



Indiana Department of Environmental Management

*Protecting Hoosiers and Our Environment Since 1986*

*Office of Air Quality*



# Indiana Department of Environmental Management

## 2014 Ozone Season Summary Report

*Office of Air Quality*

*(800) 451-6027*

[www.idem.IN.gov/airquality/2391.htm](http://www.idem.IN.gov/airquality/2391.htm)



# 2014 Ozone Season

## Purpose

This Ozone Season Summary Report provides an overview of ozone levels from 2014, as well as ozone trends over the last ten years (2005 through 2014).

## Summary

The ozone season in Indiana lasts from April 1 through September 30. The duration of the ozone season for each state is mandated by the United States Environmental Protection Agency (U.S. EPA).

- 183 total days in Indiana's 2014 ozone season.
- 5 exceedance days in 2014.
- 8 forecasted days (Air Quality Action Days) in 2014.



# Background of Ground-level Ozone

## **What is ground-level ozone?**

Ground-level ozone is a gas composed of three oxygen atoms. The chemical structure of ozone is the same whether at ground-level or above the earth; it is unhealthy to breathe at ground level.

## **Where does ground-level ozone come from?**

Ground-level ozone is not emitted directly into the air. It is created by a chemical reaction between nitrogen oxides ( $\text{NO}_x$ ) and volatile organic compounds (VOCs) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of  $\text{NO}_x$  and VOCs.

## **Health effects of ground-level ozone:**

- Chest pain, coughing, throat irritation, congestion.
- Can worsen bronchitis, emphysema, asthma.
- Reduces lung function and inflames the linings of the lungs.
- Scars lung tissues.



# National Ambient Air Quality Standards (NAAQS) for Ozone

## Primary Standards

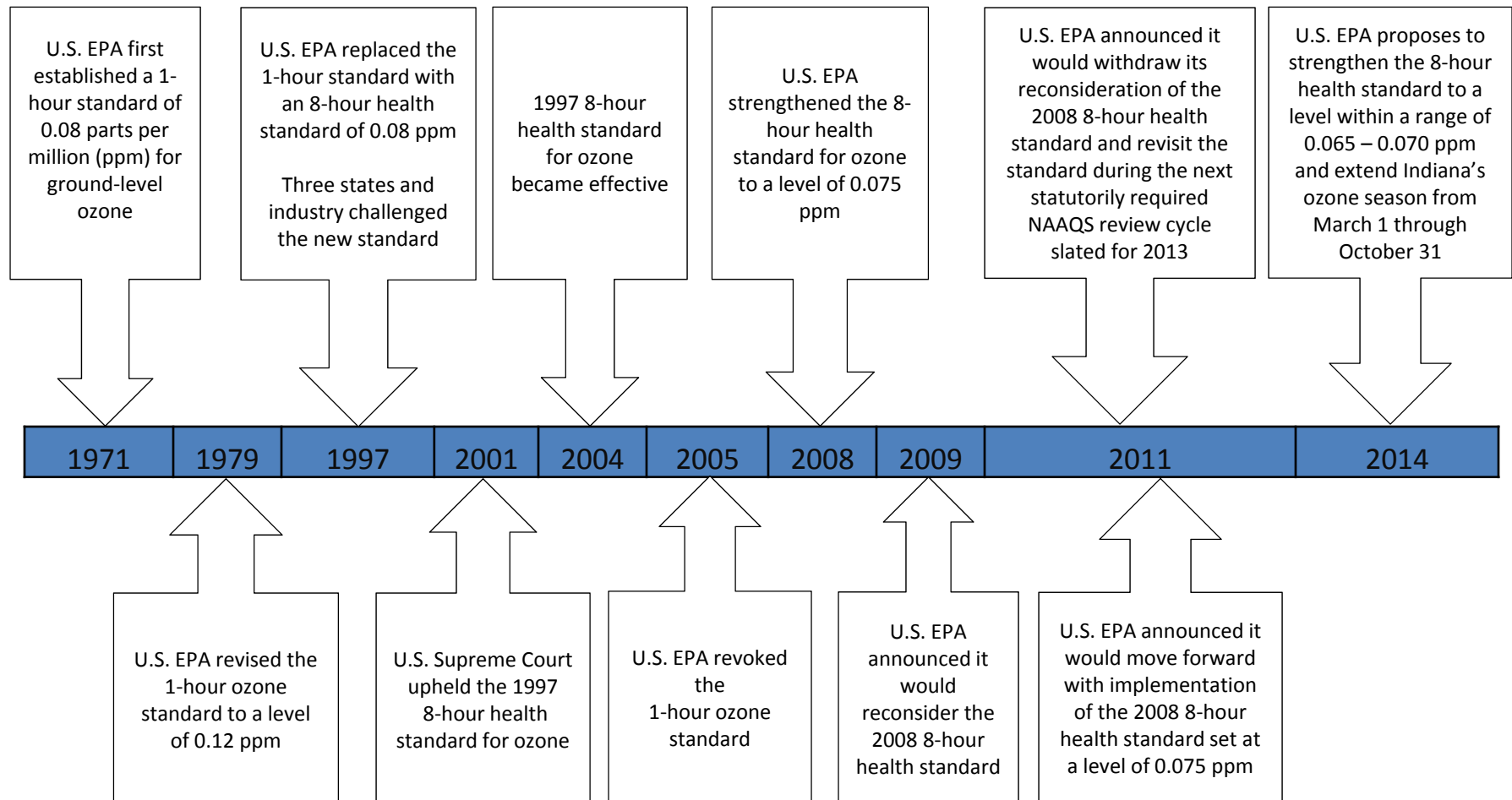
Primary standards, also known as health standards, are limits set to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly.

## Secondary Standards

Secondary standards are set to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.



# History of the Ozone Standard





# Attaining the Standard

## 8-Hour Standard

To attain the 8-hour standard, the three-year average of the fourth (4<sup>th</sup>) highest daily maximum value for the ozone season must be at or below the standard of 0.075 ppm.

## Exceedance versus a Violation of the Standard

- An ***exceedance*** occurs when an 8-hour average value is measured above the standard.
- A ***violation*** occurs when the three-year average of the 4<sup>th</sup> highest daily maximum value for the ozone season exceeds the standard.
- ***A monitor can exceed the standard without being in violation.***



# Attainment Status

## **1997 8-Hour Ozone Health Standard**

U.S. EPA revised the former health standard in 1997 to 0.08 ppm.

- Attainment designations became effective in 2004.
- Initially, 23 counties and one township in Indiana were classified as being in violation of the standard.
- At the close of the 2008 ozone season, all Indiana counties met the standard.
- By May 2010, all areas were officially designated attainment under the standard.

## **2008 8-Hour Ozone Health Standard**

U.S. EPA revised the 1997 health standard in 2008 to 0.075 ppm.

- In March 2009, the Indiana Department of Environmental Management (IDEM) submitted state recommendations to U.S. EPA for attainment status for the 2008 standard.
- Based on monitoring data from 2006 through 2008, IDEM recommended 12 counties be designated as nonattainment.
- In September 2009, U.S. EPA announced it would reconsider the standard.



# Attainment Status

## **2008 8-Hour Ozone Health Standard (continued)**

- In September 2011, U.S. EPA announced it would withdraw its reconsideration of the 2008 standard and revisit the standard during the next statutorily required NAAQS review cycle slated for 2013.
- On September 22, 2011, U.S. EPA announced its intention to fast-track initial area designations and classification rule.
- Initial area designations were based on 2008 through 2010 air quality monitoring data and 2009 state recommendations.
- U.S. EPA also announced it would consider 2011 data if certified early (i.e., by February 15, 2012).
- U.S. EPA completed designations for the Chicago-Naperville, IL-IN-WI area on May 31, 2012 (2008 through 2010 monitoring data for Indiana and Wisconsin and 2009 through 2011 monitoring data for Illinois).
- All other area designations were completed on April 30, 2012.
- Lake and Porter counties and Lawrenceburg Township in Dearborn County were designated nonattainment effective July 20, 2012.
- All other areas of the state were classified as unclassifiable/attainment.





# Attainment Status

## **2014 8-Hour Ozone Health Standard**





On December 17, 2014, U.S. EPA proposed to strengthen the 2008 standard to a level within the range of 0.065 to 0.070 ppm.

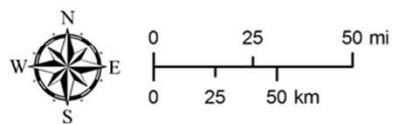
- Based on 2012 – 2014 ambient air quality data, a total of 29 monitors in 18 counties recorded three-year design values greater than 0.065 ppm.
  - 11 monitors in 10 counties recorded three-year design values greater than 0.070 ppm.
- U.S. EPA also proposed to extend Indiana's ozone monitoring season by two months (i.e., March 1 through October 31) to match the times of the year when data, according to their analysis, shows ozone can approach unhealthy levels, and to alert the public.



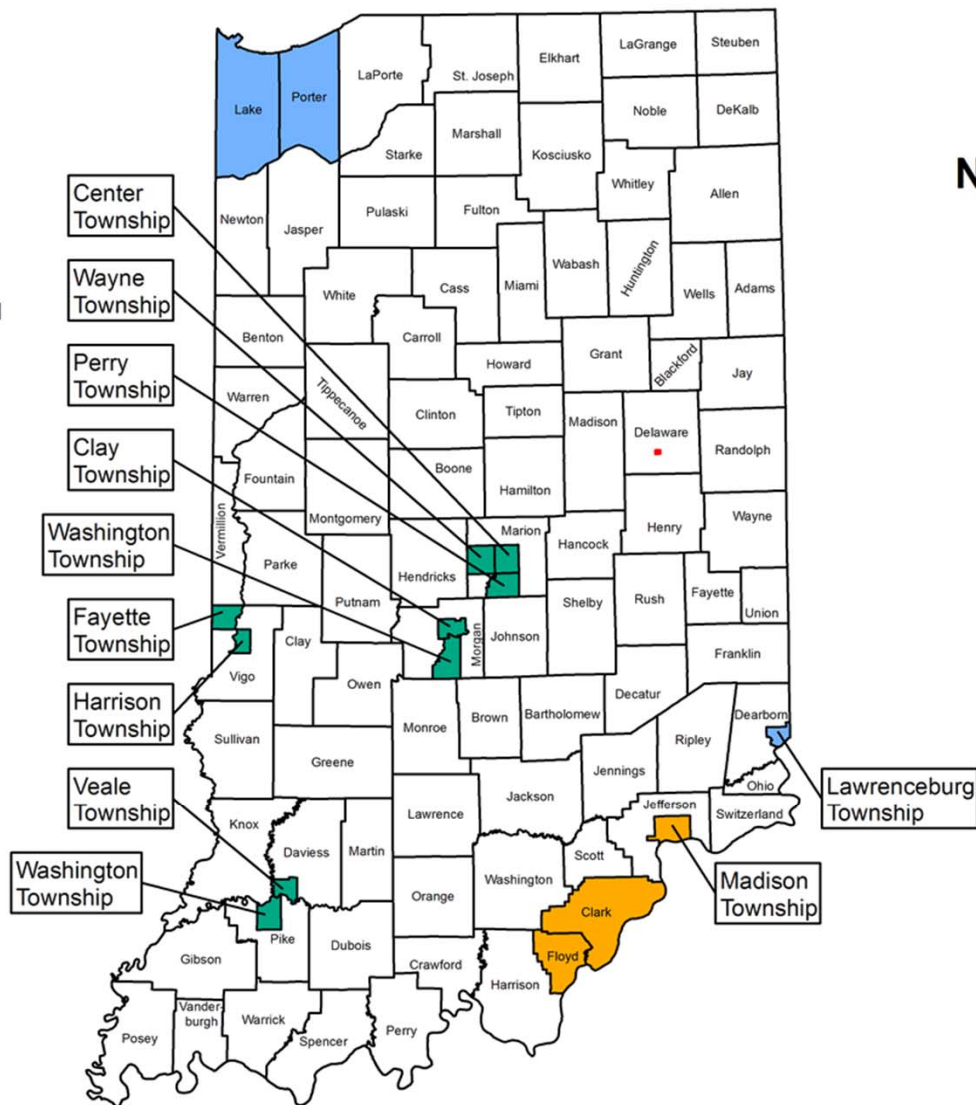
## Current Nonattainment Areas

### Legend





-  Nonattainment for the 1997 Fine Particle Annual Standard
-  Nonattainment for the 2008 Ozone 8-Hour Standard
-  Nonattainment for the 2010 SO<sub>2</sub> 1-Hour Standard
-  Nonattainment for the 2008 Lead Standard

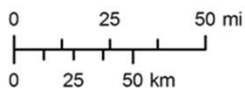


**Mapped By:** C. Mitchell, OAQ  
**Date:** 01/13/2015  
**Source:** IDEM, Air Monitoring  
**Map Projection:** UTM Zone 16 N  
**Map Datum:** NAD83



### Legend

-  Ozone Monitor With Design Value Less Than or Equal to 0.075 ppm
-  Ozone Monitor With Design Value Greater Than 0.075 ppm
-  County With Design Value Less Than or Equal to 0.075 ppm or No Data
-  County With Design Value Greater Than 0.075 ppm



**Notes:**

- Posted Data Are in Units of Parts Per Million (ppm)
- Posted Data Represent Ozone 8-Hour Average Design Values, 2012 - 2014
- Three additional monitors located in Bartholomew, Brown and Marion counties have less than three years of monitoring data and therefore are not shown.

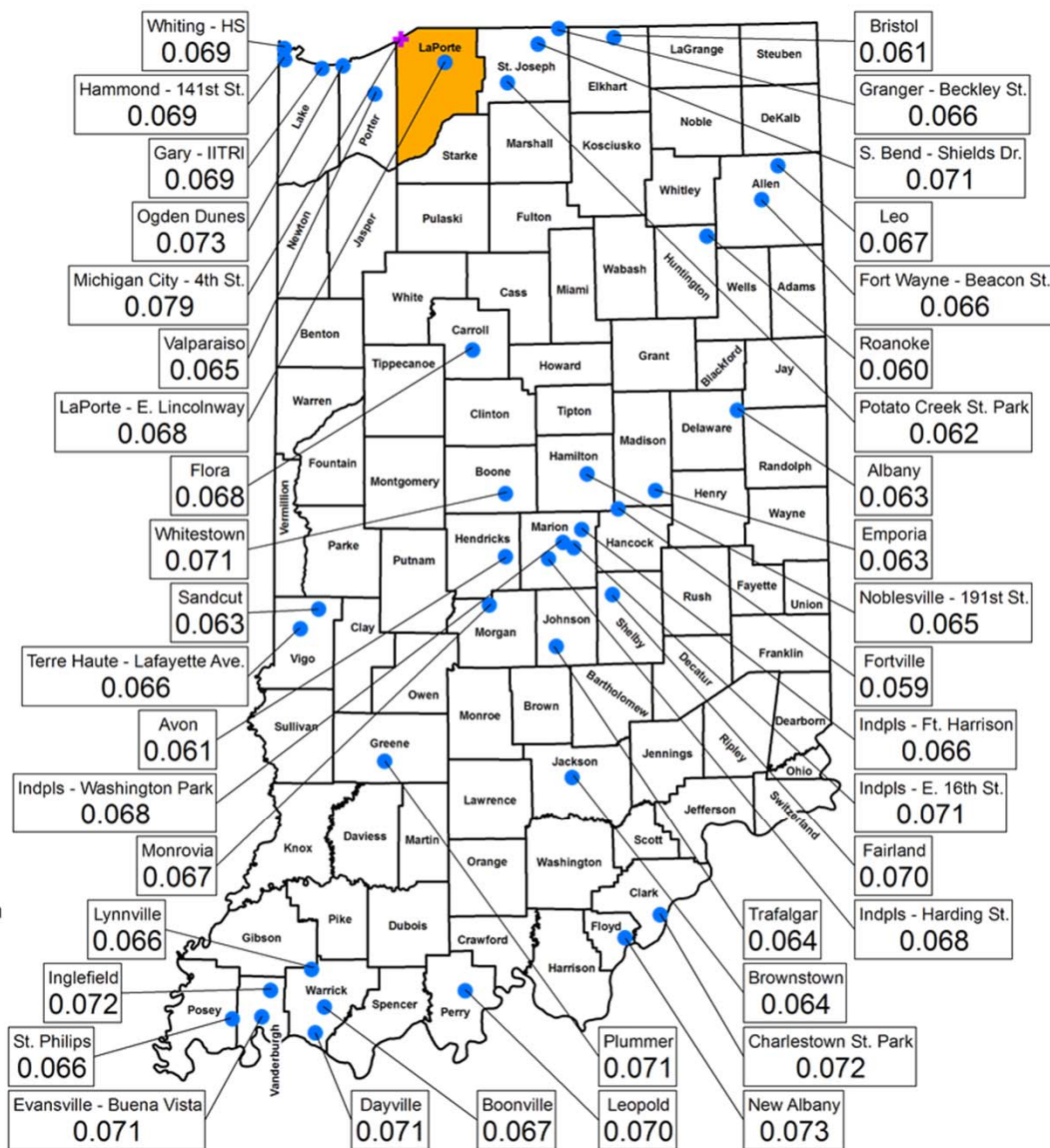
Date: 01/27/2015

**Mapped By:** C. Mitchell, OAQ

**Sources:** Office of Air Quality

**Map Projection:** UTM Zone 16 N

**Map Datum: NAD83**



**Ozone 8-Hour  
Design Values  
(3-Year Average  
4<sup>th</sup> High Daily  
Maximum)**

**Based on  
2012 - 2014  
Monitoring Data**

Standard set at  
0.075 ppm







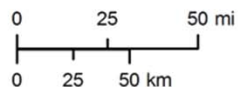
## Legend

● Ozone Monitor With Design Value Less Than or Equal to 0.070 ppm

✚ Ozone Monitor With Design Greater Than 0.070 ppm

□ County With Design Value Less Than or Equal to 0.070 ppm or No Data

■ County With Design Value Greater Than 0.070 ppm



### Notes:

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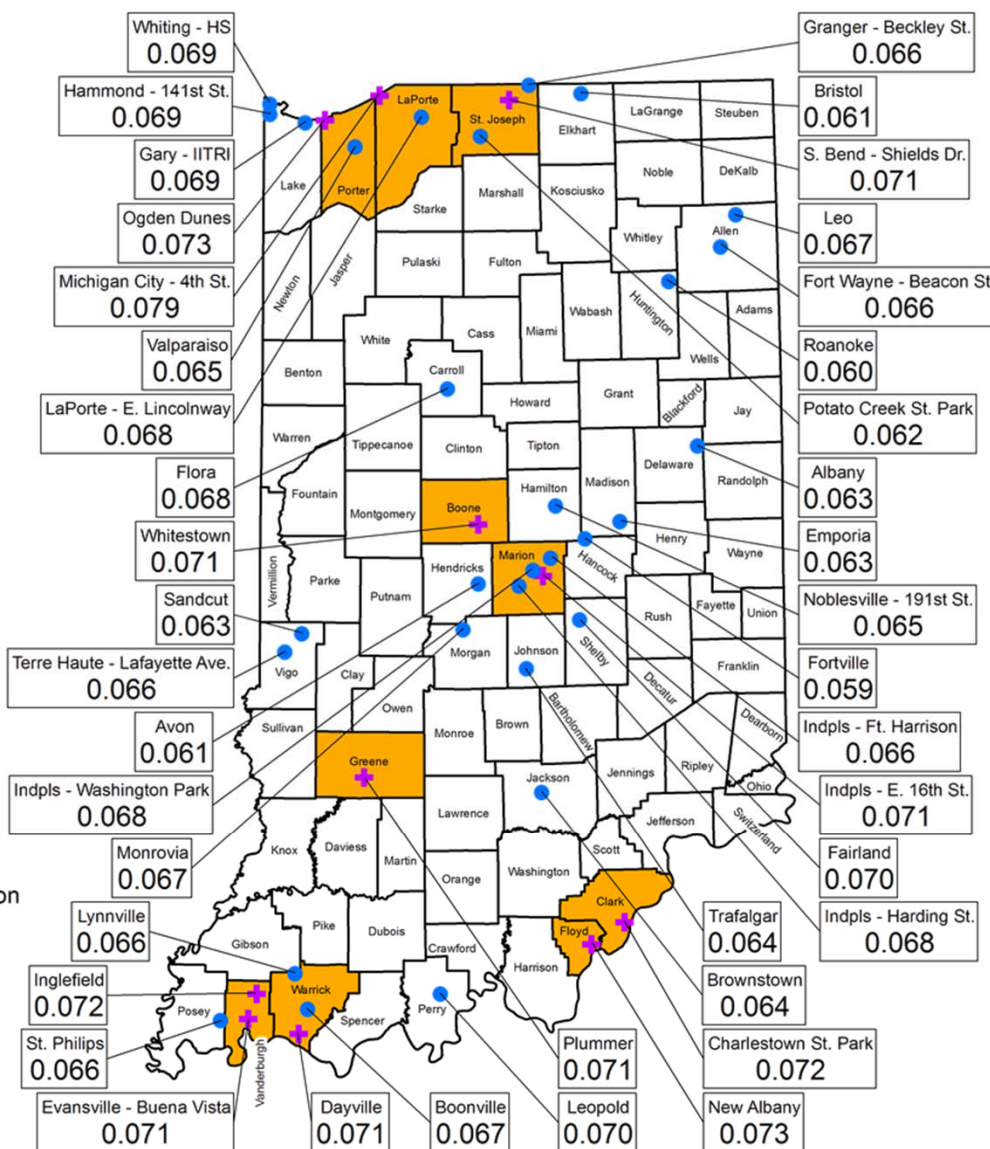
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**Ozone 8-Hour  
Design Values  
(3-Year Average  
4<sup>th</sup> High Daily  
Maximum)**

**Based on  
2012 - 2014  
Monitoring Data**

*Standard set at  
0.070 ppm*





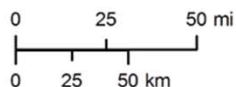
## Legend

● Ozone Monitor With Design Value Less Than or Equal to 0.065 ppm

✚ Ozone Monitor With Design Value Greater Than 0.065 ppm

□ County With Design Value Less Than or Equal to 0.065 ppm or No Data

■ County With Design Value Greater Than 0.065 ppm



### Notes:

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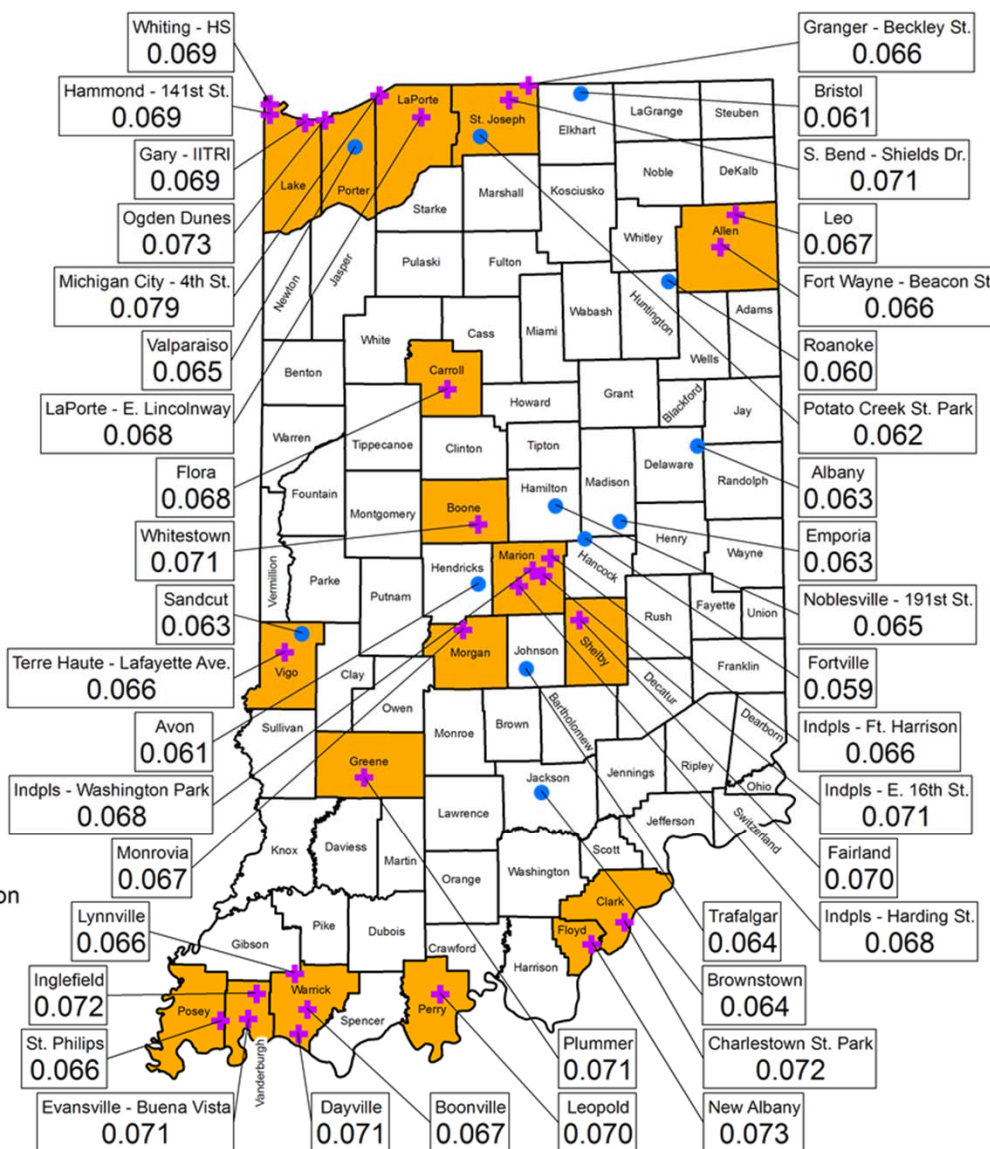
Mapped By: C. Mitchell, OAQ

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Source: IDEM, Air Monitoring

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**Ozone 8-Hour  
Design Values  
(3-Year Average  
4<sup>th</sup> High Daily  
Maximum)**

**Based on  
2012 - 2014  
Monitoring Data**

*Standard set at  
0.065 ppm*





# 2014 Monitoring Network

## Placement

- U.S. EPA provides guidance on placement of monitors.
- Monitor placement based on population density and manufacturing levels.

## Monitors

- 44 ozone monitors in 29 counties across Indiana.

## Calculating the Monitoring Data

- Levels are monitored 24 hours per day and rolling 8-hour averages are calculated; highest 8-hour average is reported for the day.
- A monitor's design value is calculated at the end of each ozone season; design values are calculated for each monitor in the state.
  - Design value: three-year average of fourth highest daily maximum values.



## 2014 Monitoring Summary

- Based on 2014 monitoring data, no monitor in the state's ambient air monitoring network recorded a 4<sup>th</sup> high daily maximum value above the 2008 8-hour health standard, i.e., greater than 0.075 ppm.
- Based on quality assured 2012 – 2014 monitoring data, the Michigan City ozone monitor (LaPorte County) was the only monitor in the state's 2014 ambient air monitoring network that recorded a three-year average 4<sup>th</sup> high daily maximum design value that exceeded the 2008 8-hour health standard of 0.075 ppm.
- Although Lawrenceburg Township in Dearborn County is currently classified as "nonattainment" under the 2008 ozone standard based on data collected in the Cincinnati Metro Area, data collected through 2014 now demonstrates attainment of the standard and this area is now eligible for redesignation to attainment.





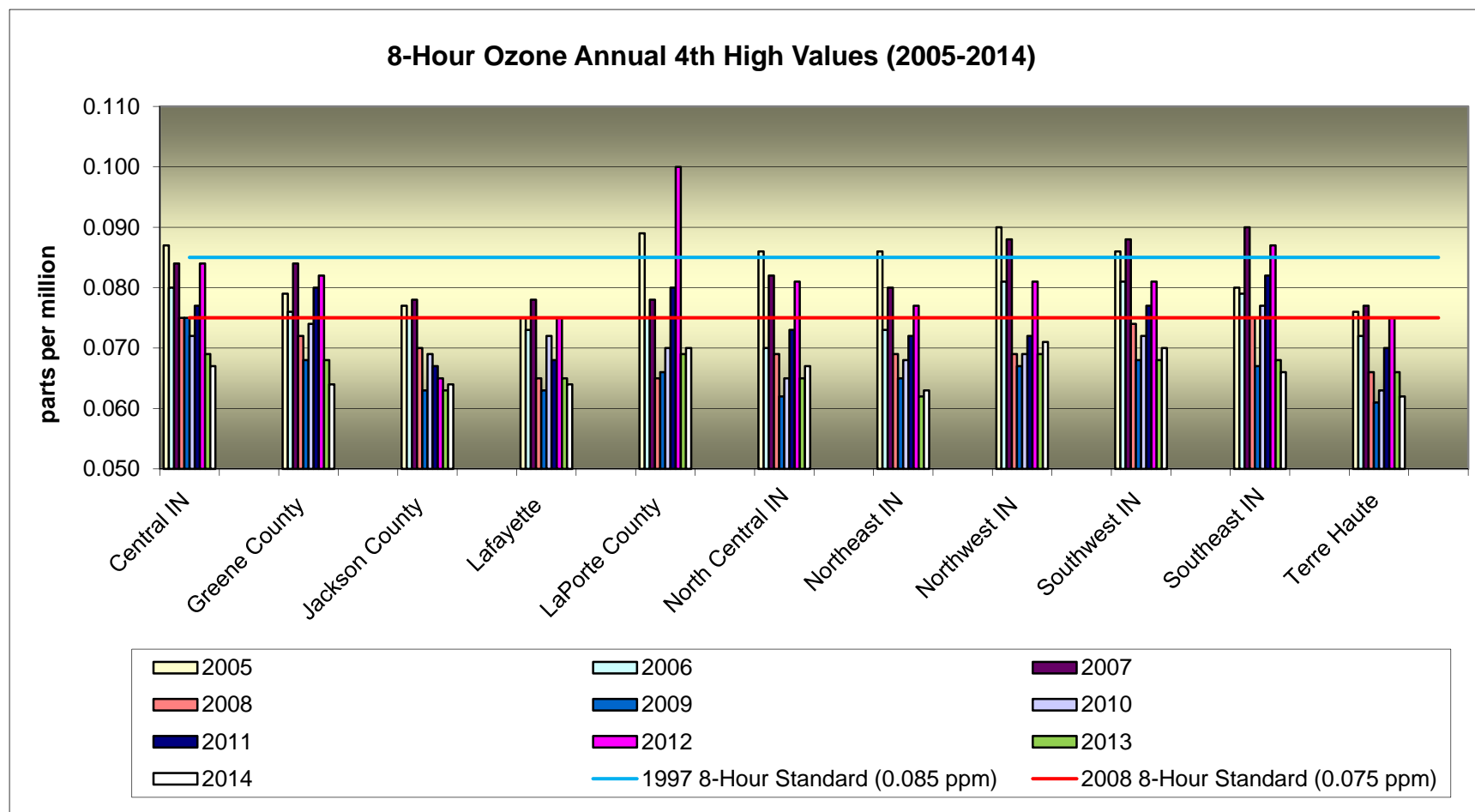
## Ozone Monitors by Area

Area	Counties		
Northwest	Lake	LaPorte	Porter
North Central	Elkhart	St. Joseph	
Northeast	Allen	Huntington	
Central	Bartholomew	Hancock	Morgan
	Boone	Hendricks	Shelby
	Brown	Johnson	
	Delaware	Madison	
	Hamilton	Marion	
West Central	Carroll	Vigo	
Southwest	Greene	Vanderburgh	
	Perry	Warrick	
	Posey		
Southeast	Clark	Floyd	Jackson



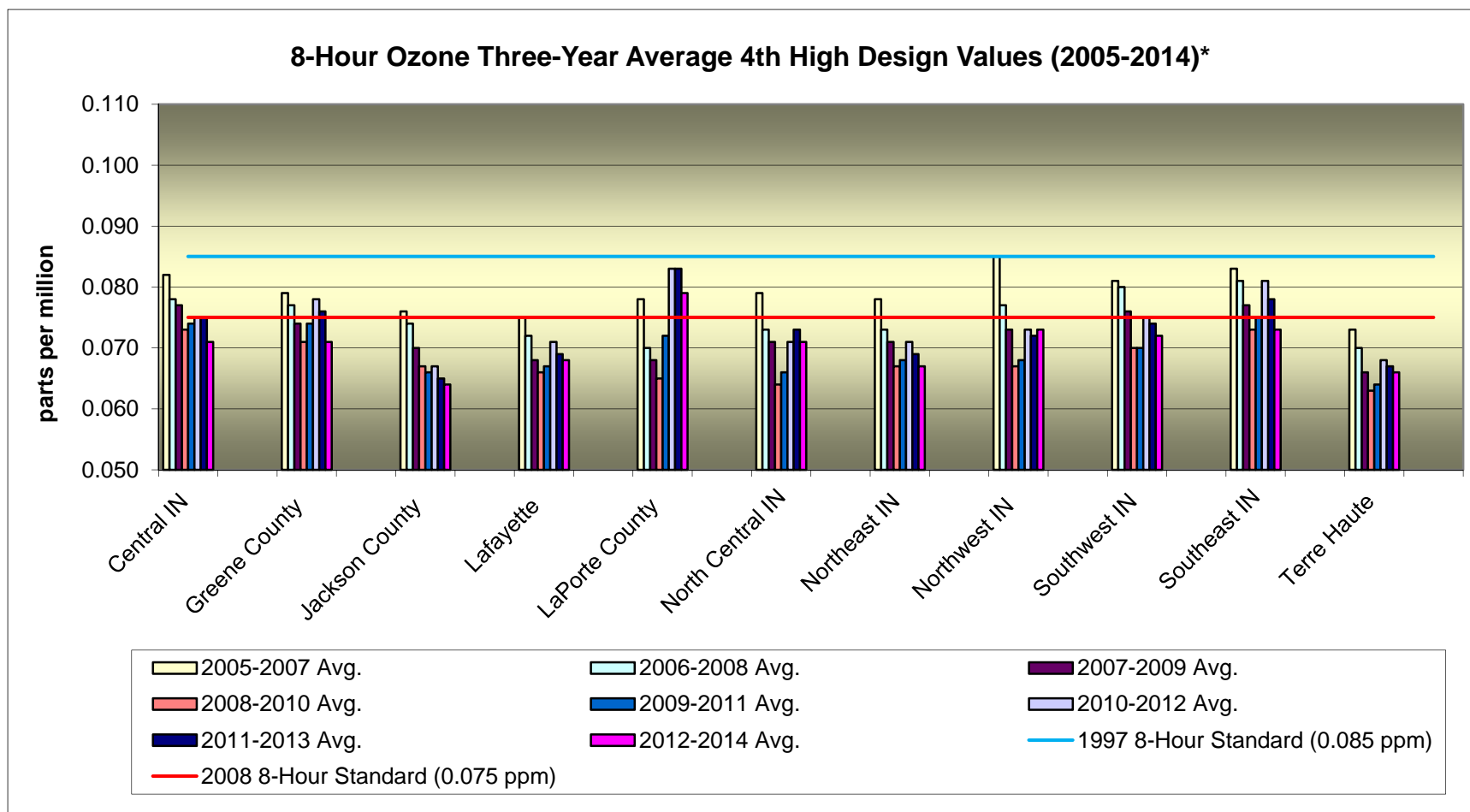


# Annual 4<sup>th</sup> High Trends 2005-2014





# Design Value Trends 2005-2014



\*Three additional monitors located in Bartholomew, Brown, and Marion counties have less than three years of monitoring data and therefore are not included.



# Meteorologically Adjusted Trend Analysis

- In order to account for variable meteorology, IDEM conducted a meteorologically adjusted trend analysis.
- Meteorological conditions can play an important role in ozone formation. By comparing ozone values under similar meteorological conditions, IDEM can evaluate whether trends are a result of changes in ozone precursor emissions and/or changes in meteorology.
- The results of this analysis confirm a downward trend in monitored ozone values across the state through 2014.
- Detailed information concerning this analysis is included in Appendix A of this summary.



## **Additional Information**

For additional information regarding the NAAQS for ground-level ozone, please visit U.S. EPA's Ground-level Ozone Regulatory Actions website:

[www.epa.gov/air/ozonepollution/actions.html](http://www.epa.gov/air/ozonepollution/actions.html).



## Contact

For more information regarding the ozone designation process or Indiana's redesignation petitions and maintenance plans, visit [www.idem.IN.gov/airquality/2392.htm](http://www.idem.IN.gov/airquality/2392.htm) or contact Mr. Gale Ferris of the Office of Air Quality at (800) 451-6027, (317) 234-3653, or [gferris@idem.IN.gov](mailto:gferris@idem.IN.gov).



# APPENDIX A

## **Meteorologically Adjusted Trend Analysis Results**

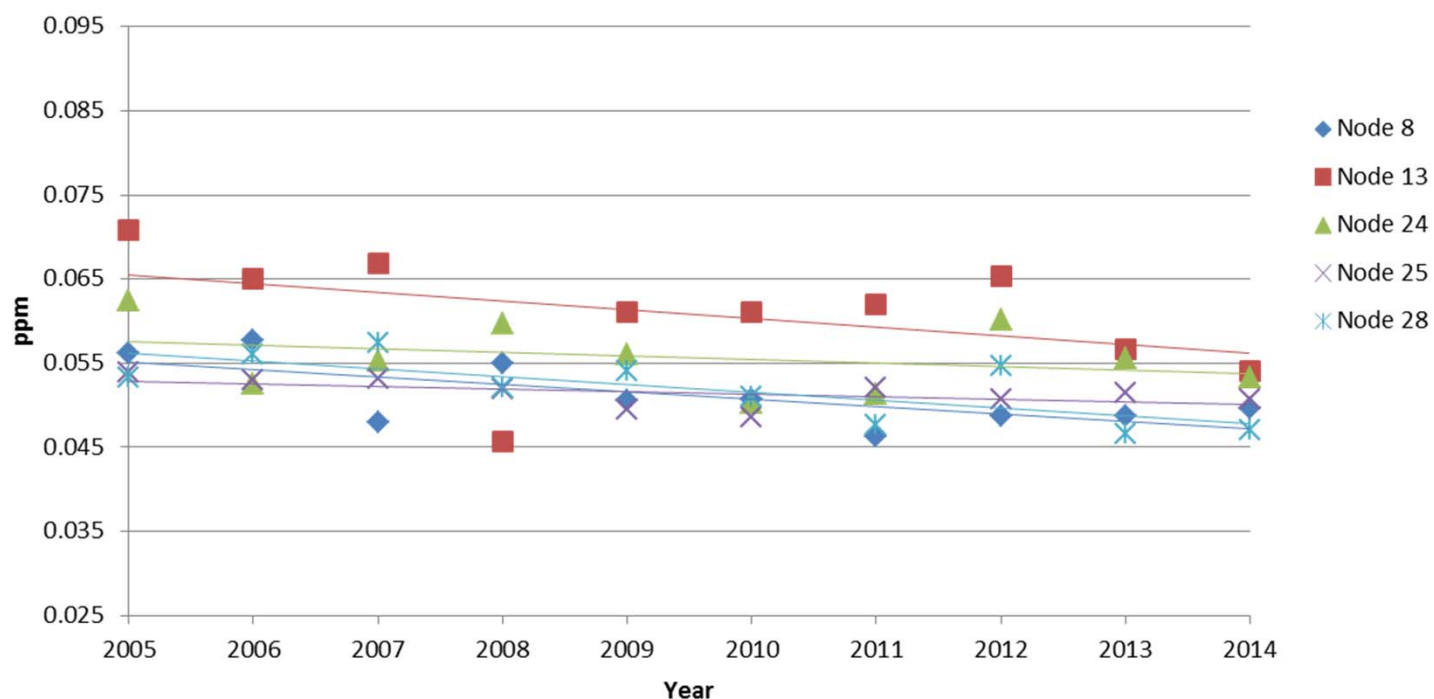


# Analysis Results

## NE Indiana, Allen County

### Beacon ST (2005-2014)

### Ozone Nodes > 0.050 parts per million (ppm)



Important nodes contain the most individual monitor values equal to or greater than 0.075 ppm: Beacon St, Node 13

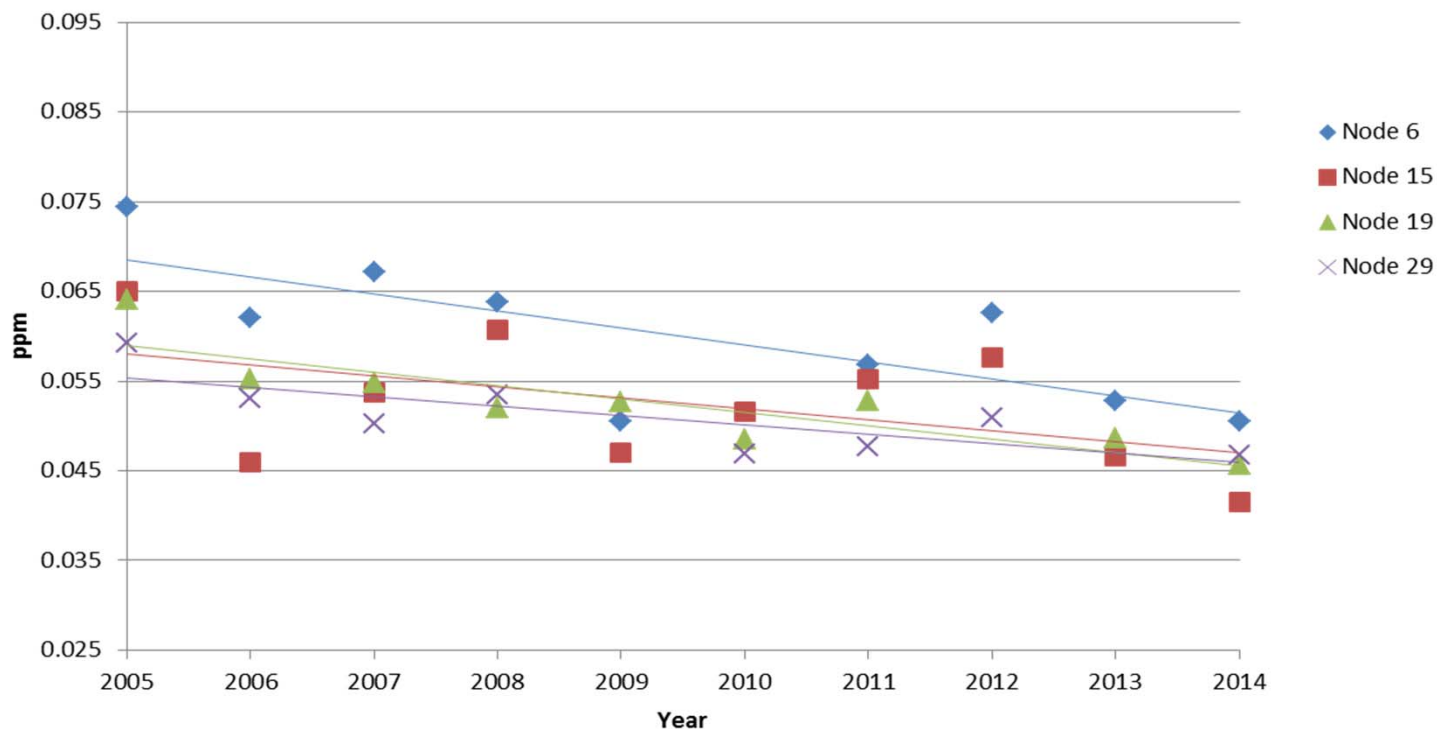


# Analysis Results

## North Central Indiana, Elkhart County

### Bristol (2005-2014)

#### Ozone Nodes > 0.050 parts per million (ppm)



Important nodes contain the most individual monitor values equal to or greater than 0.075 ppm: Bristol, Node 6



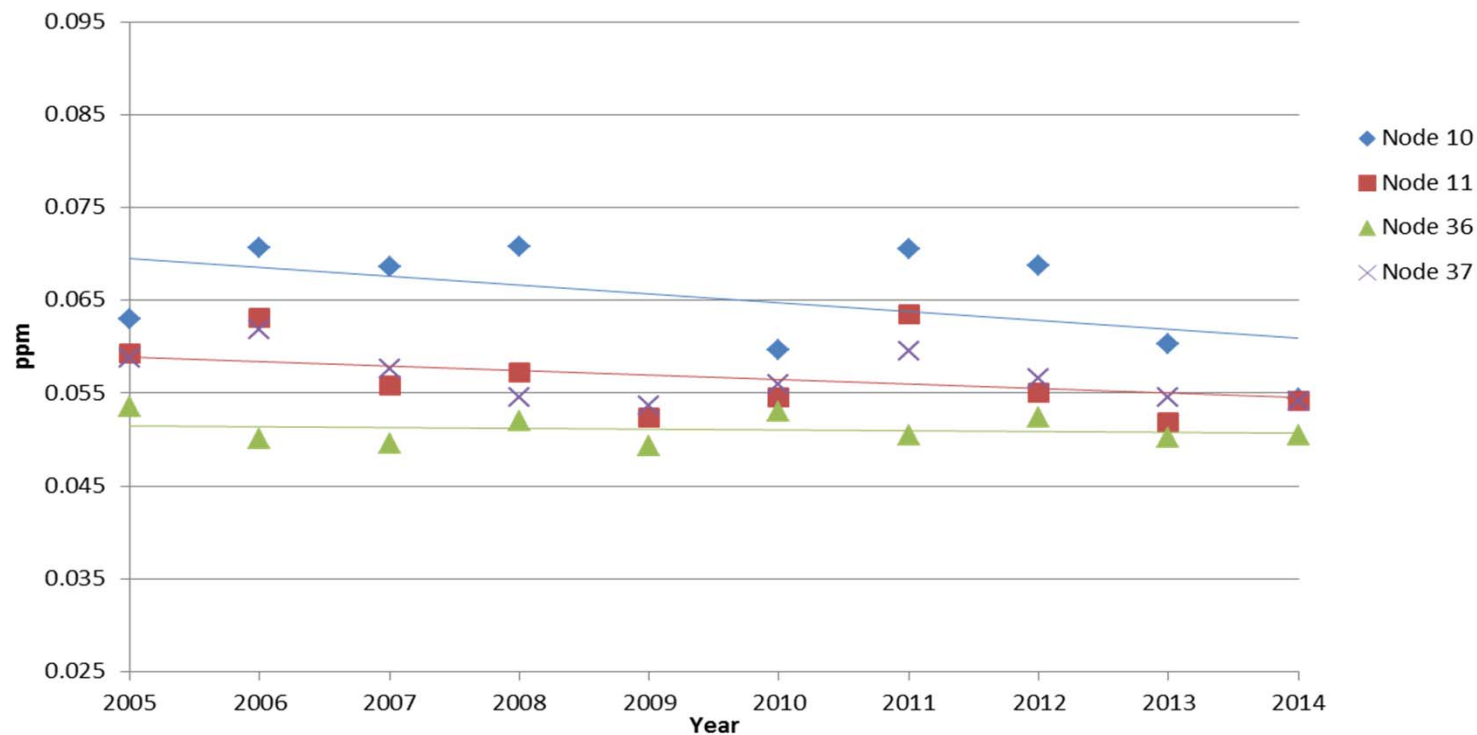


# Analysis Results

## SE Indiana, Clark County

### Charlestown (2005-2014)

#### Ozone Nodes > 0.050 parts per million (ppm)



Important nodes contain the most individual monitor values equal to or greater than 0.075 ppm: Charlestown, Node 10

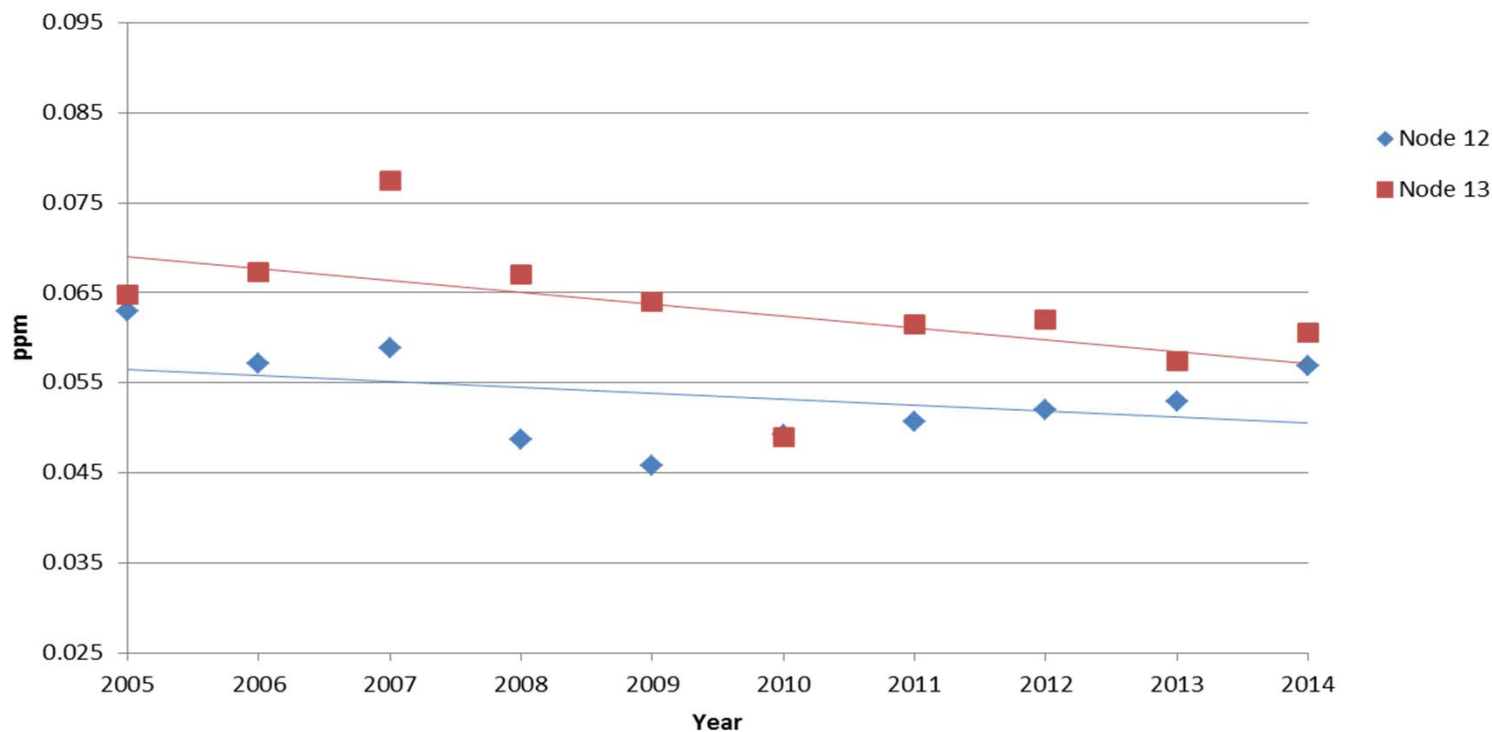


# Analysis Results

## NW Indiana, Porter County

### Ogden Dunes (2005-2014)

### Ozone Nodes > 0.050 parts per million (ppm)



Important nodes contain the most individual monitor values equal to or greater than 0.075 ppm: Ogden Dunes, Node 13

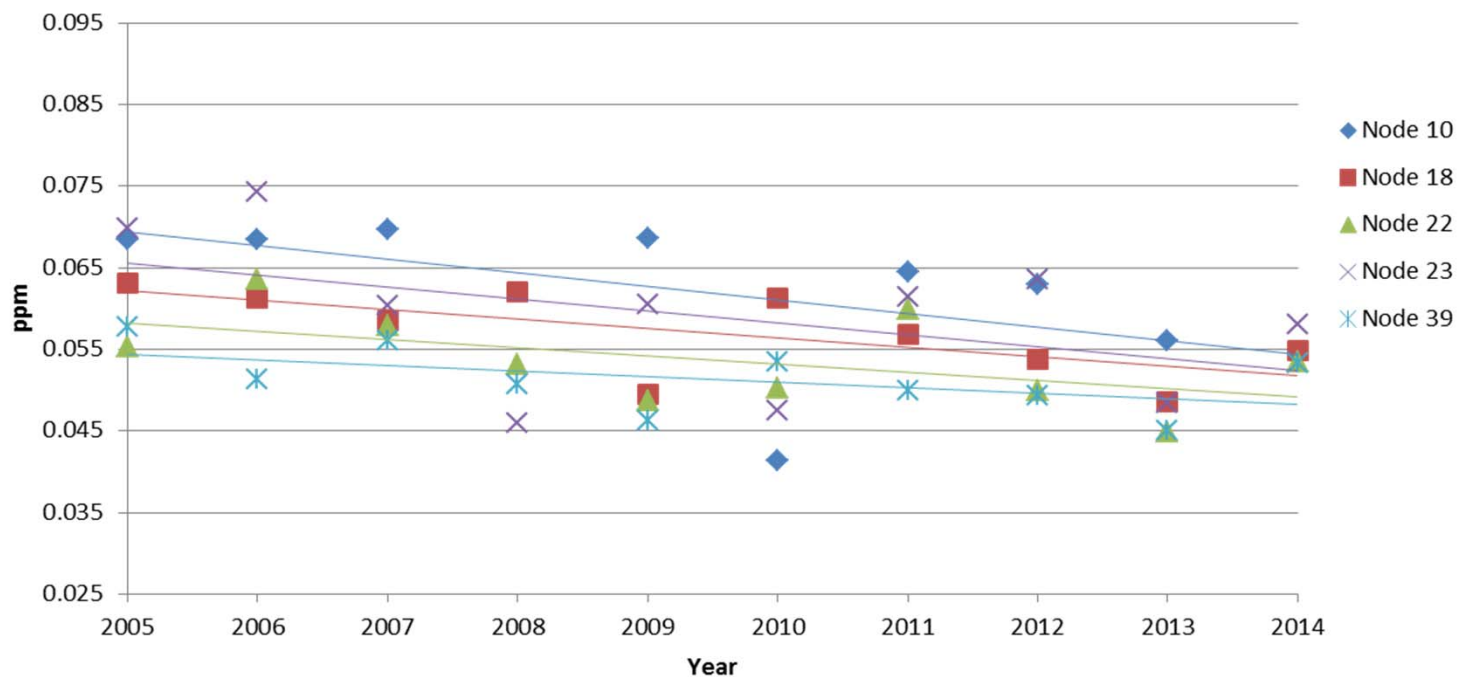


# Analysis Results

## Central Indiana, Marion County

### Fort Ben Harrison (2005-2014)

### Ozone Nodes > 0.050 parts per million (ppm)



Important nodes contain the most individual monitor values equal to or greater than 0.075 ppm: Fort Ben, Node 10

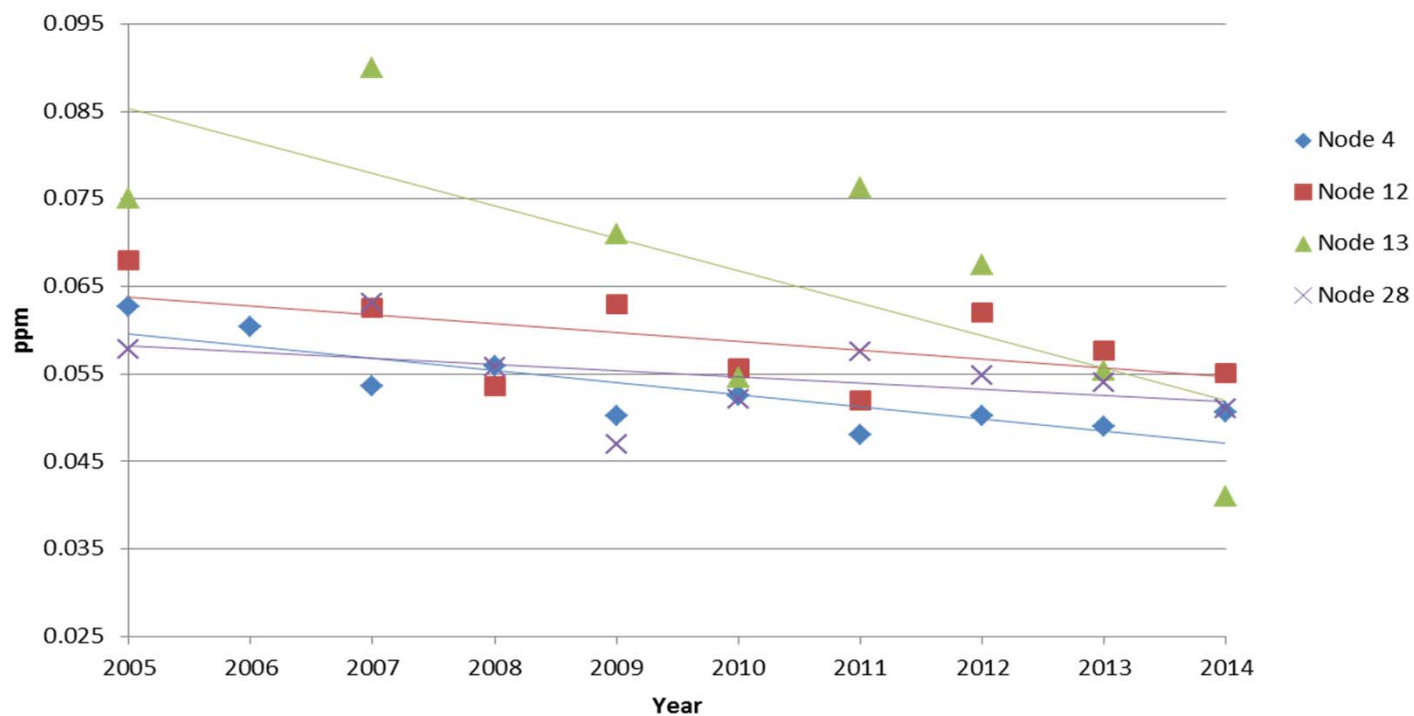


# Analysis Results

## Central SW Indiana, Greene County

### Plummer (2005-2014)

### Ozone Nodes > 0.050 parts per million (ppm)



Important nodes contain the most individual monitor values equal to or greater than 0.075 ppm: Plummer, Node 13

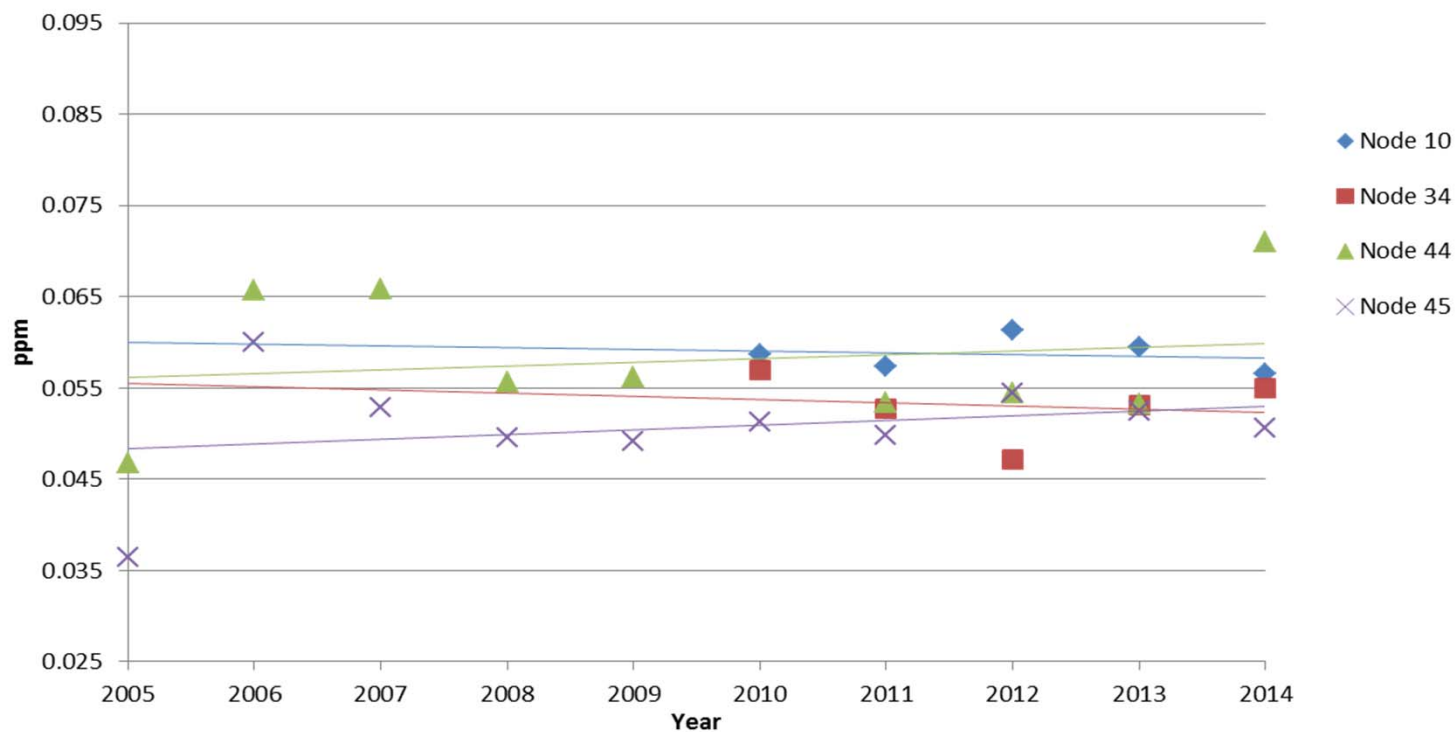


# Analysis Results

## SW Indiana, Vanderburgh County

### Evansville-Inglefield (2005-2014)

### Ozone Nodes > 0.050 parts per million (ppm)



Important nodes contain the most individual monitor values equal to or greater than 0.075 ppm: Inglefield, Node 10