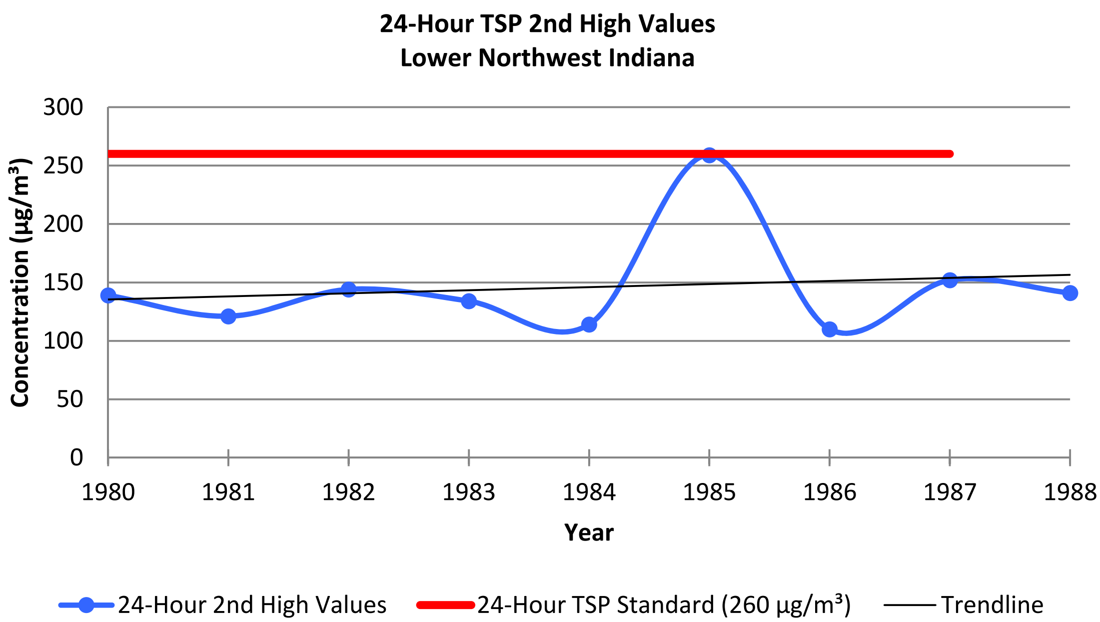


Table 18: Lower Northwest Indiana 24-Hour TSP 2nd High Values

County	Site #	Site Name	2nd High Values (µg/m³)											
			1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Tippecanoe	181570001	City Hall	139	121	144	134	114	259	110	152	141			

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 Lower Northwest 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 Lower Northwest 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 Lower Northwest 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 Lower Northwest 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).

This page intentionally left blank.

Appendix

Lower Northwest Indiana County-Specific Emission Inventory Data

(1980-2009)

This page left intentionally blank.

Benton County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	11,485.11	1,838.03	1,307.18	4,548.74	224.06	1,799.96
1981	11,146.05	1,799.77	1,294.18	4,604.86	218.65	1,775.79
1982	10,806.99	1,761.51	1,281.18	4,660.99	213.23	1,751.62
1983	10,469.23	1,723.25	1,268.18	4,717.11	207.82	1,727.45
1984	10,131.58	1,684.99	1,255.18	4,773.24	202.41	1,703.28
1985	9,793.92	1,646.73	1,242.18	4,829.36	197.00	1,679.11
1986	9,456.27	1,608.47	1,229.19	4,885.48	191.59	1,654.95
1987	9,118.62	1,570.21	1,275.67	4,944.15	186.18	1,630.78
1988	8,780.97	1,531.95	1,322.15	5,000.28	180.77	1,606.61
1989	8,443.32	1,493.69	1,368.63	5,156.96	175.36	1,582.44
1990	8,154.13	1,373.36	1,434.04	6,074.31	247.46	1,357.14
1991	7,759.81	1,339.94	1,398.12	5,914.50	217.61	1,386.87
1992	7,365.48	1,306.51	1,362.20	5,754.68	187.76	1,416.60
1993	6,971.16	1,273.09	1,326.28	5,594.87	157.92	1,446.34
1994	6,576.84	1,239.66	1,290.36	5,435.05	128.07	1,476.07
1995	6,182.51	1,206.23	1,254.52	5,275.24	98.22	1,505.80
1996	5,788.19	1,172.81	1,218.70	5,115.42	68.37	1,535.53
1997	5,571.60	1,170.75	1,029.86	4,191.55	70.06	1,547.21
1998	5,385.62	1,151.78	1,216.23	5,135.15	71.45	1,550.25
1999	5,082.81	1,387.28	1,178.99	4,967.40	101.10	1,421.41
2000	4,843.23	1,348.34	1,126.34	4,696.91	99.21	1,412.82
2001	4,798.49	1,326.34	1,103.90	4,660.16	101.08	1,435.21
2002	4,687.17	945.86	1,046.73	6,908.69	125.57	1,258.38
2003	4,286.04	989.46	1,043.82	6,905.63	123.15	1,233.26
2004	3,884.91	1,033.05	1,040.91	6,902.57	120.74	1,208.14
2005	3,483.78	1,076.64	1,038.00	6,899.52	118.32	1,183.01
2006	2,650.50	833.23	1,026.78	6,462.91	103.75	1,108.20
2007	1,817.21	589.81	1,015.57	6,026.31	89.17	1,033.39
2008	983.93	346.40	1,004.35	5,589.71	74.60	958.57
2009	983.93	346.40	1,004.35	5,589.71	74.60	958.57
%Change 1980 to 2009	-91.43%	-81.15%	-23.17%	22.88%	-66.71%	-46.74%

Carroll County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	16,336.43	2,325.80	1,735.70	5,677.59	188.39	2,781.20
1981	15,927.51	2,283.86	1,713.99	5,726.43	189.93	2,749.17
1982	15,520.16	2,241.93	1,692.29	5,775.28	191.48	2,717.13
1983	15,112.86	2,199.99	1,670.58	5,824.13	193.02	2,685.10
1984	14,705.57	2,158.06	1,648.87	5,872.97	194.56	2,653.30
1985	14,298.28	2,116.12	1,627.17	5,921.82	196.10	2,621.72
1986	13,890.99	2,074.19	1,605.46	5,970.66	197.65	2,590.14
1987	13,483.70	2,032.25	1,583.76	6,019.51	199.19	2,558.56
1988	13,076.40	1,990.32	1,562.05	6,068.35	200.73	2,526.99
1989	12,669.11	1,948.50	1,540.35	6,123.14	202.28	2,495.41
1990	11,036.82	1,603.54	1,468.53	6,431.52	351.29	2,127.07
1991	10,922.07	1,636.40	1,454.93	6,379.53	309.59	2,163.46
1992	10,807.32	1,669.25	1,441.33	6,327.53	267.88	2,199.84
1993	10,692.58	1,702.11	1,427.73	6,275.54	226.18	2,236.23
1994	10,577.83	1,734.97	1,414.12	6,223.55	184.48	2,272.62
1995	10,463.08	1,767.82	1,400.52	6,171.56	142.77	2,309.00
1996	10,348.33	1,800.68	1,386.92	6,119.57	101.07	2,345.39
1997	9,944.41	1,781.87	1,496.77	6,704.23	102.27	2,377.79
1998	9,623.11	1,734.16	1,351.22	5,989.60	102.81	2,342.95
1999	9,045.34	1,731.97	1,391.08	6,215.60	128.02	2,766.47
2000	8,921.68	1,704.19	1,412.16	6,267.02	124.94	2,707.54
2001	8,572.28	1,649.03	1,375.28	6,191.73	126.90	2,785.88
2002	8,743.63	1,570.76	1,219.16	7,857.81	308.99	2,135.05
2003	8,120.19	1,511.68	1,219.41	7,858.46	303.89	2,050.50
2004	7,496.75	1,452.60	1,219.67	7,859.10	298.78	1,965.96
2005	6,873.31	1,393.52	1,219.92	7,859.75	293.68	1,881.42
2006	5,301.07	1,138.76	1,206.10	7,244.99	274.70	1,742.50
2007	3,728.83	884.00	1,192.28	6,630.23	255.71	1,603.59
2008	2,156.59	629.24	1,178.46	6,015.46	236.72	1,464.67
2009	2,156.59	629.24	1,178.46	6,015.46	236.72	1,464.67
%Change 1980 to 2009	-86.80%	-72.95%	-32.10%	5.95%	25.65%	-47.34%

Clinton County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	35,821.33	4,572.96	2,138.65	7,859.05	3,857.03	4,383.14
1981	34,793.31	4,469.88	2,098.63	7,823.81	3,721.30	4,315.78
1982	33,765.29	4,366.80	2,058.62	7,788.57	3,585.57	4,248.43
1983	32,737.27	4,263.72	2,018.61	7,753.33	3,449.84	4,181.07
1984	31,709.25	4,160.65	1,978.60	7,718.08	3,314.10	4,113.72
1985	30,681.23	4,057.57	1,938.58	7,682.84	3,178.37	4,046.36
1986	29,653.21	3,954.49	1,898.57	7,647.60	3,042.64	3,979.01
1987	28,625.19	3,851.41	1,858.56	7,612.36	2,906.91	3,911.65
1988	27,597.17	3,748.34	1,818.55	7,577.12	2,771.17	3,844.30
1989	26,569.15	3,645.26	1,778.53	7,648.55	2,635.44	3,776.94
1990	26,172.37	3,543.56	1,856.15	8,769.88	3,163.62	3,190.07
1991	24,813.76	3,409.51	1,777.68	8,332.77	2,856.17	3,266.87
1992	23,455.14	3,275.46	1,699.20	7,895.67	2,548.73	3,343.66
1993	22,096.53	3,141.41	1,620.73	7,458.56	2,241.28	3,420.46
1994	20,737.92	3,007.35	1,542.25	7,021.45	1,933.83	3,497.26
1995	19,379.30	2,873.30	1,480.87	6,584.35	1,626.39	3,574.05
1996	18,020.69	2,739.25	1,420.03	6,147.24	1,318.94	3,650.85
1997	17,408.01	2,751.19	1,488.31	6,513.74	1,315.74	3,670.76
1998	16,849.03	2,702.06	1,536.51	6,789.10	1,286.74	3,555.56
1999	15,830.84	2,725.69	1,580.64	7,037.82	407.13	3,168.37
2000	15,762.35	2,683.98	1,612.76	7,148.27	395.54	3,188.33
2001	15,252.49	2,613.45	1,540.15	6,994.67	411.29	3,200.36
2002	15,677.86	2,761.04	1,291.91	8,057.39	774.01	3,025.07
2003	14,401.16	2,620.40	1,285.63	8,023.17	731.67	2,937.85
2004	13,124.46	2,479.76	1,279.36	7,988.96	689.32	2,850.63
2005	11,847.76	2,339.12	1,273.08	7,954.75	646.97	2,763.41
2006	9,063.18	1,878.37	1,260.25	7,495.59	646.50	2,493.25
2007	6,278.60	1,417.61	1,247.42	7,036.43	646.03	2,223.10
2008	3,494.02	956.86	1,234.59	6,577.27	645.56	1,952.94
2009	3,489.67	922.15	1,309.29	6,685.27	645.55	1,826.15
%Change 1980 to 2009	-90.26%	-79.83%	-38.78%	-14.94%	-83.26%	-58.34%

Fountain County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	23,247.25	3,119.27	1,523.11	5,215.32	976.35	3,177.03
1981	22,592.51	3,056.29	1,506.65	5,215.38	945.09	3,121.38
1982	21,937.78	2,993.31	1,490.20	5,215.43	913.83	3,068.20
1983	21,283.07	2,930.37	1,473.75	5,215.49	882.58	3,018.83
1984	20,628.57	2,867.67	1,457.30	5,215.55	851.32	2,969.48
1985	19,974.08	2,804.98	1,440.84	5,215.61	820.07	2,920.12
1986	19,319.58	2,742.29	1,424.39	5,215.67	788.81	2,870.76
1987	18,665.09	2,679.60	1,407.94	5,215.72	757.56	2,821.40
1988	18,010.59	2,616.90	1,399.21	5,215.78	726.30	2,772.05
1989	17,356.10	2,554.21	1,390.48	5,244.26	695.05	2,722.69
1990	16,010.23	2,227.72	1,352.44	5,754.79	1,120.77	2,107.73
1991	15,446.42	2,217.34	1,298.27	5,511.76	953.97	2,200.39
1992	14,882.61	2,206.96	1,244.10	5,268.73	787.17	2,293.06
1993	14,318.80	2,196.58	1,189.93	5,025.70	620.37	2,385.72
1994	13,754.98	2,186.20	1,135.76	4,782.67	453.57	2,478.38
1995	13,191.17	2,175.82	1,081.59	4,539.63	286.77	2,571.05
1996	12,627.36	2,165.44	1,027.42	4,296.60	119.97	2,663.71
1997	12,244.75	2,173.09	1,067.24	4,532.86	122.16	2,690.49
1998	11,991.28	2,144.18	1,149.80	4,987.97	123.23	2,664.84
1999	11,414.96	2,177.15	1,957.81	6,089.99	165.52	2,767.63
2000	11,117.58	2,105.39	1,985.25	6,143.12	160.48	2,790.79
2001	11,385.49	2,109.22	1,994.24	6,084.87	166.66	2,884.32
2002	9,923.03	2,068.42	984.62	5,786.20	336.16	2,013.00
2003	9,743.02	1,959.31	984.71	5,788.18	333.73	1,940.67
2004	9,563.02	1,850.20	984.79	5,790.15	331.30	1,868.35
2005	9,383.01	1,741.09	984.88	5,792.13	328.87	1,796.02
2006	7,159.86	1,380.44	970.57	5,325.69	307.24	1,654.80
2007	4,936.72	1,019.80	956.25	4,859.25	285.61	1,513.58
2008	2,713.57	659.15	941.94	4,392.82	263.98	1,372.35
2009	2,519.77	658.82	941.94	4,392.82	137.80	1,315.59
%Change 1980 to 2009	-83.07%	-78.88%	-38.16%	-15.77%	-85.89%	-58.59%

Montgomery County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	40,240.54	5,023.86	3,044.82	8,046.92	1,181.61	5,846.91
1981	39,231.05	4,959.95	2,987.02	7,995.89	1,162.48	5,749.49
1982	38,224.18	4,896.05	2,929.22	7,966.16	1,143.36	5,652.06
1983	37,224.45	4,832.14	2,871.42	7,936.43	1,124.24	5,554.63
1984	36,224.72	4,768.23	2,813.62	7,906.69	1,105.12	5,457.21
1985	35,224.99	4,704.32	2,755.82	7,876.96	1,085.99	5,359.78
1986	34,225.26	4,640.42	2,698.01	7,847.23	1,066.87	5,262.36
1987	33,245.98	4,576.51	2,640.21	7,817.49	1,047.75	5,164.93
1988	32,299.64	4,512.60	2,600.89	7,787.87	1,087.59	5,067.50
1989	31,353.30	4,448.70	2,561.56	7,965.33	1,160.91	4,970.08
1990	26,607.95	4,118.83	2,634.93	8,605.76	3,118.07	4,355.90
1991	26,575.89	4,089.90	2,575.80	8,440.72	2,705.42	4,379.89
1992	26,543.82	4,060.98	2,516.67	8,275.68	2,292.77	4,403.89
1993	26,511.76	4,032.05	2,457.54	8,110.64	1,880.12	4,427.88
1994	26,479.70	4,003.12	2,398.41	7,945.59	1,467.46	4,451.87
1995	26,447.63	3,974.20	2,339.28	7,780.55	1,054.81	4,475.87
1996	26,415.57	3,945.27	2,280.15	7,615.51	642.16	4,499.86
1997	25,653.78	3,979.85	2,269.91	7,480.95	643.67	4,497.03
1998	24,947.59	3,939.89	2,246.05	7,419.44	682.69	4,245.10
1999	23,563.94	4,056.66	2,408.19	7,744.23	719.52	4,511.08
2000	23,399.74	4,085.09	2,434.68	7,699.44	901.08	4,489.85
2001	23,036.19	4,098.63	2,372.07	7,536.03	1,071.48	4,535.31
2002	22,333.28	4,287.13	1,500.27	8,469.18	1,324.96	3,808.56
2003	20,890.60	4,126.09	1,503.81	8,488.85	1,508.95	3,669.19
2004	19,447.93	3,965.05	1,507.34	8,508.51	1,692.94	3,529.83
2005	18,005.25	3,804.00	1,510.88	8,528.17	1,876.94	3,390.46
2006	13,971.63	3,204.75	1,501.05	7,873.72	3,006.10	3,070.05
2007	9,938.02	2,605.49	1,491.23	7,219.27	4,135.27	2,749.64
2008	5,904.40	2,006.24	1,481.41	6,564.82	5,264.43	2,429.23
2009	5,552.82	1,813.82	1,422.93	6,439.62	5,264.43	2,408.49
%Change 1980 to 2009	-86.20%	-63.90%	-53.27%	-19.97%	345.53%	-58.81%

Tippecanoe County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	102,772.62	14,449.76	8,380.86	18,813.34	23,091.90	35,842.43
1981	99,914.05	14,180.87	8,188.02	18,497.46	22,457.50	34,743.44
1982	97,055.48	13,911.98	7,995.19	18,181.58	21,823.11	33,644.45
1983	94,196.92	13,643.10	7,802.36	17,865.70	21,192.27	32,545.46
1984	91,338.35	13,374.21	7,614.78	17,549.83	20,623.89	31,446.47
1985	88,479.78	13,105.32	7,427.20	17,233.95	20,055.52	30,347.47
1986	85,621.21	12,836.43	7,239.62	16,918.07	19,487.14	29,248.48
1987	82,804.53	12,567.54	7,052.04	16,602.19	18,918.77	28,149.49
1988	79,991.28	12,298.68	6,864.46	16,704.35	18,350.39	27,050.50
1989	77,178.06	12,029.82	6,676.88	16,388.47	17,782.02	25,951.51
1990	68,754.54	12,158.60	7,400.38	20,865.71	17,989.18	29,791.09
1991	67,097.74	11,656.60	6,906.32	19,491.23	17,202.74	27,098.70
1992	65,440.93	11,154.60	6,412.26	18,116.74	16,416.30	24,406.31
1993	63,784.13	10,652.60	5,918.20	16,742.25	15,629.86	21,713.92
1994	62,127.33	10,150.60	5,425.93	15,367.77	14,843.41	19,021.52
1995	60,470.52	9,648.60	4,962.39	13,993.28	14,056.97	16,329.13
1996	58,813.72	9,146.60	4,887.39	12,618.80	13,270.53	13,636.74
1997	56,760.32	9,225.88	4,908.41	12,617.96	13,386.27	13,803.09
1998	55,208.57	9,103.38	4,935.92	12,724.35	13,481.35	13,258.75
1999	53,157.93	9,967.89	4,849.95	12,698.03	10,895.15	14,170.91
2000	52,661.71	9,903.12	4,881.51	12,787.88	11,042.39	14,351.06
2001	52,293.81	9,922.13	4,771.28	12,457.74	11,433.81	14,727.64
2002	44,947.52	9,626.43	2,679.22	13,185.77	8,366.65	9,990.04
2003	41,459.43	9,309.87	2,642.49	13,139.70	8,572.65	9,760.00
2004	37,971.33	8,993.31	2,605.76	13,093.62	8,778.65	9,529.96
2005	34,483.24	8,676.75	2,569.02	13,047.55	8,984.65	9,299.92
2006	26,647.86	7,369.47	2,542.72	12,134.13	8,745.07	8,546.86
2007	18,812.49	6,062.19	2,516.42	11,220.71	8,505.49	7,793.81
2008	10,977.11	4,754.91	2,490.11	10,307.29	8,265.92	7,040.75
2009	10,883.46	4,739.56	2,716.53	10,127.38	6,574.66	6,840.42
%Change 1980 to 2009	-89.41%	-67.20%	-67.59%	-46.17%	-71.53%	-80.92%

Warren County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	10,438.60	1,691.10	950.13	3,024.17	3,191.01	4,222.77
1981	10,132.53	1,655.95	943.05	3,085.60	3,067.65	4,088.86
1982	9,826.46	1,620.80	935.96	3,147.03	2,944.29	3,954.94
1983	9,520.39	1,585.65	928.88	3,208.46	2,820.93	3,821.03
1984	9,214.32	1,550.50	921.80	3,269.89	2,697.57	3,687.12
1985	8,908.25	1,515.35	914.71	3,331.31	2,574.21	3,553.20
1986	8,602.18	1,480.20	907.63	3,392.74	2,450.85	3,419.29
1987	8,296.11	1,445.05	900.55	3,454.17	2,327.49	3,285.38
1988	7,990.04	1,409.90	893.46	3,515.60	2,204.13	3,151.46
1989	7,683.97	1,374.75	886.38	3,577.03	2,080.77	3,017.55
1990	7,897.75	1,395.44	1,005.85	4,581.90	1,538.26	2,734.40
1991	7,405.37	1,340.13	954.32	4,330.67	1,581.39	2,665.83
1992	6,912.98	1,284.82	903.53	4,080.01	1,624.52	2,597.26
1993	6,420.60	1,229.52	852.73	3,829.34	1,667.65	2,528.69
1994	5,928.22	1,174.21	801.94	3,578.67	1,710.77	2,460.11
1995	5,435.83	1,118.90	751.15	3,328.00	1,753.90	2,391.54
1996	4,943.45	1,063.59	700.36	3,077.33	1,797.03	2,322.97
1997	4,735.69	1,053.36	726.17	3,230.31	1,795.87	2,380.38
1998	4,593.23	1,029.55	810.03	3,654.47	1,761.11	2,406.06
1999	4,250.66	918.75	831.87	3,794.68	72.25	1,057.47
2000	4,185.08	904.49	846.47	3,848.47	70.95	1,064.59
2001	4,005.89	873.37	825.84	3,810.53	71.98	1,069.70
2002	4,438.39	1,075.95	812.91	5,318.19	121.60	1,005.63
2003	4,091.52	1,041.66	811.11	5,316.31	118.98	985.47
2004	3,744.65	1,007.37	809.31	5,314.43	116.37	965.32
2005	3,397.78	973.09	807.51	5,312.55	113.75	945.16
2006	2,608.61	814.84	799.15	4,904.27	98.78	857.55
2007	1,819.44	656.59	790.80	4,496.00	83.82	769.95
2008	1,030.27	498.35	782.45	4,087.72	68.86	682.34
2009	1,030.27	498.35	782.45	4,087.72	68.86	682.34
%Change 1980 to 2009	-90.13%	-70.53%	-17.65%	35.17%	-97.84%	-83.84%

White County Emissions (Tons per Year)

Year	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1980	35,968.47	3,827.82	2,110.52	7,088.38	645.41	4,619.88
1981	34,910.83	3,757.30	2,080.83	7,107.43	632.00	4,538.10
1982	33,853.19	3,686.77	2,051.14	7,126.47	618.59	4,456.31
1983	32,795.56	3,616.25	2,021.44	7,145.52	605.18	4,374.53
1984	31,737.92	3,545.73	1,991.75	7,164.57	591.77	4,292.74
1985	30,680.28	3,475.21	1,962.06	7,183.62	578.36	4,210.96
1986	29,622.64	3,404.68	1,932.37	7,202.67	564.95	4,129.17
1987	28,565.00	3,334.16	1,902.68	7,221.72	551.54	4,047.39
1988	27,507.36	3,263.64	1,872.99	7,240.77	538.13	3,965.60
1989	26,449.73	3,193.11	1,843.29	7,428.04	524.72	3,883.82
1990	26,220.09	3,065.86	1,735.81	7,384.01	902.72	3,598.29
1991	24,760.60	2,981.97	1,716.33	7,316.89	773.57	3,549.25
1992	23,301.10	2,898.07	1,696.84	7,249.78	644.42	3,500.21
1993	21,841.61	2,814.18	1,677.35	7,182.66	515.27	3,451.17
1994	20,382.12	2,730.28	1,657.92	7,115.54	386.12	3,402.12
1995	18,922.62	2,646.38	1,643.36	7,048.42	256.97	3,353.08
1996	17,463.13	2,562.49	1,629.10	6,981.30	127.82	3,304.04
1997	16,908.29	2,580.47	1,736.86	7,560.30	130.79	3,327.60
1998	16,457.53	2,545.45	1,811.97	7,954.22	132.54	3,221.31
1999	15,842.76	2,603.46	1,842.12	8,170.30	187.88	3,432.21
2000	15,470.01	2,516.34	1,865.90	8,234.81	181.59	3,350.74
2001	15,516.16	2,494.62	1,812.86	8,110.59	187.79	3,427.22
2002	14,429.91	2,815.20	1,323.49	8,241.83	470.76	2,843.40
2003	13,294.56	2,675.02	1,321.97	8,241.04	462.19	2,779.07
2004	12,159.22	2,534.84	1,320.45	8,240.24	453.62	2,714.74
2005	11,023.88	2,394.66	1,318.93	8,239.45	445.05	2,650.40
2006	8,450.07	1,932.41	1,299.88	7,654.34	416.61	2,383.27
2007	5,876.27	1,470.15	1,280.83	7,069.23	388.17	2,116.14
2008	3,302.46	1,007.90	1,261.77	6,484.12	359.72	1,849.01
2009	3,302.46	1,017.15	1,261.77	6,533.70	359.72	1,805.96
%Change 1980 to 2009	-90.82%	-73.43%	-40.22%	-7.83%	-44.26%	-60.91%