



Indiana Department of Environmental Management  
*Protecting Hoosiers and Our Environment Since 1986*

*Office of Air Quality*



# Indiana Department of Environmental Management

## 2014 Fine Particles (PM<sub>2.5</sub>) 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 Fine Particles Monitoring

## Purpose

This Fine Particles (PM<sub>2.5</sub>) Summary Report provides an overview of PM<sub>2.5</sub> levels from 2014, as well as PM<sub>2.5</sub> trends over the last 10 years (2005 through 2014).

## Summary

Monitoring and reporting of fine particles occurs on a year-round basis as mandated by the United States Environmental Protection Agency (U.S. EPA).

- There were 13 exceedance days in 2014.
- There were 5 Air Quality Action Days in 2014.



# Background of Particulate Matter

## **What is particulate matter?**

Particulate matter is a complex mixture of small particles found in the air, including dust, dirt, smoke, and liquid droplets.

## **Where does PM come from?**

Sources of PM include all types of combustion activities:

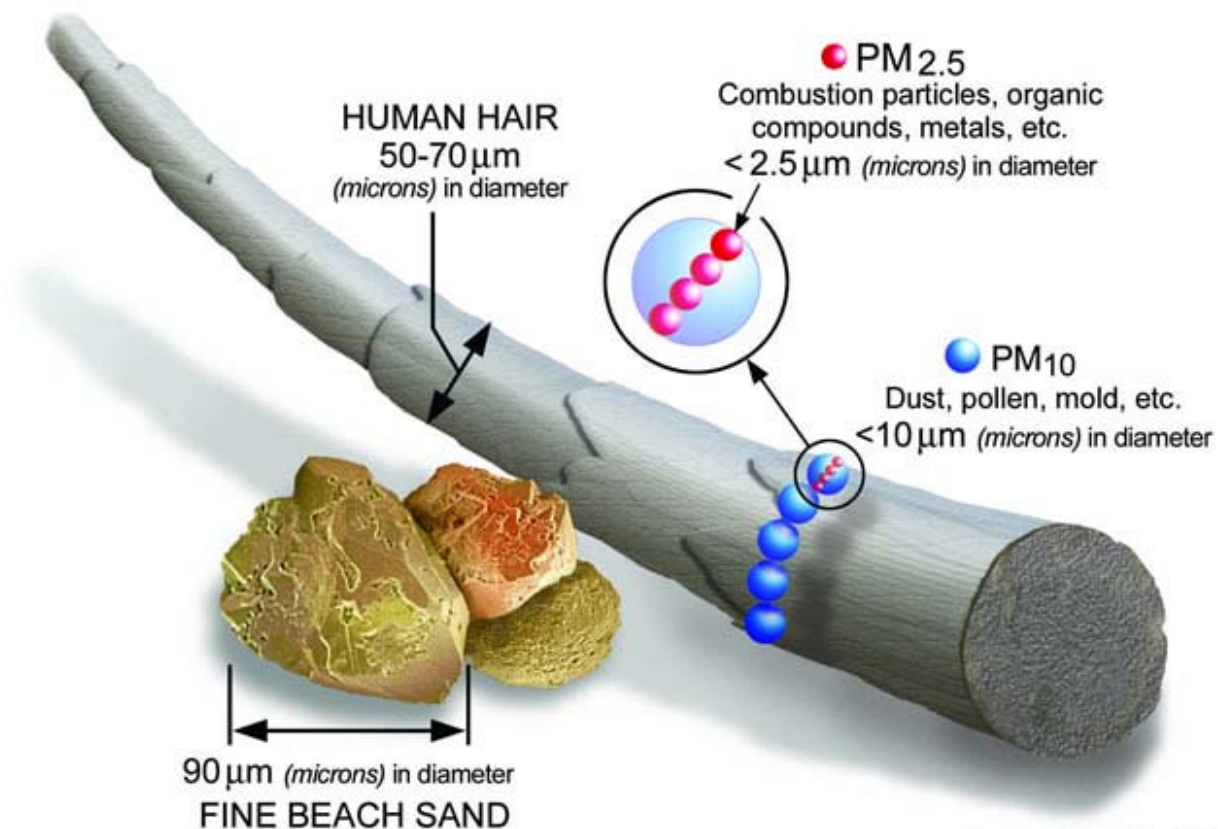
- Motor vehicles, coal-fired power plants, open burning, etc.
- Certain industrial processes.

## **Health effects of PM:**

- Increased respiratory symptoms:
  - Irritation of the airways.
  - Coughing or difficulty breathing.
  - Decreased lung function.
  - Aggravated asthma.
  - Development of chronic bronchitis.
- Irregular heartbeats.
- Nonfatal heart attacks.
- Premature death in people with heart or lung disease.



# How Big Is Particulate Matter?



*Image courtesy of the U.S. EPA*



# National Ambient Air Quality Standards (NAAQS) for PM<sub>2.5</sub>

## **Primary Standards**

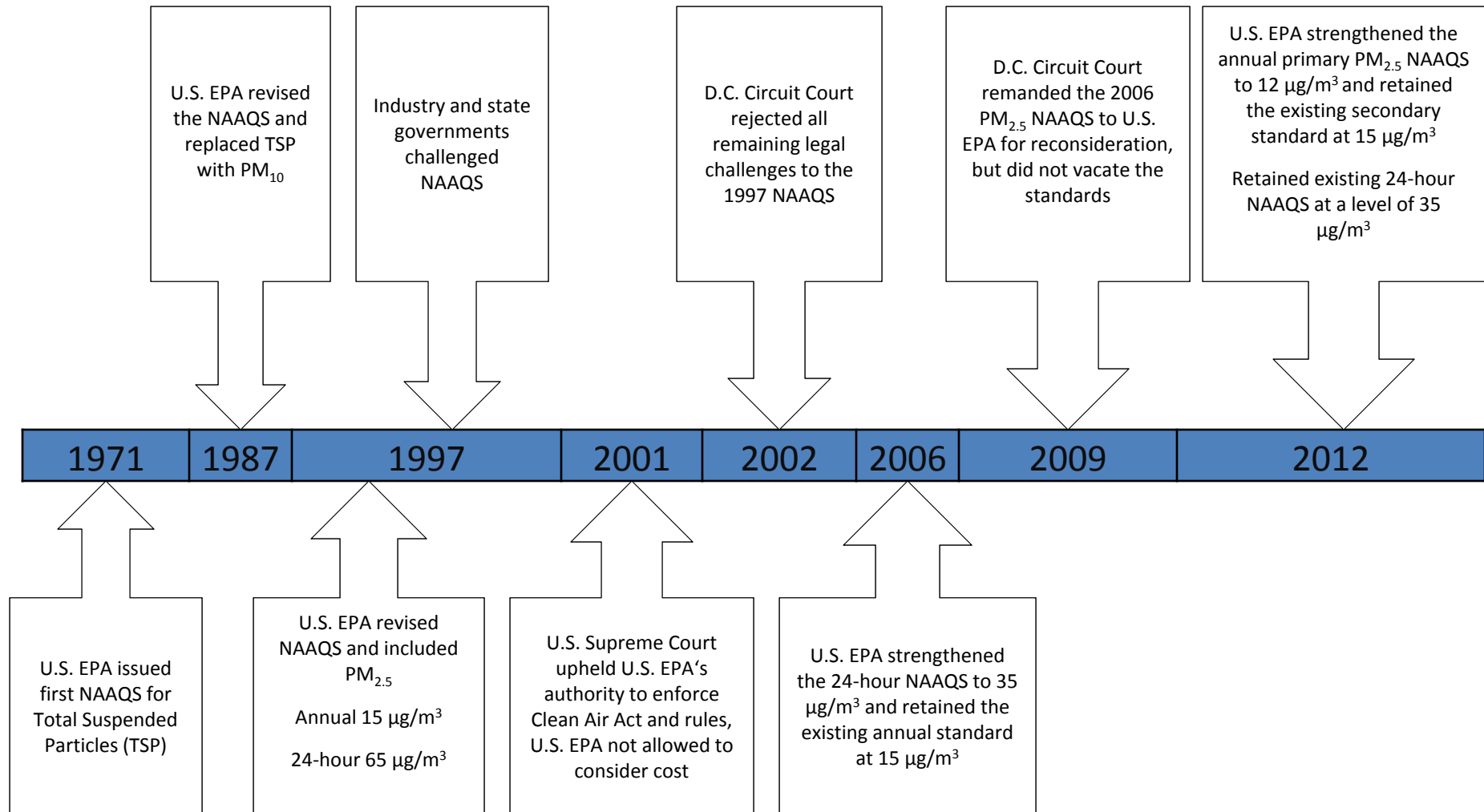
Primary standards, also known as health standards, are limits set to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly.

## **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 PM Standards



µg/m<sup>3</sup> = micrograms per cubic meter



# Attaining the Standards

## Annual Standard

To attain the 2012 annual standard, the three-year average of weighted annual mean  $\text{PM}_{2.5}$  concentrations from a monitor must not exceed  $12 \mu\text{g}/\text{m}^3$ .

## Exceedance versus a Violation of the Standard

- An **exceedance** occurs when the annual mean is measured above the standard. A **violation** occurs when the three-year average of the annual mean is above the standard. **A monitor can exceed the standard without being in violation.**

## 24-Hour Standard

To attain the 2006 24-hour standard, the three-year average of the 98<sup>th</sup> percentile of 24-hour concentrations at each monitor must not exceed  $35 \mu\text{g}/\text{m}^3$ .

## Exceedance versus a Violation of the Standard

- An **exceedance** occurs when the 98<sup>th</sup> percentile is measured above the standard. A **violation** occurs when the three-year average of the 98<sup>th</sup> percentile is measured above the standard. **A monitor can exceed the standard without being in violation.**



# Attainment Status

## **1997 Annual Standard**

U.S. EPA attainment designations for the 1997 annual standard were effective on April 5, 2005.

- Twelve full and five partial counties were designated as “nonattainment”.
- Dubois, Vanderburgh, and Warrick counties, as well as Montgomery Township in Gibson County, Ohio Township in Spencer County, and Washington Township in Pike County were redesignated to attainment on October 27, 2011.
- Lawrenceburg Township in Dearborn County, which is part of the Cincinnati-Hamilton OH-KY-IN Fine Particles Nonattainment Area, was redesignated to attainment on December 23, 2011.
- Lake and Porter counties were redesignated to attainment on February 6, 2012.
- Hamilton, Hendricks, Johnson, Marion, and Morgan counties were redesignated to attainment on July 11, 2013.
- Clark and Floyd counties, as well as Madison Township in Jefferson County, are pending redesignation with U.S. EPA.
- All areas of the state currently meet the 1997 annual air quality standard.

## **2006 24-Hour Standard**

U.S. EPA attainment designations for the 2006 24-hour standard were effective December 14, 2009.

- All Indiana counties were designated as attaining the standard and remain in attainment.





# Attainment Status

## **2012 Standard**

On December 14, 2012, U.S. EPA strengthened the annual primary NAAQS to a level of 12  $\mu\text{g}/\text{m}^3$  and retained the existing secondary annual standard at a level of 15  $\mu\text{g}/\text{m}^3$  and primary and secondary 24-hour standards at a level of 35  $\mu\text{g}/\text{m}^3$ . The standards were finalized by U.S. EPA on January 15, 2013, and became effective on March 18, 2013.

## **Area Designations**

- On December 18, 2014, U.S. EPA announced final designations for the 2012 annual primary standard. In that announcement, U.S. EPA designated Clark and Floyd counties “nonattainment” based on the fact that the Jeffersonville – Walnut St. monitor located in Clark County measured a 2011 – 2013 design value above the standard (i.e., 12.1  $\mu\text{g}/\text{m}^3$ ).
- Lake and Porter counties were designated “unclassifiable” due to uncertainties with monitoring data within Chicago’s monitoring network. U.S. EPA intends to assess air quality in the Chicago IL-IN nonattainment area once the requisite amount of valid air quality monitoring data are available.
- All other areas of the state were classified as unclassifiable/attainment.
- U.S. EPA also announced that it is willing to re-evaluate the status of an area based on its annual  $\text{PM}_{2.5}$  monitoring from 2012 – 2014, if a state submits complete, quality-assured, and certified air quality data before the designations become effective. U.S. EPA established a deadline of February 27, 2015, for states to provide 2014 data.



# Attainment Status


## **2012 Standard (continued)**

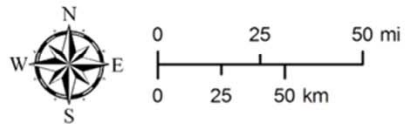
- On January 13, 2015, Indiana submitted complete, quality-assured, and certified 2014 monitoring data to U.S. EPA demonstrating that the Jeffersonville – Walnut St. monitor measured a 2012 – 2014 design value below the 2012 annual primary standard (i.e., 11.8  $\mu\text{g}/\text{m}^3$ ). All other  $\text{PM}_{2.5}$  monitors in Clark and Floyd counties measured 2012 – 2014 design values well below the 2012 standard.
- Based on this updated monitoring data, Indiana is requesting that U.S. EPA reconsider the “nonattainment” designations for Clark and Floyd counties and designate both counties as “attainment”.
- U.S. EPA attainment designations for the 2014 annual standard will become effective on April 15, 2015.
- State implementation plans are due to U.S. EPA within eighteen months from the effective date of designations.
- States are required to meet the standard no later than the end of the sixth calendar year after designations become effective (i.e., December 31, 2021).



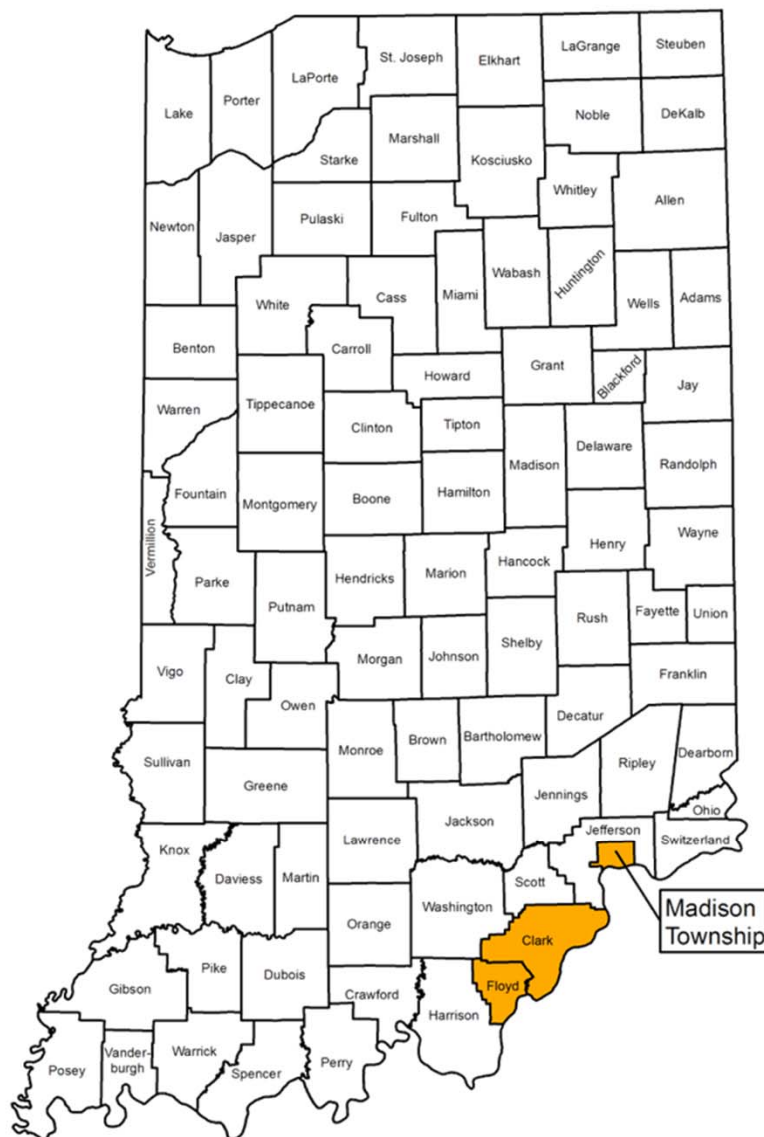
## Current Nonattainment Areas for the 1997 PM<sub>2.5</sub> Annual Standard

### Legend

 Nonattainment for the  
1997 Fine Particle Annual Standard



**Mapped By:** C. Mitchell, OAQ  
**Date:** 02/24/2015  
**Source:** IDEM, Air Monitoring  
**Map Projection:** UTM Zone 16 N  
**Map Datum:** NAD83





## PM<sub>2.5</sub> Annual Design Values 2012 - 2014



Standard set  
at 12.0  $\mu\text{g}/\text{m}^3$

1997:  
U.S. EPA  
Established This  
Standard at  
15.0  $\mu\text{g}/\text{m}^3$

2006:  
U.S. EPA  
Retained This  
Standard at  
15.0  $\mu\text{g}/\text{m}^3$

2012:  
U.S. EPA  
Revised This  
Standard to  
12.0  $\mu\text{g}/\text{m}^3$

### Legend

-  PM<sub>2.5</sub> Design Value  
Less Than or Equal  
to 12.0  $\mu\text{g}/\text{m}^3$
-  Indiana County  
Borders



0 25 50 mi  
0 25 50 km

### Notes:

Posted Data Are in Units  
of Micrograms Per Cubic  
Meter ( $\mu\text{g}/\text{m}^3$ )

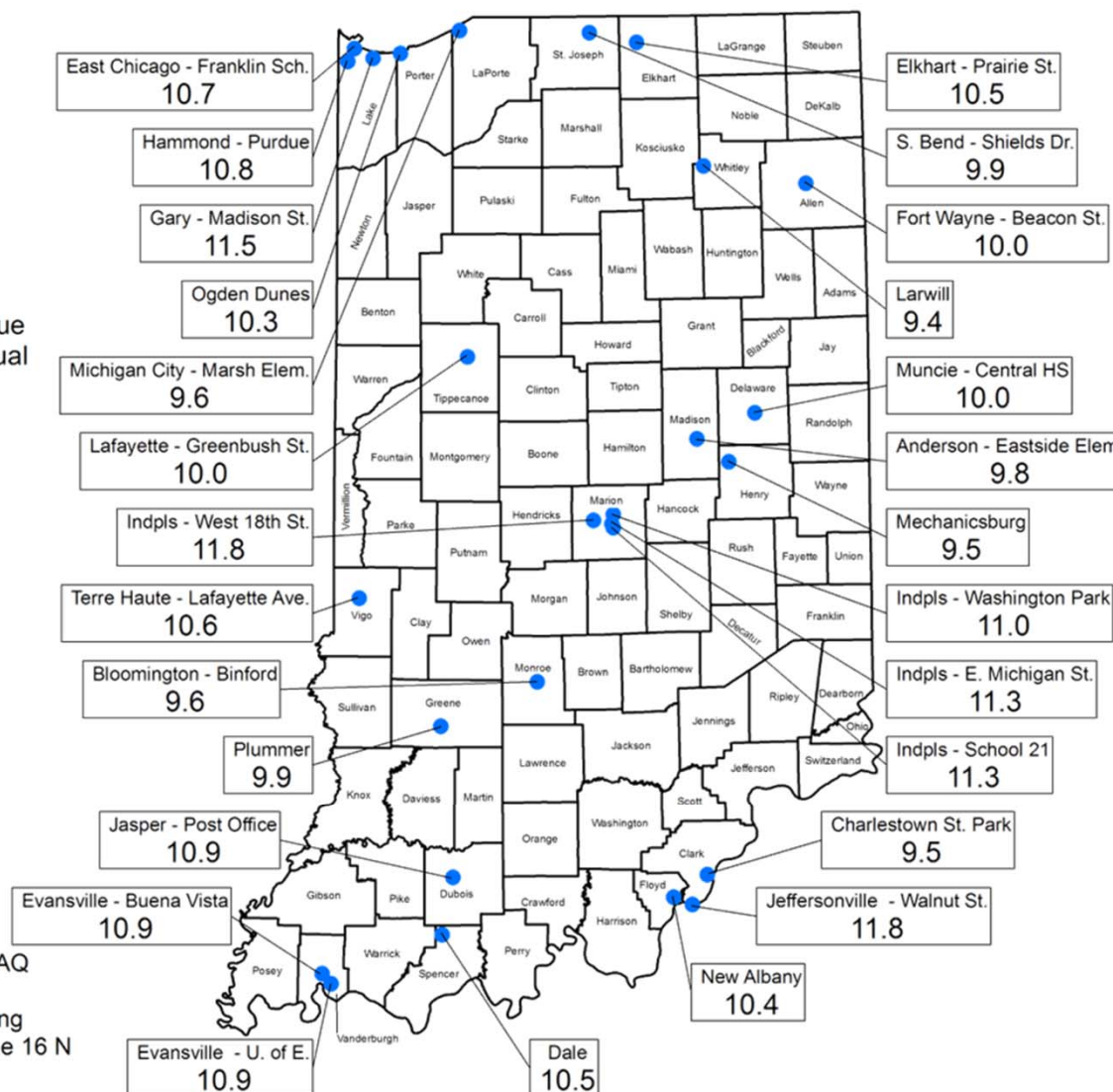
Mapped By: C. Mitchell, OAQ

Date: 02/04/2015

Source: IDEM, Air Monitoring

Map Projection: UTM Zone 16 N


Map Datum: NAD83







## Legend

 PM<sub>2.5</sub> Design Value  
Less Than or Equal to  
35 µg/m<sup>3</sup>



0 25 50 mi  
0 25 50 km

### Notes:

Posted Data Are in Units  
of Micrograms Per Cubic  
Meter (ug/m<sup>3</sup>)

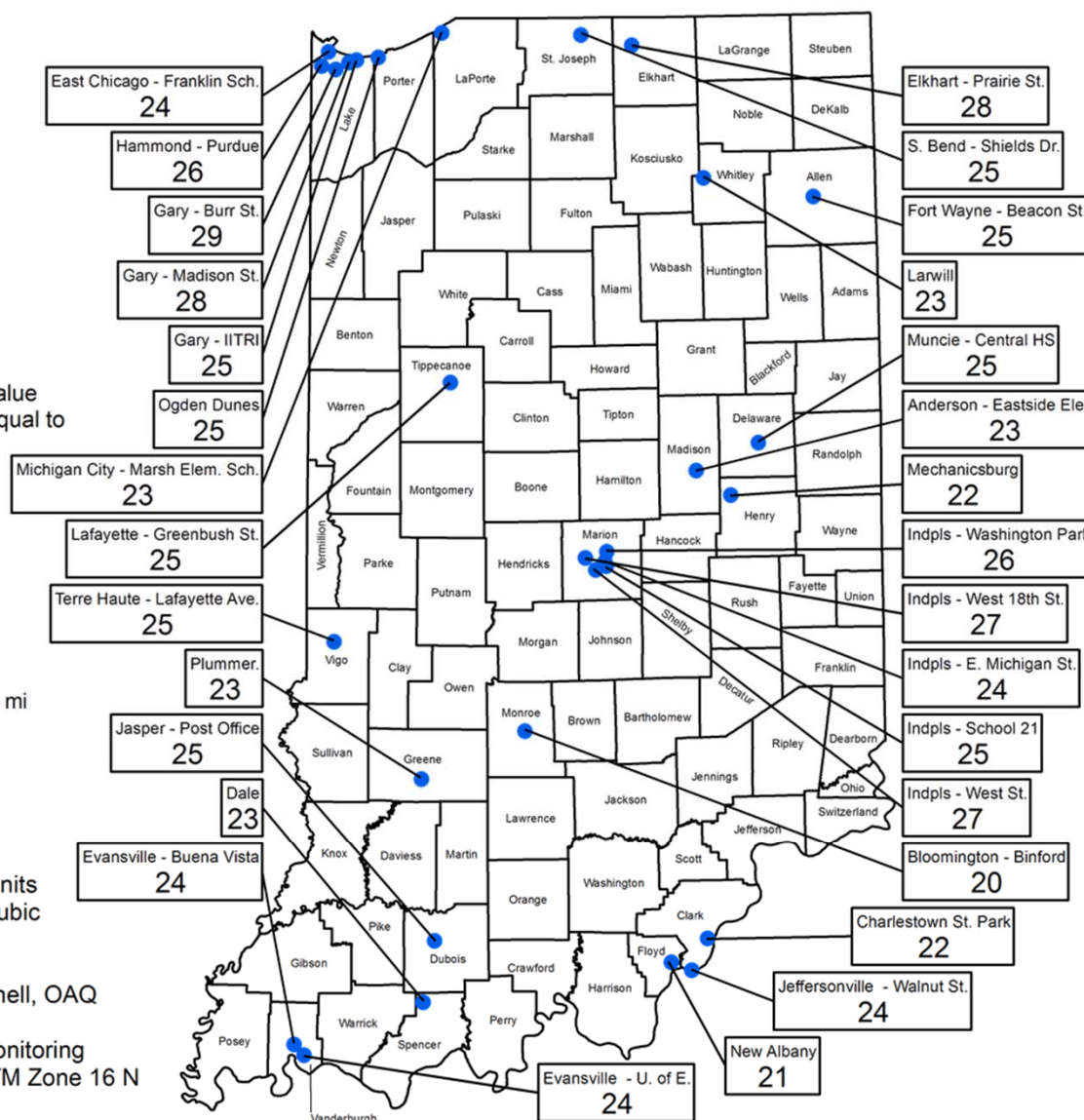
**Mapped By:** C. Mitchell, OAQ

**Date:** 02/11/2015

**Source:** IDEM Air Monitoring

**Map Projection:** UTM Zone 16 N

**Map Datum:** NAD83



**PM<sub>2.5</sub> 24-Hour  
Design Values  
2012 - 2014**

Standard set at  
35.0 µg/m<sup>3</sup>



# 2014 Monitoring Network

## Placement

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

## Monitors

- 32 annual fine particle monitors in 23 counties across Indiana.
- 35\* 24-hour fine particle monitors in 23 counties across Indiana.

## Calculating the Design Value

- A monitor's design value is calculated at the end of the year, once all of the data has been quality assured.
  - Annual Design Value: three-year average of the weighted annual mean  $PM_{2.5}$  concentrations.
  - 24-Hour Design Value: three-year average of the 98<sup>th</sup> percentile of 24-hour concentrations.

\* Three monitoring sites reflect air quality in a relatively small area, are directly influenced by a specific source, and are intended to be used for attainment status under the 24-hour standard only.



## 2014 Annual Ambient Air PM<sub>2.5</sub> Monitoring Network

### Legend

● PM<sub>2.5</sub> Annual Design Value Monitors

□ County

0 25 50 mi

0 25 50 km

### Notes:

Map Shows Active PM<sub>2.5</sub> Monitors, Not Those That Were Discontinued or Are Pending Installation

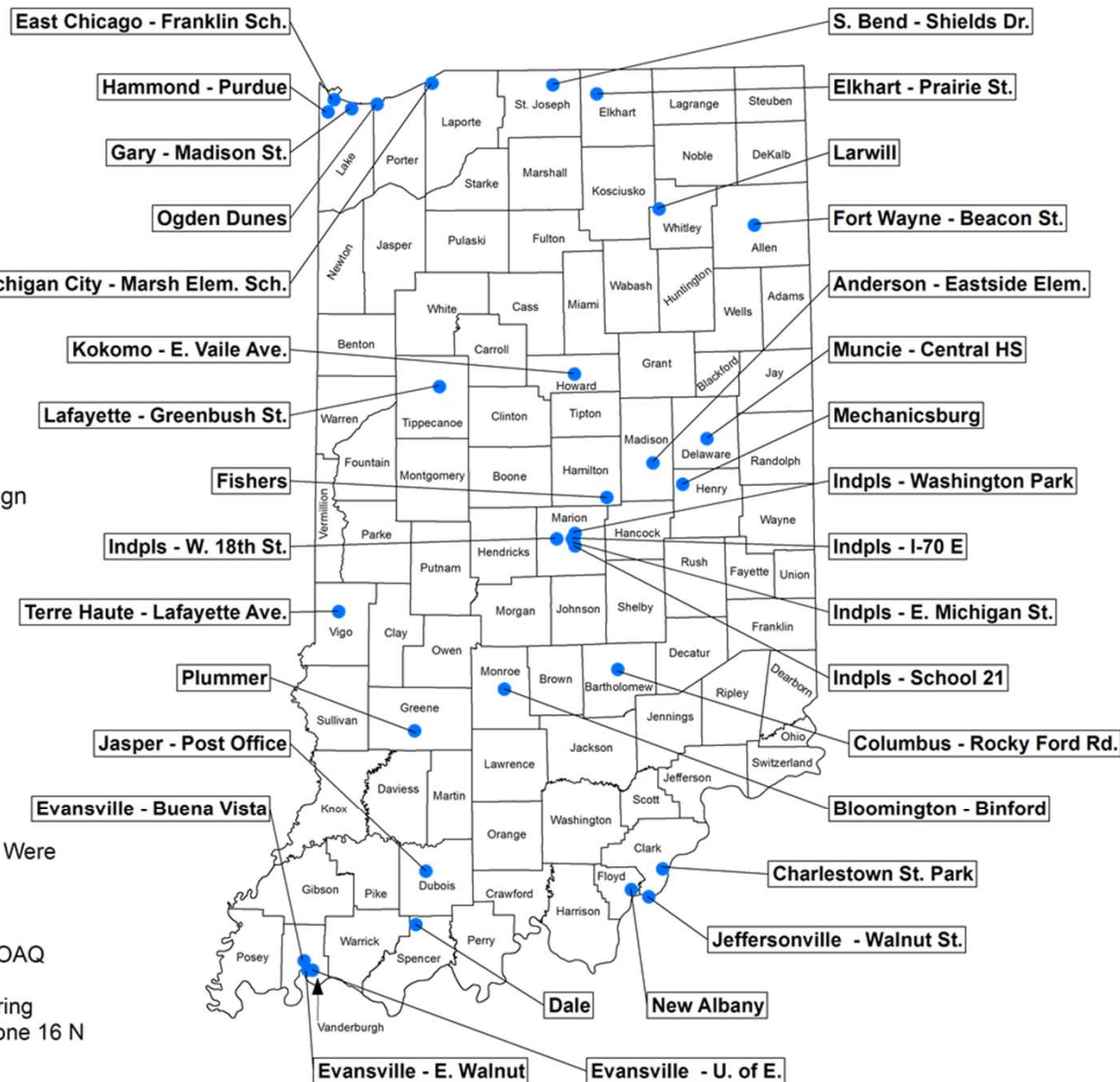
Mapped By: C. Mitchell, OAQ

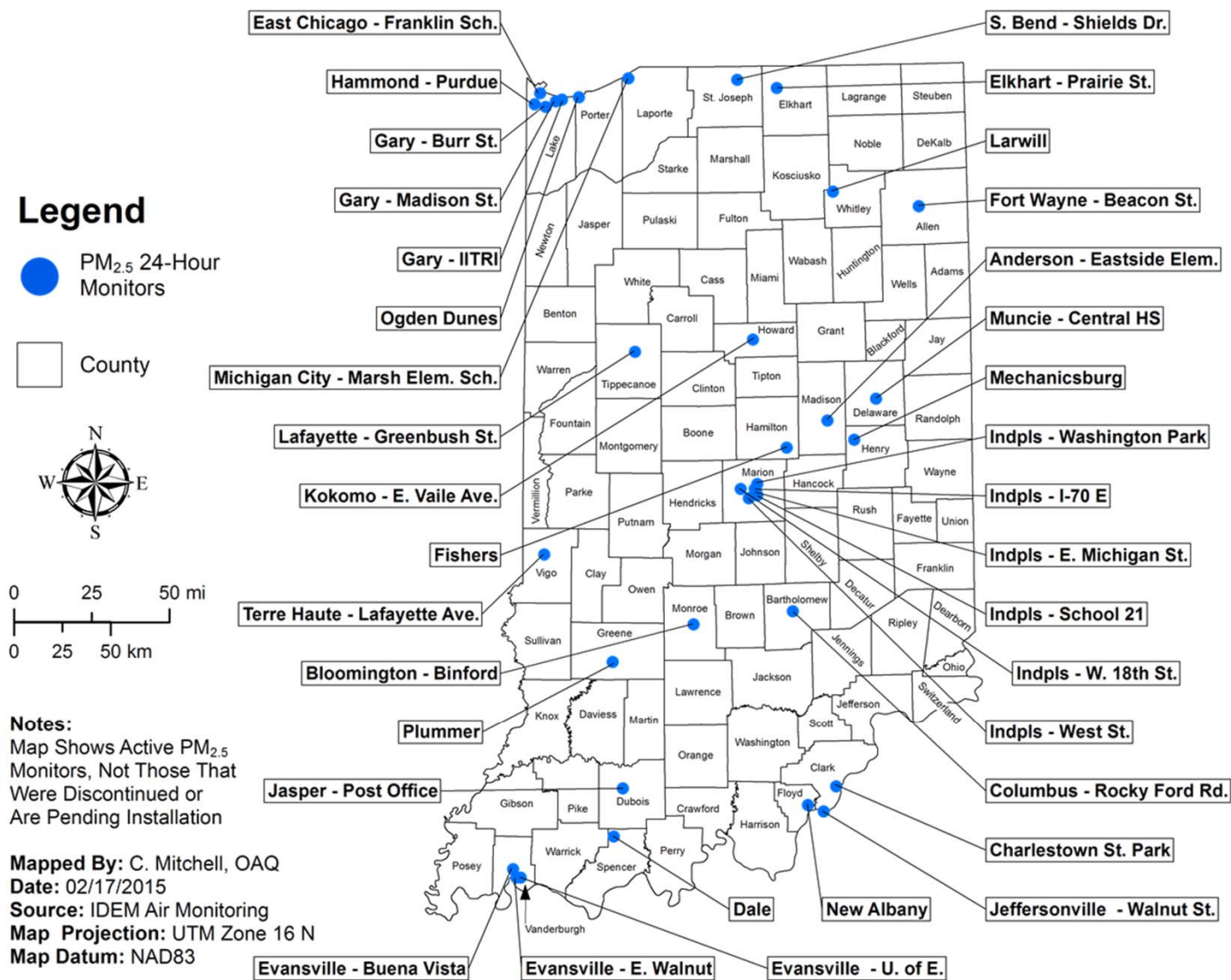
Date: 02/10/2015

Source: IDEM Air Monitoring

Map Projection: UTM Zone 16 N

Map Datum: NAD83





**2014  
PM<sub>2.5</sub>  
24-Hour  
Ambient Air  
Monitoring  
Network**





## PM<sub>2.5</sub> Monitors by Area

<u>Area</u>	<u>Counties</u>
Central	Bartholomew, Hamilton, Madison, Marion
East Central	Delaware, Henry, Howard
Northeast	Allen, Whitley
Northwest	Lake, LaPorte, Porter
North Central	Elkhart, St. Joseph
Southeast	Clark, Floyd
Southwest	Dubois, Greene, Spencer, Vanderburgh
West Central	Monroe, Tippecanoe, Vigo

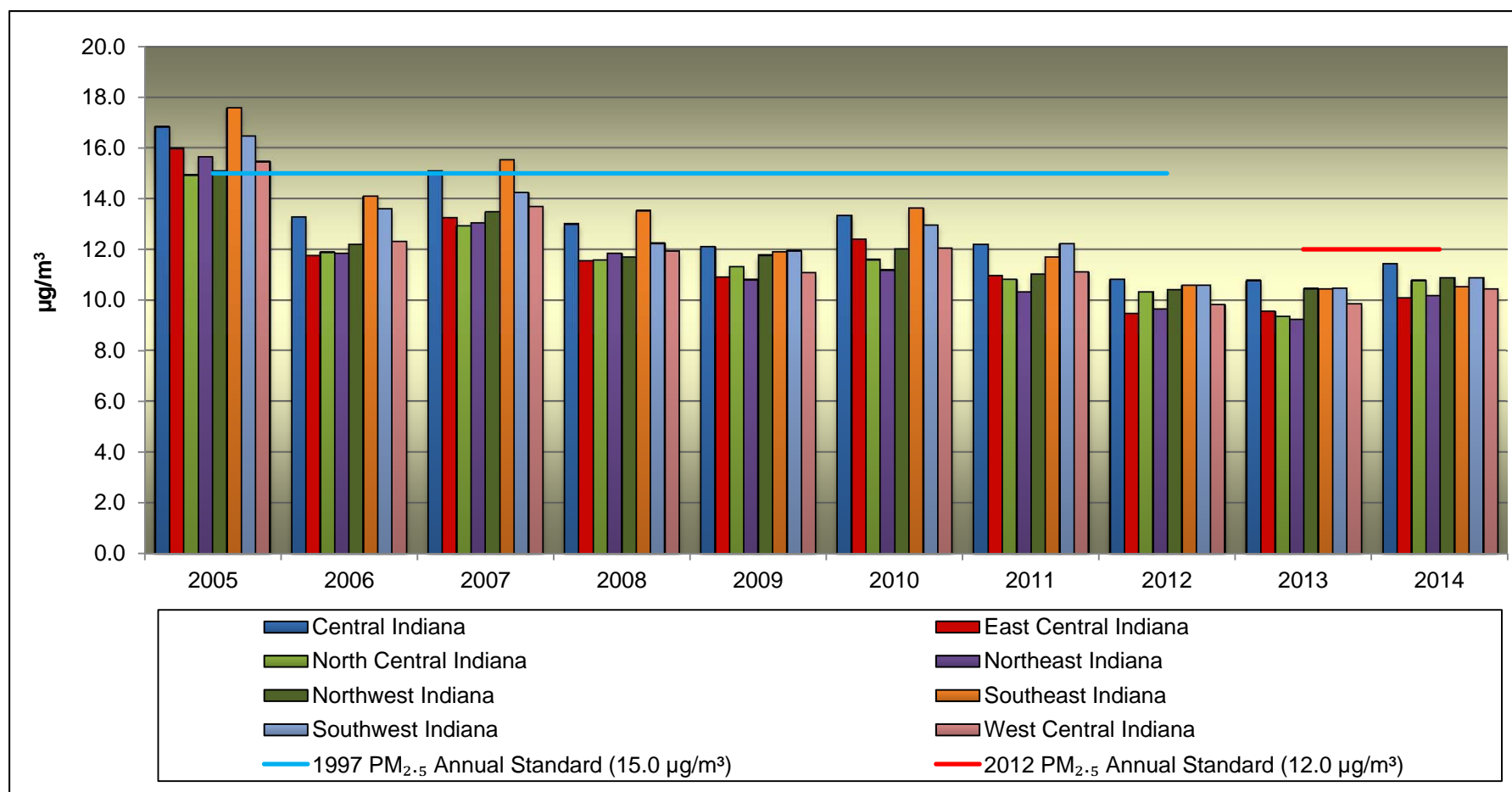


## 2014 Monitoring Summary

- 2014 quality assured monitoring data:
  - The Indianapolis – West 18<sup>th</sup> Street and I-70 East PM<sub>2.5</sub> monitors (Marion County) were the only monitors in the state that recorded weighted annual arithmetic mean values above the 2012 annual health standard.
  - No monitor in the state recorded 24-hour 98<sup>th</sup> percentile values that exceeded the 2006 24-hour health standard.
- 2012 – 2014 quality assured monitoring data:
  - No monitor in the state recorded a three-year average weighted annual arithmetic mean above the 2012 annual health standard.
  - No monitor in the state recorded a three-year average 98<sup>th</sup> percentile value that exceeded the 2006 24-hour health standard.



## Annual Arithmetic Mean Trends 2005-2014



µg/m³ = micrograms per cubic meter



## Annual PM<sub>2.5</sub> Design Value Trends 2005-2014

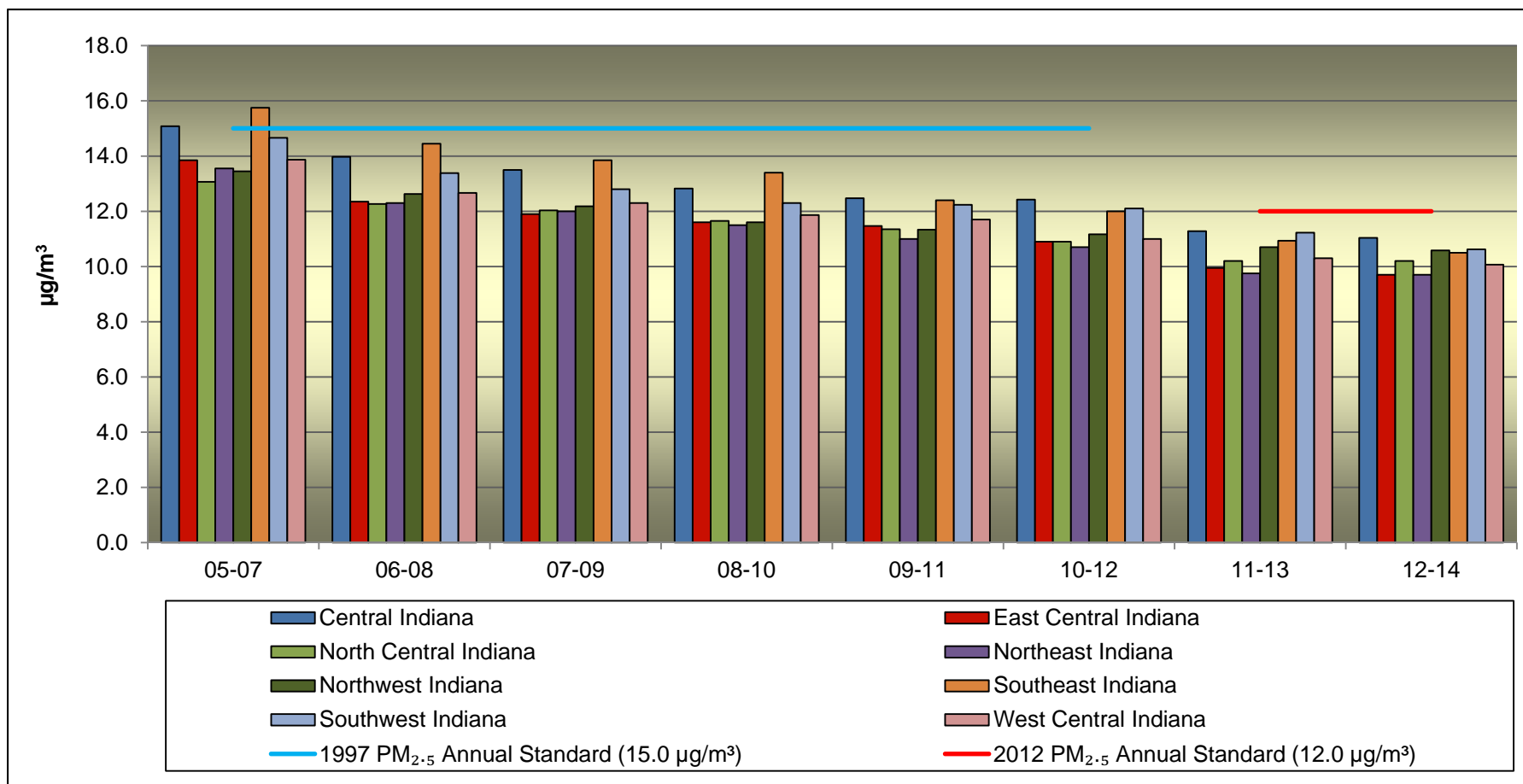
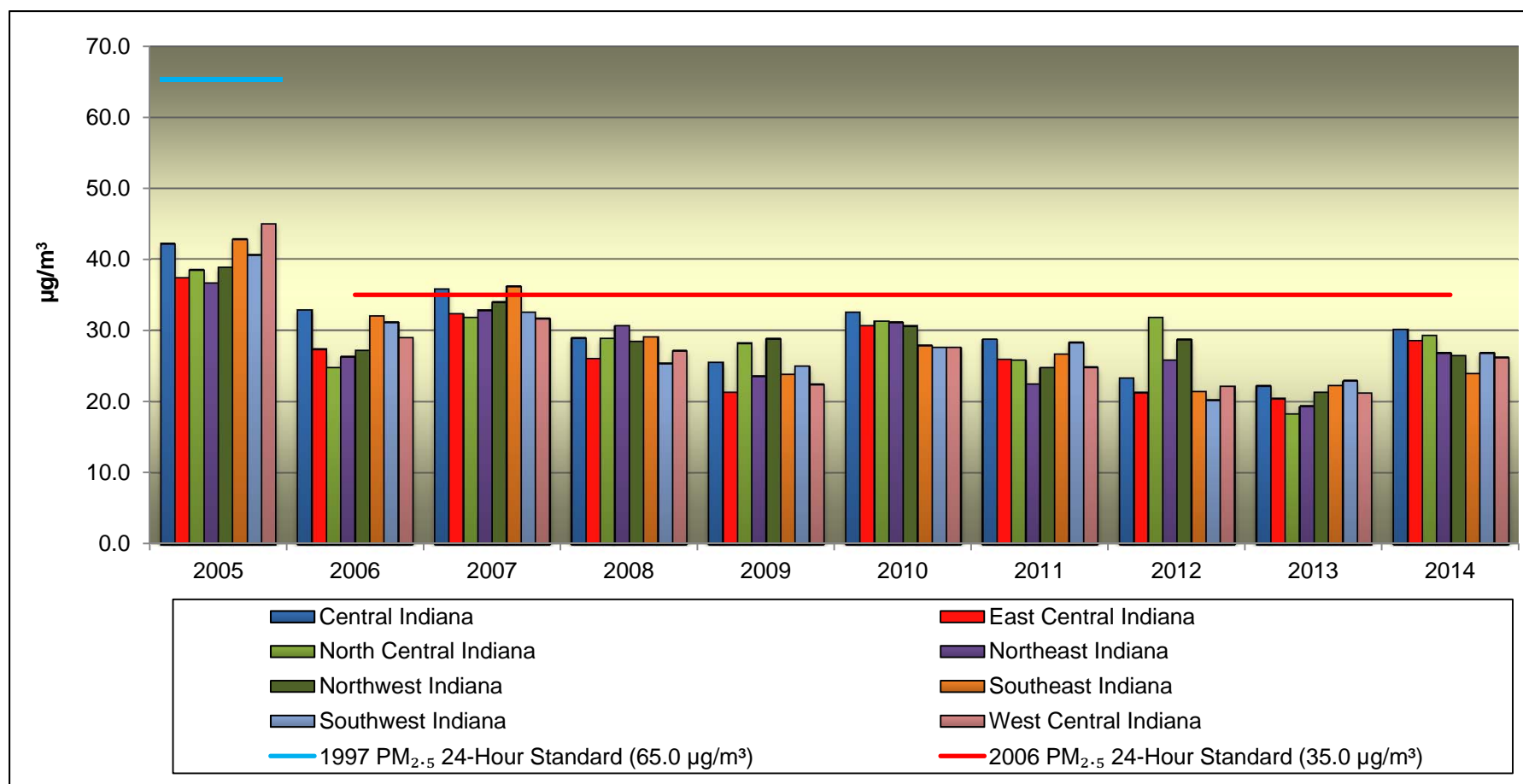


Chart excludes monitors with incomplete data and/or less than three full years of monitoring data.

µg/m³ = micrograms per cubic meter



## 24-Hour 98<sup>th</sup> Percentile Trends 2005-2014



µg/m³ = micrograms per cubic meter



## 24-Hour PM<sub>2.5</sub> Design Value Trends 2005-2014

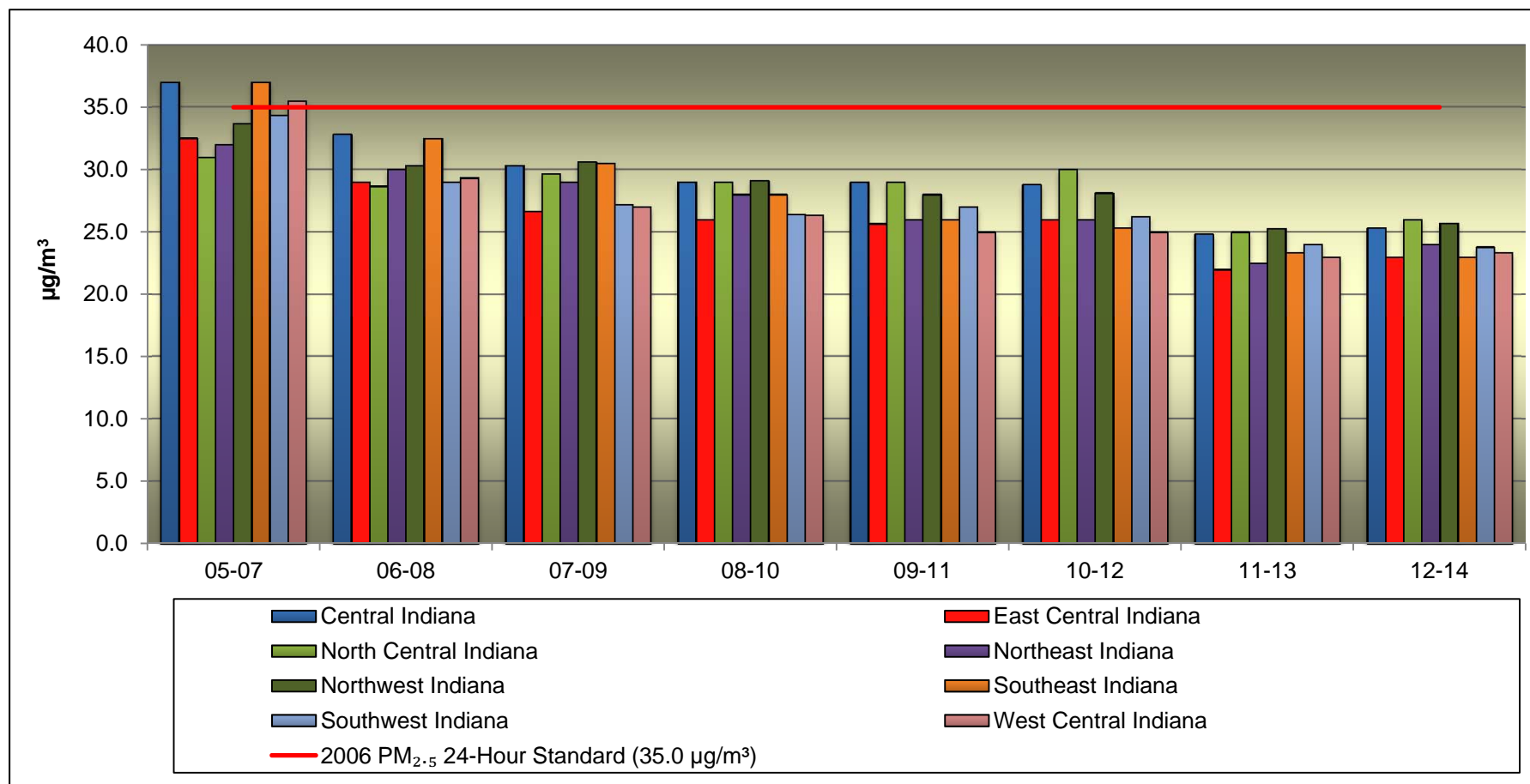


Chart excludes monitors with incomplete data and/or less than three full years of monitoring data.

µg/m³ = micrograms per cubic meter



## Additional Information

For additional information regarding the NAAQS for fine particles, please visit U.S. EPA's Particulate Matter Regulatory Actions website:

<http://www.epa.gov/particles/actions.html>



## Contact

For more information regarding the particulate matter designation process or Indiana's redesignation petition 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).