

Indiana 2016 Ambient Air Monitoring Network Plan



Indiana Department of Environmental Management
Office of Air Quality
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Table of Contents

Acronyms.....	7
Introduction.....	8
Public Review and Comment	8
Indiana's Air Monitoring Network.....	8
Air Quality Data.....	9
Overview of Monitored Parameters.....	9
Criteria Pollutants.....	9
Carbon Monoxide (CO)	9
Lead (Pb).....	9
Nitrogen Dioxide (NO ₂).....	9
Ozone (O ₃)	9
Particulate Matter (PM ₁₀).....	9
Fine Particulate Matter (PM _{2.5})	9
Sulfur Dioxide (SO ₂)	10
Non Criteria Parameters	10
PM _{2.5} Speciation	10
Photochemical Assessment Monitoring Station, PAMS (Ozone Precursors)	10
Toxics / Carbonyls / Metals	10
Meteorological Monitoring.....	11
NCore Monitoring	11
National Ambient Air Quality Standards (NAAQS)	11
5-Year Network Assessment.....	12
New U.S. EPA Monitoring Requirements.....	12
Network Overview	12
Review Summary	17
Network Description	17
Network Review Description.....	18
Monitoring Requirements	19
Parameter Networks.....	22
Carbon Monoxide (CO).....	22
Monitoring Requirements	22
Monitoring Methodology	22
Monitoring Network	22
Network Modifications	22
Lead (Pb)	25
Monitoring Requirements	25
Monitoring Scale.....	25
Monitoring Methodology	25
Monitoring Network	25
Network Modifications	25
Oxides of Nitrogen (NO, NO ₂ , NO _x , NO _y)	28
Monitoring Requirements	28
Monitoring Methodology	28
Monitoring Network	28
Network Modifications	28
Ozone (O ₃)	31
Monitoring Requirements	31
Monitoring Season	31
Data	31
Monitoring Methodology	31
Monitoring Network	31

Network Modifications	32
Particulate Matter (PM ₁₀)	38
Monitoring Requirements	38
Monitoring Methodology	38
Monitoring Network	38
Network Modifications	38
Fine Particulate Matter (PM _{2.5})	42
Monitoring Requirements	42
Monitoring Methodology	42
Monitoring Network	43
Data / Design Value	43
Network Modifications	46
Unanticipated Network Changes	46
Sulfur Dioxide (SO ₂)	51
Monitoring Requirements	51
Monitoring Methodology	52
Monitoring Network	52
Network Modifications	52
PM _{2.5} Speciation	55
Monitoring Requirements	55
Monitoring Methodology	55
Monitoring Network	55
Network Modifications	55
PAMS Ozone Precursors (VOCs)	59
Monitoring Requirements	59
Monitoring Methodology	59
Monitoring Network	59
Network Modifications	59
Toxics (VOCs)	62
Monitoring Requirements	62
Monitoring Methodology	62
Monitoring Network	63
Network Modifications	63
Carbonyls	66
Monitoring Requirements	66
Monitoring Methodology	66
Monitoring Network	66
Network Modifications	66
Metals	69
Monitoring Requirements	69
Monitoring Methodology	69
Monitoring Network	69
Network Modifications	69
Meteorological Monitoring	72
Monitoring Requirements	72
Monitoring Network	72
Network Modifications	72
NCore	75
Monitoring Requirements	75
Monitoring Network	75
Network Modifications	75

Appendices

Appendix A - Comment Submittal Information.....79

Appendix B - Evaluation of Indiana's Continuous PM_{2.5} Data.....81

Cover photo of Indpls – I-70 E Near-Road Site

List of Tables

Table 1 – State Air Monitoring Network.....	13
Table 2 – CO Monitoring Network	24
Table 3 – Lead Monitoring Network.....	27
Table 4 – Oxides of Nitrogen (NO, NO ₂ , NO _x , NO _y) Monitoring Network.....	30
Table 5 – SLAMS Minimum O ₃ Monitoring Requirement	32
Table 6 – SLAMS O ₃ Sites Required for Indiana	33
Table 7 – Ozone Monitoring Network.....	36
Table 8 – PM ₁₀ Site Requirements.....	39
Table 9 – PM ₁₀ Monitoring Network.....	41
Table 10 – SLAMS Minimum PM _{2.5} Monitoring Site Requirements	42
Table 11 – Number of SLAMS PM _{2.5} Monitoring Sites Required for Indiana	43
Table 12 – PM _{2.5} Monitoring Network.....	48
Table 13 – Number of SO ₂ Sites Required by CFR.....	51
Table 14 – SO ₂ Monitoring Network	54
Table 15 – PM _{2.5} Speciation Monitoring Network.....	58
Table 16 – PAMS Target Compounds	59
Table 17 – Ozone Precursor Monitoring Network	61
Table 18 – VOCs	62
Table 19 – Toxics Monitoring Network	65
Table 20 – Carbonyl Monitoring Network	68
Table 21 – Metals Monitoring Network.....	71
Table 22 – Meteorological Monitoring Network	74
Table 23 – NCore Required Parameters.....	77
Table 24 – Additional Parameters Collected at NCore Site	78

List of Figures

Figure 1 – State Air Monitoring Network 2016	16
Figure 2 – Indiana MSAs	21
Figure 3 – CO Monitoring Network	23
Figure 4 – Lead Monitoring Network	26
Figure 5 – Oxides of Nitrogen Monitoring Network	29
Figure 6 – O ₃ Design Values (2012 – 2014)	34
Figure 7 – O ₃ Monitoring Network	35
Figure 8 – PM ₁₀ Monitoring Network	40
Figure 9 – PM _{2.5} Site Design Values	45
Figure 10 – PM _{2.5} Monitoring Network	47
Figure 11 – SO ₂ Monitoring Network	53
Figure 12 – Speciation Monitoring Network	57
Figure 13 – Ozone Precursors Network	60
Figure 14 – Toxics Monitoring Network	64
Figure 15 – Carbonyl Monitoring Network	67
Figure 16 – Metals Monitoring Network	70
Figure 17 – Meteorological Monitoring Network	73
Figure 18 – NCore Monitoring Network	76

Acronyms

APCD	Louisville Metropolitan Air Pollution Control District
AQI	Air Quality Index
AQS	Air Quality System
BAM	Beta Attenuation Monitor
CAFO	Concentrated Animal Feeding Operation
CBSA	Core Based Statistical Area
CFR	Code of Federal Regulations
CSA	Combined Statistical Area
CSN	Chemical Speciation Network
CO	Carbon Monoxide
DNPH	2,4-Dinitrophenylhydrazine
DV	Design Value
FDMS	Filter Dynamic Measurement System
FEM	Federal Equivalent Method
FID	Flame Ionization Detector
FRM	Federal Reference Method
GC	Gas Chromatograph
GC/MS	Gas Chromatograph / Mass Spectrometry
HPLC	High Pressure Liquid Chromatography
HVAC	Heating Ventilation Air Conditioning
ICP/MS	Inductive Coupled Plasma / Mass Spectrometry
IDEM	Indiana Department of Environmental Management
INDOT	Indiana Department of Transportation
IMPROVE	Interagency Monitoring of Protected Visual Environments
KDEP	Kentucky Department for Environmental Protection
LADCO	Lake Michigan Air Directors Consortium
LEADS	Leading Environmental Analysis and Display System
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standard
NATTS	National Air Toxics Trends Station
NCore	National Core multi-pollutant monitoring stations
nm	Nanometer
NO	Nitric Oxide
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
NO _y	Total Reactive Nitrogen Oxides
NOAA	National Oceanic and Atmospheric Administration
O ₃	Ozone
OAQPS	Office of Air Quality Planning and Standards
PAMS	Photochemical Assessment Monitoring Station
Pb	Lead
PM _{2.5}	Particulate matter with a diameter less than or equal to 2.5 micrometers
PM ₁₀	Particulate matter with a diameter less than or equal to 10 micrometers
PM _{10-2.5}	Particulate matter with a diameter less than or equal to 10 micrometers, and greater than or equal to 2.5 micrometers
ppb	parts per billion
ppm	parts per million
PQAO	Primary Quality Assurance Organization
PSD	Prevention of Significant Deterioration
PWEI	Population Weighted Emissions Index

QA	Quality Assurance
SWOAQA	Southwest Ohio Air Quality Agency
SASS	Speciation Air Sampling System
SHARP	Synchronized Hybrid Ambient Real-time Particulate
SLAMS	State or Local Air Monitoring Stations
SO ₂	Sulfur Dioxide
SPM	Special Purpose Monitor
STN PM _{2.5}	Speciation Trends Network
TAD	Technical Assistance Document
TSA	Technical Systems Audit
TSP	Total Suspended Particulate
TEOM	Tapered Element Oscillating Microbalance
µg/m ³	micrograms per cubic meter
U.S. EPA	United States Environmental Protection Agency
UV	Ultraviolet
VOC	Volatile Organic Compounds
VSCC	Very Sharp Cut Cyclone
WINS	Well Impactor Ninety-Six

Introduction

In October 2006, United States Environmental Protection Agency (U.S. EPA) issued final regulations concerning state and local agency ambient air monitoring networks. These regulations in 40 CFR Part 58.10 require states to submit an annual monitoring network review to U.S. EPA. This network plan is required to provide the framework for establishment and maintenance of an air quality surveillance system and to list any changes that are proposed to take place to the current network during the 2016 season.

Public Review and Comment

The annual monitoring network plan must be made available for public inspection for 30 days prior to submission to U.S. EPA. Information on how to comment on the plan and any comments received are listed in Appendix A.

Indiana's Air Monitoring Network

The Indiana Department of Environmental Management (IDEM) regulates air quality to protect public health and the environment in the State of Indiana. Air monitoring data are required by regulation and are used to determine compliance with U.S. EPA's National Ambient Air Quality Standards (NAAQS). Other important uses of the air monitoring data include, the production of a daily AQI report, daily air quality forecast report, support of short and long-term health risk assessments, identification of a localized health concern, and tracking long-term trends in air quality. Indiana monitors the six criteria pollutants which have NAAQS identified for them; CO, lead, NO₂, O₃, particulate matter (PM₁₀ and PM_{2.5}), and SO₂. Other pollutants which do not have ambient standards established for them are also monitored: toxics (volatile organic compounds, VOCs), metals, carbonyls, PM_{2.5} speciated compounds, and ozone precursors. In addition, meteorological data are also collected to support the monitoring and aid in analysis of the data.

Air Quality Data

IDEM presents two different types of air quality data, intermittent and continuous on IDEM's Internet website <http://www.in.gov/idem/airquality/2346.htm>. Annual and quarterly summary reports of pollutants collected by manual methods are available as well as hourly values from continuous monitors. The Leading Environmental Analysis and Display System (LEADS) provides on-line access to Indiana's continuous air quality monitoring network. It has been available to the public since July, 2007. LEADS offers access to near real-time data from 62 continuous air monitoring sites across Indiana. This allows anyone to track pollutant and meteorological values throughout the day. In addition, past data back to 1998 are available as raw data and canned summary reports or user specified retrievals. Intermittent data are being added to LEADS. This will eventually bring all data into one system.

Overview of Monitored Parameters

Criteria Pollutants

Carbon Monoxide (CO)

Carbon monoxide (CO) is a poisonous gas that, when introduced into the bloodstream, inhibits the delivery of oxygen to body tissue. The health risk is greatest for individuals with cardiovascular disease.

Lead (Pb)

Lead (Pb) is a metal that is highly toxic when ingested or inhaled. It is a suspected carcinogen of the lungs and kidneys and has adverse effects on cardiovascular, nervous, and renal systems.

Nitrogen Dioxide (NO₂)

Nitrogen dioxide (NO₂) is a highly toxic, reddish-brown gas that is created primarily from fuel combustion in industrial sources and vehicles. It creates an odorous haze that causes eye and sinus irritation, blocks natural sunlight, and reduces visibility.

Ozone (O₃)

Ground-level ozone (O₃), or photochemical smog, is not emitted into the atmosphere as ozone, but rather is formed by the reactions of other pollutants. The primary pollutants entering into this reaction, VOCs and oxides of nitrogen, create ozone in the presence of sunlight. Ozone is a strong irritant of the upper respiratory system and also causes damage to crops.

Particulate Matter (PM₁₀)

Particulate matter with a mean diameter of 10 microns or less (PM₁₀) is emitted from transportation and industrial sources. Exposure to particle pollution is linked to a variety of significant health problems ranging from aggravated asthma to premature death in people with heart and lung disease.

Fine Particulate Matter (PM_{2.5})

Fine particulate matter with a diameter of 2.5 microns or less (PM_{2.5}) is created primarily from industrial processes and fuel combustion. These particles are breathed deeply into the lungs. Exposure to particle pollution is linked to a variety of significant health problems ranging from aggravated asthma to premature death in people with heart and lung disease.

Sulfur Dioxide (SO₂)

Sulfur dioxide (SO₂) is a gaseous pollutant that is emitted primarily by industrial furnaces or power plants burning coal or oil containing sulfur. At high concentrations, breathing can be impaired. Damage to vegetation can also result.

Non Criteria Parameters

PM_{2.5} Speciation

U.S. EPA implemented the PM_{2.5} chemical speciation monitoring program. Knowing the chemical composition of the PM_{2.5} mix is important for determining sources of pollution and links between observed health effects. The basic objective of speciation analysis is to develop seasonal and annual chemical characterizations of ambient particulates across the nation. This speciation data will be used to perform source attribution analyses, evaluate emission inventories and air quality models, and support health related research studies and regional haze assessments.

The speciation samplers use different inlet tubes and filters to collect the components of the PM_{2.5} mixture. The process consists of using three different types of filters to separate out such specific compounds as: sulfate, nitrate, organic and elemental carbon, ammonium, metals, and certain ions.

Photochemical Assessment Monitoring Station, PAMS (Ozone Precursors)

Of the six criteria pollutants, O₃ is the most encompassing. The most prevalent photochemical oxidant and an important contributor to “smog”, O₃ is unique among the criteria pollutants because it is not emitted directly into the air. Instead, it results from complex chemical reactions in the atmosphere between VOCs and NO_x in the presence of sunlight. There are thousands of sources of VOCs and NO_x located across the country. To track and control O₃, U.S. EPA is trying to create an understanding of not only the pollutant itself, but the chemicals, reactions, and conditions that contribute to its formation as well. Because of this, U.S. EPA called for improved monitoring of O₃ and its precursors, VOC and NO_x, to obtain more comprehensive and representative data on O₃ air pollution. U.S. EPA initiated the PAMS program in February 1993. The PAMS program requires the establishment of an enhanced monitoring network in all O₃ nonattainment areas classified as serious, severe, or extreme. Details of what compounds are sampled are found in the Parameter Networks section.

Toxics / Carbonyls / Metals

Toxic air pollutants, also known as hazardous air pollutants, are those pollutants that are known or suspected to cause cancer, other serious health effects, or adverse environmental conditions. Air toxics include semi-volatile and volatile organic compounds (VOC), metals, and carbonyls.

Air toxic compounds are released from many different sources, including mobile sources (vehicles), stationary industrial sources, small area sources, indoor sources (cleaning materials, etc.), and other environmental sources (wildfires, etc.). The lifetime, transportation, and make-up of these pollutants are affected by weather and landscape. They can be transported far away from the original source, or be caught in rain and deposited to waterways or land.

The air toxics, carbonyls, and metals are divided into separate categories due to different sampling and analytical methodologies used for each. With all three categories combined, more than eighty different pollutants are analyzed.

Meteorological Monitoring

Any study of air pollution should include an analysis of the weather patterns (meteorology) of the local area because the fate of air pollutants is influenced by the movement and characteristics of the air mass into which they are emitted.

If the air is calm and pollutants cannot disperse, then the concentration of these pollutants will build up. Conversely, if a strong and turbulent wind is blowing, the pollutant will rapidly disperse into the atmosphere and will result in lower concentrations near the pollution source.

The measurements of wind speed and direction, temperature, humidity, rainfall, barometric pressure, ultraviolet radiation and solar radiation are important parameters used in the study of air quality monitoring results and to further understand the chemical reactions that occur in the atmosphere. Meteorological monitoring is used to predict air pollution events, high pollutant concentration days, and to simulate and predict air quality using computer models.

NCore Monitoring

NCore is a multi-pollutant approach to monitoring. NCore sites are intended to support multiple objectives with a greater emphasis on assessment, research support, and accountability than the traditional SLAMS networks. NCore provides an opportunity to address new directions in monitoring and begin to fill measurement and technological gaps that have accumulated in the networks. Indiana is required to establish and operate one urban NCore site. These sites are required to measure PM_{2.5}, speciated PM_{2.5}, PM_{10-2.5}, O₃, SO₂, CO, Nitrogen Oxides (NO/NO₂), Total Reactive Nitrogen Oxides (NO_y), Pb, and meteorology.

National Ambient Air Quality Standards (NAAQS)

NAAQS are identified for the criteria pollutants; CO, Pb, NO₂, O₃, particulate matter (PM₁₀ and PM_{2.5}), and SO₂. Measuring pollutant concentrations in outdoor air and comparing the measured concentrations to corresponding standards determines the ambient air quality status of an area as attaining or not attaining the standards.

The NAAQS are separated into primary and secondary standards. Primary standards are those established to protect public health. Secondary standards are those established to protect the public welfare from adverse pollution effects on soils, water, vegetation, manmade materials, animals, weather, visibility, climate, property, and economy.

The scientific criteria upon which the standards are based are reviewed periodically by U.S. EPA, which may retain or change the standards according to its findings. Note that there are hundreds of compounds that are generally considered pollutants when found in ambient air but whose health and welfare effects are not well enough understood for ambient standards to be defined.

A pollutant measurement that is greater than the ambient air quality standard for its specific averaging time is called an exceedance. An exceedance is not necessarily a synonym for a violation. For each pollutant there are specific rules about how many exceedances are allowed in a given time period before a pattern of exceedances is considered a violation of the NAAQS that may result in regulatory actions to further clean up the area's air. This distinction is made to allow for certain limited exceedances of the standard that may occur during an unusual weather pattern, for example, reserving regulatory action for instances where the exceedances are too frequent.

The design value for a site is the level of pollutant concentration when the rules of the NAAQS calculations are applied to that specific pollutant. For example, the O₃ design value is calculated by taking

the three year average of the annual fourth highest daily 8-hour maximums. If this number is above the NAAQS for O₃, then it is a violation or 'nonattainment' of the NAAQS. If the design value is below the NAAQS then the area is in 'attainment' of the standard. Generally, nonattainment is based on the highest design value reported for a specific geographic area (usually an MSA), and the entire area would be defined by that monitor, and classified accordingly. This number basically tells you how polluted an area would be in relation to a NAAQS. A listing of the NAAQS can be found at: <http://epa.gov/air/criteria.html>

5-Year Network Assessment

U.S. EPA requires a Network Assessment be performed every five (5) years, as per 40 CFR Part 58.10(d). The first Regional Network Assessment, published July 1, 2010 by the Lake Michigan Air Directors Consortium (LADCO) for the states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, has been approved by U.S. EPA. The report is available at http://www.ladco.org/reports/general/Regional_Network_Assessment/index.php Indiana uses the recommendations from the Regional Assessment as input into the Annual Network Review. Work on the second Regional Network Assessment is progressing, and is due July 1, 2015.

New U.S. EPA Monitoring Requirements

Several of the NAAQS and monitoring requirements for the various pollutants have either been revised recently, are in the final review stages prior to promulgation, or are planning to have proposals within the next year. Even though IDEM is aware of these proposals and how they could possibly affect Indiana's monitoring network, only those requirements which have been approved and are in effect at this time are considered when modifying Indiana's current network.

Network Overview

Indiana has reviewed its current ambient air quality network and has developed a proposed network to be implemented during 2016. Current NAAQS, data trends, site redundancy, siting problems, site access concerns and other identified monitoring issues all contribute to any proposed network revisions.

The number of sites listed in the current monitoring network include sites where changes were planned to have occurred during 2014 and were not, but are planned, or have been completed during 2015. These include the relocation of the Hammond-Purdue site for PM_{2.5}.

Indiana's air monitoring network for 2016 consists of the sites and monitors listed in Table 1. All site changes which have occurred or plan to take place in 2015 are included along with the planned network modifications for 2016. Figure 1 is an overview of Indiana's current monitoring network with population density showing the locations where monitoring takes place in 2016.

The number of monitoring locations operated by the State is planned to decrease by one; from 83 to 82 sites. The number of monitored parameters or monitoring systems will decrease from 188 to 186.

Table 1 – State Air Monitoring Network

Indiana Ambient Air Quality Monitoring Network 2015

AQS#	COUNTY	CITY	SITE NAME	SITE ADDRESS	O ₃	SO ₂	CO	NO _x	PM ₁₀	PM _{10-2.5}	PM _{2.5} (FRM)	PM _{2.5} (Cont)	PM _{2.5} (Spec)	PM _{2.5} (Spec Cont)	LEAD	TOXICS (VOCs)	O ₃ PREC	CARBONYLS	METALS	MET
170230001	Clark, IL	West Union, IL	West Union	416 S. Hwy 1	X															X
180030002	Allen	Leo	Leo	Leo HS, 14600 Amstutz Rd.	X															
180030004	Allen	Fort Wayne	Fort Wayne - Beacon St.	2022 N. Beacon St	X						X	X								X
180050007	Bartholomew		Hope	Hauser Jr-Sr HS, 9404 N775 E.	X	X		X												
180050008	Bartholomew	Columbus	Columbus - Rocky Ford Rd.	3475 Trestle Dr.							X	X								
180110001	Boone		Whitestown	Perry-Worth Elem Sch., 3900 E. 300 S, Lebanon	X															
180130001	Brown		Helmsburg	Jackson Twp Fire Dept., 4831 Helmsburg Road, Nashville	X															
180150002	Carroll		Flora	Flora Airport, 481 S. 150 W, Flora	X															X
180190006	Clark	Jeffersonville	Jeffersonville - Walnut St	PFAU, 719 Walnut St.					X		X		X							
180190008	Clark		Charlestown St. Park	Charlestown State Park, 12500 Highway 62, Charlestown	X						X									X
180190009	Clark	Clarksville	Clarksville	Falls of the Ohio State Park, 201 W. Riverside Dr.												X				
180350006	Delaware	Muncie	Muncie - Central HS	801 N. Walnut St.							X									
180350009	Delaware	Muncie	Muncie - Mt. Pleasant Blvd.	2601 W. Mt. Pleasant Blvd.											X					
180350010	Delaware	Albany	Albany	Albany Elem. Sch., 700 W. State St.	X															
180372001	Dubois	Jasper	Jasper - Post Office	Post Office, 206 E. 6th St.					X		X		X							
180370004	Dubois	Jasper	Jasper - Sport	1401 12th Ave.																X
180390007	Elkhart	Bristol	Bristol	Bristol Elem. Sch. 705 Indiana Ave.	X															
180390008	Elkhart	Elkhart	Elkhart - Prairie St.	2745 Prairie St.							X	X		Discontinue B. Carbon						
180431004	Floyd	New Albany	New Albany	Green Valley Elem. Sch., 2230 Green Valley Rd.	X	X					X	X								
180550001	Greene		Plummer	2500 S. 275 W	X						X									X
180570006	Hamilton	Noblesville	Noblesville - 191st St.	Our Lady of Grace Catholic Church, 9900 E. 191st St.	X															
180570007	Hamilton	Fishers	Fishers	11775 Brooks School Road							X	X								
180590003	Hancock	Fortville	Fortville	Fortville Municipal Bldg.	Discontinue															
180630004	Hendricks	Avon	Avon	7203 E. US Highway 36	X															
180650003	Henry		Mechanicsburg	Shenandoah HS, 7354 W. Hwy. 36, Middletown							X		X							X
180670004	Howard	Kokomo	Kokomo - E. Vaile Ave.	1802 E. Vaile Ave.							X	X								
180690002	Huntington	Roanoke	Roanoke	Roanoke Elem. Sch., 423 W. Vine St.	X															
180710001	Jackson		Brownstown	225 W & 300 N, Brownstown	X															X

AQS#	COUNTY	CITY	SITE NAME	SITE ADDRESS	O ₃	SO ₂	CO	NO _x	PM ₁₀	PM _{10-2.5}	PM _{2.5} (FRM)	PM _{2.5} (Cont)	PM _{2.5} (Spec)	PM _{2.5} (Spec Cont)	LEAD	TOXICS (VOCs)	O ₃ PREC	CAR-BONYLS	METALS	MET
180810002	Johnson	Trafalgar	Trafalgar	200 W. Pearl St.	X															
180890006	Lake	East Chicago	East Chicago - Franklin Sch.	Washington (formerly Franklin) Elem. Sch., 2400 Cardinal Dr.					X		X									
180890015	Lake	East Chicago	East Chicago - Post Office.	East Chicago Post Office, 901 E. Chicago Ave.			X													
180890022	Lake	Gary	Gary - IITRI	IITRI Bunker, 201 Mississippi St.	X	X		X	X		X	X	X	B. Carbon		X	X	X		X
180890026	Lake	Gary	Gary - Burr St.	25th Ave. and Burr St.							X									
180890030	Lake	Whiting	Whiting - HS	Whiting High School, 1751 Oliver St.	Discontinue											Relocate				
18089____	Lake	Whiting														Relocation				
180890031	Lake	Gary	Gary - Madison St.	Indiana American Water Co. 650 Madison St.					X		X									
180890032	Lake	Gary	Gary - 4th Ave.	Gary SouthShore RailCats, One Stadium Plaza											X				X	
180890033	Lake	East Chicago	East Chicago - E. 135th St.	Abraham Lincoln Elem. Sch., E. 135th St.											X				X	
180890034	Lake	East Chicago	East Chicago - Marina	East Chicago Marina, 3301 Aldis St.					X						X	X			X	
180892004	Lake	Hammond	Hammond - Purdue	Powers Bldg, Purdue Univ. Calumet, 2200 169th St.							Relocate	Relocate								
180890035	Lake	Hammond									Relocation	Relocation								
180892008	Lake	Hammond	Hammond - 141st St.	1300 E. 141st St.	X	X									X	X			x	X
180910005	LaPorte	Michigan City	Michigan City - 4th St.	NIPSCO Gas Station, 341 W. 4th St.	X															
180910010	LaPorte	LaPorte	LaPorte - E. Lincolnway	2011 E. Lincolnway	X															
180910011	LaPorte	Michigan City	Michigan City - Marsh Elem. Sch.	400 E. Homer St.							X									
180950010	Madison		Emporia	East Elem. Sch., 893 E. US 36, Pendleton	X															
180950011	Madison	Anderson	Anderson - Eastside Elem.	Eastside Elem. Sch., 844 N. Scatterfield Rd.							X	X								
180970043	Marion	Indianapolis	Indpls - West St.	1735 S. West St.					X		X									
180970050	Marion	Indianapolis	Indpls - Ft. Harrison	Ft. Harrison St. Park, 5753 Glenn Rd.	X															
180970057	Marion	Indianapolis	Indpls - Harding St.	1321 S. Harding St.	X	X														
180970063	Marion	Indianapolis	Indpls - Rockville Rd.	7601 Rockville Rd											X					
180970072	Marion	Indianapolis	Indpls - N. Illinois St	50 N. Illinois St.			X													
180970073	Marion	Indianapolis	Indpls - E. 16th St	6125 E. 16th St.	X						X									X
180970078	Marion	Indianapolis	Indpls - Washington Park	Washington Park, 3120 E. 30th St.	X	X	X	X	X	X	X	X	X	B. Carbon Discont Sulfate	X	X	X	X	X	X
180970081	Marion	Indianapolis	Indpls - W. 18th St	School 90, 3351 W. 18th St.							X	X								
180970083	Marion	Indianapolis	Indpls - E. Michigan St	School 15, 2302 E. Michigan St.							X									
180970084	Marion	Indianapolis	Indpls - School 21	School 21, 2815 English Ave.							X									
180970086	Marion	Indianapolis	Indpls - Southport	Southport Advanced Wastewater Treatment Plant, 3800 W. Southport Rd																X
180970087	Marion	Indianapolis	Indpls - I-70 E	1650 Ludlow Ave.	X		X	X			X	Add		B. Carbon		Add				X
181050003	Monroe	Bloomington	Bloomington - Binford	Binford Elem. Sch., 2300 E. 2nd St.							X	X								
181090005	Morgan	Monrovia	Monrovia	Monrovia HS, 135 S Chestnut St	X															
181230009	Perry		Leopold	Perry Central HS, 19856 Old St. Rd 37, Leopold	X															

AQS#	COUNTY	CITY	SITE NAME	SITE ADDRESS	O ₃	SO ₂	CO	NO _x	PM ₁₀	PM _{10-2.5}	PM _{2.5} (FRM)	PM _{2.5} (Cont)	PM _{2.5} (Spec)	PM _{2.5} (Spec Cont)	LEAD	TOXICS (VOCs)	O ₃ PREC	CARBONYLS	METALS	MET
181270023	Porter	Portage	Portage - Hwy 12	Bethlehem Steel Waste Lagoon, Hwy. 12					X											
181270024	Porter	Ogden Dunes	Ogden Dunes	Water Treatment Plant, 84 Diana Rd.	X						X	X				X				
181270026	Porter	Valparaiso	Valparaiso	Valparaiso Water Dept., 1000 Wesly St.	X															
181270027	Porter		Burns Harbor - Port of Indiana	E. Boundary Rd											X				X	
181290003	Posey		St. Phillips	2027 St. Phillips Rd., Evansville	X															X
181410010	St. Joseph		Potato Creek St. Park	Potato Creek St. Park, 25601 St. Rd. 4, N. Liberty	X															
181410015	St. Joseph	South Bend	S. Bend - Shields Dr.	2335 Shields Dr.	X			X			X	X								X
181410016	St. Joseph	Granger	Granger - Beckley St.	12441 Beckley St., Granger	X															
181450001	Shelby		Fairland	Triton Central MS, 4740 W. 600N, Fairland	X															
181470009	Spencer	Dale	Dale	David Turnham School, 105 Dunn St.							X									
181570008	Tipecanoe	Lafayette	Lafayette - Greenbush St.	Cinergy Substation, 3401 Greenbush St.							X	X								
181630013	Vanderburgh		Inglefield	Scott Elem. School, 14940 Old State Rd.	X															
181630016	Vanderburgh	Evansville	Evansville - U. of E.	University of Evansville - Carson Center							X					X				
181630021	Vanderburgh	Evansville	Evansville - Buena Vista	1110 W. Buena Vista Rd.	X	X		X	X		Discontinue Collocate	X	X	B. Carbon						
181630022	Vanderburgh	Evansville	Evansville - Lloyd	10 S. 11th Ave.			X													
181630023	Vanderburgh	Evansville	Evansville - E. Walnut	Rescue Mission, 500 E. Walnut St.							X									
181670018	Vigo	Terre Haute	Terre Haute - Lafayette Ave.	961 N. Lafayette Ave.	X	X			X		X	X								
181670025	Vigo	Terre Haute	Terre Haute - Fort Harrison Rd.	INDOT Maintenance, 2400 Fort Harrison Rd.												X				
181670024	Vigo		Sandcut	7597 Stevenson Rd., Terre Haute	X															
181730008	Warrick	Boonville	Boonville	Boonville HS, 300 N. 1st St.	X															
181730009	Warrick		Lynnville	Tecumseh HS, 5244 State Road 68, Lynnville	X															
181730011	Warrick		Dayville	3488 Eble Rd., Newburgh	X															X
181830003	Whitley		Larwill	Whitko Middle School, 710 N. State Rd. 5		X		X			X	X								X

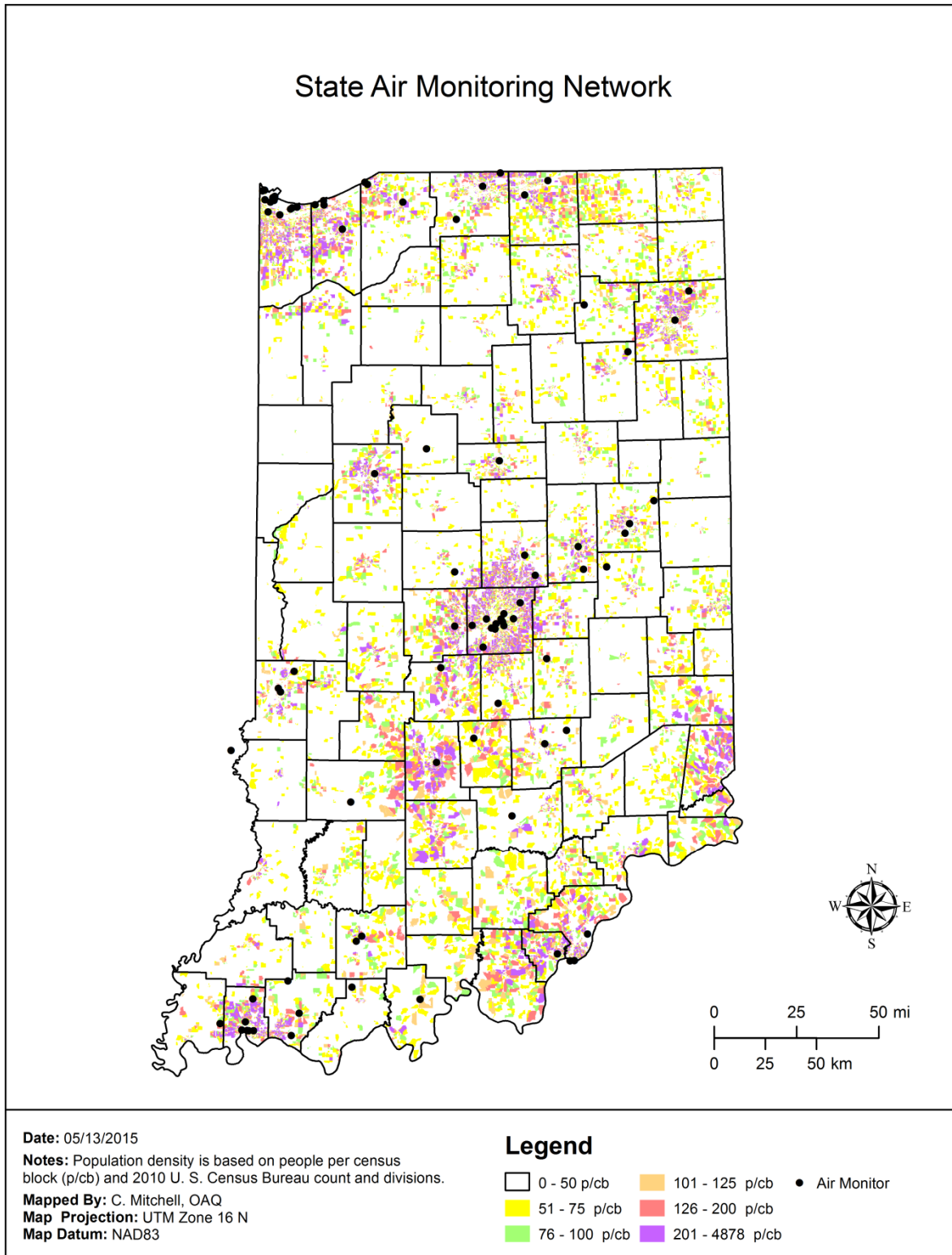
Number of Parameters

	Number of Monitoring Sites	Number of Monitored Parameters	O ₃	SO ₂	CO	NO _x	PM ₁₀	PM _{10-2.5}	PM _{2.5} (FRM)	PM _{2.5} (Cont)	PM _{2.5} (Spec)	PM _{2.5} (Spec Cont)	LEAD	TOXICS (VOCs)	O ₃ PREC	CARBONYLS	METALS	MET
Current Monitoring Network (2015)	83	188	45	9	5	7	11	1	35	18	6	6	8	9	2	2	6	18
Proposed Monitoring Network (2016)	82	186	43	9	5	7	11	1	35	19	6	4	8	10	2	2	6	18

Indicates a site where a change is to occur or occurred in 2015

Indicates a site where a change is planned for 2016

Figure 1 – State Air Monitoring Network 2016



Review Summary

The changes proposed for the 2016 Monitoring Network are:

- Discontinuation of Fortville O₃
- Discontinuation of Whiting High School O₃
- Relocation of Whiting High School Toxics - VOC
- Discontinuation of Indpls – Washington Park continuous Sulfate
- Discontinuation of Elkhart – Prairie St. continuous Black Carbon
- Discontinuation of Evansville – Buena Vista PM_{2.5} Collocated
- Addition of continuous PM_{2.5} to Indpls – I-70 E near-road site
- Addition of Toxics - VOC to Indpls – I-70 E near-road site

The changes proposed for the 2015 Monitoring Network, but disallowed were:

- Relocation of Indpls – E. Michigan St. PM_{2.5} to Indpls – E. 16th St. The relocation must be within a half mile of the original location. The Indpls – E. 16th St. is not comparable to the original location. A PM_{2.5} monitor has been added to Indpls – E.16th St. to attempt to show comparability.

Network Description

As per 40 CFR Part 58.10, an annual monitoring network plan which provides for the establishment and maintenance of an air quality surveillance system consisting of the air quality monitors in the state, is required to be submitted by all states to U.S. EPA.

Specifically §58.10 (a) requires for each existing and proposed monitoring site:

1. A statement of purpose for each monitor.
2. Evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of 40 CFR Part 58, where applicable.
3. Proposals for any State and Local Air Monitoring Station (SLAMS) network modifications.

§58.10 (b) requires the plan must contain the following information for each existing and proposed site:

1. The Air Quality System (AQS) site identification number.
2. The location, including street address and geographical coordinates.
3. The sampling and analysis method(s) for each measured parameter.
4. The operating schedules for each monitor.
5. Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.
6. The monitoring objective and spatial scale of representativeness for each monitor.
7. The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM_{2.5} NAAQS as described in §58.30.
8. The Metropolitan Statistical Area (MSA), Core Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor.
9. The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.
10. Any source-oriented monitors for which a waiver has been requested or granted by the U.S. EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.
11. Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the U.S. EPA Regional Administrator for the use of Pb-PM₁₀ monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.

Network Review Description

The following definitions represent the categories found in the Network Review. Over the years, the list of Monitor Type designations has changed. The allowable Monitor Types and Network Affiliations have been modified once more since the last Network Plan was submitted. The number of Monitor Types has been decreased and many of the deleted Monitor Types are now Network Affiliations.

Monitor Type – Indicates the “Administrative classification of a monitor.” Each monitor can only have one monitor type at a time. The complete list allowed is listed below with those used in Indiana’s network **underlined and in bold**:

- **SLAMS** – State or Local air monitoring station for parameters (pollutants and/or meteorological data) addressed by 40 CFR Part 58. The SLAMS make up the ambient air quality sites that are primarily needed for NAAQS comparison, but may serve other data purposes. U.S. EPA must approve all SLAMS sites.
- **TRIBAL** – Air monitoring stations operating under the authority of a Federally recognized tribal agency for parameters addressed by 40 CFR Part 58.
- **SPECIAL PURPOSE (SPM)** – A monitor that an agency has designated as “Special Purpose” in its annual monitoring network plan for parameters addressed by 40 CFR Part 58. SPMs are not counted by the agency when showing compliance with the minimum network requirements for the number and siting of monitors. SPMs generally indicated a shorter term monitoring project. Or monitors are designated SPM for the first 24-months of monitoring to allow for ease of site movement due to unforeseen circumstances.
- **INDUSTRIAL** – A monitor that is operated by a private industry entity rather than under control of a State, Local, or Tribal government.
- **EPA** – A monitor that is operated by EPA or an EPA contractor for parameters addressed by 40 CFR Part 58.
- **NON-EPA FEDERAL** – A monitor operated by another Federal agency for parameters addressed by 40 CFR Part 58.
- **OTHER** – A monitor for a parameter not addressed by 40 CFR Part 58. It is not allowed for criteria pollutants or other parameters associated with a monitoring network such as NCORE, PAMS, NATTS, etc.

Network – The Monitor Network or Program affiliation of the monitor. A monitor may have more than one at a time or no value. Those networks in Indiana’s plan are listed:

- **NCore** – *National Core (NCore) Multi-pollutant Monitoring Station*: Sites that measure multiple pollutants at trace levels in order to provide support to integrated air quality management data needs. There is currently one NCore site for Indiana located in Indianapolis.
- **Near-Road** – Monitors at sites meeting the near road design as per 40 CFR Part 58. Typically measure near road peak hourly NO₂ or CO concentrations in larger urban areas. There is currently one Near-Road site for Indiana located in Indianapolis.
- **PAMS** – *Photochemical Assessment Monitoring Station*: Sites established to obtain more comprehensive data of areas with high levels of ozone pollution by also monitoring NO_x and VOCs.
- **CSN Supplemental** – *Supplemental Speciation Station*: Any PM_{2.5} speciation station that is used to gain supplemental data and is not dedicated as part of the speciation trends network.
- **CSN STN** – *Trends Speciation Station*: A PM_{2.5} speciation station designated to be part of the speciation trends network. This network provides chemical species data of fine particulates.
- **Unofficial PAMS** – *Unofficial Photochemical Assessment Monitoring Station*: Sites established in serious and severe O₃ nonattainment areas in the 1990s to obtain more comprehensive data of areas with ozone pollution by also monitoring NO_x and VOCs.

Operating Schedule - specifies how often a sample is taken.

- **Continuous** - operates 24 hours per day, 7 days per week; applies mainly to gaseous analyzers, although some particulate samplers (TEOM, SHARP, and BAMs) operate continuously.

- Daily – a sample is taken every day; applies to manual method particulate samplers.
- 3 - Day - Manual method particulate samplers that run every third day.
- 6 - Day - Manual method particulate samplers that run every sixth day.

Sampling Method – Each ambient air monitor is classified by a specific method number. This method combines both the collection procedure along with the analysis performed on the sample. These numbers can be found in the U.S. EPA “List of Designated Reference and Equivalent Methods” (see U.S. EPA Transfer Technology Network web page at:

<http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf>

Scale – The specific “spatial scales of representation” describes the physical dimensions of the air parcel around the monitoring station throughout which actual pollutant concentrations are reasonably similar.

- Microscale - Areas ranging from several meters to about 100 meters,
- Middle scale - Areas ranging from 100 meters to 0.5 kilometers,
- Neighborhood - 0.5 to 4.0 kilometers, and uniform land use,
- Urban scale - 4 to 50 kilometers,
- Regional - 50 to hundreds of kilometers.

Monitoring Objective – Describes the purpose/objective for monitoring at a site.

- General/Background concentration – sites located to determine general background concentration levels.
- Highest concentration – sites located to determine the highest concentrations expected to occur in the area covered by the network.
- Maximum Precursor Emissions Impact – sites where the magnitude and type of precursor emissions in the area are expected to impact. These sites are suited for the monitoring of urban air toxic pollutants.
- Population exposure – sites located to measure typical concentrations in areas of high population density.
- Quality assurance – sites where two monitors of the same type are located; one used to report air quality for the site, and the other dedicated as an audit monitor.
- Regional transport – sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards.
- Source-oriented – sites located to determine the impact of significant sources or source categories on air quality.
- Upwind background – sites established to characterize upwind background and transported ozone and its precursor concentrations into an area.

NAAQS Comparable – 40 CFR Part 58 Subpart B requires the identification of any sites that are suitable or not suitable for comparison against the PM_{2.5} NAAQS as described in Sections 58.11 and 58.30. If a ‘No’ is present in this category the data should not be used in comparison to the NAAQS.

MSA – Metropolitan Statistical Area is defined by the U.S. Office of Management and Budget as “geographical areas having a large population nucleus and a high degree of economic and social integration within the nucleus”. In Indiana, MSAs are either one county or a group of counties. Figure 2 is a map of the MSAs in Indiana. Several border areas are included with other counties in bordering states.

Site Change Proposed – Designates whether this particular site is being considered for some type of modification during 2016: relocation, discontinuation, or addition.

Monitoring Requirements

Appendix A of 40 CFR Part 58 outlines the Quality Assurance Requirements for SLAMS, SPMs, and PSD Air Monitoring. It details the calibration and auditing procedures used to collect valid air quality data, the minimum number of collocated monitoring sites, the calculation used for data quality assessments and

the reporting requirements. All sites in Indiana operate following the requirements set forth in this appendix.

Appendix C of 40 CFR Part 58 specifies the criteria pollutant monitoring methods which must be used in SLAMS and NCore stations. All criteria pollutant monitoring in Indiana follows the methods specified in this appendix.

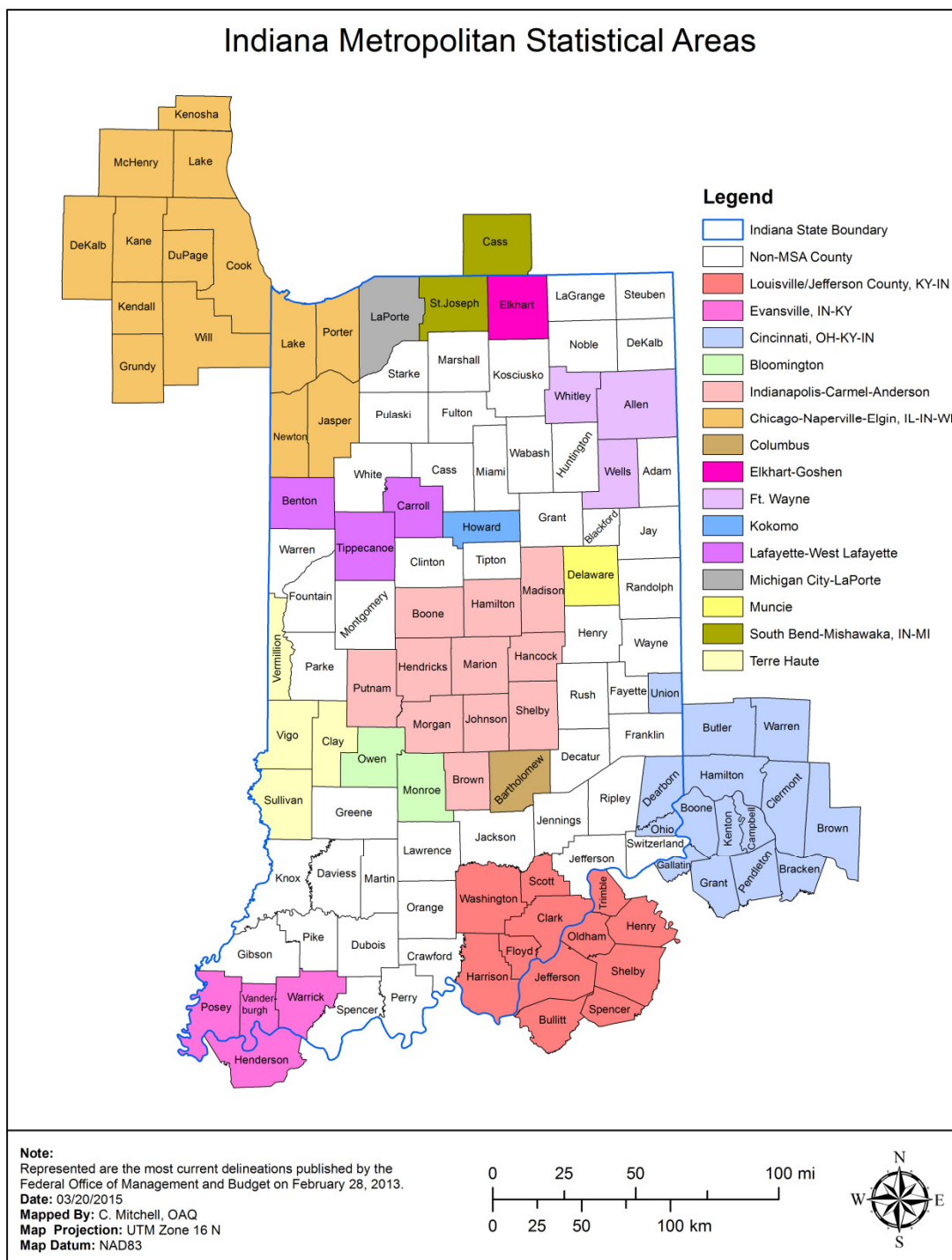
Appendix D of 40 CFR Part 58 deals with the network design criteria for ambient air quality monitoring. The overall design criteria, the minimum number of sites for each parameter, the type of sites, the spatial scale of the sites, and the monitoring objectives of the sites are detailed in this appendix. In designing the air monitoring network for Indiana, the requirements of this appendix were followed. The specifics for each pollutant network are in the individual parameter chapters.

O₃, PM₁₀, and PM_{2.5} have minimum monitoring requirements based upon the population of an MSA. Population data from the 2010 census are used in this report.

According to §2(e) of Appendix D, "The EPA recognizes that State and local agencies must consider MSA/CSA boundaries and their own political boundaries and geographical characteristics in designing their air monitoring networks. The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." The individual tables list the data, the requirements, and the current sites for the full multi-agency MSAs or CBSAs. In instances where it is more logical or desirable to divide the monitoring requirements, Indiana has entered into agreements with some of the neighboring agencies to ensure that the minimum requirements for the MSA continue to be met and the resulting network provides adequate coverage. Agreements have been signed with the Southwest Ohio Air Quality Agency (SWOAQA) and the Louisville Metropolitan Air Pollution Control District (APCD).

Appendix E of 40 CFR Part 58, which deals with the placement of the monitoring probe, its spacing from obstructions and what materials the probe can be made of. All monitors operated in Indiana meet Appendix E criteria.

Figure 2 – Indiana MSAs



Parameter Networks

Carbon Monoxide (CO)

Monitoring Requirements

40 CFR Part 58 Appendix D §4.2 details the requirements for CO monitoring. One CO monitor is required to operate collocated with one required near-road NO₂ monitor in CBSAs having a population of 1,000,000 or more persons. Other CO monitors may be required if deemed necessary by the Regional Administrator. As per 58.13(e)(2), Indiana's CO site must be operational by January 1, 2017.

In addition 40 CFR Part 58 Appendix D §3(b) states that CO measurements will be included at the NCore multi-pollutant monitoring sites. CO is monitored at the Indpls-Washington Park (180970078) NCore site.

Microscale and middle scale measurements are useful classifications for SLAMS CO sites since most people have the potential for exposure on these scales. Maximum CO concentrations primarily occur in areas near major roadways and intersections with high traffic density and often poor atmospheric ventilation.

Middle scale CO monitoring is intended to represent areas with dimensions from 100 meters to 0.5 kilometers. In some cases middle scale measurements may apply to areas that have a total length of several kilometers such as "Line Emission Sources." This type of emission source area would include air quality along a commercially developed street, a shopping plaza, a freeway corridor, parking lots and feeder streets.

Microscale CO monitoring applies when air quality measurements are to be used to represent distributions within street canyons, over sidewalks and near major roadways. Microscale measurements in one location can often be considered as representative of similar locations throughout a city.

Monitoring Methodology

Indiana's CO monitoring network collects data with Teledyne Advanced Pollution Instrumentation (API) T300 analyzers along with Thermo Scientific Model 48c and Model 48i using nondispersive infrared monitoring methodology. The API Model 300EU and T300EU Trace level/Ultra-sensitive analyzers are used to collect trace level CO data at both the NCore Indpls - Washington Park site, and the Near-Road Indpls – I-70 E site (180970087).

Monitoring Network

Indiana operates five CO monitors located throughout the state, as displayed in Figure 3. The details of the current network are listed in Table 2.

Network Modifications

There are no changes or modifications planned for the CO Monitoring Network in 2016.

Figure 3 – CO Monitoring Network

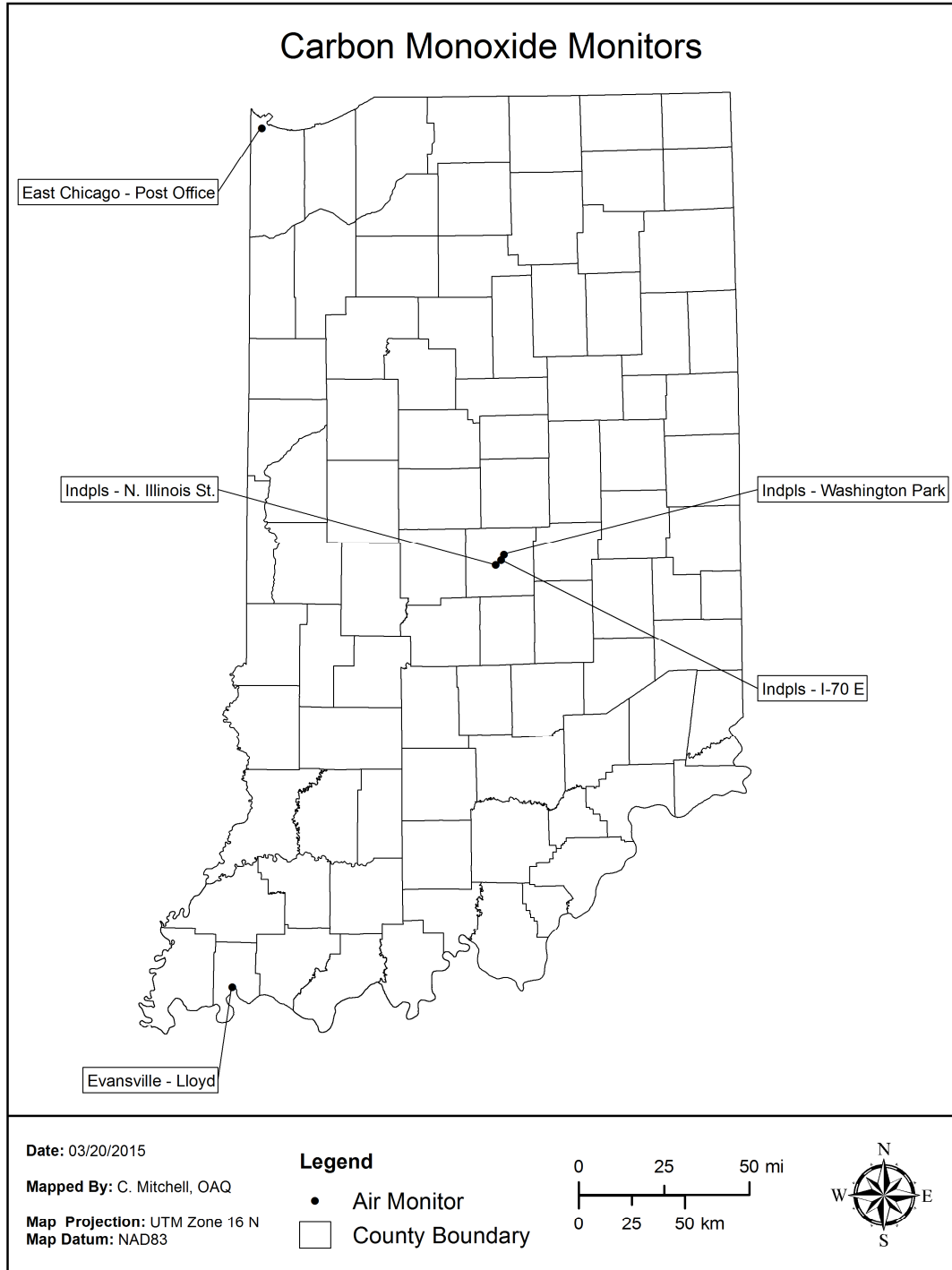


Table 2 – CO Monitoring Network

Parameter Code: 42101				CO - Carbon Monoxide										
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
180890015	East Chicago - Post Office	Lake	East Chicago	Post Office, 901 East Chicago Ave.	SLAMS	03/01/84	Continuous	054	Micro	Highest Conc	41.628611	-87.461389	Chicago-Naperville-Elgin, IL-IN-WI	No
180970072	Indpls - Illinois St.	Marion	Indianapolis	50 N. Illinois St.	SLAMS	02/01/90	Continuous	093	Micro	Highest Conc	39.768056	-86.160000	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS (NCORE)	01/01/10	Continuous	593	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	05/02/14	Continuous	593	Neigh	Pop Exp	39.787933	-86.130880	Indianapolis-Carmel-Anderson	No
181630022	Evansville - Lloyd	Vanderburgh	Evansville	10 S. 11th Ave	SLAMS	09/10/09	Continuous	093	Micro	Highest Conc	37.977640	-87.596861	Evansville, IN-KY	No
CO MONITORING METHOD: 054 - THERMO ELECTRON 48C, 48i 093 - TELEDYNE API T300 593 - TELEDYNE API 300EU, T300EU TRACE-LEVEL														

Lead (Pb)

Monitoring Requirements

40 CFR Part 58 Appendix D §4.5 specifies that Pb monitoring must be conducted taking into account Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure. At a minimum there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each Pb source which emits 0.5 or more tons per year. Waivers may be granted if the state can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS.

In addition, Pb monitoring is required at any NCore site in each CBSA with a population equal to or greater than 500,000 people. This site is located at Indpls – Washington Park (180970078) and has been collecting data since 1999.

Collocated samplers are required at 15% of the sites operated by a Primary Quality Assurance Organization (PQAO) or a minimum of one per network. Indiana is required to operate one collocated site.

The lead NAAQS final rule of November 12, 2008, states that the primary and secondary standards for lead are not to exceed $0.15 \mu\text{g}/\text{m}^3$ averaged over a rolling 3-month time period.

Monitoring Scale

The appropriate scales for the source-oriented sites are either microscale (up to 100 meters) or middle scale (100 to 500 meters). The neighborhood scale (0.5 – 4.0 kilometers) is the appropriate scale for population-oriented monitoring.

Monitoring Methodology

Indiana utilizes TSP filter sampling with atomic absorption analysis to generate ambient Pb concentrations from the monitoring sites.

Monitoring Network

The Pb monitoring network in Indiana in 2016 consists of eight sites. These sites are displayed in Figure 4 and detailed in Table 3.

Network Modifications

There are no changes planned for the Pb monitoring network in 2016.

Figure 4 – Lead Monitoring Network

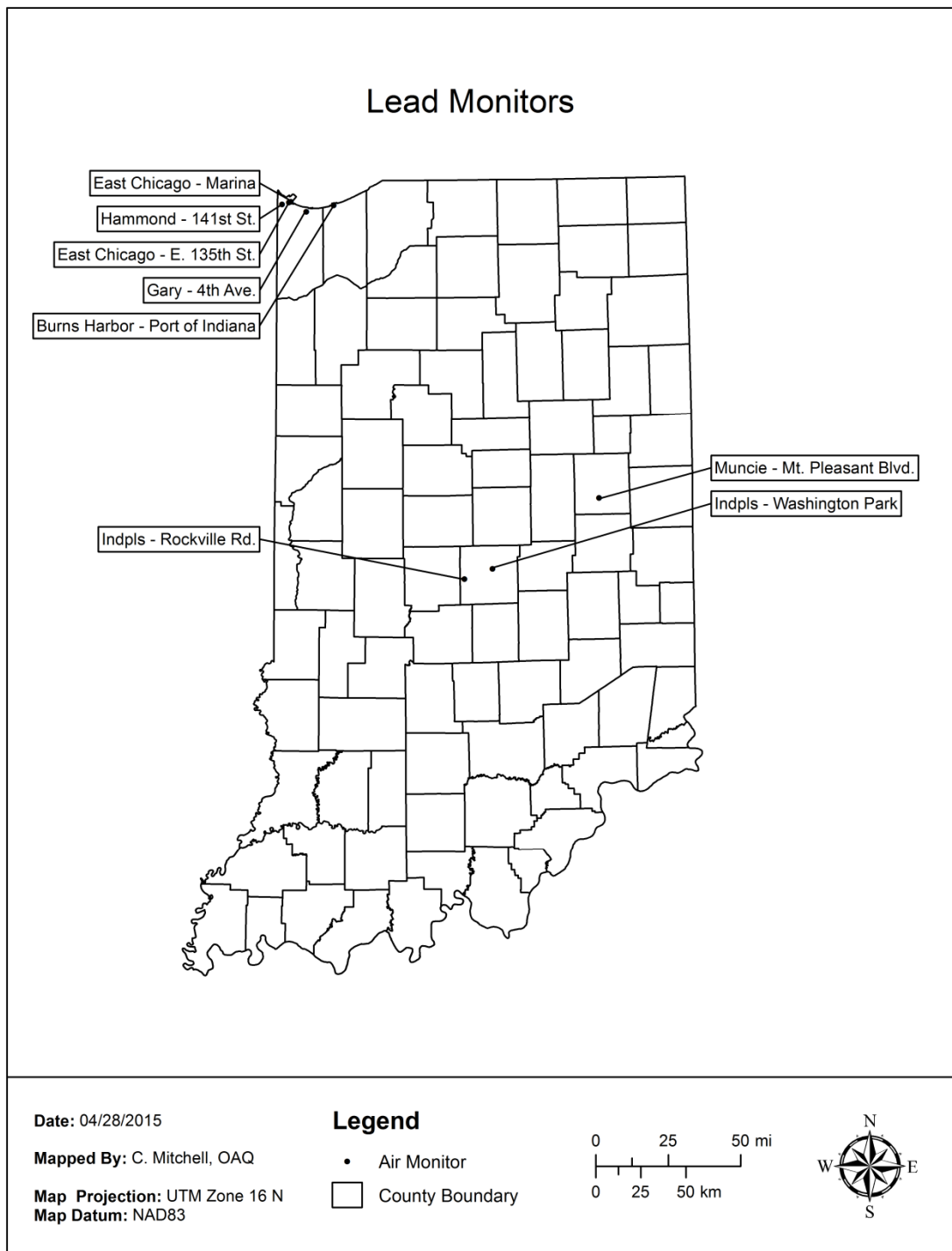


Table 3 – Lead Monitoring Network

Parameter Code: 14129					Pb - Lead											
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management																
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Source Oriented?	Site Change Proposed?	
180350009	Muncie - Mt. Pleasant Blvd.	Delaware	Muncie	2601W. Mt. Pleasant Blvd.	SLAMS	01/02/10	6-Day	107	Middle	Source Oriented	40.159417	-85.415021	Muncie	Yes Exide	No	
180890032	Gary - 4th. Ave	Lake	Gary	Gary South Shore RailCats, One Stadium Plaza	SLAMS	01/02/10	6-Day	107	Middle	Source Oriented	41.603582	-87.332658	Chicago-Naperville-Elgin, IL-IN-WI	Yes US Steel	No	
180890033	East Chicago - E. 135th St.	Lake	East Chicago	Abraham Lincoln Elem. Sch., E. 135th St.	SLAMS	01/02/10	6-Day	107	Middle	Source Oriented	41.648064	-87.447256	Chicago-Naperville-Elgin, IL-IN-WI	Yes Mittal West	No	
180890034	East Chicago-Marina	Lake	East Chicago	East Chicago Marina, 3301 Aldis St.	SLAMS	10/30/12	6-Day	107	Middle	Source Oriented	41.653480	-87.435584	Chicago-Naperville-Elgin, IL-IN-WI	Yes Mittal East	No	
180892008	Hammond - 141st St.	Lake	Hammond	1300 E. 141st Street	SLAMS	01/01/77	6-Day	107	Neigh	Pop Exp	41.639444	-87.493611	Chicago-Naperville-Elgin, IL-IN-WI	No	No	
180892008	Hammond - 141st St.	Lake	Hammond	1300 E. 141st Street	SLAMS	01/01/07	6-Day	107	Neigh	Quality Assurance	41.639444	-87.493611	Chicago-Naperville-Elgin, IL-IN-WI	No	No	
180970063	Indpls - Rockville Rd.	Marion	Indianapolis	7601 Rockville Road	SLAMS	01/01/84	6-Day	107	Middle	Src Oriented Highest Conc	39.760889	-86.296863	Indianapolis-Carmel-Anderson	Yes Quemetco	No	
180970063	Indpls - Rockville Rd.	Marion	Indianapolis	7601 Rockville Road	SLAMS	10/01/00	6-Day	107	Middle	Quality Assurance	39.760889	-86.296863	Indianapolis-Carmel-Anderson	Yes Quemetco	No	
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	SLAMS (NOORE)	04/19/99	6-Day	107	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No	No	
181270027	Burns Harbor-Port of Indiana	Porter		E. Boundary Rd	SLAMS	08/19/11	6-Day	107	Middle	Source Oriented	41.635594	-87.150197	Chicago-Naperville-Elgin, IL-IN-WI	Yes Arcelor Mittal	No	
MONITORING METHOD: 107 - HI-VOL SAMPLER/FLAMELESS ATOMIC ABSORPTION (GFAA)																

Oxides of Nitrogen (NO, NO₂, NO_x, NO_y)

Monitoring Requirements

On February 9, 2010, the Federal Register amended 40 CFR Parts 50 and 58 establishing a new NO₂ NAAQS for 1-hour concentrations and new monitoring requirements to be implemented by January 1, 2014.

One microscale near-road NO₂ monitoring station must be located within each CBSA with a population of 500,000 people, or more to be installed by January 1, 2014. An additional near-road NO₂ monitoring station is required for any CBSA with a population of 2,500,000 persons or more. For Indiana, one near-road site is required for the Indianapolis-Carmel-Anderson MSA. Additionally, sites are required for the Cincinnati, OH-KY-IN CBSA, the Louisville/Jefferson County, KY-IN CBSA, and the Chicago-Naperville-Elgin, IN-IL-WI CBSA. These cross-state requirements are addressed in agreements signed with the appropriate neighboring agencies.

One area-wide NO₂ monitoring station must also be located in each CBSA with a population greater than 1,000,000 people and was required to be installed by January 1, 2013. Each area listed above also requires an area-wide monitor.

40 CFR Part 58 Appendix D §3(b) and 40 CFR Part 58 Appendix D §4.3 state that NO/NO_y measurements should be included at the NCore multi-pollutant monitoring sites and in the PAMS program. NO/NO_y monitors are used at these sites because it is important to collect data on total reactive nitrogen species in order to better understand O₃ photochemistry.

Monitoring Methodology

The NO, NO₂ and NO_x network uses Thermo Scientific Model 42i chemiluminescence monitors to collect data. The API Model 200EU/501 NO_y Trace level/Ultra-sensitive analyzer is used to collect NO and NO_y data at the Indpls - Washington Park NCore site (180970078).

Monitoring Network

Indiana operates seven NO₂ monitors and one trace level monitor as displayed in Figure 5. The current network, along with any changes planned in 2016, is listed in Table 4.

Network Modifications

Indiana has no proposed changes to the monitoring network in 2016.

Figure 5 – Oxides of Nitrogen Monitoring Network

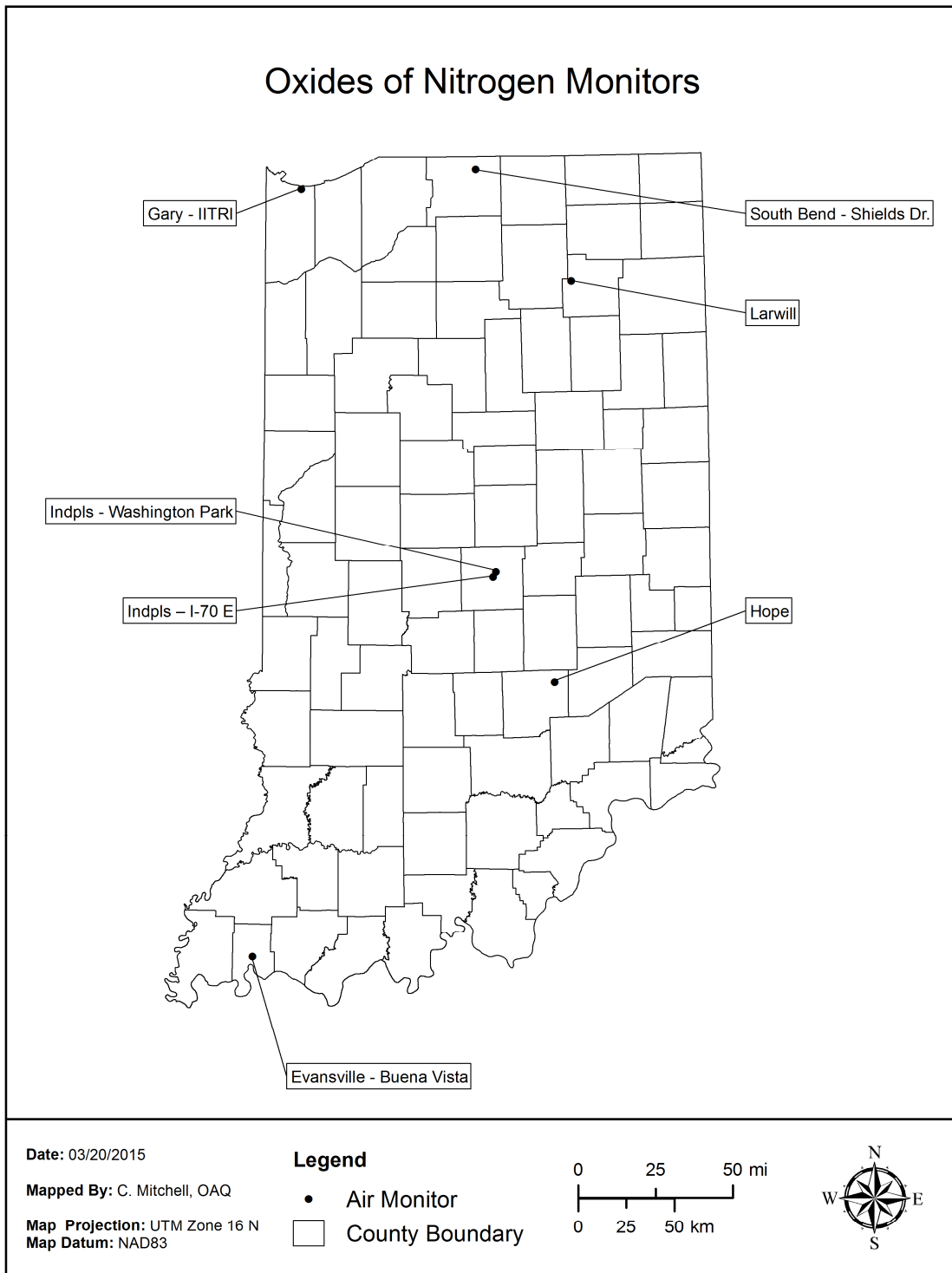


Table 4 – Oxides of Nitrogen (NO, NO₂, NO_x, NO_y) Monitoring Network

Parameter Code: 42602		NO, NO ₂ , NO _x , NO _y - Oxides of Nitrogen												
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
180050007	Hope	Bartholomew		Hauser Jr-Sr HS, 9404 N775 E.	SPM	06/05/13	Continuous	074	Urban	Background	39.294322	-85.766816	Columbus	No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS (UNOFFICAL PAMS)	06/27/95	Continuous	074	Neigh	Highest Conc	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS (NCORE)	01/01/13	Continuous	074	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS (NCORE)	01/01/11	Continuous	699	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	02/07/14	Continuous	074	Neigh	Pop Exp	39.787933	-86.130880	Indianapolis-Carmel-Anderson	No
181410015	South Bend - Shields Dr.	St Joseph	South Bend	2335 Shields Dr.	SLAMS	06/06/06	Continuous	074	Neigh	Pop Exp	41.696660	-86.214706	South Bend-Mishawaka, IN-MI	No
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	07/08/09	Continuous	074	Neigh	Pop Exp	38.013309	-87.577876	Evansville, IN-KY	No
181830003	Larwill	Whitley		Whitko Middle School, 710 N. State Rd. 5	SPM	05/01/13	Continuous	074	Urban	Background	41.169650	-85.622922	Fort Wayne	No
NOx MONITORING METHOD: 074-THERMO ELECTRON 42i NOy MONITORING METHOD: 699-TELEDYNE API 200EU NOy TRACE-LEVEL														

Ozone (O₃)

Monitoring Requirements

Table D-2 in 40 CFR Part 58 Appendix D details the number of O₃ sites required in each MSA. The number of sites is based on the population of an MSA and if the design value exceeds 85% of the standard, or 0.064 ppm, for that area. Table 5 lists the requirements stated in Part 58. Table 6 lists the requirements as they relate to Indiana. There are five MSAs which cross state lines. Except for the Cincinnati, OH-KY-IN MSA, Indiana meets the requirement for all MSAs, including multi-agency MSAs. A multi-agency agreement between the Southwest Ohio Air Quality Agency (Cincinnati, OH) and IDEM specifies that the Southwest Ohio Air Quality Agency will fulfill all the O₃ monitoring requirements in this MSA. In the absence of an agreement, Indiana would be required to operate two sites in the Cincinnati, OH-KY-IN MSA.

Monitoring Season

Table D-3 of Appendix D of Part 58 defines the O₃ monitoring season for all of the states. Indiana's monitoring season is from April 1 to September 30. Indiana operates one site in Illinois (West Union) and two sites (Charlestown State Park and New Albany) in the Louisville/Jefferson County, KY-IN MSA. Because the monitoring season extends through October in Illinois and Kentucky, Indiana operates these three sites through October. In addition, the Charlestown State Park and New Albany sites in the Louisville MSA are operated in March to correspond with Kentucky's ozone season.

Three sites operate year-round; Indpls – Washington Park (180970078), Indpls – I-70 E (180970087), and Evansville – Buena Vista (181630021). Indpls – Washington Park is Indiana's NCore site and Indpls – I-70 E is Indiana's near-road site. They are required to collect data all year. The Evansville – Buena Vista site collects data to aid local health officials in tracking and researching concentrations the entire year.

There is a possibility that new monitoring requirements may be promulgated in 2015. If any changes in the monitoring season are required to begin in 2016, Indiana will implement any season modification at that time.

Data

The design value for an area, usually a county or an MSA, is determined by the 3-year average of the 4th highest daily 8-hour maximum from the highest site in the area. If this value is greater than 0.075 ppm, the area is considered to be in violation of the NAAQS and could potentially be designated as a nonattainment area. If the air quality improves and the design value is 0.075 ppm or less, the area may be reclassified as a maintenance area. The design values for all sites for the most recent sampling period (2012 – 2014) along with the 2008 8-hour nonattainment areas, (based on current NAAQS of 0.075 ppm) are illustrated in Figure 6.

The design value for Michigan City (180910005) in the Michigan City-LaPorte MSA was greater than 0.075 ppm during the sampling period 2012 - 2014. All other O₃ monitoring sites were under the 0.075 ppm for the same sampling period.

Monitoring Methodology

Monitoring sites in Indiana use O₃ analyzers from Thermo Scientific; Models 49c, or 49i, or API Model T400. These monitors use ultraviolet absorption photometry. Air is drawn through a sample cell through which ultraviolet light (254 nm wavelength) passes. Any light that is not absorbed by the O₃ is then converted into an electrical signal proportional to the O₃ concentration.

Monitoring Network

In 2016 there will be 43 monitoring sites in Indiana's O₃ monitoring network as displayed in Figure 7. The O₃ monitoring network with proposed changes for 2016 is in Table 7.

Network Modifications

There are two network modifications planned for 2016. Monitoring at the Fortville (180590003) site will be discontinued. This site has been in attainment during the previous five years. The current design value (2012 – 2014) is 0.059 ppm, which is less than 80% of the NAAQS, and continues to trend downward. The site is not required by an attainment or maintenance plan. This site meets the requirements for station discontinuation detailed in 40 CFR §58.14 paragraph (c) (1).

The second network modification will be the discontinuation of the Whiting – HS (180890030) site. The site is no longer needed. When the project started in 2004, one of the initial goals of monitoring O₃ at Whiting High School was to introduce the students to the principles and practical elements of ambient air quality monitoring and train them in the operation of O₃ and air toxics monitoring equipment. After extensive training with IDEM staff, the students were to take over operation of the site. The training was never completed, and the students never took over site operations. The siting criteria were never considered optimal, as siting probe height approaches the upper range of 15 meters above ground level. This site was established more as educational rather than regulatory. There is a comparable site near Whiting – HS at Hammond – 141st St.(180892008), 4.6 km to the south.

Table 5 – SLAMS Minimum O₃ Monitoring Requirement

# of Sites Required per Population and Design Value		
MSA Population	<u>3yr Design Value ≥ 85% of NAAQS (0.064ppm)</u>	<u>3 yr Design Value < 85% of NAAQS (0.064ppm)</u>
>10 million	4	2
4-10 million	3	1
350,000 - 4 million	2	1
50,000 - 350,000	1	0

Table 6 – SLAMS O₃ Sites Required for Indiana

MSA	MSA Population ¹ (2010)	Design Value (ppm) (2012-2014)	# of Sites Required per CFR	Current No. of Sites	2016 No. of Sites
Bloomington	159,549	0.058	1	1 ⁴	1
Chicago-Naperville-Elgin, IL-IN-WI (total MSA)	9,461,105	0.081 ²	3	22 ²	-
Chicago-Naperville-Elgin, IL-IN-WI (IN only)	9,461,105	0.073 ³	3	5 ³	4
Cincinnati, OH-KY-IN (total MSA)	2,114,580	0.075 ²	2	10 ²	
Cincinnati, OH-KY-IN (IN only)	2,114,580	No Data ³	2	0 ³	0
Columbus	76,794	0.066	1	1	1
Elkhart-Goshen	197,559	0.061	0	1	1
Evansville, IN-KY (total MSA)	311,552	0.074 ²	1	7 ²	-
Evansville, IN-KY (IN only)	311,552	0.072 ³	1	6 ³	6
Fort Wayne	416,257	0.067	2	2	2
Indianapolis-Carmel-Anderson	1,887,862	0.071	2	13 ⁴	12
Kokomo	82,752	No Data	0	0	0
Lafayette-West Lafayette	201,789	0.068	1	1	1
Louisville/Jefferson County, KY-IN (total MSA)	1,235,708	0.075 ²	2	7 ²	-
Louisville/Jefferson County, KY-IN (IN only)	1,235,708	0.073 ³	2	2 ³	2
Michigan City-LaPorte	111,467	0.079	1	2	2
Muncie	117,671	0.063	0	1	1
South Bend-Mishawaka, IN-MI (total MSA)	319,224	0.072 ²	1	4 ²	-
South Bend-Mishawaka, IN-MI (IN only)	319,224	0.071 ³	1	3 ³	3
Terre Haute	172,425	0.066	1	2	2
Non MSA					
West Union - Clark Co., IL		0.065		1	1
Plummer - Greene Co. ³		0.071		1	1
Huntington - Huntington Co.		0.060		1	1
Brownstown - Jackson Co.		0.064		1	1
Leopold - Perry Co.		0.070		1	1
	Value exceeds NAAQS				
	DV ≥ 85% of NAAQS				
# of sites needed if Indiana meets all multi-state MSA requirements			17		
		Sites in Indiana Network		45	43
¹ MSA populations adjusted according to MSA changes in February 2013.					
² Information for full MSA.					
³ Information for Indiana's portion of MSA.					
⁴ Bloomington MSA impact site is located in Brown County, part of Indianapolis-Carmel-Anderson MSA					

Figure 6 – O₃ Design Values (2012 – 2014)

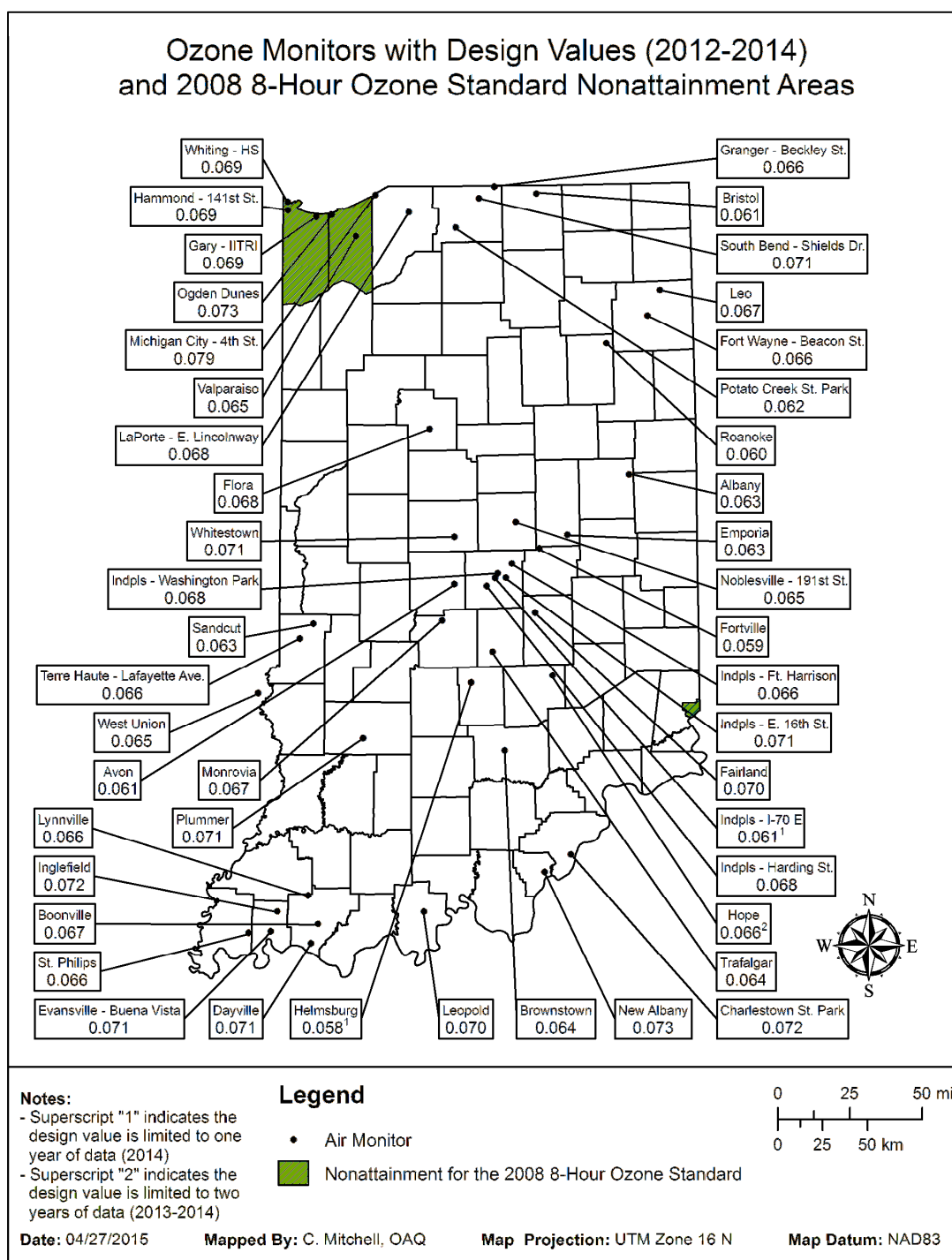


Figure 7 – O₃ Monitoring Network

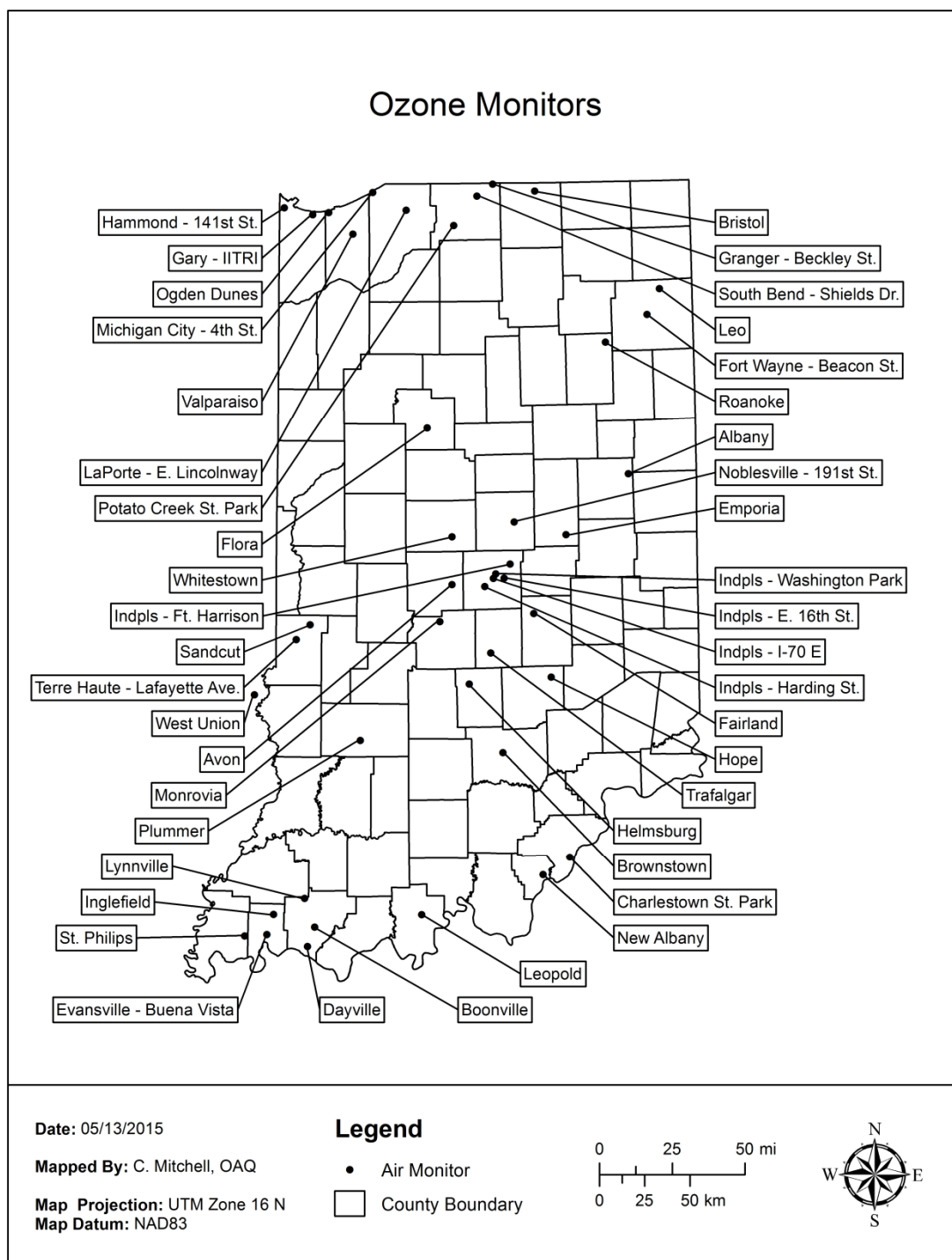


Table 7 – Ozone Monitoring Network

Parameter Code: 44201				O ₃ - Ozone										
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
170230001	West Union	Clark, IL		416 S. Hwy 1, West Union, IL	SLAMS	04/01/01	Continuous	047	Urban	General Bkgrd	39.210857	-87.668297	Non-MSA County	No
180030002	Leo HS	Allen	Leo	Leo HS, 14600 Amstutz Rd.	SLAMS	04/01/86	Continuous	047	Urban	Highest Conc	41.221418	-85.016821	Ft. Wayne	No
180030004	Ft Wayne - Beacon St.	Allen	Fort Wayne	2022 N. Beacon St.	SLAMS	07/01/79	Continuous	047	Neigh	Pop Exp	41.094966	-85.101816	Ft. Wayne	No
180050007	Hope	Bartholomew		Hauser Jr-Sr HS, 9404 N775 E.	SLAMS	05/28/13	Continuous	047	Urban	Pop Exp	39.294322	-85.766816	Columbus	No
180110001	Whitestown	Boone		Perry - Worth Elem Sch., 3900 E. 300 S, Lebanon	SLAMS	04/01/01	Continuous	047	Urban	Highest Conc	39.997484	-86.395172	Indianapolis-Carmel-Anderson	No
180130001	Helmsburg	Brown		Jackson Twp Fire Dept. 4831 Helmsburg Road, Nashville	SLAMS	05/16/14	Continuous	047	Urban	Highest Conc	39.263914	-86.292261	Indianapolis-Carmel-Anderson	No
180150002	Flora	Carroll		Flora Airport, 481 S. 150 W., Flora	SLAMS	04/01/01	Continuous	047	Urban	Pop Exp	40.540455	-86.553035	Lafayette-West Lafayette	No
180190008	Charlestown State Park	Clark		Charlestown State Park, 12500 Hwy 62, Charlestown	SLAMS	05/04/07	Continuous	047	Urban	Highest Conc	38.393833	-85.664167	Louisville/Jefferson County, KY-IN	No
180350010	Albany	Delaware	Albany	Albany Elem. Sch., 706 W. State St.	SLAMS	04/01/01	Continuous	047	Urban	Pop Exp	40.300000	-85.245556	Muncie	No
180390007	Bristol	Elkhart	Bristol	Bristol Elem Sch., 705 Indiana Ave.	SLAMS	04/01/02	Continuous	047	Urban	Pop Exp	41.718050	-85.830550	Elkhart-Goshen	No
180431004	New Albany	Floyd	New Albany	Green Valley Elem. Sch., 2230 Green Valley Road	SLAMS	01/01/77	Continuous	047	Neigh	Highest Conc	38.308056	-85.834167	Louisville/Jefferson County, KY-IN	No
180550001	Plummer	Greene		2500 S. 275 W	SLAMS	04/03/00	Continuous	047	Regional	Upwind Bkgrd	38.985477	-86.990419	Non-MSA County	No
180570006	Noblesville - 191st St.	Hamilton	Noblesville	Our Lady of Grace Catholic Church, 9900 E. 191st St.	SLAMS	05/13/10	Continuous	067	Urban	Highest Conc	40.068297	-85.992451	Indianapolis-Carmel-Anderson	No
180590003	Fortville	Hancock	Fortville	Fortville Municipal Bldg., 714 E Broadway	SLAMS	06/01/87	Continuous	047	Urban	Highest Conc	39.934870	-85.840671	Indianapolis-Carmel-Anderson	Discontinue
180630004	Avon	Hendricks	Avon	7203 E. US 36, Avon	SLAMS	04/01/00	Continuous	047	Urban	Pop Exp	39.758707	-86.398500	Indianapolis-Carmel-Anderson	No
180690002	Roanoke Elem School	Huntington	Roanoke	Roanoke Elem. Sch., 423 W. Vine St.	SLAMS	04/14/00	Continuous	047	Urban	Upwind Bkgrd	40.959671	-85.379647	Non-MSA County	No
180710001	Brownstown	Jackson		225 W & 300 N, Brownstown	SLAMS	04/04/00	Continuous	047	Regional	Upwind Bkgrd	38.920835	-86.080523	Non-MSA County	No
180810002	Trafalgar	Johnson	Trafalgar	200 W. Pearl St.	SLAMS	04/01/97	Continuous	047	Urban	Pop Exp	39.417155	-86.152406	Indianapolis-Carmel-Anderson	No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS (UNOFFICAL PAMS)	07/01/95	Continuous	047	Neigh	Pop Exp	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180890030	Whiting HS	Lake	Whiting	Whiting HS, 1751 Oliver St.	SLAMS	04/01/04	Continuous	047	Urban	Highest Conc	41.681684	-87.494722	Chicago-Naperville-Elgin, IL-IN-WI	Discontinue
180892008	Hammond - 141st St.	Lake	Hammond	1300 E. 141st St.	SLAMS	01/01/76	Continuous	047	Neigh	Pop Exp	41.639444	-87.493611	Chicago-Naperville-Elgin, IL-IN-WI	No
180910005	Michigan City - 4th St.	La Porte	Michigan City	NIPSCO Gas Station, 341 W. 4th St.	SLAMS	05/24/90	Continuous	047	Urban	Pop Exp	41.716944	-86.907500	Michigan City-LaPorte	No
180910010	LaPorte - E. Lincolnway	La Porte	LaPorte	2011 E. Lincolnway	SLAMS	05/07/97	Continuous	047	Urban	Pop Exp	41.629259	-86.685020	Michigan City-LaPorte	No

Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
18090010	Emporia	Madison		East Elem. Sch., 883 E. US 36, Pendleton	SLAMS	04/05/83	Continuous	047	Urban	Pop Exp	40.002511	-85.666391	Indianapolis-Carmel-Anderson	No
180970050	Indpls - R. Harrison	Marion	Indianapolis	5753 Glenn Rd	SLAMS	12/01/79	Continuous	047	Urban	Highest Conc	39.858991	-86.021344	Indianapolis-Carmel-Anderson	No
180970057	Indpls - Harding St.	Marion	Indianapolis	121 S. Harding St.	SLAMS	03/01/82	Continuous	087	Neigh	Pop Exp	39.749019	-86.186314	Indianapolis-Carmel-Anderson	No
180970073	Indpls - E. 18th St.	Marion	Indianapolis	6125 E. 18th St.	SLAMS	04/02/90	Continuous	047	Neigh	Pop Exp	39.789167	-86.060833	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS (NOORE)	04/01/09	Continuous	047	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	05/14/14	Continuous	047	Neigh	Pop Exp	39.787933	-86.130880	Indianapolis-Carmel-Anderson	No
181090005	Monrovia	Morgan	Monrovia	Monrovia HS, 135 S. Chestnut St.	SLAMS	04/01/97	Continuous	047	Urban	Pop Exp	39.575596	-86.477914	Indianapolis-Carmel-Anderson	No
181230009	Leopold	Perry		Perry Central HS, 1856 Old St Rd 37, Leopold	SLAMS	04/01/04	Continuous	047	Urban	Highest Conc	38.115120	-86.603261	Non-MSA County	No
181270024	Ogden Dunes	Porter	Ogden Dunes	Water Treatment Plant, 84 Diana Rd	SLAMS	11/01/83	Continuous	047	Urban	Highest Conc	41.617773	-87.199481	Chicago-Naperville-Elgin, IL-IN-WI	No
181270026	Valparaiso	Porter	Valparaiso	Valpo Water Department, 1000 Wesley St.	SLAMS	04/01/98	Continuous	047	Urban	Pop Exp	41.512084	-87.036172	Chicago-Naperville-Elgin, IL-IN-WI	No
181290003	St Phillips	Posey		2027 South St. Phillips Rd., Evansville	SLAMS	07/01/96	Continuous	047	Urban	Upwind Bkgrd	38.006410	-87.718354	Evansville, IN-KY	No
181410010	Potato Creek State Park	St Joseph		Potato Creek St. Park, 26801 St. Rd 4, North Liberty	SLAMS	04/24/91	Continuous	047	Urban	Upwind Bkgrd	41.551504	-86.370189	South Bend-Mishawaka, IN-MI	No
181410015	South Bend-Shields Dr.	St Joseph	South Bend	2335 Shields Dr.	SLAMS	06/06/06	Continuous	047	Neigh	Pop Exp	41.696660	-86.214706	South Bend-Mishawaka, IN-MI	No
181410016	Granger-Beckley St.	St Joseph	Granger	12441 Beckley St., Granger	SLAMS	04/01/12	Continuous	047	Urban	Highest Conc	41.754876	-86.110057	South Bend-Mishawaka, IN-MI	No
181450001	Fairland	Shelby		Triton Central MS, 4740 W. 600N, Fairland	SLAMS	04/01/00	Continuous	047	Urban	General Bkgrd	39.613367	-85.870669	Indianapolis-Carmel-Anderson	No
181630013	Inglefield	Vanderburgh		Scott School, 14940 Old State Road	SLAMS	05/01/80	Continuous	047	Urban	Highest Conc	38.113913	-87.536887	Evansville, IN-KY	No
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	07/08/09	Continuous	047	Neigh	Pop Exp	38.016309	-87.577876	Evansville, IN-KY	No
181670018	Terre Haute - Lafayette Ave.	Vigo	Terre Haute	961 N. Lafayette Ave.	SLAMS	07/01/83	Continuous	047	Neigh	Pop Exp	39.486111	-87.401389	Terre Haute	No
181670024	Sandcut	Vigo		7597 N. Stevenson Rd., Terre Haute	SLAMS	04/01/01	Continuous	047	Urban	Pop Exp	39.560556	-87.313056	Terre Haute	No
181730008	Boonville	Warrick	Boonville	Boonville HS, 300 N. 1st St.	SLAMS	04/16/91	Continuous	047	Urban	Highest Conc	38.052419	-87.281504	Evansville, IN-KY	No
181730009	Lynnville	Warrick		Tecumseh HS, 5244 State Rd 68, Lynnville	SLAMS	05/02/91	Continuous	047	Urban	Highest Conc	38.194185	-87.341004	Evansville, IN-KY	No
181730011	Dayville	Warrick		3488 Eble Rd., Newburgh	SLAMS	04/01/07	Continuous	047	Urban	Highest Conc	37.954450	-87.321889	Evansville, IN-KY	No
<div> O3 MONITORING METHOD: 047 - THERMO ELECTRON 49C, 49i 087 - TELEDYNE API T400 </div>														

Particulate Matter (PM₁₀)

Monitoring Requirements

The requirements for the design of the PM₁₀ monitoring network are listed in 40 CFR Part 58 Appendix D §4.6. Indiana must operate the minimum number of sites as defined by the MSA population and the ambient PM₁₀ data of the area. Table 8 lists the sites required per MSA along with the highest monitored PM₁₀ value in the proper category for each MSA. The current and proposed networks are also listed. There are five MSAs which cross state lines. Indiana meets the requirement for the number of sites for the full MSA, in the multi-agency MSAs, except for the Cincinnati, OH-KY-IN and Louisville/Jefferson County, KY-IN MSAs. IDEM has multi-agency agreements with the Southwest Ohio Air Quality Agency (Cincinnati, OH) and the Louisville Metropolitan Air Pollution Control District (APCD) specifying the sites which will operate in each district to fulfill the PM₁₀ monitoring requirements in the Cincinnati, OH-KY-IN and Louisville/Jefferson County, KY-IN MSAs.

Collocated samplers are required at 15% of the sites in the network to determine monitoring precision. IDEM is required to operate two collocated samplers.

Monitoring Methodology

Intermittent PM₁₀ samples are collected on a pre-weighed 46.2 mm diameter Teflon filter. Air is drawn through an inlet designed to pass only particles smaller than 10 microns in diameter and across the filter for 24 hours. The filter is then removed and weighed again. Concentrations are calculated by dividing the weight gain by the volume of air that passed through the filter.

Continuous PM₁₀ concentrations are obtained by using an R&P TEOM 1400a and a Thermo Scientific 1405 which collects the particulate on a filter attached to an oscillating glass rod. The concentration of the particulate is proportional to the change in oscillating frequency. A Met One BAM 1020 is used to collect continuous PM₁₀. Particulate is collected through a sampling inlet onto a filter tape. The amount of particulate concentration is determined by measuring beta ray transmissions through the tape. The Teledyne API 602 Beta^{PLUS} is also used to collect continuous PM₁₀ on 47 mm diameter filters using direct beta attenuation to determine the mass measurement.

Monitoring Network

Indiana currently operates 11 monitoring sites in the State. The 2016 network is displayed in Figure 8. Concentrations at all sites except for two source-oriented sites in Northwest Indiana, Gary – IITRI (180890022) and Portage – Hwy 12 (181270023), are well under 50% of the 24-hour NAAQS of 150 µg/m³. Table 9 details the current PM₁₀ network and the modifications planned for 2016.

Network Modifications

There are no network modifications planned for 2016.

Table 8 – PM₁₀ Site Requirements

CFR Requirement	MSA Population		High Conc. ¹	Medium Conc. ²	Low Conc. ³		
	> 1,000,000	# of Required Sites =>	6-10	4-8	2-4		
	MSA	Population	MSA Highest Value			# of Sites 2015	# of Sites 2016
	Chicago-Naperville-Elgin, IL-IN-WI	9,461,105			138 ^{4,6} / 99 ^{5,6}	9	-
	Chicago-Naperville-Elgin, IL-IN-WI	9,461,105			138 ^{4,7} / 59 ^{5,7}	5	5
	Cincinnati, OH-KY-IN	2,114,580			105 ^{4,8} 47 ^{5,6}	7	-
	Cincinnati, OH-KY-IN	2,114,580			No Data ⁷	0	0
	Indianapolis-Carmel-Anderson	1,887,862			62	2	2
	Louisville-Jefferson County, KY-IN	1,235,708			51 ⁶	4	-
	Louisville-Jefferson County, KY-IN	1,235,708			38 ⁷	1	1

CFR Requirement	MSA Population		High Conc. ¹	Medium Conc. ²	Low Conc. ³		
	500,000 - 1,000,000	# of Required Sites =>	4-8	2-4	1-2		
	MSA	Population	MSA Highest Value			# of Sites 2015	# of Sites 2016
	No MSAs in this category						

CFR Requirement	MSA Population		High Conc. ¹	Medium Conc. ²	Low Conc. ³		
	250,000 - 500,000	# of Required Sites =>	3-4	1-2	0-1		
	MSA	Population	MSA Highest Value			# of Sites 2015	# of Sites 2016
	Evansville, IN-KY	311,552			31 ⁶	2	-
	Evansville, IN-KY	311,552			31 ⁷	1	1
	Fort Wayne	416,257			No Data	0	0
	South Bend-Mishawaka, IN-MI	319,224			No Data	0	0
	South Bend-Mishawaka, IN-MI	319,224			No Data	0	0

CFR Requirement	MSA Population		High Conc. ¹	Medium Conc. ²	Low Conc. ³		
	100,000 - 250,000	# of Required Sites =>	1-2	0-1	0		
	MSA	Population	MSA Highest Value			# of Sites 2015	# of Sites 2016
	Bloomington	159,549			No Data	0	0
	Elkhart-Goshen	197,559			No Data	0	0
	Kokomo	82,752			No Data	0	0
	Lafayette-West Lafayette	201,789			No Data	0	0
	Michigan City-LaPorte	111,467			No Data	0	0
	Muncie	117,671			No Data	0	0
	Terre Haute	172,425			35	1	1

	Non MSA		Highest Value			# of Sites 2015	# of Sites 2016
	Jasper - Dubois Co.	54,734			32	1	1
Sites in Indiana Network						11	11

¹ Exceeds NAAQS by 20% (180ug/m3).

² Exceeds 80% of NAAQS (120 ug/m3).

³ <80% of NAAQS (120 ug/m3).

⁴ Highest value from source oriented site (not indicative of entire MSA).

⁵ Highest value from population oriented sites.

⁶ Information for full MSA.

⁷ Information for Indiana's portion of MSA

Figure 8 – PM₁₀ Monitoring Network

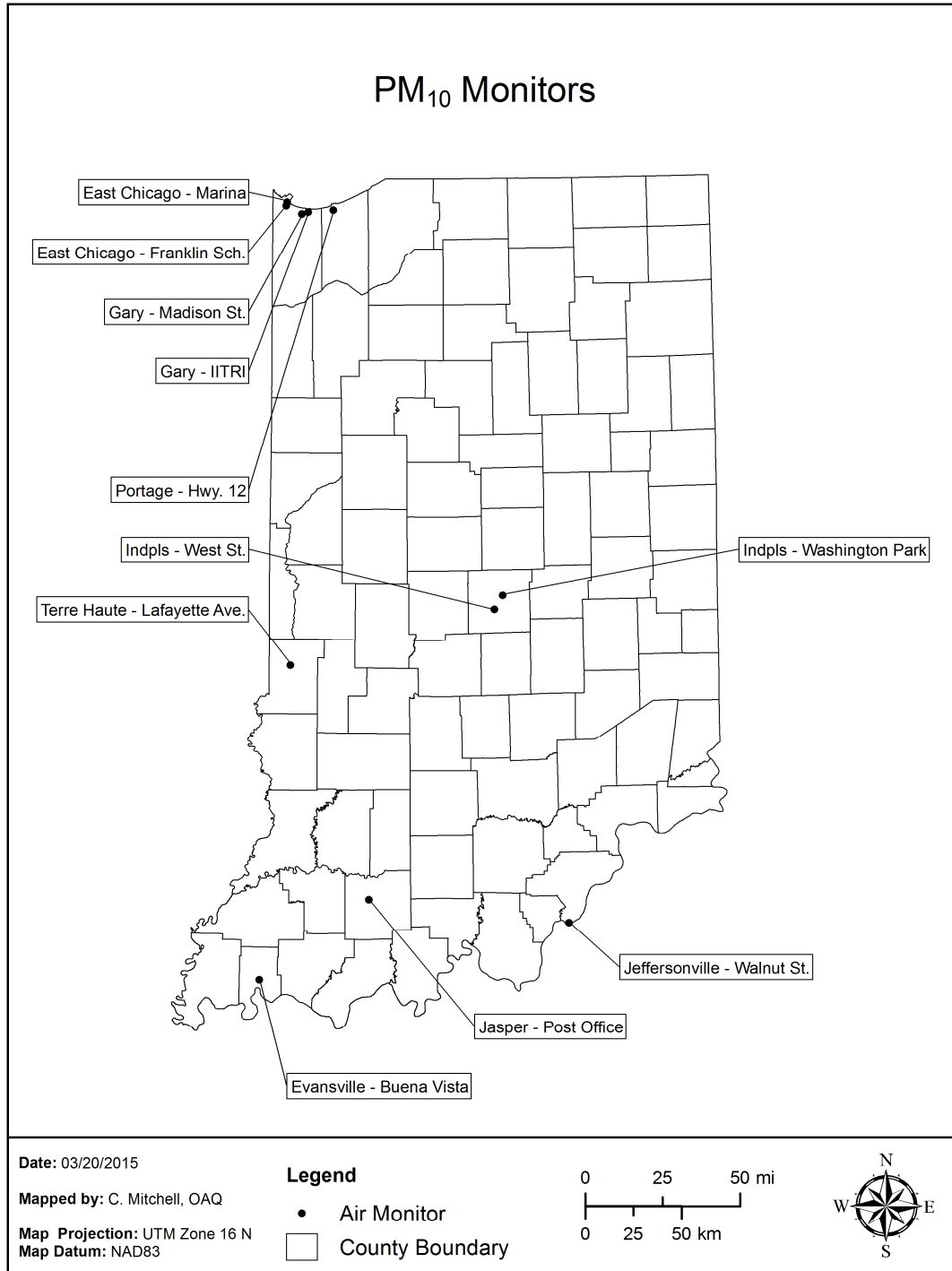


Table 9 – PM₁₀ Monitoring Network

Parameter Code: 81102		PM ₁₀ - Particulate Matter													
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management															
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?	
18090006	Jeffersonville - Walnut St.	Clark	Jeffersonville	Jeffersonville PFAU, 719 Walnut St.	SLAMS	06/26/03	6-Day	127	Neigh	Pop Exp	38.277675	-85.740163	Louisville/Jefferson County, KY-IN	No	
180372001	Jasper - Post Office	Dubois	Jasper	Jasper Post Office, 206 E. 6th St. Washington (formerly Franklin) School, Alder & 142nd St.	SLAMS	07/01/87	6-Day	127	Neigh	Highest Conc	38.391799	-86.929668	Non-MSA County	No	
180890006	East Chicago - Franklin Sch.	Lake	East Chicago		SLAMS	10/01/87	6-Day	127	Middle	Highest Conc	41.636111	-87.440833	Chicago-Naperville-Elgin, IL-IN-WI	No	
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS	03/26/93	1-Day	127	Middle	Source Oriented	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No	
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS	03/01/97	Continuous	079	Middle	Source Oriented	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No	
180890031	Gary - Madison St.	Lake	Gary	Indiana American Water Co., 650 Madison St.	SLAMS	07/01/05	6-Day	127	Neigh	Pop Exp	41.598505	-87.342991	Chicago-Naperville-Elgin, IL-IN-WI	No	
180890031	Gary - Madison St.	Lake	Gary	Indiana American Water Co., 650 Madison St.	SLAMS	07/01/05	6-Day	127	Neigh	Quality Assurance	41.598505	-87.342991	Chicago-Naperville-Elgin, IL-IN-WI	No	
180890034	East Chicago-Marina	Lake	East Chicago	East Chicago Marina 3301 Aldis St.	SLAMS	10/30/12	6-Day	127	Middle	Source Oriented	41.653480	-87.435584	Chicago-Naperville-Elgin, IL-IN-WI	No	
180970043	Indpls - West St.	Marion	Indianapolis	1735 S. West St.	SLAMS	10/29/86	6-Day	127	Middle	Highest Conc	39.744957	-86.166496	Indianapolis-Carmel-Anderson	No	
180970043	Indpls - West St.	Marion	Indianapolis	1735 S. West St.	SLAMS	01/01/13	6-Day	127	Middle	Quality Assurance	39.744957	-86.166496	Indianapolis-Carmel-Anderson	No	
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	SLAMS	07/01/10	1-Day	127	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No	
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	SLAMS	08/02/11	Continuous	122	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No	
181270023	Portage - Hwy 12	Porter	Portage	Bethlehem Steel Waste Lagoon, Hwy 12	SLAMS	10/01/95	Continuous	079	Neigh	Highest Conc	41.616618	-87.146959	Chicago-Naperville-Elgin, IL-IN-WI	No	
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	07/10/09	Continuous	205	Neigh	Pop Exp	38.013309	-87.577876	Evansville, IN-KY	No	
181670018	Terre Haute - Lafayette Ave.	Vigo	Terre Haute	961 N. Lafayette Ave.	SLAMS	07/01/88	6-Day	127	Neigh	Pop Exp	39.486111	-87.401889	Terre Haute	No	
PM10 MONITORING METHODS: 079 - R&P TEOM 1400, 1400 A 122- Met One - Beta Attenuation 127 - R&P 2025A or 2025B Sequential 205 - Teledyne 602 Beta ^{PLUS}															

Fine Particulate Matter (PM_{2.5})

Monitoring Requirements

40 CFR Part 58, Appendix D §4.7 details the number of PM_{2.5} sites required in each MSA. The number of sites is based on the population of an MSA and if the design value for that area is greater or less than 85% of either NAAQS. Table 10 (Table D-5 of Appendix D) lists the minimum requirements as stated in Part 58. Table 11 lists the requirements as they relate to Indiana. Indiana meets the minimum number of sites for each MSA within Indiana's boundaries. There are five MSAs which cross state lines. Except for the Cincinnati, OH-KY-IN MSA, Indiana meets the requirement for the number of sites for the full MSA in the multi-agency MSAs. An agreement between the SWOAQA and IDEM specifies that the SWOAQA will fulfill the PM_{2.5} monitoring requirements in the Cincinnati, OH-KY-IN MSA. In the absence of an agreement, Indiana would be required to operate three sites in the Cincinnati, OH-KY-IN MSA, and 15 additional monitoring sites.

In addition, 40 CFR, Appendix D §4.7.2 states that "State, or where appropriate, local agencies must operate continuous fine particulate analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of Appendix D. At least one required FRM/FEM monitor in each MSA must be collocated." As these requirements are applied to Indiana, 10 would be required. Indiana meets this requirement in all MSAs, except in the Cincinnati, OH-KY-IN and Louisville/Jefferson County, KY-IN MSAs. IDEM has multi-agency agreements with SWOAQA (Cincinnati, OH) and APCD of Louisville specifying the sites which will operate in each district to fulfill the PM_{2.5} monitoring requirements in the Cincinnati, OH-KY-IN and Louisville/Jefferson County, KY-IN MSAs.

Collocated samplers are required at 15% of the FRM/FEM sites operated by each PQAO. IDEM is the sole PQAO for Indiana and plans to operate 35 sites. Indiana is required to have five collocated samplers.

Table 10 – SLAMS Minimum PM_{2.5} Monitoring Site Requirements

Number of Sites per MSA and Design Value		
MSA Population	3 yr DV ≥ 85% of either NAAQS	3 yr DV < 85% of either NAAQS
> 1,000,000	3	2
500,000 - 1,000,000	2	1
50,000 - 500,000	1	0
	also	
	Statewide Background Site	1
	Statewide Transport Site	1
85% of 24-hour NAAQS (35) = 29.75 µg/m ³		
85% of Annual NAAQS (12) = 10.2 µg/m ³		

Monitoring Methodology

Intermittent PM_{2.5} is sampled by drawing air through a specially designed inlet that excludes particles larger than 2.5 microns in diameter. The remaining particles are collected on a Teflon™ Microfiber filter that is weighed before and after the sampling period to determine the particulate mass. Indiana uses the R&P or Thermo Scientific 2025 Sequential Samplers (FEM) (EQPM-0202-145) to collect intermittent data. The normal sampling schedule varies, as determined by the regulations: three sites sample every day, the remainder sample every 3rd day. Collocated monitors used for assessing data precision operate on a one-in-six day schedule.

Continuous data are collected using one of the following monitors: Met One BAM 1020 PM_{2.5} (FEM) (EQPM-0308-170), Thermo Scientific Model 5030 SHARP (EQPM-0609-184), or Teledyne Model 602 Beta^{PLUS} Particle Measurement System (EQPM-0912-204). The BAM 1020 collects fine particulate through a sampling inlet onto a filter tape, using a beta ray transmission to measure the amount of particulate concentration collected during a specific sampling period. The SHARP 5030 collects the particulate onto a filter tape and uses a beta ray transmission to measure the amount of particulate concentration, similar to the BAM 1020 FEM. In addition, the SHARP 5030 also has an optical assembly that senses light scattered by the aerosol and is constantly referenced to the measurement of the mass sensor. The TAPI 602 collects the particulate on a filter and uses beta ray transmission combined with dual-channel, sequential sampling technology to determine concentration.

Table 11 – Number of SLAMS PM_{2.5} Monitoring Sites Required for Indiana

MSA	MSA Population ¹ (2010)	Annual Design Value (ug/m3) (2012-2014)	Daily Design Value (ug/m3) (2012-2014)	# of Sites Required per CFR	2015 # of Sites	2016 # of Sites (IN)	2015 # of Cont. Mont.	2016 # of Cont. Mont. (IN)
Bloomington	159,549	9.6	20	0	1	1	1	1
Chicago-Naperville-Elgin, IL-IN-WI (total MSA)	9,461,105	11.6 ⁷	28 ⁷	3	24 ²	-	13 ²	-
Chicago-Naperville-Elgin, IL-IN-WI (IN only)	9,461,105	11.6 ³	28 ³	3	6 ³	6	3 ³	3
Cincinnati, OH-KY-IN (total MSA)	2,114,580	13.4 ²	27 ²	3	11 ²	-	7 ²	-
Cincinnati, OH-KY-IN (IN only)	2,114,580	No Data ³	No Data ³	3	0 ³	0	0 ³	0
Columbus	76,794	10.7 ⁴	21 ⁴	0	1	1	1	1
Elkhart-Goshen	197,559	10.5	28	1	1	1	1	1
Evansville, IN-KY (total MSA)	311,552	10.9 ²	25 ²	1	4 ²	-	2 ²	-
Evansville, IN-KY (IN only)	311,552	10.9 ³	25 ³	1	3 ³	3	1 ³	1
Fort Wayne	416,257	10.0	25	0	2	2	2	2
Indianapolis-Carmel-Anderson	1,887,862	11.8	27	3	8	8	4	5
Kokomo	82,752	10.4 ⁵	22 ⁵	1	1	1	1	1
Lafayette-West Lafayette	201,789	10.0	25	0	1	1	1	1
Louisville-Jefferson County, KY-IN (total MSA)	1,235,708	11.8 ⁶	24 ⁶	3	6 ²	-	5 ²	-
Louisville-Jefferson County, KY-IN (IN only)	1,235,708	11.8 ³	24 ³	3	3 ³	3	1 ³	1
Michigan City-LaPorte	111,467	9.6	23	0	1	1	0	0
Muncie	117,671	10	25	0	1	1	0	0
South Bend-Mishawaka, IN-MI (total MSA)	319,224	9.9 ²	25 ²	0	1 ²	-	1 ²	-
South Bend-Mishawaka, IN-MI (IN only)	319,224	9.9 ³	25 ³	0	1 ³	1	1 ³	1
Terre Haute	172,425	10.6	25	1	1	1	1	1
Other Requirements								
State Background Site - Green Co.		9.9	23	1	1	1		
State Transport Site - Henry Co.		9.5	22	1	1	1		
Non MSAs								
Jasper - Dubois Co.		10.9	25		1	1		
Dale - Spencer Co.		10.5	23		1	1		
		Values above NAAQS						
		DV ≥ 85% of NAAQS						
# of sites needed if Indiana meets all multi-state MSA requirements				18				
# of continuous monitors required (1/2 of the required sites)(rounded up)				10				
Sites in Indiana Network					35	35	18	19
¹ MSA populations adjusted according to MSA changes in February 2013.								
² Information for full MSA.								
³ Information for Indiana's portion of MSA.								
⁴ Site began operation in July 2014								
⁵ Site began operation in April 2014								
⁶ Data from Indiana only. Validity issues with data collected in Louisville.								
⁷ Data from Indiana and Wisconsin only. Validity issues with data collected in Illinois.								

Monitoring Network

In 2016 the Indiana PM_{2.5} monitoring network consists of 35 monitoring sites. Continuous monitors will be collecting data at 19 site locations.

Data / Design Value

The data collected from the intermittent FEM samplers are considered eligible for comparison to the NAAQS and used for calculation of the design value for a site. Only the continuous data from the Indpls – W. 18th St. (180970081) site was used in the past for comparison to the NAAQS.

Appendix B presents the current evaluation of Indiana's continuous PM_{2.5} data. Of the eligible data Indiana proposes to accept the following sites for comparison to the NAAQS:

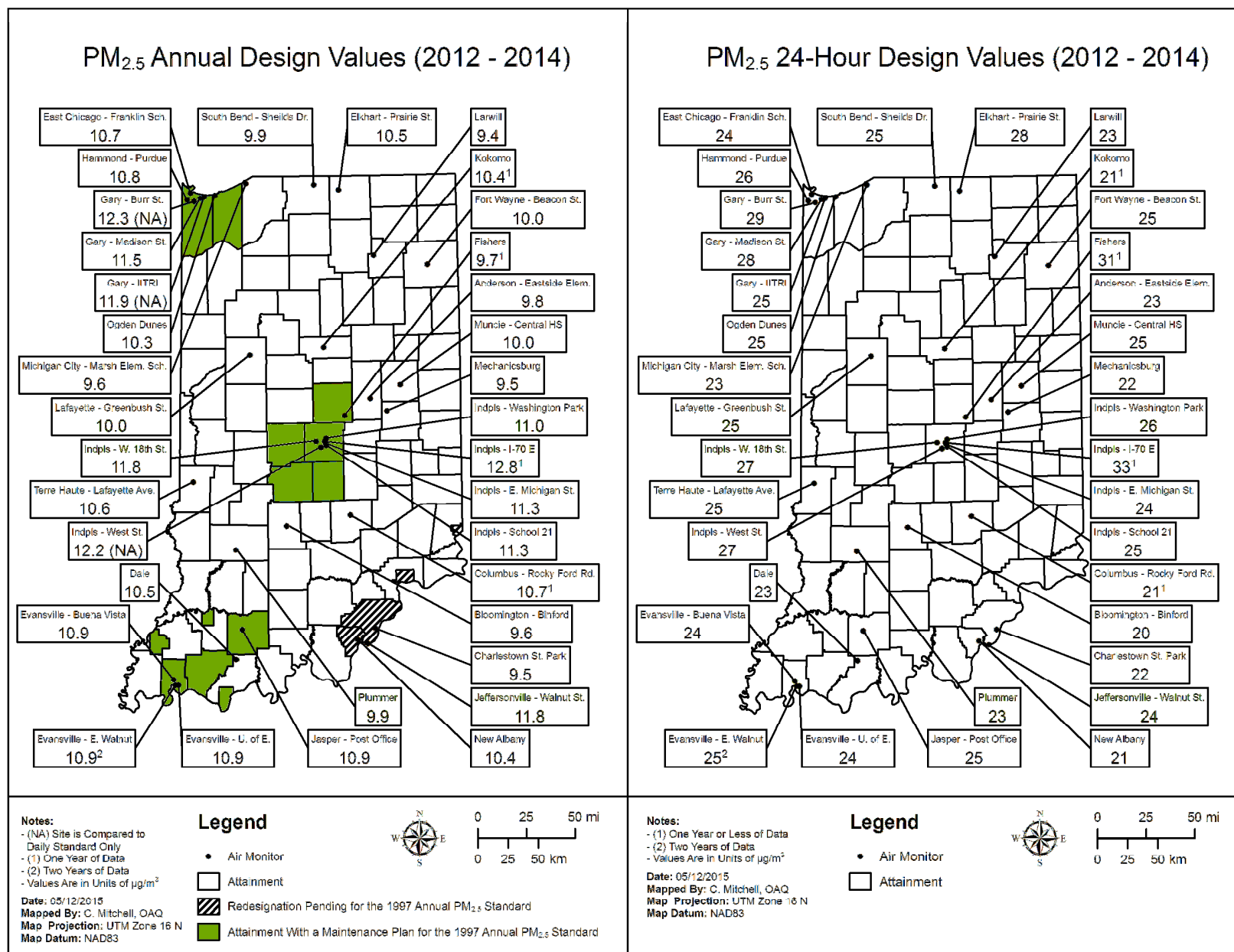
Fort Wayne – Beacon St. (180030004)
Gary – IITRI (180890022)
Anderson – Eastside Elementary (180950011)
Indpls – Washington Park (180970078)
Terre Haute – Lafayette St. (181670018)

The data from Ogden Dunes (181270024) and South Bend – Shields Dr. (181410015) are proposed to be excluded.

A site's annual design value is determined by first calculating the quarterly average concentrations, then calculating the weighted annual concentration by averaging the quarterly values, and then averaging the three consecutive annual averages. The highest site design value in an MSA is generally determined to be the design value for the area. It is compared to the annual NAAQS of 12 µg/m³ to determine attainment/nonattainment for the area. Similarly, a site's 24-hour design value is obtained by averaging the 98th percentile value from three consecutive years. This value is then compared to the 24-hour NAAQS, 35 µg/m³, to determine attainment/nonattainment of the 24-hour standard.

The design values for all sites for the most recent sampling period (2012 - 2014), along with the designation status of areas for PM_{2.5} are shown in Figure 9. Currently all counties in Indiana meet the 24-hour, and 2012 annual NAAQS for PM_{2.5}.

Figure 9 – PM_{2.5} Site Design Values



Network Modifications

There are two modifications proposed. The Evansville - Buena Vista (181630021) FRM collocated site will be discontinued on December 31, 2015. Collocation requirements will still be fulfilled across the network. When a new shelter is installed later in 2015 or early 2016, the number of monitors to be installed on the roof should be minimal to prevent potential damage and leaks. PM_{2.5} intermittent monitoring will continue with the reporting instrument as well as the continuous PM_{2.5}.

The second proposed change is the addition of continuous PM_{2.5} monitoring at the Indpls – I-70 E (180970087) near-road site. This is a secondary monitoring requirement. Having real-time data will be informative during key commuting hours. A Thermo SHARP 5030 will be operational by January 1, 2016.

As per 40 CFR Part 58.12, if the 24-hour design value of an area is within plus or minus 5% of the NAAQS, then sampling must be daily. Each year the data are evaluated to determine which sites must collect daily data. The design values from 2012 through 2014 will determine which sites will collect daily samples in 2016. No sites are currently required to collect daily samples. However, the Indpls – Washington Park and Indpls – W. 18th St. sites will continue sampling daily to collect comparison data for the continuous monitors. The Jeffersonville – Walnut St. site (180190006) will also collect daily samples to collect more data for the Jeffersonville area.

The PM_{2.5} monitoring network with the changes proposed for 2016 is shown in Table 12. A map of the 2016 network is shown in Figure 10.

Unanticipated Network Changes

Indiana has not opted to spatially average PM_{2.5} values from multiple sites in an MSA. If access to a site is lost or the site must be discontinued, and that site is violating the NAAQS for PM_{2.5}, a new site need not be found, if the 'design value site' for the MSA is still operational. The attainment of the area would still be determined by the 'design value site'. However, if the violating 'design value site' were to be lost, every effort would be made to obtain a new site close to the old site and having the same scale of representativeness and monitoring objectives as the original site.

Figure 10 – PM_{2.5} Monitoring Network

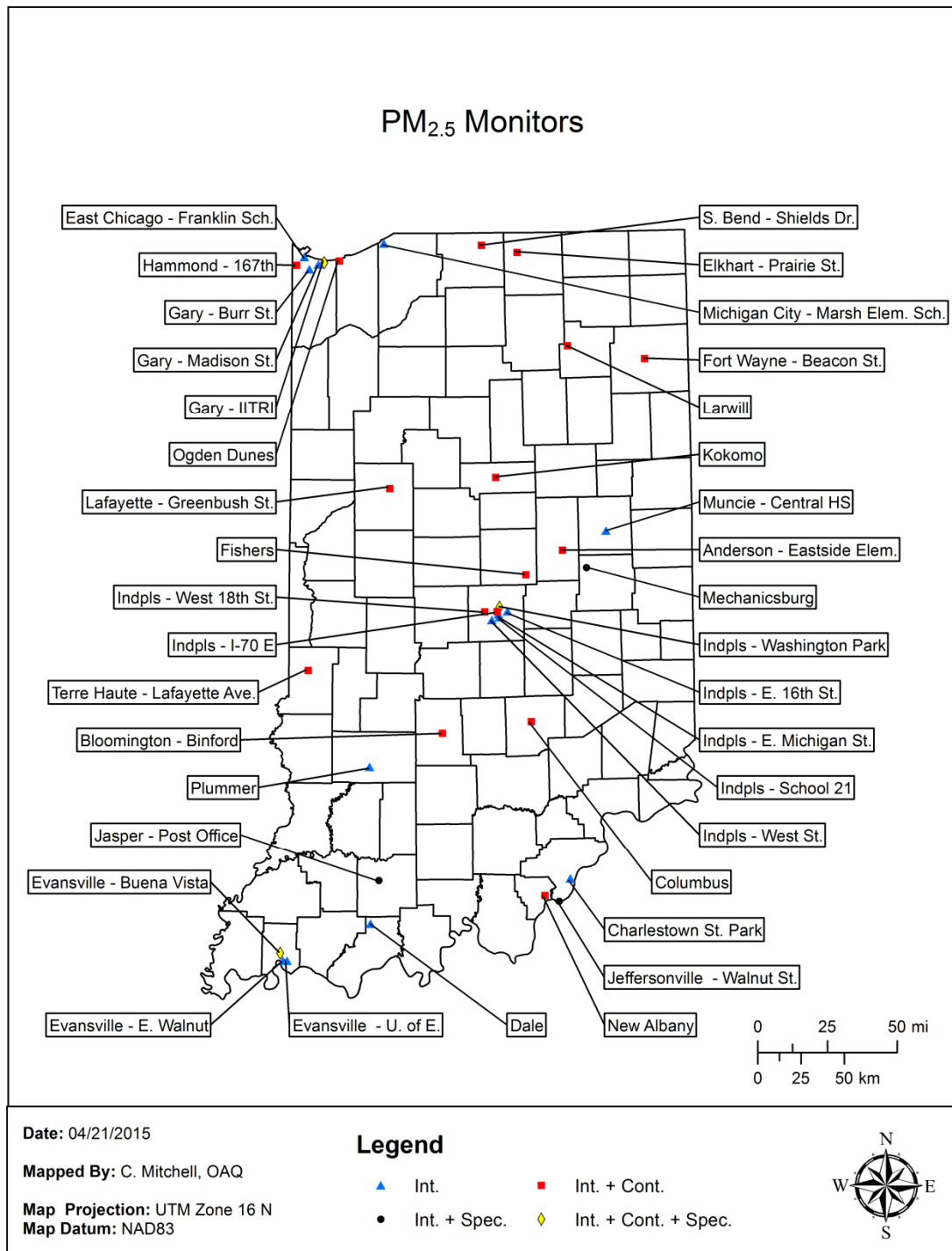


Table 12 – PM_{2.5} Monitoring Network

PM _{2.5} Monitoring Network																
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management																
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	NAAQS Comparable	MSA	Site Change Proposed?	
180030004	Ft Wayne - Beacon St.	Allen	Fort Wayne	2022 North Beacon St.	SLAMS	01/01/99	3-Day	145	Neigh	Pop Exp	41.094966	-85.101816	Yes	Ft. Wayne	No	
180030004	Ft Wayne - Beacon St.	Allen	Fort Wayne	2022 North Beacon St.	SLAMS	01/04/13	3-Day	145	Neigh	Quality Assurance	41.094966	-85.101816	Yes	Ft. Wayne	No	
180030004	Ft Wayne - Beacon St.	Allen	Fort Wayne	2022 North Beacon St.	SLAMS	01/01/02	Continuous	170	Neigh	Pop Exp	41.094966	-85.101816	Yes	Ft. Wayne	No	
180050008	Columbus - Rocky Ford Rd.	Bartholomew	Columbus	3475 Trestle Dr.	SPM	07/16/14	3-Day	145	Neigh	Pop Exp	39.237464	-85.891330	Yes	Columbus	No	
180050008	Columbus - Rocky Ford Rd.	Bartholomew	Columbus	3475 Trestle Dr.	SPM	07/25/14	Continuous	170	Neigh	Pop Exp	39.237464	-85.891330	No	Columbus	No	
180190006	Jeffersonville - Walnut St.	Clark	Jeffersonville	Jeffersonville PFALU, 719 Walnut St.	SLAMS	06/26/03	1-Day	145	Neigh	Pop Exp	38.277675	-85.740153	Yes	Louisville/Jefferson County, KY-IN	No	
180190008	Charlestown State Park	Clark		Charlestown State Park, 12500 Hwy 62, Charlestown	SLAMS	07/01/08	3-Day	145	Urban	Pop Exp	38.383833	-85.664167	Yes	Louisville/Jefferson County, KY-IN	No	
180350006	Muncie - Central HS	Delaware	Muncie	Muncie Central HS, 801N Walnut St.	SLAMS	10/15/99	3-Day	145	Neigh	Pop Exp	40.201111	-85.388056	Yes	Muncie	No	
180372001	Jasper - Post Office	Dubois	Jasper	Post Office, 206 E. 6th St.	SLAMS	01/01/00	3-Day	145	Neigh	Pop Exp	38.381739	-86.923688	Yes	Non-MSA County	No	
180380008	Elkhart - Prairie St.	Elkhart	Elkhart	2745 Prairie St.	SLAMS	01/01/08	3-Day	145	Neigh	Pop Exp	41.657153	-85.968450	Yes	Elkhart-Goshen	No	
180390008	Elkhart - Prairie St.	Elkhart	Elkhart	2745 Prairie St.	SLAMS	11/23/10	Continuous	170	Neigh	Pop Exp	41.657153	-85.968450	No	Elkhart-Goshen	No	
180431004	New Albany	Floyd	New Albany	Green Valley Elem. Sch., 2230 Green Valley Rd.	SLAMS	01/18/99	3-Day	145	Neigh	Pop Exp	38.308056	-85.834167	Yes	Louisville/Jefferson County, KY-IN	No	
180431004	New Albany	Floyd	New Albany	Green Valley Elem. Sch., 2230 Green Valley Rd.	SLAMS	01/18/99	6-Day	145	Neigh	Quality Assurance	38.308056	-85.834167	No	Louisville/Jefferson County, KY-IN	No	
180431004	New Albany	Floyd	New Albany	Green Valley Elem. Sch., 2230 Green Valley Rd.	SLAMS	11/01/03	Continuous	170	Neigh	Pop Exp	38.308056	-85.834167	No	Louisville/Jefferson County, KY-IN	No	
180550001	Plummer	Greene		2500 S. 275 W	SLAMS	01/12/12	3-Day	145	Regional	Upwind Backd	38.985477	-86.990419	Yes	Non-MSA County	No	
180570007	Fishers	Hamilton	Fishers	11775 Brooks School Rd.	SLAMS	01/02/14	3-Day	145	Urban	Pop Exp	39.960884	-85.939546	Yes	Indianapolis-Carmel-Anderson	No	
180570007	Fishers	Hamilton	Fishers	11775 Brooks School Rd.	SLAMS	12/06/13	Continuous	170	Urban	Pop Exp	39.960884	-85.939546	No	Indianapolis-Carmel-Anderson	No	
180650003	Mechanicsburg	Henry		Shenandoah HS, 7354 W. Hwy. 36, Pendleton	SLAMS	09/06/00	3-Day	145	Regional	Regional Transport	40.009544	-85.523470	Yes	Non-MSA County	No	
180670004	Kokomo - E. Vaile Ave.	Howard	Kokomo	1802 E. Vaile Ave.	SLAMS	04/03/14	3-Day	145	Urban	Pop Exp	40.481347	-86.109688	Yes	Kokomo	No	
180670004	Kokomo - E. Vaile Ave.	Howard	Kokomo	1802 E. Vaile Ave.	SLAMS	04/03/14	Continuous	170	Urban	Pop Exp	40.481347	-86.109688	No	Kokomo	No	

Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	NAAQS Comparison	MSA	Site Change Proposed?
180890006	East Chicago - Franklin Sch.	Lake	East Chicago	Washington (formerly Franklin) School, Alder & 142nd St.	SLAMS	01/27/99	3-Day	145	Neigh	Pop Exp	41.636111	-87.440833	Yes	Chicago-Naperville-Elgin, IL-IN-WI	No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS	03/04/99	3-Day	145	Middle	Source & Pop Exp	41.606623	-87.304843	Yes**	Chicago-Naperville-Elgin, IL-IN-WI	No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS	01/01/03	Continuous	170	Middle	Source & Pop Exp	41.606623	-87.304843	Yes	Chicago-Naperville-Elgin, IL-IN-WI	No
180890026	Gary - Burr St	Lake	Gary	Truck Stop, 25th Ave & Burr St.	SLAMS	02/12/00	3-Day	145	Middle	Source & Pop Exp	41.573056	-87.405833	Yes**	Chicago-Naperville-Elgin, IL-IN-WI	No
180890031	Gary - Madison St.	Lake	Gary	Indiana American Water Co., 650 Madison St.	SLAMS	07/01/05	3-Day	145	Neigh	Pop Exp	41.598505	-87.342391	Yes	Chicago-Naperville-Elgin, IL-IN-WI	No
180890031	Gary - Madison St.	Lake	Gary	Indiana American Water Co., 650 Madison St.	SLAMS	07/01/05	6-Day	145	Neigh	Quality Assurance	41.598505	-87.342391	No	Chicago-Naperville-Elgin, IL-IN-WI	No
180892004	Hammond - Purdue	Lake	Hammond	Powers Bldg. Purdue Univ. Calumet, 2200 169th St.	SLAMS	02/01/99	3-Day	145	Neigh	Pop Exp	41.585278	-87.474444	Yes	Chicago-Naperville-Elgin, IL-IN-WI	Relocate
180892004	Hammond - Purdue	Lake	Hammond	Powers Bldg. Purdue Univ. Calumet, 2200 169th St.	SLAMS	12/01/03	Continuous	184	Neigh	Pop Exp	41.585278	-87.474444	No	Chicago-Naperville-Elgin, IL-IN-WI	Relocate
180890035	Hammond	Lake	Hammond		SPM	2015	3-Day	145	Neigh	Pop Exp	41.594408	-87.495041	Yes	Chicago-Naperville-Elgin, IL-IN-WI	Relocation
180890035	Hammond	Lake	Hammond		SPM	2015	Continuous	184	Neigh	Pop Exp	41.594408	-87.495041	No	Chicago-Naperville-Elgin, IL-IN-WI	Relocation
180910011	Michigan City - Marsh Elem. Sch.	LaPorte	Michigan City	Marsh Elem. Sch., 400 E. Homer St.	SLAMS	12/17/99	3-Day	145	Neigh	Pop Exp	41.705944	-86.891111	Yes	Michigan City-LaPorte	No
180950011	Anderson - Eastside Elem.	Madison	Anderson	Eastside Elementary Sch., 844 N. Scatterfield Rd.	SLAMS	07/22/10	3-Day	145	Middle	Pop Exp	40.125690	-85.652127	Yes	Indianapolis-Carmel-Anderson	No
180950011	Anderson - Eastside Elem.	Madison	Anderson	Eastside Elementary Sch., 844 N. Scatterfield Rd.	SLAMS	07/08/10	Continuous	184	Middle	Pop Exp	40.125690	-85.652127	Yes	Indianapolis-Carmel-Anderson	No
180970043	Indpls - West St.	Marion	Indianapolis	1735 South West Street	SLAMS	01/24/99	3-Day	145	Middle	Pop Exp	39.744957	-86.166496	Yes**	Indianapolis-Carmel-Anderson	No
180970073	Indpls - E. 18th St.	Marion	Indianapolis	6125 E. 18th St.	SPM	01/03/15	3-Day	145	Neigh	Pop Exp	39.789157	-86.060833	Yes	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	SLAMS (NCORE)	03/07/99	1-Day	145	Neigh	Pop Exp	39.811097	-86.114469	Yes	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	SLAMS (NCORE)	01/01/04	Continuous	170	Neigh	Pop Exp	39.811097	-86.114469	Yes	Indianapolis-Carmel-Anderson	No
180970081	Indpls - W. 18th St.	Marion	Indianapolis	Ernie Pyle Sch 90, 3351 W. 18th St.	SLAMS	02/03/99	1-Day	145	Neigh	Pop Exp	39.788903	-86.214628	Yes	Indianapolis-Carmel-Anderson	No
180970081	Indpls - W. 18th St.	Marion	Indianapolis	Ernie Pyle Sch 90, 3351 W. 18th St.	SLAMS	02/11/99	6-Day	145	Neigh	Quality Assurance	39.788903	-86.214628	No	Indianapolis-Carmel-Anderson	No
180970081	Indpls - W. 18th St.	Marion	Indianapolis	Ernie Pyle Sch 90, 3351 W. 18th St.	SLAMS	11/01/07	Continuous	184	Neigh	Pop Exp	39.788903	-86.214628	No	Indianapolis-Carmel-Anderson	No
180970083	Indpls - E. Michigan St.	Marion	Indianapolis	Thomas Gregg Sch 15, 2302 E. Michigan St.	SLAMS	01/22/99	3-Day	145	Neigh	Pop Exp	39.774896	-86.122000	Yes	Indianapolis-Carmel-Anderson	No
180970084	Indpls - School 21	Marion	Indianapolis	IPS Sch 21, 2815 English Ave.	SLAMS	02/16/09	3-Day	145	Neigh	Pop Exp	39.759083	-86.155556	Yes	Indianapolis-Carmel-Anderson	No
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	02/01/14	3-Day	145	Neigh	Pop Exp	39.787933	-86.130880	No	Indianapolis-Carmel-Anderson	No
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	01/01/16	Continuous	184	Neigh	Pop Exp	39.787933	-86.130880	No	Indianapolis-Carmel-Anderson	Add
181050003	Bloomington	Monroe	Bloomington	Binford Elementary Sch, 2300 E. 2nd St.	SLAMS	04/01/09	3-Day	145	Neigh	Pop Exp	39.193972	-86.504747	Yes	Bloomington	No
181050003	Bloomington	Monroe	Bloomington	Binford Elementary Sch, 2300 E. 2nd St.	SLAMS	04/01/09	Continuous	184	Neigh	Pop Exp	39.193972	-86.504747	No	Bloomington	No

Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	NAAQS Comparison	MSA	Site Change Proposed?
181270024	Ogden Dunes	Porter	Ogden Dunes	Water Treatment Plant, 84 Diana Rd	SLAMS	01/27/99	3-Day	145	Neigh	Pop Exp	41.617773	-87.199481	Yes	Chicago-Naperville-Elgin, IL-IN-WI	No
181270024	Ogden Dunes	Porter	Ogden Dunes	Water Treatment Plant, 84 Diana Rd	SLAMS	01/10/13	3-Day	145	Neigh	Quality Assurance	41.617773	-87.199481	Yes	Chicago-Naperville-Elgin, IL-IN-WI	No
181270024	Ogden Dunes	Porter	Ogden Dunes	Water Treatment Plant, 84 Diana Rd	SLAMS	12/03/03	Continuous	170	Neigh	Pop Exp	41.617773	-87.199481	No	Chicago-Naperville-Elgin, IL-IN-WI	No
181410015	South Bend - Shields Dr.	St Joseph	South Bend	2335 Shields Dr.	SLAMS	06/01/06	3-Day	145	Neigh	Pop Exp	41.696660	-86.214706	Yes	South Bend-Mishawaka, IN-MI	No
181410015	South Bend - Shields Dr.	St Joseph	South Bend	2335 Shields Dr.	SLAMS	06/01/06	6-Day	145	Neigh	Quality Assurance	41.696660	-86.214706	No	South Bend-Mishawaka, IN-MI	No
181410015	South Bend - Shields Dr.	St Joseph	South Bend	2335 Shields Dr.	SLAMS	06/01/06	Continuous	170	Neigh	Pop Exp	41.696660	-86.214706	No	South Bend-Mishawaka, IN-MI	No
181470009	Dale	Spencer	Dale	David Turnham School, Dunn & Locust	SLAMS	02/01/00	3-Day	145	Urban	Regional Trans	38.167098	-86.983180	Yes	Non-MSA County	No
181570008	Lafayette - Greenbush St.	Tiptecanoe	Lafayette	Cinergy Substation, 3401 Greenbush St	SLAMS	10/01/02	3-Day	145	Neigh	Pop Exp	40.431614	-86.852597	Yes	Lafayette-West Lafayette	No
181570008	Lafayette - Greenbush St.	Tiptecanoe	Lafayette	Cinergy Substation, 3401 Greenbush St	SLAMS	10/01/02	6-Day	145	Neigh	Quality Assurance	40.431614	-86.852597	No	Lafayette-West Lafayette	No
181570008	Lafayette - Greenbush St.	Tiptecanoe	Lafayette	Cinergy Substation, 3401 Greenbush St	SLAMS	04/01/05	Continuous	170	Neigh	Pop Exp	40.431614	-86.852597	No	Lafayette-West Lafayette	No
181630016	Evansville - U of E	Vanderburgh	Evansville	Carson Center, Walnut St.	SLAMS	06/05/99	3-Day	145	Neigh	Pop Exp	37.974680	-87.532301	Yes	Evansville, IN-KY	No
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	07/10/09	3-Day	145	Neigh	Pop Exp	38.013309	-87.577876	Yes	Evansville, IN-KY	No
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	04/03/11	6-Day	145	Neigh	Quality Assurance	38.013309	-87.577876	No	Evansville, IN-KY	Discontinue
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	07/14/09	Continuous	204	Neigh	Pop Exp	38.013309	-87.577876	No	Evansville, IN-KY	No
181630023	Evansville - E Walnut	Vanderburgh	Evansville	500 E. Walnut St.	SLAMS	01/01/13	3-Day	145	Neigh	Pop Exp	37.974460	-87.568018	Yes	Evansville, IN-KY	No
181670018	Terre Haute - Lafayette Ave.	Vigo	Terre Haute	961 N. Lafayette Ave.	SLAMS	03/19/99	3-Day	145	Neigh	Pop Exp	39.486111	-87.401389	Yes	Terre Haute	No
181670018	Terre Haute - Lafayette Ave.	Vigo	Terre Haute	961 N. Lafayette Ave.	SLAMS	07/02/03	Continuous	170	Neigh	Pop Exp	39.486111	-87.401389	Yes	Terre Haute	No
181670018	Terre Haute - Lafayette Ave.	Vigo	Terre Haute	961 N. Lafayette Ave.	SLAMS	01/01/13	Continuous	170	Neigh	Quality Assurance	39.486111	-87.401389	Yes	Terre Haute	No
181630003	Larwill	Whitley	Larwill	Whitko Middle School, 710 N. State Rd. 5	SLAMS	04/08/10	3-Day	145	Regional	Regional Transport	41.168650	-85.623252	Yes	Fl. Wayne	No
181630003	Larwill	Whitley	Larwill	Whitko Middle School, 710 N. State Rd. 5	SLAMS	04/08/10	Continuous	170	Regional	Regional Transport	41.168650	-85.623252	No	Fl. Wayne	No
** According to 40 CFR Part 58 Subpart D, PM2.5 data that is representative of a unique population-oriented scale or localized hot spot are only eligible for comparison to the 24-hour PM2.5 NAAQS. The annual standard does not apply.															
<div> MONITORING METHODS: 145 - R&P 2025A or B 170 - MET ONE BAM - FEM 184 - Thermo SHARP 204 - Teledyne 602 Beta ^{PLUS} </div>															

Sulfur Dioxide (SO₂)

Monitoring Requirements

The monitoring requirements for SO₂ are detailed in 40 CFR Part 58 Appendix D §4.4. Section 4.4.2 of the Appendix lists the number of monitors to be located in a CBSA based on the Population Weighted Emissions Index (PWEI). The PWEI combines the population of the area and the SO₂ emissions from National Emissions Inventory for each county. The population from the most current census data or estimates is multiplied by the emissions and divided by one million. The PWEI dictates the number of sites required:

PWEI	# of Sites
>1,000,000	3
100,000 to 1,000,000	2
5,000 to 100,000	1
<5,000	0

As depicted in Table 13, the CBSAs in Indiana which require monitoring sites are the Chicago-Naperville-Elgin, IL-IN-WI CBSA, the Cincinnati, OH-KY-IN CBSA, the Indianapolis-Carmel-Anderson, IN CBSA, the Evansville, IN-KY CBSA, the Louisville/Jefferson County, KY-IN CBSA, and the Terre Haute, IN CBSA. Indiana meets the minimum monitoring requirements in four of the six areas which require monitors. For the Chicago-Naperville-Elgin, IL-IN-WI CBSA Indiana has an agreement with Illinois EPA for the remaining required site to be operated by them. For the Cincinnati, OH-KY-IN CBSA, SWOQA meets the monitoring requirements in that area as per an agreement between Indiana and SWOQA.

Monitoring of SO₂ is also required at the NCore sites as per 40 CFR Part 58 Appendix D, 4.4.5.

Table 13 – Number of SO₂ Sites Required by CFR

CBSA Name - Required Areas	2009 Points & 2008 v2 SO ₂ (tpy) ¹	2012 Pop. Estimate ²	July 2012 PWEI Values	July 2012 PWEI Required Monitors	Current No. of Sites	2016 No. of Sites
Chicago-Naperville-Elgin, IL-IN-WI (total CBSA)	157,003	9,461,105	1,485,425	3	6	-
Chicago-Naperville-Elgin, IL-IN-WI (IN only)					2	2
Cincinnati, OH-KY-IN (total CBSA) ³	115,862	2,128,603	246,624	2	6	-
Cincinnati, OH-KY-IN (IN only)					0	0
Indianapolis-Carmel-Anderson, IN ³	58,161	1,928,982	112,192	2	2	2
Evansville, IN-KY (total CBSA) ³	56,799	313,433	17,803	1	2	-
Evansville, IN-KY (IN only)					1	1
Louisville-Jefferson County, KY-IN (total CBSA) ³	67,858	1,251,351	84,914	1	4	-
Louisville-Jefferson County, KY-IN (IN only)					1	1
Terre Haute, IN	72,395	172,493	12,488	1	1	1
CBSA Name - Non-required Areas						
Fort Wayne, IN	1,697	421,257	715	0	1	1
Columbus, IN	320	79,129	25	0	1	1
# of sites needed to meet full CBSA requirements				10		
Sites in Indiana Network					9	9
¹ Emissions data from USEPA Table						
² Population estimates from US Census Bureau						
³ Population from revised CBSAs (Feb 2013), emissions from old CBSAs						

Monitoring Methodology

Indiana's SO₂ monitoring network collects data with Thermo Scientific Models 43c and 43i using pulsed ultra-violet fluorescence monitoring methodology. A Thermo Scientific Model 43i Trace Level-Enhanced is used to collect trace level SO₂ data at the NCore, Indpls - Washington Park site (180970078).

Monitoring Network

Indiana operates nine SO₂ monitors located throughout the state, as displayed in Figure 11. This Figure includes nine townships designated nonattainment for SO₂. The current network is listed in Table 14.

Network Modifications

There are no planned changes for the SO₂ network in 2016.

Figure 11 – SO₂ Monitoring Network

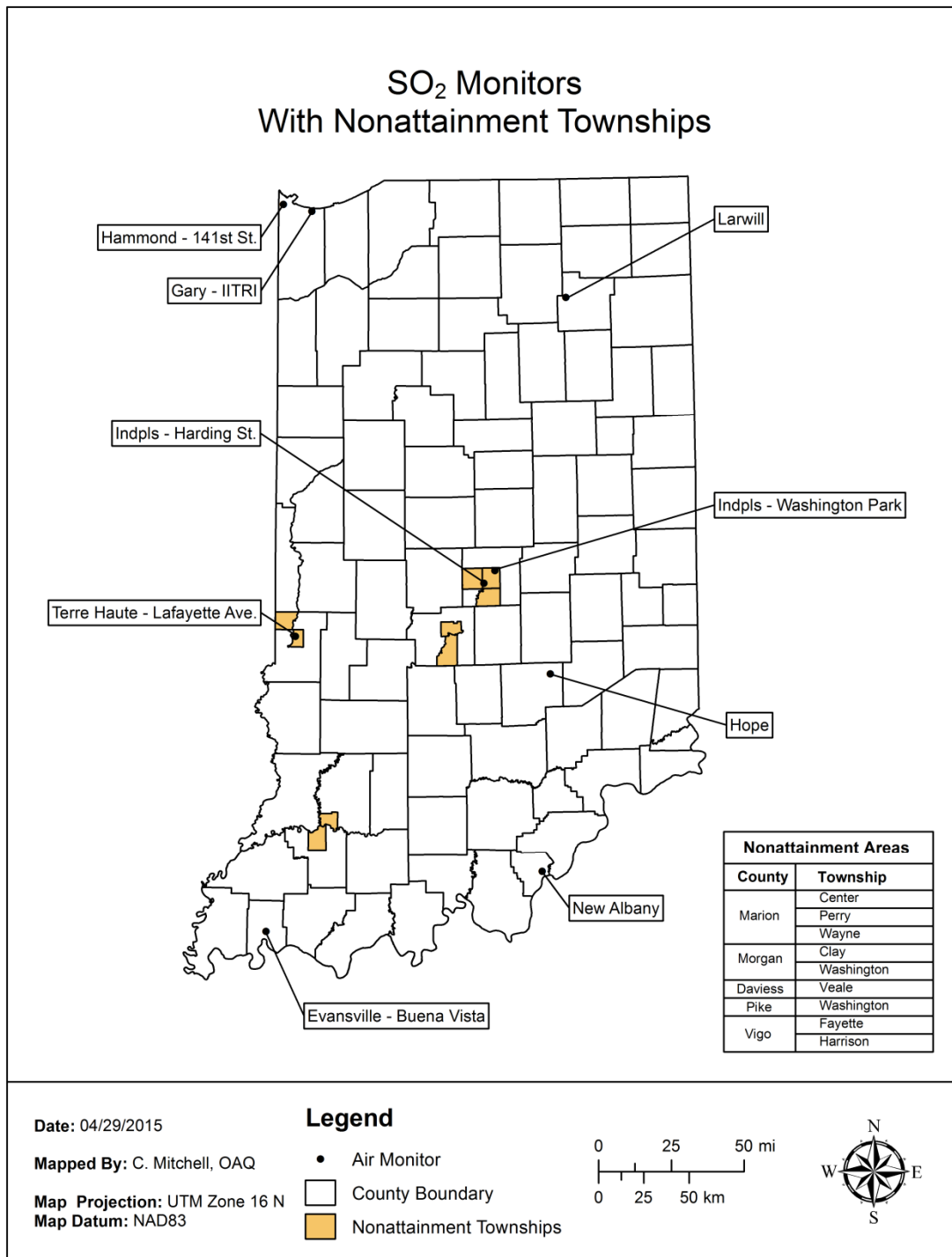


Table 14 – SO₂ Monitoring Network

Parameter Code: 42401				SO ₂ - Sulfur Dioxide										
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
180050007	Hope	Bartholomew		Hauser Jr-Sr HS, 9404 N775 E.	SPM	06/04/13	Continuous	060	Urban	Background	39.294322	-85.766816	Columbus	No
180431004	New Albany	Floyd	New Albany	Green Valley Elem. Sch., 2230 Green Valley Rd.	SLAMS	11/01/76	Continuous	060	Neigh	Pop Exp	38.308056	-85.834167	Louisville/Jefferson County, KY-IN	No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS	06/12/97	Continuous	060	Neigh	Pop Exp	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180892008	Hammond - 141st St.	Lake	Hammond	1300 E. 141st Street	SLAMS	08/01/75	Continuous	060	Neigh	Highest Conc	41.639444	-87.483611	Chicago-Naperville-Elgin, IL-IN-WI	No
180970057	Indpls - Harding St.	Marion	Indianapolis	1321 S. Harding St.	SLAMS	03/04/82	Continuous	060	Neigh	Highest Conc	39.749019	-86.186314	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS (NOORE)	01/01/10	Continuous	560	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	07/08/09	Continuous	060	Neigh	Pop Exp	38.013309	-87.577876	Evansville, IN-KY	No
181670018	Terre Haute - Lafayette Ave.	Vigo	Terre Haute	961 N. Lafayette Ave.	SLAMS	07/01/83	Continuous	060	Neigh	Pop Exp	39.486111	-87.401389	Terre Haute	No
181830003	Larwill	Whitley		Whitko Middle School, 710 N. State Rd. 5	SPM	01/01/13	Continuous	060	Urban	Background	41.169650	-85.629252	Fort Wayne	No
SO2 MONITORING METHOD: 060 - THERMO ELECTRON 43C, 43i 560 - THERMO ELECTRON 43i TRACE LEVEL														

PM_{2.5} Speciation

Monitoring Requirements

Monitoring requirements in 40 CFR Part 58 Appendix D §4.7.4 states that “each state shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the STN PM_{2.5}.” The STN PM_{2.5} is part of the Chemical Speciation Network (CSN).

Monitoring Methodology

Intermittent speciation samples are collected on three different filter mediums, each for a specific analysis and list of compounds. A Teflon filter, using the Energy Dispersive X-ray Fluorescence analysis methodology, is used to target 33 trace metals. A nylon filter, using Ion Chromatography for an analytical method, is used to target sulfates, nitrates, and three cations (ammonium, potassium, and sodium). A quartz fiber filter, using Thermal Optical Analysis, is used to target organic, elemental, and total carbon.

The Met One SASS and SuperSASS is used to collect PM_{2.5}, trace elements, Cations-PM_{2.5}, Nitrate-PM_{2.5}, and Sulfate-PM_{2.5} data. The URG-3000N sampler is used to collect organic and elemental carbon data. Samples are collected on a 1/6 day sampling frequency at all sites except the Indpls - Washington Park (180970078) site, which samples every third day.

Indiana also operates continuous speciation monitors at five different locations. A Magee Aethalometer, using optical absorption analysis methodology, is used for sampling black carbon at the Indpls - Washington Park, Gary - IITRI (180890022), Evansville - Buena Vista (181630021), and Elkhart - Prairie St.(180390008) sites. A Teledyne API Aethalometer, using optical adsorption analysis methodology, is used for sampling black carbon at the Indpls – I-70 E. (180970087) site. A Thermo Scientific Sulfate Particulate Analyzer, using Catalytic Thermal Reduction and Pulsed Fluorescence analysis, monitors sulfates at the Indpls - Washington Park site.

Monitoring Network

Currently the Indiana speciation network consists of six STN PM_{2.5} and six continuous monitors across the state. The current network, along with any changes planned for 2016, is listed in Table 15 and displayed in Figure 12.

Network Modifications

U.S. EPA conducted an assessment in 2014 of the CSN in an effort to optimize the network and create a network that is financially sustainable. As a result of this assessment, U.S. EPA recommended defunding a number of monitoring sites, eliminating the CSN PM_{2.5} mass measurement, reducing the frequency of carbon blanks, and reducing the number of icepacks in shipment during the cooler months of the year. The state of Indiana had the Elkhart – Prairie St. (18-039-0008) monitor defunded with December 31, 2014 as the last sample date. The CSN PM_{2.5} mass measurement was eliminated in October 2014. The State of Indiana will continue operating the Mechanicsburg (18-065-0003) site.

The Met One SASS and URG-3000N samplers at the Indpls - Washington Park site had their sample frequency changed from the 1/3 alternate schedule to the 1/3 sequential schedule starting in January 2015, as preferred for NCore sites. The state of Indiana upgraded the Met One SASS to SuperSASS in order to run on the sequential schedule. This schedule will allow 1/3 day samples to be collected two at a time in order to eliminate the need for weekend and holiday work for staff. This eliminated the loss of data when the samples were scheduled on a Friday/Monday and the samples were not collected during the weekend or holiday.

The State of Indiana also proposes eliminating the Thermo Scientific Sulfate Particulate Analyzer, using Catalytic Thermal Reduction and Pulsed Fluorescence analysis, at the Indpls - Washington Park site. Due to age of the equipment, the manufacturer no longer supports the instrumentation. Additionally, newer versions of the instrument were never successfully deployed and the manufacturer no longer sells this analyzer. Expendables needed to keep the analyzer operating will not be sold as of August, 2015. For these reasons the State of Indiana plans on discontinuing the sulfate measurements.

The State of Indiana proposes to discontinue monitoring Aethalometer Black Carbon at the Elkhart-Prairie St. site due to the defunding of the CSN site at that location.

Figure 12 – Speciation Monitoring Network

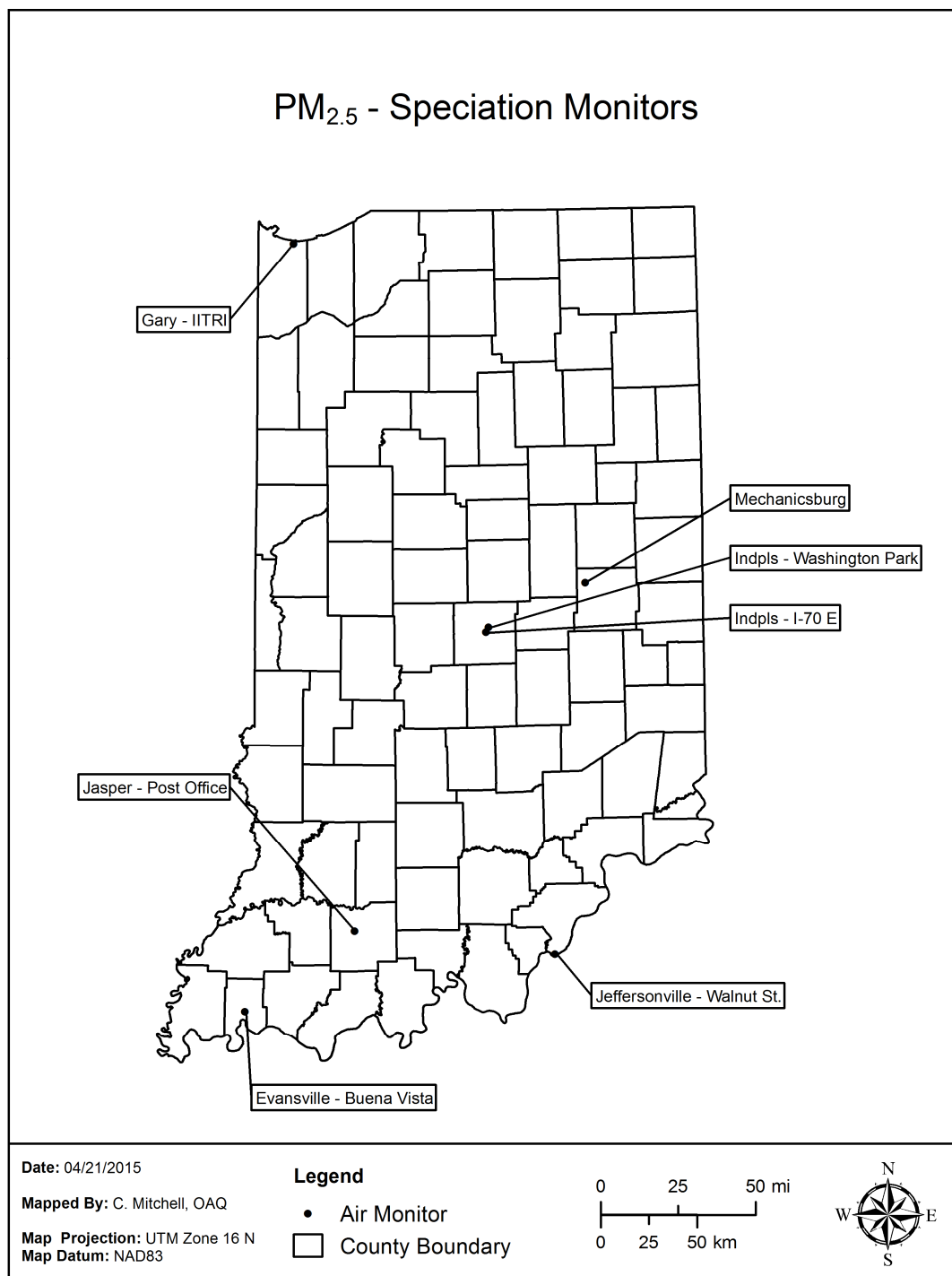


Table 15 – PM_{2.5} Speciation Monitoring Network

PM2.5 Speciation (Sulfate, Nitrate, Carbon, etc.)														
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Change Proposed?
18090006	Jeffersonville-Walnut St.	Clark	Jeffersonville	Jeffersonville PFAU, 719 Walnut St.	SLAMS (CSN SUPPLEMENTAL)	07/01/08	6-Day	810, 811, 812, 826, 831, 838, 839, 840, 841, 842	Neigh	Pop Exp	38.277675	-85.740153	Louisville/Jefferson County, KY-IN	No
180372001	Jasper - Post Office	Dubois	Jasper	Post Office, 206 E. 6th St	SLAMS (CSN SUPPLEMENTAL)	01/04/05	6-Day	810, 811, 812, 826, 831, 838, 839, 840, 841, 842	Neigh	Pop Exp	38.391799	-86.929668	Non-MSA County	No
180390008	Elkhart - Prairie St.	Elkhart	Elkhart	2745 Prairie St.	SLAMS	02/01/12	Continuous Black Carbon	867	Neigh	Pop Exp	41.657153	-85.969450	Elkhart-Goshen	Discontinue
180650003	Mechanicsburg	Henry		Shenandoah HS, 7354 W. Hwy. 36	SLAMS (CSN SUPPLEMENTAL)	02/01/02	6-Day	810, 811, 812, 826, 831, 838, 839, 840, 841, 842	Regional	Regional Trans	40.009544	-85.523470	Non-MSA County	No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS (CSN SUPPLEMENTAL)	04/03/03	6-Day	810, 811, 812, 826, 831, 838, 839, 840, 841, 842	Middle	Pop Exp	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS	04/01/05	Continuous Black Carbon	866	Middle	Pop Exp	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS (CSN STN) (NOORE)	12/13/00	3-Day	810, 811, 812, 826, 831, 838, 839, 840, 841, 842	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS	10/01/03	Continuous Black Carbon	866	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS	01/01/06	Continuous Sulfate	875	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	Discontinue
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	05/06/15	Continuous Black Carbon	894	Neigh	Pop Exp	39.787933	-86.100880	Indianapolis-Carmel-Anderson	No
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS (CSN SUPPLEMENTAL)	07/12/09	6-Day	810, 811, 812, 826, 831, 838, 839, 840, 841, 842	Neigh	Pop Exp	38.013309	-87.577876	Evansville, IN-KY	No
181630021	Evansville - Buena Vista	Vanderburgh	Evansville	1110 W. Buena Vista Rd	SLAMS	07/08/09	Continuous Black Carbon	867	Neigh	Pop Exp	38.013309	-87.577876	Evansville, IN-KY	No
MONITORING METHOD: 810 - MET ONE SASS NYLON / GRAVIMETRIC 811 - MET ONE SASS TEFLON / ANALYSIS METHOD: ENERGY DISPERSIVE XRF 812 - MET ONE SASS NYLON / ANALYSIS METHOD: ION CHROMATOGRAPHY 826 - URG 3000 w. PALL QUARTZ FILTER AND CYCLONE INLET / IMPROVE_A TOT 831 - URG 3000 w. PALL QUARTZ FILTER AND CYCLONE INLET / EC1+EC2+EC3-(OP(TOR)) 838 - URG 3000 w. PALL QUARTZ FILTER AND CYCLONE INLET / IMPROVE TOT 839 - URG 3000 w. PALL QUARTZ FILTER AND CYCLONE INLET/OC1+OC2+OC3+OC4+(OP(TOT)) 840 - URG 3000 w. PALL QUARTZ FILTER AND CYCLONE INLET / EC1+EC2+EC3-(OP(TOT)) 841 - URG 3000N w. PALL QUARTZ FILTER AND CYCLONE INLET / IMPROVE_A 842 - URG 3000N w. PALL QUARTZ FILTER AND CYCLONE INLET / IMPROVE_A TOR 866 - MAGEE AETHALOMETER AE21 / ANALYSIS METHOD: OPTICAL ABSORPTION 867 - MAGEE AETHALOMETER AE22 / ANALYSIS METHOD: OPTICAL ABSORPTION 875 - THERMO ELECTRON 5020 / CATALYTIC THERMAL REDUCT, PULSED FLUORESCENCE 894 - TELEDYNE API MODEL 633 AETHALOMETER / ANALYSIS METHOD: OPTICAL ABSORPTION														

PAMS Ozone Precursors (VOCs)

Monitoring Requirements

Ozone precursor monitoring is required as part of the PAMS program. The specific requirements are addressed in Table D-6 of 40 CFR Part 58 Appendix D. According to the Modified Network Plan for the Chicago Nonattainment Area, Indiana operates one Type 2 Unofficial PAMS site. A Type 2 site requires measurements for speciated VOCs, carbonyls, NO_x, CO (at one Type 2 site; Chicago-Jardine), O₃, and surface meteorology.

This section deals with speciated VOCs. The other parameters are addressed in their own area. According to the plan, 56 speciated VOCs are to be collected at Indiana's PAMS site.

Monitoring Methodology

Ozone precursor VOCs are collected continuously using a Perkin Elmer Clarus 500 GC, with dual Flame Ionization Detectors (FID)s and a TurboMatrix thermal desorber. In addition, canister samples are collected on a 1/6 day sampling schedule. These canisters are analyzed using the same analytical method. The 56 PAMS target compounds are shown in Table 16.

Table 166 – PAMS Target Compounds

Ethylene	Acetylene	Ethane	Propylene
Propane	Isobutane	1-Butene	n-Butane
t-2-Butene	c-2-Butene	<i>Isopentane</i>	1-Pentene
n-Pentane	Isoprene	t-2-Pentene	c-2-Pentene
2,2-Dimethylbutane	Cyclopentane	2,3-Dimethylbutane	2-Methylpentane
3-Methylpentane	n-Hexane	Methylcyclopentane	2,4-Dimethylpentane
Benzene	Cyclohexane	2-Methylhexane	2,3-Dimethylpentane
3-Methylhexane	2,2,4-Trimethylpentane	n-Heptane	Methylcyclohexane
2,3,4-Trimethylpentane	Toluene	2-Methylheptane	3-Methylheptane
n-Octane	Ethylbenzene	m-Xylene	p-Xylene
Styrene	o-Xylene	n-Nonane	Isopropylbenzene
n-Propylbenzene	m-Ethyltoluene	p-Ethyltoluene	1,3,5-Trimethylbenzene
o-Ethyltoluene	1,2,4-Trimethylbenzene	n-Decane	1,2,3-Trimethylbenzene
m-Diethylbenzene	p-Diethylbenzene	n-Undecane	Dodecane

In addition to these individual compounds, there are two aggregated parameters reported; sum of PAMS compounds and total NMOC.

Monitoring Network

Indiana operates one Unofficial PAMS monitoring site collecting ozone precursor VOCs at the Gary - IITRI (180890022) site for the Chicago PAMS area, and one "PAMS-like" site in Indianapolis; at the Indpls - Washington Park (180970078) site which collects data for the Indianapolis MSA. The normal PAMS monitoring season is June, July, and August, but Indiana began collecting data year-round in 2011 to observe values outside the season as well. The monitors are shown in Figure 13 and site details are in Table 17.

Network Modifications

No changes are planned for ozone precursor VOC monitoring in 2016.

Figure 13 – Ozone Precursors Network

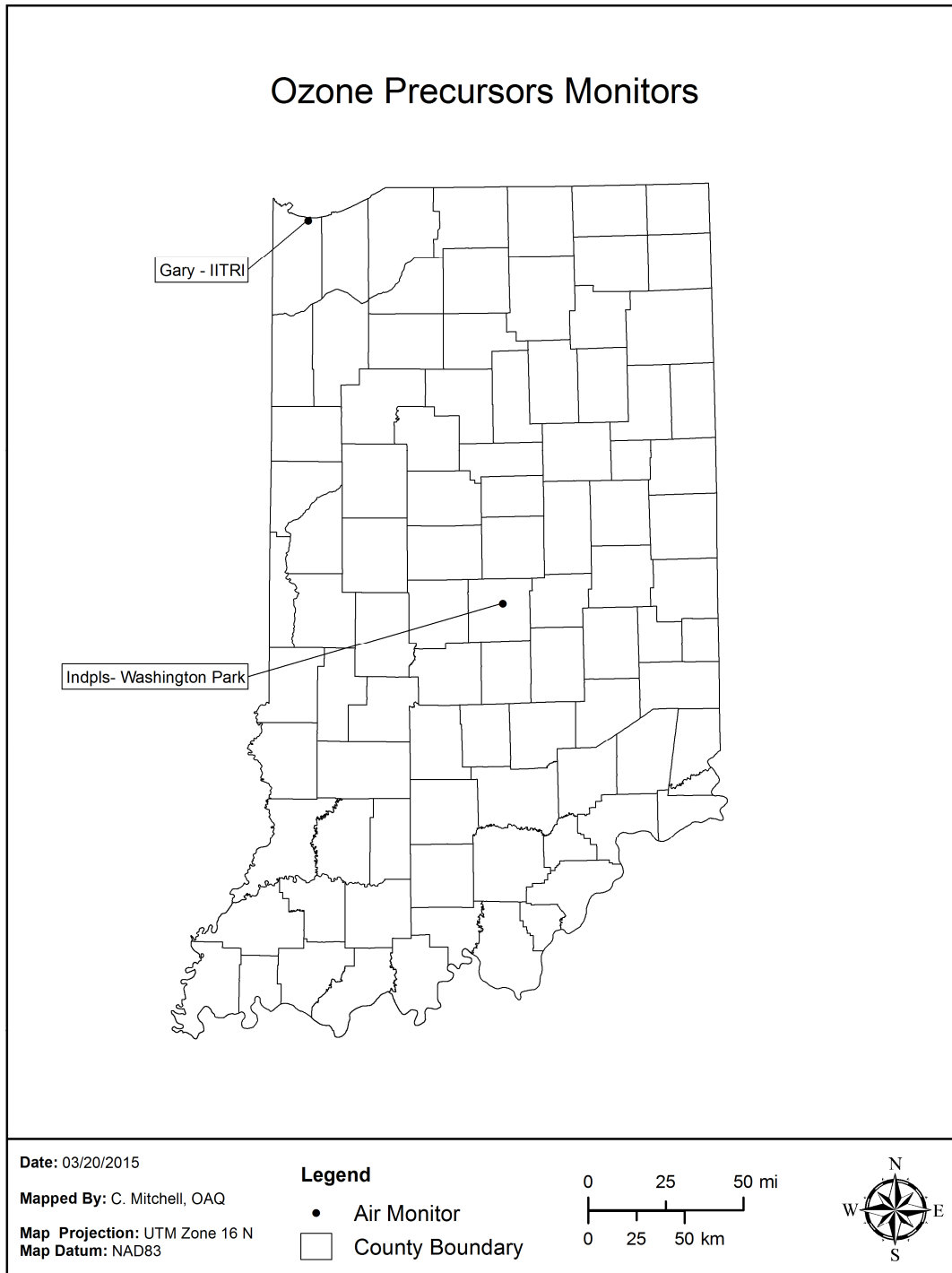


Table 177 – Ozone Precursor Monitoring Network

Ozone Precursors														
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
18090022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS (UNOFFICIAL PAWS)	07/06/95	Continuous	128	Middle	Max Prec. Em. Impact	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
18090022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS (UNOFFICIAL PAWS)	07/06/95	6-Day	146	Middle	Max Prec. Em. Impact	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	SLAMS	07/01/11	Continuous	128	Middle	Max Prec. Em. Impact	39.811037	-86.114469	Indianapolis-Carmel-Anderson	No
<div> MONITORING METHOD: 128 - AUTO GC; SUBAMBIENT - DUAL FID 146 - AUTO GC; SUBAMBIENT - DUAL FID </div>														

Toxics (VOCs)

Monitoring Requirements

There are no requirements for toxics monitoring listed in 40 CFR Part 58.

Monitoring Methodology

Indiana uses a modification of the TO-15 method to collect toxics VOC data. TO-15 is part of U.S. EPA's Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air and consists of guidance for the sampling and analysis of volatile organic compounds in air. Ambient air is collected in a stainless steel canister in the field using either the Meriter MCS-1-R or the ATEC 2200 Air Toxic Samplers and analyzed using a GC/MS to determine the concentration of the compounds found in the sample obtained. Samples are collected for 24 hours on a 1/6 sampling schedule. In Table 18 are the 62 different VOCs, and an aggregate currently being analyzed and reported.

Table 188 – VOCs

Propene	Freon-12	Chloromethane	Freon-114
Vinyl Chloride	1,3-Butadiene	Bromomethane	Chloroethane
Ethanol	Acrolein	Acetone	Freon-11
Isopropanol	Vinylidene Chloride	Dichloromethane	Carbon Disulfide
Freon-113	t-1,2-Dichloroethene	1,1-Dichloroethane	Methyl Tert-Butyl Ether
Vinyl acetate	Methyl Ethyl Ketone	c-1,2-Dichloroethene	Hexane
Ethyl Acetate	Chloroform	Tetrahydro-Furan	1,2-Dichloroethane
1,1,1-Trichloroethane	Benzene	Carbon Tetrachloride	Cyclohexane
1,2-Dichloropropane	Bromodichloromethane	Trichloroethene	1,4-dioxane
Heptane	c-1,3-Dichloropropene	Methyl Isobutyl Ketone	t-1,3-Dichloropropene
1,1,2-Trichloroethane	Toluene	Methyl Butyl Ketone	Dibromochloromethane
1,2-Dibromoethane	Tetrachloroethene	Chlorobenzene	Ethylbenzene
m+p-Xylenes	Bromoform	Styrene	1,1,2,2-Tetrachloroethane
o-Xylene	p-Ethyltoluene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene
Benzyl Chloride	m-Dichlorobenzene	p-Dichlorobenzene	o-Dichlorobenzene
1,2,4-Trichlorobenzene	Hexachloro-1,3-butadiene	Total NMOC	

Monitoring Network

Indiana will operate 10 toxics sites. The current network, along with any changes planned in 2016, is listed in Table 19 and shown in Figure 14.

Network Modifications

Canister sampling at the Whiting - HS (180890030) site will be relocated. When the project started in 2004, one of the initial goals of monitoring toxics at Whiting High School was to introduce the students to the principles and practical elements of ambient air quality monitoring and train them in the operation of O₃ and air toxics monitoring equipment. After extensive training with IDEM staff, the students were to take over operation of the site. The training was never completed, and the students never took over site operations. The siting criteria were never considered optimal, as siting probe height approaches the upper range of 15 meters above ground level. This site was established more as educational rather than regulatory. Indiana proposes relocating the toxics – VOC monitoring to another site near the Whiting – HS site requiring less probe height, less effort, and fewer materials to maintain.

A second change to the network will be to install monitoring at Indpls - I-70 E (180970087) near-road site. Toxics are a secondary recommended monitoring priority in the Near-Road TAD.

Figure 14 – Toxics Monitoring Network

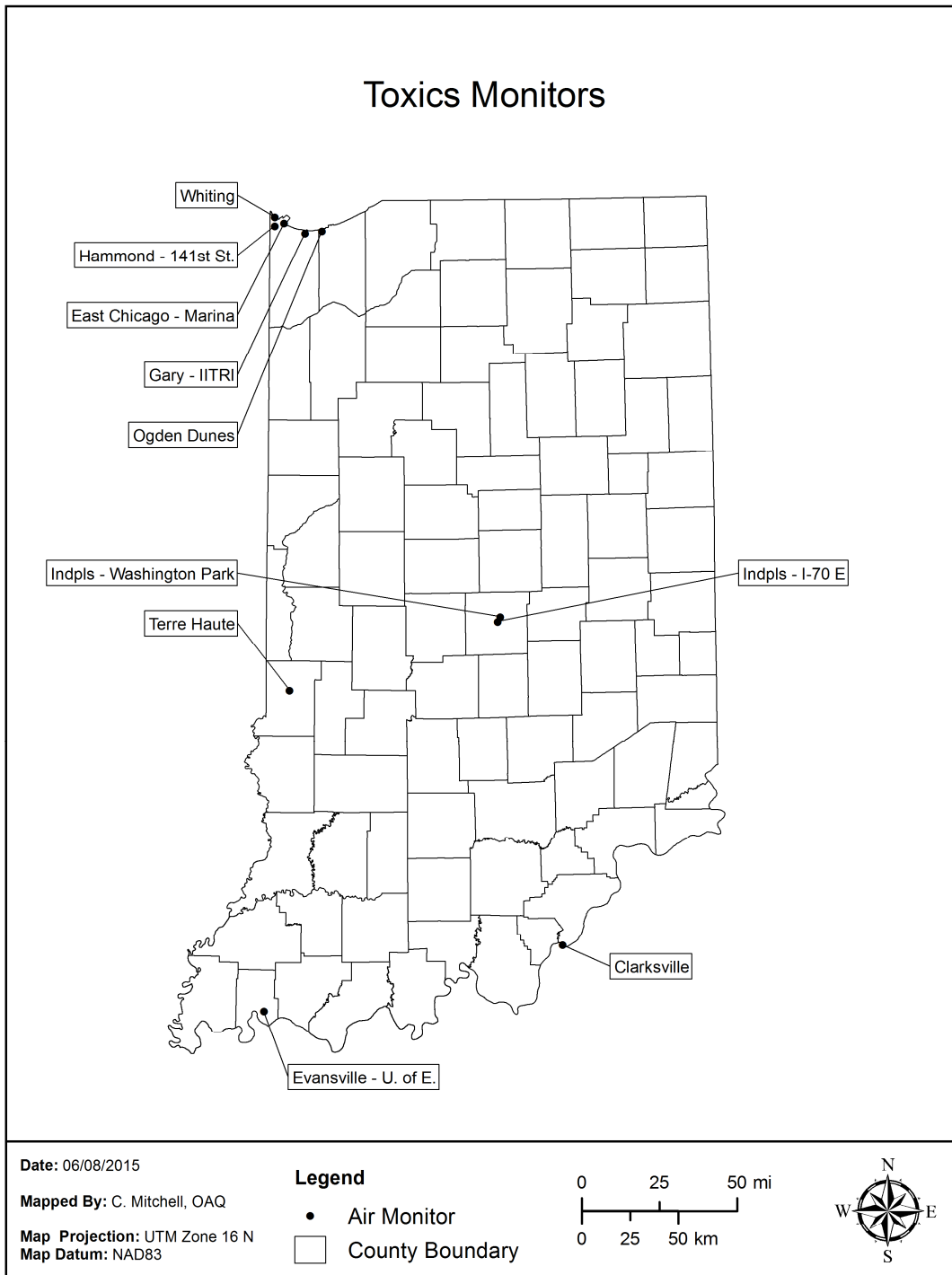


Table 199 – Toxics Monitoring Network

Toxics - VOC														
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
18090009	Clarksville	Clark	Clarksville	Falls of the Ohio SP, 201W. Riverside Dr.	OTHER	03/07/08	6-Day	126, 150	Neigh	Pop Exp	38.276628	-85.763811	Louisville/Jefferson County, KY-IN	No
18089022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	OTHER	07/06/95	6-Day	126, 150	Middle	Pop Exp	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180890030	Whiting HS	Lake	Whiting	Whiting HS, 1751 Oliver St.	OTHER	04/01/04	6-Day	126, 150	Neigh	Pop Exp	41.681384	-87.494722	Chicago-Naperville-Elgin, IL-IN-WI	Relocate
18089		Lake	Whiting		OTHER	01/01/16	6-Day	126, 150	Neigh	Pop Exp			Chicago-Naperville-Elgin, IL-IN-WI	Relocation
180890034	East Chicago Marina	Lake	East Chicago	East Chicago Marina, 3301 Aldis St.	OTHER	10/30/12	6-Day	126, 150	Neigh	Pop Exp	41.653480	-87.435584	Chicago-Naperville-Elgin, IL-IN-WI	No
180892008	Hammond - 141st St.	Lake	Hammond	1300 E. 141st St.	OTHER	02/01/89	6-Day	126, 150	Neigh	Pop Exp	41.639444	-87.493611	Chicago-Naperville-Elgin, IL-IN-WI	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	OTHER	04/18/99	6-Day	126, 150	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Carmel-Anderson	No
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	01/01/16	6-Day	126, 150	Neigh	Pop Exp	39.787933	-86.130880	Indianapolis-Carmel-Anderson	Add
181270024	Ogden Dunes	Porter	Ogden Dunes	Water Treatment Plant, 84 Diana Rd.	OTHER	08/05/98	6-Day	126, 150	Neigh	Pop Exp	41.617773	-87.199481	Chicago-Naperville-Elgin, IL-IN-WI	No
181630016	Evansville - U of E	Vanderburgh	Evansville	Carson Center, Walnut St.	OTHER	06/23/99	6-Day	126, 150	Neigh	Pop Exp	37.974580	-87.532301	Evansville, IN-KY	No
181670025	Terre Haute - Fort Harrison Rd.	Vigo	Terre Haute	INDOT Maintenance, 2400 Fort Harrison Rd.	OTHER	10/13/13	6-Day	126, 150	Neigh	Pop Exp	39.507688	-87.374440	Terre Haute	No
MONITORING METHOD: 126 - CRYOGENIC PRECONCENTRATION GC/FID DETECTION 150- Cryogenic Preconcentration GC/MS														

Carbonyls

Monitoring Requirements

Carbonyl monitoring is required as one of the components of the PAMS monitoring program. The overall requirements are addressed in Table D-6 of 40 CFR Part 58 Appendix D. The specific requirement of monitoring for carbonyls at Indiana's Unofficial PAMS site is listed in the approved PAMS network plan for the Chicago nonattainment area.

Monitoring Methodology

Carbonyl data are collected using Method TO-11A of the U.S. EPA's Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air Compendium of Method. Currently Indiana uses the ATEC 2200 2C for 1/6 day sampling at the Indpls - Washington Park (180970078) site and the ATEC 8000 Automated Sampler for 1/6 day sampling at the Gary - IITRI (180890022) Unofficial PAMS site. Samples are collected by drawing a known volume of air through a cartridge filled with silica gel coated with activated DNPH. These samples are analyzed using HPLC with a UV absorption detector.

Monitoring Network

Indiana currently operates two carbonyl monitoring sites. The Gary - IITRI site collects data for the Chicago PAMS network. Sampling at the Indpls - Washington Park site is conducted as part of Indiana's toxics network, and as parameters for the Indianapolis "PAMS-like" monitoring network. The details of the network are provided in Table 20 and locations are shown in Figure 15.

Network Modifications

No changes are planned for the carbonyl monitoring network in 2016.

Figure 15 – Carbonyl Monitoring Network

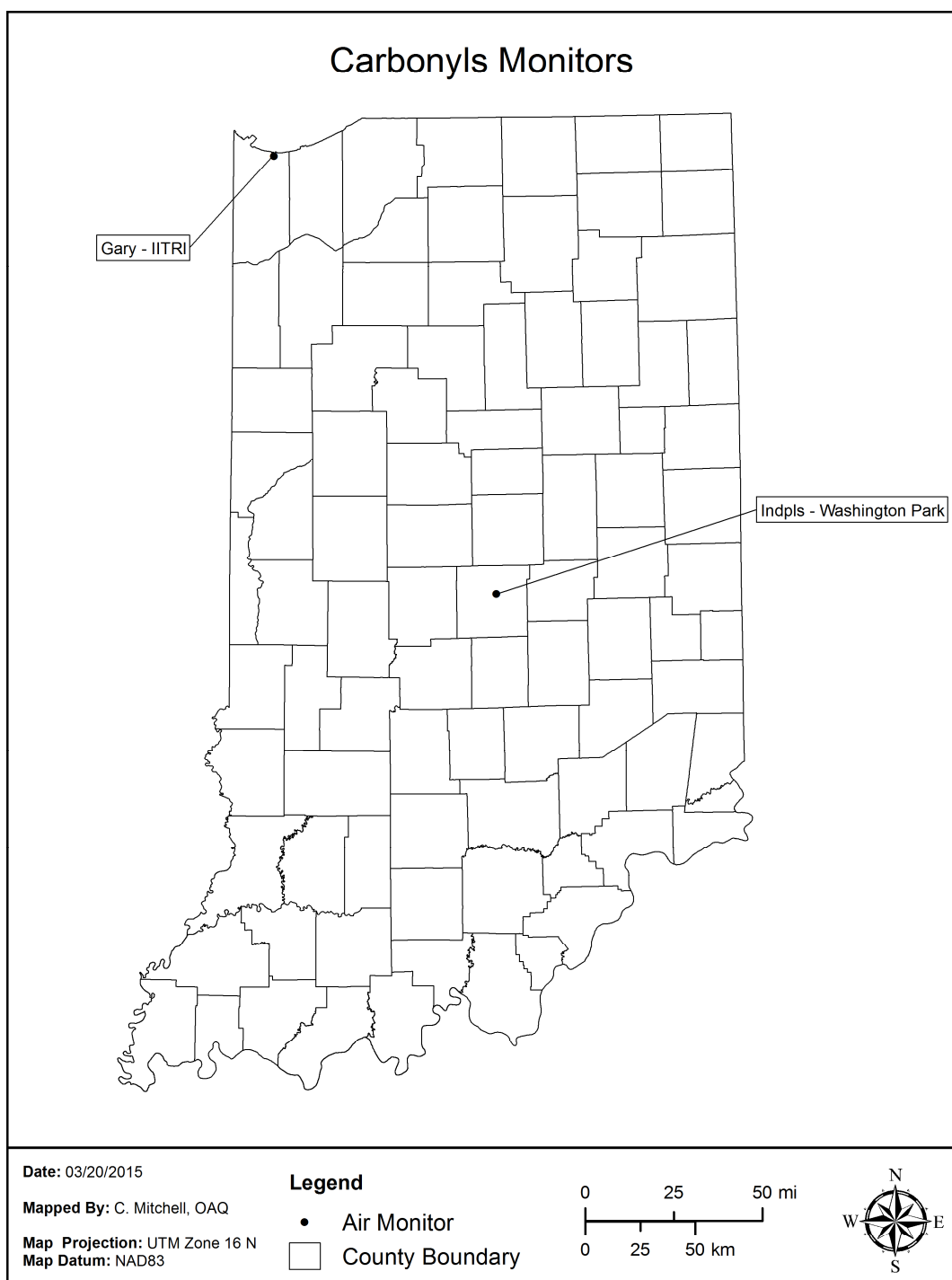


Table 20 – Carbonyl Monitoring Network

Carbonyls														
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
18080022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS (UNOFFICIAL PAMS)	06/01/95	6-Day	202	Neigh	Max Prec. Em. Impact	41.606623	-87.304943	Chicago-Naperville-Elgin, IL-IN-WI	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS	04/18/99	6-Day	202	Neigh	Max Prec. Em. Impact	39.811037	-86.114469	Indianapolis-Carmel-Anderson	No
MONITORING METHOD: 202 - HPLC (TO-11A) DNPH-COATED CARTRIDGES														

Metals

Monitoring Requirements

There are no requirements for metals monitoring listed in 40 CFR Part 58.

Monitoring Methodology

Metals data are collected using a TSP sampler and collecting the sample on filters for a 24-hour period according to a 1/6 day sampling schedule. Filters are analyzed using the flameless atomic absorption method.

Monitoring Network

There are six sites that monitor TSP metals in Indiana. Arsenic, beryllium, cadmium, chromium, lead, manganese, and nickel are monitored at the Indpls - Washington Park (180970078) site. Due to concern over possible elevated manganese values reported in the School Air Toxics monitoring program in 2009, it was decided to analyze all the Pb samples collected in Lake and Porter Counties for manganese. These sites began reporting the additional metals data on January 2, 2010. These sites are detailed in Table 21 and shown in Figure 16.

Network Modifications

No changes are planned for the metals monitoring network in 2016.

Figure 16 – Metals Monitoring Network

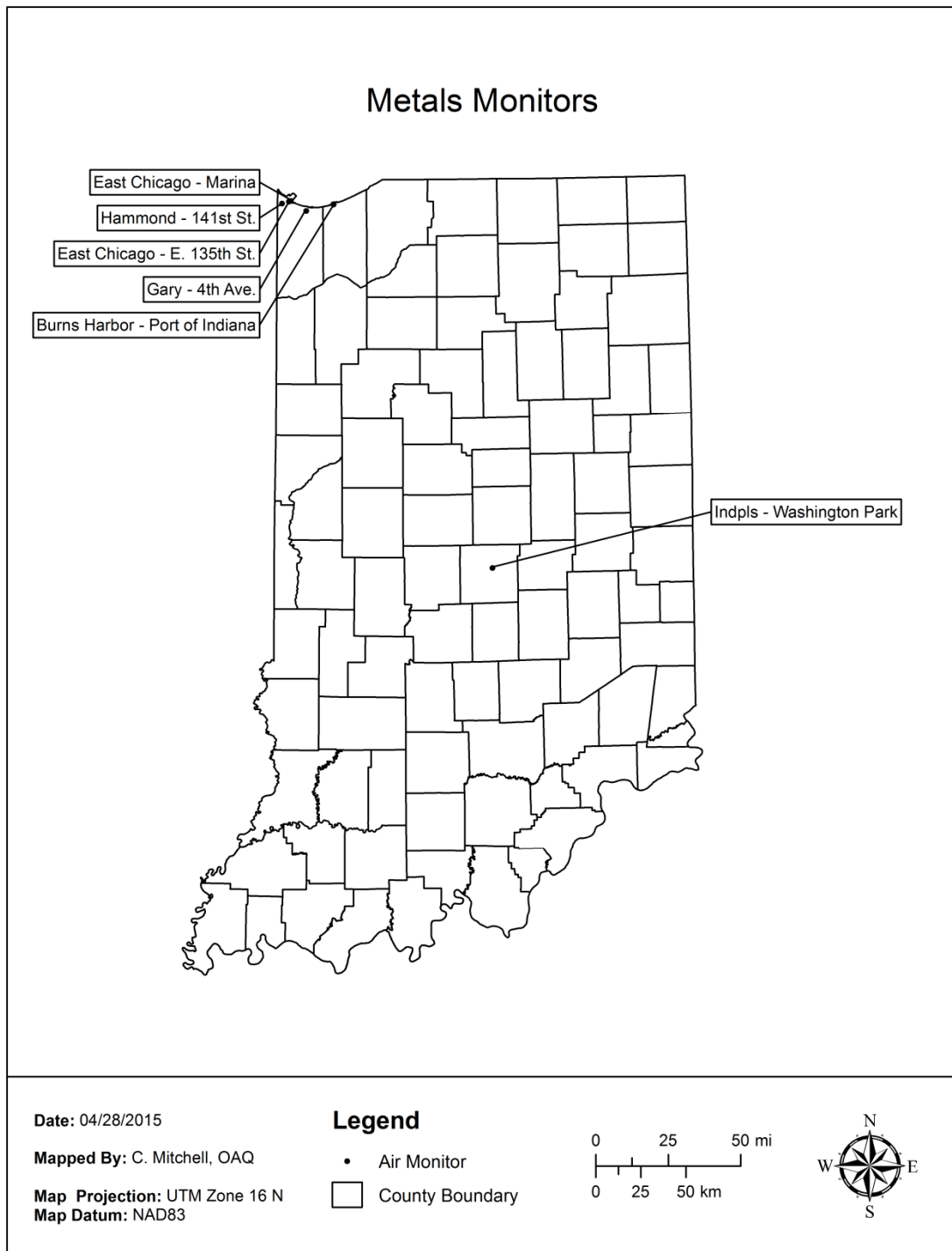


Table 21 – Metals Monitoring Network

Metals														
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management														
Site ID	Site Name	County	City	Address	Monitor Type (Network)	Start Date	Operating Schedule	Monitoring Method	Scale	Monitoring Objective	Latitude	Longitude	MSA	Site Change Proposed?
180890032	Gary - 4th Ave *	Lake	Gary	Gary South Shore Rail Cats, One Stadium Plaza	OTHER	01/02/10	6-Day	107	Middle	Source Oriented	41.603582	-87.333658	Chicago-Naperville-Elgin, IL-IN-WI	No
180890033	East Chicago - E. 189th St. *	Lake	East Chicago	Abraham Lincoln Elem. Sch., E. 189th St.	OTHER	01/02/10	6-Day	107	Middle	Source Oriented	41.649064	-87.447256	Chicago-Naperville-Elgin, IL-IN-WI	No
180890034	East Chicago-Marina*	Lake	East Chicago	East Chicago Marina St. 3301 Aldis	OTHER	10/30/12	6-Day	107	Middle	Source Oriented	41.663580	-87.435660	Chicago-Naperville-Elgin, IL-IN-WI	No
180892008	Hammond - 141st St. *	Lake	Hammond	1800 E. 141st Street	OTHER	01/02/10	6-Day	107	Middle	Pop Exp	41.639444	-87.493611	Chicago-Naperville-Elgin, IL-IN-WI	No
180892008	Hammond - 141st St. *	Lake	Hammond	1800 E. 141st Street	OTHER	01/02/10	6-Day	107	Middle	Quality Assurance	41.639444	-87.493611	Chicago-Naperville-Elgin, IL-IN-WI	No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St.	OTHER	04/18/99	6-Day	107	Neigh	Pop Exp	39.811097	-86.114469	Indianapolis-Camel-Anderson	No
181270027	Burns Harbor-Port of Indiana*	Porter		E. Boundary Rd	OTHER	08/18/11	6-Day	107	Middle	Source Oriented	41.635594	-87.150197	Chicago-Naperville-Elgin, IL-IN-WI	No
<u>Metals Monitored</u> Manganese * Manganese Only Nickel Arsenic Beryllium Cadmium Chromium														
MONITORING METHOD: 107 - HI-VOL SAMPLER / ANALYSIS METHOD: FLAMELESS ATOMIC ABSORPTION														

Meteorological Monitoring

Monitoring Requirements

Meteorological monitoring is generally not required for SLAMS, however meteorological monitoring data support the suitability of the site along with other data sets. Many factors determine the amount and types of meteorological data that are collected in Indiana. Some of the factors include the intended use of the data and the availability of representative meteorological data that is already being collected by the National Weather Service in any given area of interest. Meteorological monitoring is required at two types of sites: NCore and PAMS. 40 CFR Part 58 Appendix D §3(b) specifies that at a minimum wind speed, wind direction, relative humidity, and ambient temperature be measured at NCore sites. Meteorology measurements are required at PAMS according to 40 CFR Appendix D §5. No specific parameters are defined. Guidance provided in the "Technical Assistance Document for Sampling and Analysis of Ozone Precursors", EPA/600-R-98/161, September 1998, recommends that wind speed, wind direction, ambient temperature, and relative humidity are monitored at all PAMS locations. Solar radiation, UV radiation, barometric pressure and precipitation should be monitored at one site in the area.

The near-road NO₂ monitoring sites do not require meteorological monitoring according to 40 CFR Part 58. However, meteorological monitoring is listed as a recommended Primary Priority in the Near-Road NO₂ Monitoring TAD. U.S. EPA suggests (at a minimum) to monitor wind speed, wind direction, temperature and relative humidity. If possible, other measurements such as precipitation, solar radiation and barometric pressure (among others) should be considered as well.

Monitoring Network

As shown in Figure 17, meteorological data are to be collected at 18 sites across Indiana in 2016. Sites are established to provide coverage in all areas of the state where pollutant monitoring is conducted. Table 22 details the meteorological sites and the parameters collected.

Network Modifications

No changes are planned for the meteorological monitoring network in 2016.

Figure 17 – Meteorological Monitoring Network

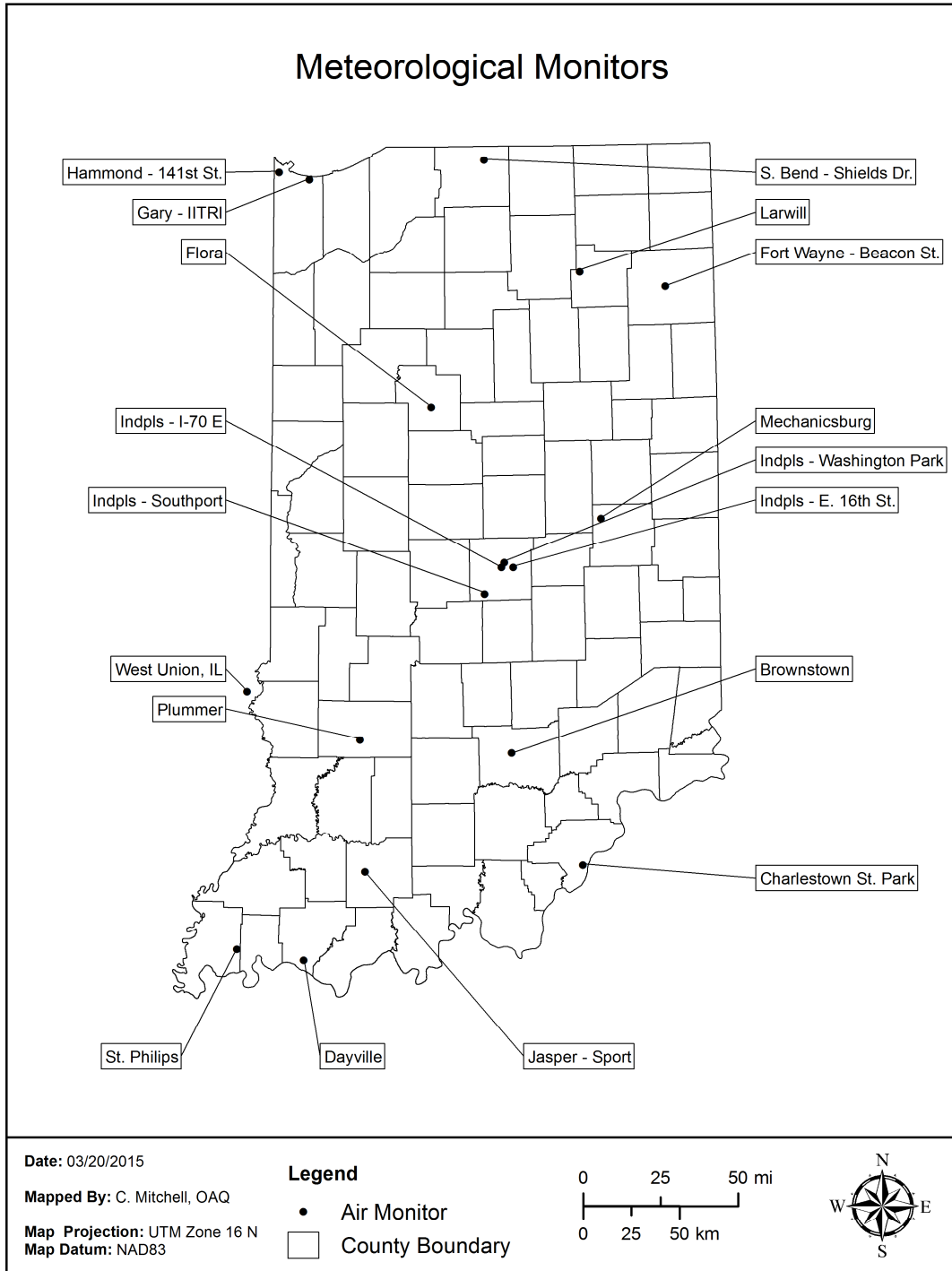


Table 22 – Meteorological Monitoring Network

Meteorological Parameters by Site																
RO: 0520 OPERATING AGENCY: Indiana Department of Environmental Management																
SiteID	SiteName	County	City	Address	Monitor Type (Network)	Latitude	Longitude	6103/ 6104 WS/Wd	62201 BH	64101 Baro Press	62101 Outside Temp	63302 UV Rad	63301 Solar Rad	61112 Vertical WD	65102 Precip	Site Change Proposed?
170230001	West Union	Clark Co., IL	West Union	416 S. St. Hwy 1	OTHER	39.210657	-87.668297	■	■	■	■					No
180030004	Fl Wayne - Beacon St.	Allen	Fort Wayne	2022 North Beacon	OTHER	41.094966	-85.11816	■	■		■					No
180160002	Flora	Carroll		Flora Airport, 481 S. 160 W	OTHER	40.540455	-86.553035	■	■		■					No
180160008	Charlestown State Park	Clark		Charlestown State Park, 12500 Hwy 62, Charlestown	OTHER	38.393833	-85.664157	■	■	■	■					No
180370004	Jasper Sport	Dubois	Jasper	Jasper Sport Complex - 1401 12th Ave.	OTHER	38.369448	-86.958034	■			■					No
180550001	Plummer	Greene		2500 S. 275 W	OTHER	38.955477	-86.980419	■	■		■					No
180650003	Mechanicsburg	Henry		Shenandoah HS, 7354 W. Hwy. 36	OTHER	40.009544	-85.523470	■	■	■	■			■		No
180710001	Brownstown	Jackson		225 W & 300 N	OTHER	38.920835	-86.080523	■	■		■					No
180890022	Gary - IITRI	Lake	Gary	IITRI Bunker, 201 Mississippi St.	SLAMS (UNOFFICIAL PAMS)	41.606823	-87.304943	■	■	■	■	■	■	■	■	No
180892008	Hammond - 141st St.	Lake	Hammond	1800 E. 141st Street	OTHER	41.639444	-87.493611	■	■		■					No
180970073	Indpls - E. 16th St.	Marion	Indianapolis	6125 E. 16th St.	OTHER	39.789167	-86.060833	■	■		■					No
180970078	Indpls - Washington Park	Marion	Indianapolis	Washington Park, 3120 E. 30th St	SLAMS (NOORE)	39.810097	-86.114469	■	■	■	■	■	■		■	No
180970086	Indpls - Southport	Marion	Indianapolis	Southport Advanced Wastewater Treatment Plant, 3000 W. Southport Rd	OTHER	39.664498	-86.234698	■								No
180970087	Indpls - I-70 E	Marion	Indianapolis	1650 Ludlow Ave.	SLAMS (NEAR ROAD)	39.787333	-86.00680	■	■		■					No
181290003	St Phillips	Posey		2027 S. St. Phillips Rd., Evansville	OTHER	38.008410	-87.718354	■	■	■	■	■	■			No
181410015	South Bend - Shields Dr.	St Joseph	South Bend	2335 Shields Dr.	OTHER	41.696660	-86.214706	■	■		■			■		No
181730011	Dayville	Warrick		3488 Eble Rd., Newburgh	OTHER	37.954492	-87.321989	■	■	■	■					No
181830003	Larwill	Whitley		Whitko Middle School, 710 N. State Rd. 5	OTHER	41.169650	-85.629252	■	■		■					No

NCore

Monitoring Requirements

40 CFR Part 58 Appendix D §3 requires each state to operate at least one NCore site and lists the minimum parameters which must be measured at that site. Currently the required parameters are continuous and intermittent $PM_{2.5}$, $PM_{2.5}$ speciation, $PM_{10-2.5}$ particle mass, CO, O₃, SO₂, NO/NO_y, Pb, wind speed, wind direction, relative humidity, and ambient temperature.

Monitoring Network

As shown in Figure 18, Indiana's NCore site is Indpls – Washington Park (180970078). The details for all the NCore parameters are listed in Table 23. Except for $PM_{10-2.5}$, parameters are also listed in the individual parameter sections.

Other parameters have also been collected at the Indpls – Washington Park site over the past 15 years. These are listed in Table 24 as well as in the individual parameter sections.

Network Modifications

No changes are planned for the NCore monitoring network in 2016.

Figure 18 – NCore Monitoring Network

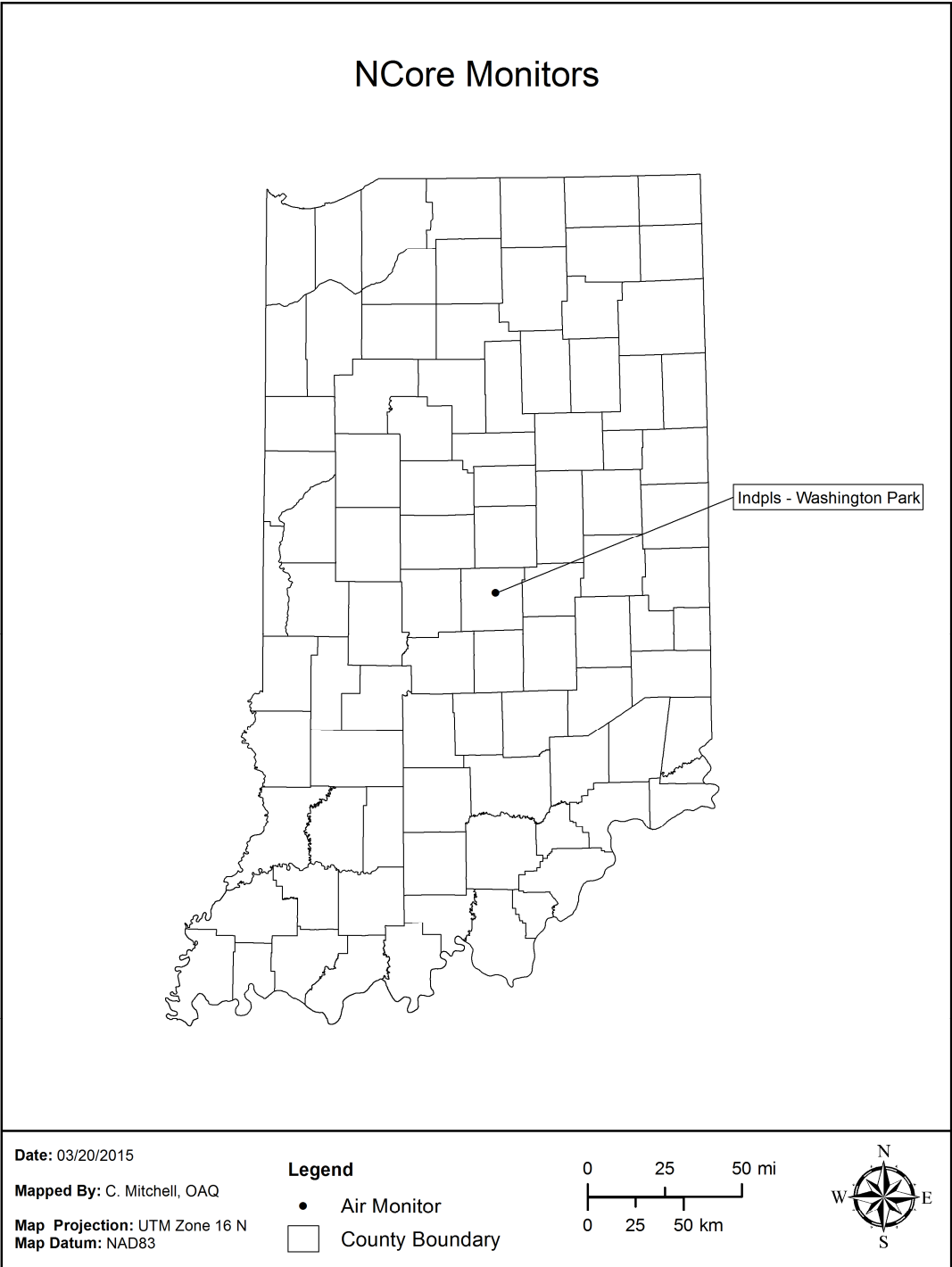


Table 23 – NCore Required Parameters

Parameter	Monitor Type	Start Date	Sampler or Monitor	Method Code	Analysis Method	Sample Frequency
CO – trace level	SLAMS	1/1/2010	Teledyne API 300EU	593	Automated reference method utilizing trace level non-dispersive infrared analysis.	Continuous
NO	SLAMS	3/10/2010	Teledyne API 200EU	699	Automated reference method utilizing chemiluminescence analysis.	Continuous
NO _y	SLAMS	3/10/2010	Teledyne API 200EU	699	Automated reference method utilizing chemiluminescence analysis.	Continuous
O ₃	SLAMS	4/1/2009	Thermo Scientific 49i	047	Automated equivalent method utilizing uv photometry analysis.	Continuous
SO ₂ – trace level	SLAMS	1/1/2010	Thermo Scientific 43i TLE	560	Automated equivalent method utilizing Trace Level UV Fluorescence Analysis	Continuous
Intermittent PM _{2.5}	SLAMS	3/7/1999	Thermo Scientific 2025	145	Manual reference method utilizing gravimetric analysis.	1/1 day
Continuous PM _{2.5}	SLAMS	1/1/2004	Met One Instruments BAM-1020 System	170	Automated equivalent method utilizing beta ray transmission	Continuous
Intermittent PM _{10-2.5}	SLAMS	7/1/2010	Thermo Scientific Partisol-Plus Model 2025 Sequential sampler pair	176	Manual reference method utilizing gravimetric analysis.	1/1 day
Continuous PM _{10-2.5}	SLAMS	7/22/2011	Met One Instruments BAM-1020 System	185	Automated equivalent method utilizing beta ray transmission	Continuous
PM _{2.5} Speciation	SLAMS	12/13/2000	Met One SASS & URG 3000N	811 / 812 / 833	Multi-species manual collection method utilizing thermal optical, ion chromatography, gravimetric, and x-ray fluorescence analyses.	1/3 day
WS/WD	SLAMS	10/11/2009	RM Young 05305-AQ	020	Air quality measurements approved instrumentation for wind speed and wind direction	Continuous
OT/RH	SLAMS	10/11/2009	RM Young 41372VF	040 / 020	Air quality measurements approved instrumentation for humidity and temperature	Continuous
Lead	SLAMS	4/18/1999	High Volume Sampler	803	Atomic Absorption with graphite furnace	1/6 day

Table 24 – Additional Parameters Collected at NCore Site

Parameter	Designation	Start Date	Sampler or Monitor	Method Code	Analysis Method	Sample Frequency
Intermittent PM ₁₀	SLAMS	7/1/2010	Thermo Scientific 2025	127	Manual reference method utilizing gravimetric analysis.	1/1 day
Continuous PM ₁₀	SLAMS	8/2/2011	Met One Instruments BAM-1020 System	122	Automated equivalent method utilizing beta ray transmission	Continuous
NO	SLAMS	1/1/2013	Thermo Scientific 42i	074	Chemiluminescence	Continuous
NO ₂	SLAMS	1/1/2013	Thermo Scientific 42i	074	Chemiluminescence	Continuous
NO _x	SLAMS	1/1/2013	Thermo Scientific 42i	074	Chemiluminescence	Continuous
Continuous Sulfate	SLAMS	1/1/2006	Thermo Scientific 5020 SPA	875	Catalytic thermal reduction fluorescence	Continuous
Continuous Black Carbon	SLAMS	10/1/2003	Magee AE21	866	Optical Absorption	Continuous
Toxics	OTHER	4/18/1999	Meriter MCS-1-R	126 / 150	SS 6l canister with cryogenic GC/MS	1/6 day
Carboynls	SLAMS	4/18/1999	ATEC 2200 2C	102	Silica DNPH cartridge w/KI O3 scrubber with HPLC (TO-11A)	1/6 day
Metals	OTHER	4/18/1999	High Volume Sampler	107	Atomic Absorption with graphite furnace	1/6 day
Precipitation	OTHER	10/11/2009	RM Young 52202E	014	Air quality measurements approved instrumentation for rainfall	Continuous
BP	OTHER	10/11/2009	Met One 594	011	Air quality measurements approved instrumentation for barometric pressure	Continuous
Solar Radiation	OTHER	1/1/2013	Eppley Precision Spectral Pyranometer	011	First Class Radiometer	Continuous
Ultraviolet Radiation	OTHER	1/1/2013	Eppley Total Ultraviolet Radiometer	011	Hermetically sealed selenium barrier-layer cell	Continuous
PAMS	SLAMS	7/1/2011	Perkin Elmer Clarus 500 Gas Chromatograph	128	Cryogenic Preconcentration GC/FID Detection	Continuous

Appendix A - Comment Submittal Information

The proposed 2016 Ambient Air Monitoring Network Plan is posted on the IDEM website at <http://www.in.gov/idem/airquality/2389.htm> for review and comment for thirty (30) days.

Comments should be emailed to:

Steve Lengerich (slengeri@idem.IN.gov)

or mailed to:

Steve Lengerich
IDEM/OAQ/AMB
100 North Senate Avenue
Shadeland
Indianapolis, IN 46204-2251

or faxed to:

317-308-3239

Network Comments

Response to Comments

Comment #1

Received from Joanne M. Alexandrovich, Ph.D., Vanderburgh County Ozone Officer
E-mail submission on 6/19/2015.

Dr. Alexandrovich submitted comments addressing the following areas:

1. Monitor Type Concerns
Dr. Alexandrovich believes that IDEM's use of both SPM and SP as Monitor Type designations could be misleading and not necessary. Her suggestion is to use SPM only.
2. Research Monitoring
In a comment to last year's Network Plan, Dr. Alexandrovich commented that IDEM should put information into the plan on any type of monitoring activities. The ozone and VOC monitoring at Plummer was the project in question.

Response

1. Monitor Type Concerns
IDEM agrees with Dr. Alexandrovich's suggestion to not use both SPM and SP Monitor Types. The original reasoning was to try and differentiate between two types of special purpose monitoring sites. After further research into how EPA changed the allowable Monitor Types and Network Affiliations in 2014, IDEM has revised that information on the Network Tables to reflect the current information. The number of allowable monitor types has decreased as many of the

older monitor types are either no longer used or have been converted to Network Affiliation under a Monitor Type. The lists of allowable options are available at:

<https://aqs.epa.gov/aqsweb/codes/data/MonitorTypes.html>

and

<https://aqs.epa.gov/aqsweb/codes/data/MonitorNetworks.html>

2. Research Monitoring

As stated in the 2015 Comments, if IDEM conducts a research type of project and does not plan to enter the data into AQS, that type of monitoring project would not be part of the Annual Network Review. The main focus of the Network Plan is to address the monitoring network as it pertains to the parameters and requirements spelled out in 40 CFR Part 58, or the monitoring to support these efforts.

Appendix B

Evaluation of Indiana's Continuous PM_{2.5} Data Proposed Exclusion of Data from Comparison to the NAAQS July 1, 2015

Introduction

The State of Indiana through the Office of Air Quality of IDEM has operated continuous PM_{2.5} monitors since 2000. Over the years the network has expanded to 18 sites. The monitors have been converted from available non FEM monitors to FEM monitors as they became approved, the reliability was considered adequate, and funding to obtain them was sufficient. The data from the continuous FEM monitors currently are used for AQI purposes and for submittal to AirNow for national and regional mapping purposes. Indiana has used the data for design value calculations and comparison to the National Ambient Air Quality Standards (NAAQS) at two sites in the past. The comparison between the data from the intermittent FRM/FEMs and the continuous FEMs has not always met the criteria for comparison as set forth in 40CFR Part 53. This analysis and proposal details Indiana's determination of the data which are acceptable for use in NAAQS calculations or should be excluded.

Rules and Guidance

The rules and procedures for the testing and approval of ambient air monitoring reference and equivalent methods are contained in 40CFR part 53. Table C-4 of Subpart C contains the specific criteria for the determination of Class III FEM monitors for the collection of PM_{2.5} concentrations.

On January 15, 2013 U.S. EPA promulgated new requirements (78 FR 3086) for assessing the continuous PM_{2.5} data. These included amending "§58.11 Network Technical Requirements" by adding a new subsection (e) which defined the data and the requirements needed to determine if continuous FEM data from a State's or Local Agency's network should be used for comparison to the NAAQS.

§58.11(e) is summarized as follows:

1. State and local governments must assess the data from the Class III FEM PM_{2.5} monitors using the performance criteria in Table C-4 of subpart C to identify data which does not meet criteria and should not be used in comparison to the NAAQS.
2. The assessment should be included in the agency's annual network plan.
3. Values down to 0 µg/m³ can be included.
4. A minimum of one test site with one FRM and at least one FEM is required.
5. The precision statistic does not apply.
6. All seasons must be covered, with no more than 36 consecutive months aggregated together.
7. The key statistic metric is the bias (both additive and multiplicative) of the FEM compared to the FRM. Correlation is required to be reported, but failure to meet these criteria is not cause to exclude the data.

In April 2013, detailed instructions and a template for requesting exclusion of the data were distributed by OAQPS. It provided a detailed summary of the items required, explanation of the required statistics, and a variety of analysis tools available to aid in the analysis. The procedures for submitting the exclusion request outside of the annual network review were also included.

Indiana's Network

At the end of 2014 Indiana operated 18 continuous PM_{2.5} monitors at 17 sites across the state. All the monitors are FEMs and collocated with intermittent FEMs (R&P/Thermo 2025 w/VSCC). Fourteen sites use the Met One BAM1020 and three sites use the Thermo 5030 SHARP. The Met One BAM1020 is collocated at the Terre Haute – Lafayette St. site (181670018). Table 1 is a listing of the current network.

Table 1
PM2.5 Continuous Network Summary

Site Name	County	City	AQS#	Current FEM Sampler	Current FEM Method Start Date	POC	Monitoring Criteria Met	Siting Criteria Met	Submit Waiver	Include in Analysis	Why Not Included
Fort Wayne - Beacon St.	Allen	Fort Wayne	180030004	Met One BAM 1020	10/27/2012	3	1/1/2013	No	Yes	Yes	
Columbus - Rocky Fort Rd	Bartholomew	Columbus	180050008	Met One BAM 1020	7/25/2014	3	7/25/2014	7/25/2014		No	<6 mos available
Elkhart - Prairie St.	Elkhart	Elkhart	180390008	Met One BAM 1020	11/17/2010	3	1/1/2013	No		No	Siting criteria not met
New Albany	Floyd	New Albany	180431004	Met One BAM 1020	6/8/2011	3	1/1/2013	3/1/2014		No	Only 10 mos available
Fishers	Hamilton	Fishers	180570007	Met One BAM 1020	1/1/2014	3	1/1/2014	1/1/2014		No	Only 12 mos available
Kokomo - Vaile Ave.	Howard	Kokomo	180670004	Met One BAM 1020	4/3/2014	3	4/3/2014	4/3/2014		No	Only 9 mos available
Gary - IITRI	Lake	Gary	180890022	Met One BAM 1020	10/18/2011	3	1/1/2013	No	Yes	Yes	
Hammond - Purdue	Lake	Hammond	180891004	Thermo Scientific 5030 SHARP	Monitor Removed (Site Shelter issues - Planned relocation)	3	1/1/2013	1/1/2013		No	Monitor Removed
Anderson - Eastside Elem.	Madison	Anderson	180950011	Thermo Scientific 5030 SHARP	7/13/2010	3	1/1/2013	No	Yes	Yes	
Indpls - Washington Park	Marion	Indianapolis	180970078	Met One BAM 1020	7/21/2011	3	1/1/2013	No		Yes	
Indpls - W. 18th St	Marion	Indianapolis	180970081	Thermo Scientific 5030 SHARP	9/25/2014	3	9/25/2014	9/25/2014		No	Only 3 mos available
Bloomington - Binford	Monroe	Bloomington	181050003	Thermo Scientific 5030 SHARP	4/9/2009	3	1/1/2013	1/21/2014		No	Only 11 mos available
Ogden Dunes	Porter	Ogden Dunes	181270024	Met One BAM 1020	6/11/2012	3	1/1/2013	1/1/2013		Yes	
South Bend - Shields Dr.	St. Joseph	South Bend	181410015	Met One BAM 1020	10/16/2008	3	1/1/2013	1/1/2013		Yes	
Lafayette - Greenbush St.	Tippecanoe	Lafayette	181570008	Met One BAM 1020	11/15/2007	3	1/1/2013	No		No	Siting criteria not met
Evansville - Buena Vista	Vanderburgh	Evansville	181630021	Met One BAM 1020	2/17/2010	3	1/1/2013	No		No	Siting criteria not met
Terre Haute - Lafayette Ave.	Vigo	Terre Haute	181670018	Met One BAM 1020	12/3/2009	3	1/1/2013	No	Yes	Yes	
Terre Haute - Lafayette Ave. (colo)	Vigo	Terre Haute	181670018	Met One BAM 1020	1/16/2013	4	1/16/2013	No	Yes	Yes	
Larwill	Whitley		181830003	Met One BAM 1020	4/7/2010	3	1/1/2013	No		No	Siting criteria not met

Data Period to Review

In general, Indiana evaluated the data for the current monitor being used at the sites for the past two years, 2013 and 2014. If a current site had not been collecting data with the current monitor for a minimum of two years, it was not evaluated in terms of data exclusion. Past monitors that were discontinued during this period and replaced with another monitoring method were also not included. Table 1 lists the sites which are included in this analysis.

Network Evaluation

The number of sites operating a specific FEM monitor determines the number and type of monitor which must be collocated with the FEM. It was determined in 2012 that Indiana needed two collocated monitors for the Met One BAM1020 monitors; a Met One BAM 1020 and a Thermo 2025. These criteria were met in January of 2013 with additional monitors being deployed. A Thermo 2025 also was necessary at a site operating a Thermo SHARP monitor. This requirement was also met.

An audit of the network by U.S. EPA in October and November of 2013 also found some siting deficiencies. The spacing between the monitors and samplers was not correct at all sites. Most of the sites where this issue could be corrected had the issues resolved. Several sites had distance problems which could not be resolved or could not be resolved immediately. Waivers will be submitted for four sites as indicated in Table 1.

Request for Exclusion of Data

In accordance with the PM NAAQS rule published on January 15, 2013 and specific to the provisions detailed in §58.10 (b)(13) and §58.11 (e), Indiana is requesting that data from specific sites and time periods be set aside for comparison to the NAAQS. Indiana is not yet at a point where the comparability of all the PM_{2.5} continuous FEMs operated in the network compared to the collocated FRMs are acceptable such that Indiana is comfortable using the continuous FEM data for comparison to the NAAQS. After assessing the available data and the siting issues, IDEM has determined that an exclusion analysis would be conducted for seven sites. The sites evaluated and the results are summarized in Table 2.

Of the seven sites evaluated, Indiana has determined that five were acceptable for NAAQS data comparison:

- Fort Wayne – Beacon St. (180030004)
- Gary – IITRI (180890022)
- Anderson – Eastside Elementary (180950011)
- Indpls – Washington Park (180970078)
- Terre Haute – Lafayette St. (181670018)

Indiana is requesting that the continuous data be excluded for:

- Ogden Dunes (181270024)
- South Bend – Shields Dr. (181410015)

Analysis of Data

All available data were used in the evaluation, including data down to 0.0 µg/m³. A minimum of 23 samples were required in a season to be considered a complete data set. All sites met these criteria.

The data from the two FEMs at Terre Haute – Lafayette St. were averaged and then compared to the FRM as per the analysis performed by the Exclusion Template. Substitution of FEM data for missing FRM data follows the same criteria.

The results of the analysis are presented in Tables 3 thru 9.

Monitoring Site Criteria Waivers

Of the seven sites evaluated for exclusion, four sites require waivers of the monitoring site criteria. These sites are:

- Fort Wayne – Beacon St.
- Gary IITRI
- Anderson – Eastside Elementary
- Terre Haute – Lafayette St.

These waivers will be forthcoming and submitted to U.S. EPA as near to July 1 as possible.

Table 2
PM2.5 Data Exclusion Summary (2013 - 2014)

Site Name	AQS#	POC	Current FEM Sampler	Method Code	Current FEM Method Start Date	Data Period		Accept / Exclude Data?	Submit Waiver?
						Start Date	End Date		
Fort Wayne - Beacon St.	180030004	3	Met One BAM 1020	170	10/27/2012	1/1/2013	12/31/2014	Accept	Yes
Gary - IITRI	180890022	3	Met One BAM 1020	170	10/18/2011	1/1/2013	12/31/2014	Accept	Yes
Anderson - Eastside Elem.	180950011	3	Thermo Scientific 5030 SHARP	184	7/13/2010	1/1/2013	12/31/2014	Accept	Yes
Indianapolis - Washington Park	180970078	3	Met One BAM 1020	170	7/21/2011	1/1/2013	12/31/2014	Accept	
Ogden Dunes	181270024	3	Met One BAM 1020	170	6/11/2012	1/1/2013	12/31/2014	Exclude	
South Bend - Shields Dr.	181410015	3	Met One BAM 1020	170	10/16/2008	1/1/2013	12/31/2014	Exclude	
Terre Haute - Lafayette Ave.	181670018	3	Met One BAM 1020	170	12/3/2009	1/1/2013	12/31/2014	Accept	Yes

Table 3
Fort Wayne - Beacon St.

Site Name Fort Wayne - Beacon St.
City Fort Wayne
AQS # 180030004
POC 3
Instrument Met One BAM 1020
Method Description Beta Attenuation

PM2.5 Continuous Data Period		Continuous/FRM Sample Pairs Per Season			Slope Criteria			Intercept Criteria			Correlation Criteria				Data Status
Begin Date	End Date	Season	# of Pairs	Meets Req?	Acceptable Range	Slope (m)	Meets Req?	Acceptable Range	Intercept (y)	Meets Req?	CCV	Acceptable Correlation Range	Correlation	Meets Req?	
1/1/2013	12/31/2014	Winter =	60	Yes	1 +/-0.10	1.0092	Yes	1.7286 to -2.0000	1.0915	Yes	0.585	>=0.9500	0.9457	No	Accept
		Spring =	53												
		Summer =	59												
		Fall =	59												
		Total =	231												

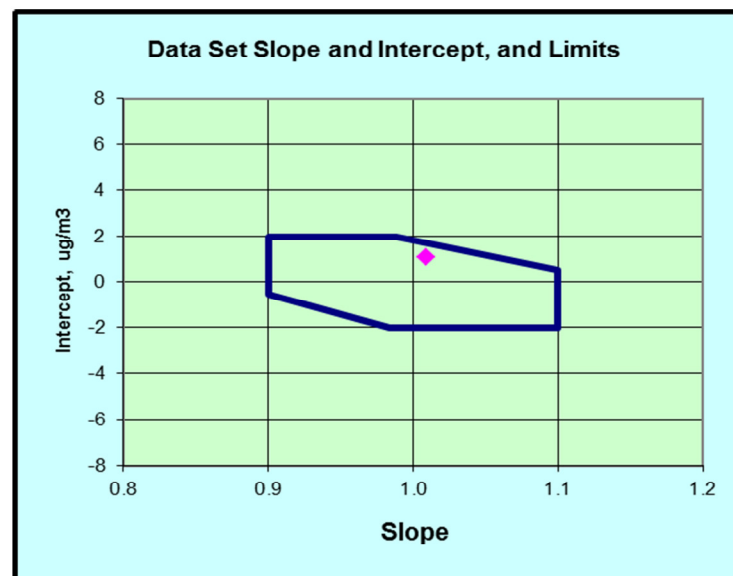
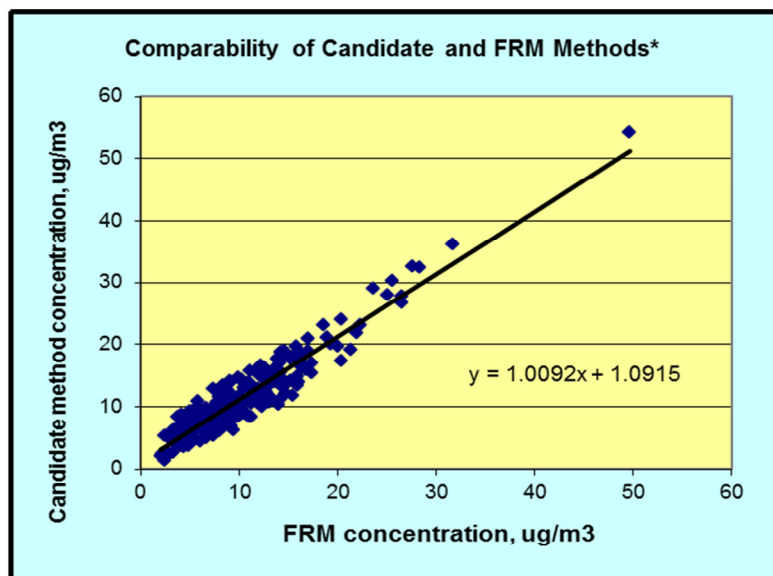


Table 4
Gary - IITRI

Site Name Gary - IITRI
City Gary - IITRI
AQS # 180890022
POC 3
Instrument Met One BAM 1020
Method Description Beta Attenuation

PM2.5 Continuous Data Period		Continuous/FRM Sample Pairs Per Season			Slope Criteria			Intercept Criteria			Correlation Criteria				Data Status
Begin Date	End Date	Season	# of Pairs	Meets Req?	Acceptable Range	Slope (m)	Meets Req?	Acceptable Range	Intercept (y)	Meets Req?	CCV	Acceptable Correlation Range	Correlation	Meets Req?	
1/1/2013	12/31/2014	Winter =	57	Yes	1 +/-0.10	0.9878	Yes	2.0000 to -2.0000	1.3629	Yes	0.479	>=0.9459	0.8732	No	Accept
		Spring =	55												
		Summer =	60												
		Fall =	54												
		Total =	226												

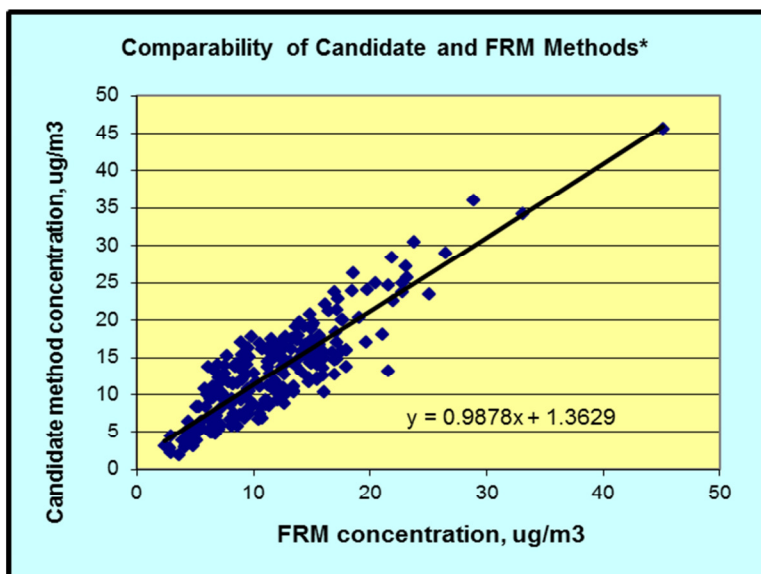


Table 5
Anderson - Eastside Elementary

Site Name Anderson - Eastside Elementary School
City Anderson
AQS # 180950011
POC 3
Instrument Thermo Environmental SHARP 5030
Method Description Nephelometer Correcting BAM

Continuous Data		Continuous/FRM Sample Pairs Per Season			Slope Criteria			Intercept Criteria			Correlation Criteria				Data Status
Begin Date	End Date	Season	# of Pairs	Meets Req?	Acceptable Range	Slope (m)	Meets Req?	Acceptable Range	Intercept (y)	Meets Req?	CCV	Acceptable Correlation Range	Correlation	Meets Req?	
1/1/2013	12/31/2014	Winter =	55	Yes	1 +/-0.10	1.0312	Yes	1.4390 to -2.0000	0.6305	Yes	0.531	>=0.9500	0.931	No	Accept
		Spring =	50												
		Summer =	48												
		Fall =	48												
		Total =	201												

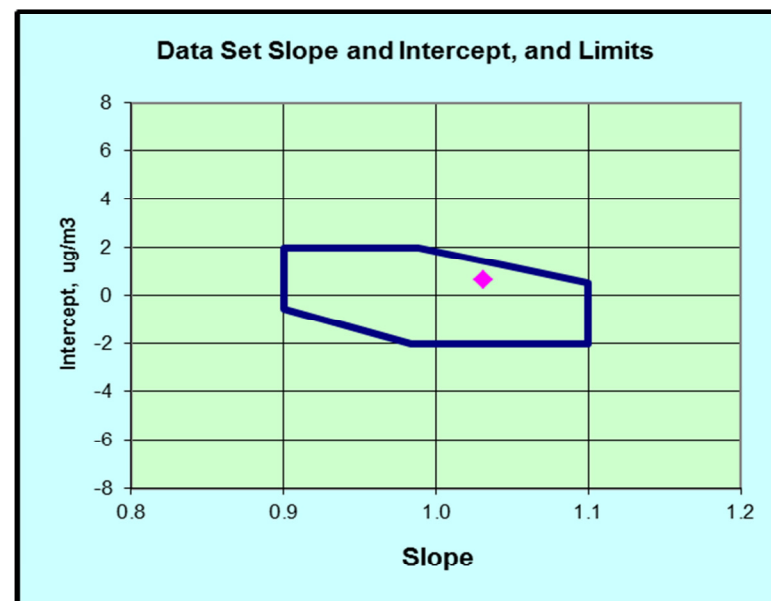
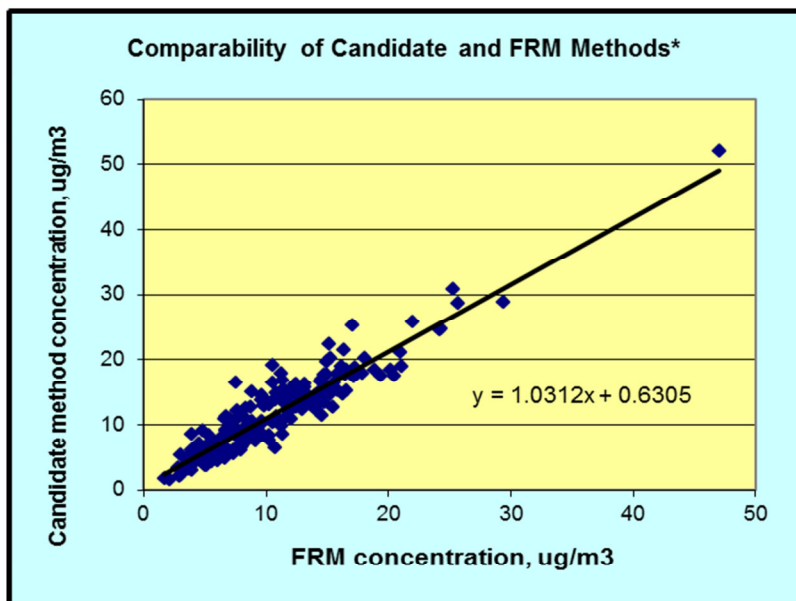


Table 6
Indianapolis - Washington Park

Site Name Indpls - Washington Park
City Indianapolis
AQS # 180970078
POC 3
Instrument Met One BAM 1020
Method Description Beta Attenuation

PM2.5 Continuous Data Period		Continuous/FRM Sample Pairs Per Season			Slope Criteria			Intercept Criteria			Correlation Criteria				Data Status
Begin Date	End Date	Season	# of Pairs	Meets Req?	Acceptable Range	Slope (m)	Meets Req?	Acceptable Range	Intercept (y)	Meets Req?	CCV	Acceptable Correlation Range	Correlation	Meets Req?	
1/1/2013	12/31/2014	Winter =	142	Yes	1 +/-0.10	0.9479	Yes	2.0000 to -1.3676	1.2568	Yes	0.534	>=0.9500	0.9457	No	Accept
		Spring =	144												
		Summer =	178												
		Fall =	146												
		Total =	610												

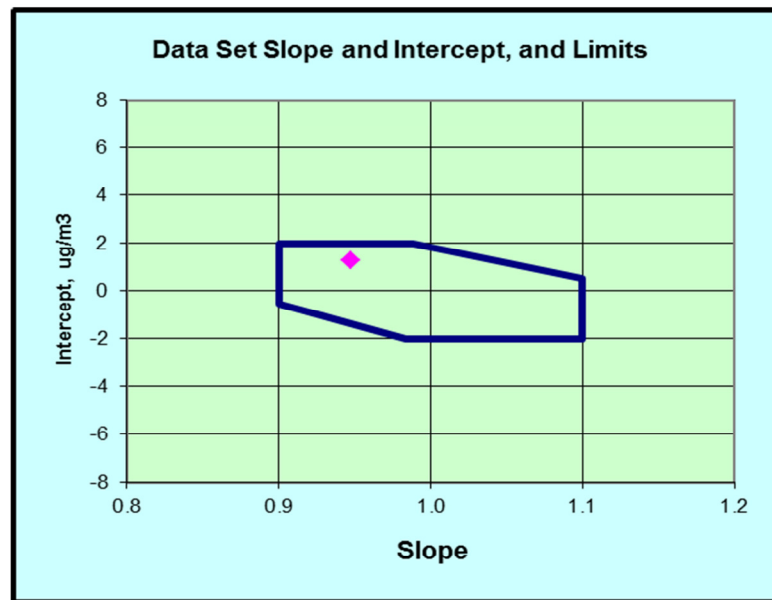
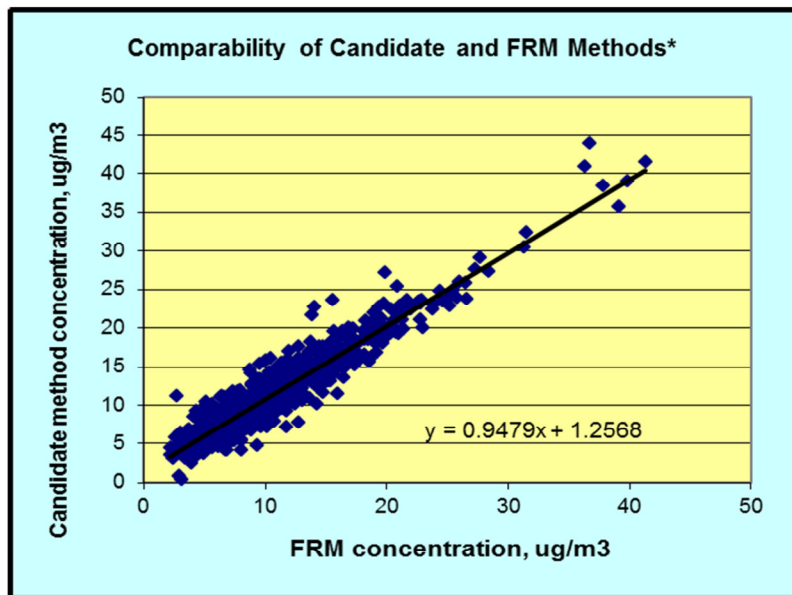


Table 7
Ogden Dunes

Site Name Ogden Dunes
City Ogden Dunes
AQS # 181270024
POC 3
Instrument Met One BAM 1020
Method Description Beta Attenuation

PM2.5 Continuous Data Period		Continuous/FRM Sample Pairs Per Season			Slope Criteria			Intercept Criteria			Correlation Criteria				Data Status
Begin Date	End Date	Season	# of Pairs	Meets Req?	Acceptable Range	Slope (m)	Meets Req?	Acceptable Range	Intercept (y)	Meets Req?	CCV	Acceptable Correlation Range	Correlation	Meets Req?	
1/1/2013	12/31/2014	Winter =	59	Yes	1 +/-0.10	1.0202	Yes	1.5830 to -2.0000	2.2049	No	0.554	>=0.9500	0.8421	No	Exclude
		Spring =	47												
		Summer =	56												
		Fall =	55												
		Total =	217												

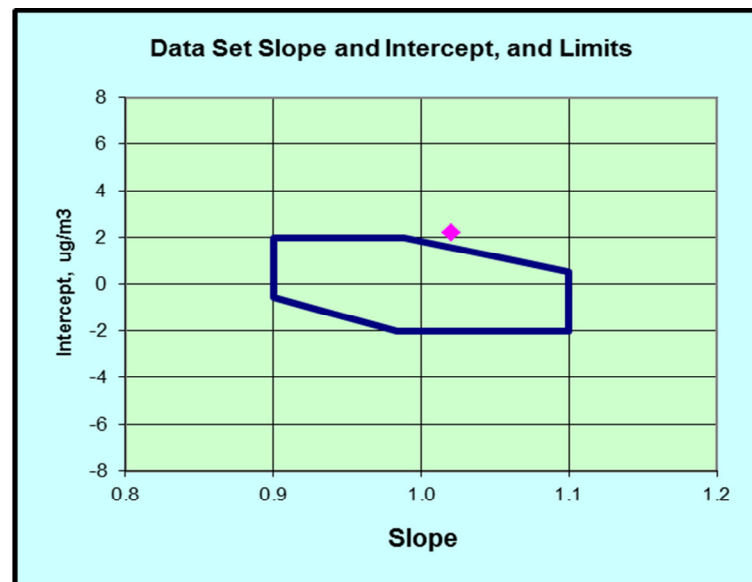
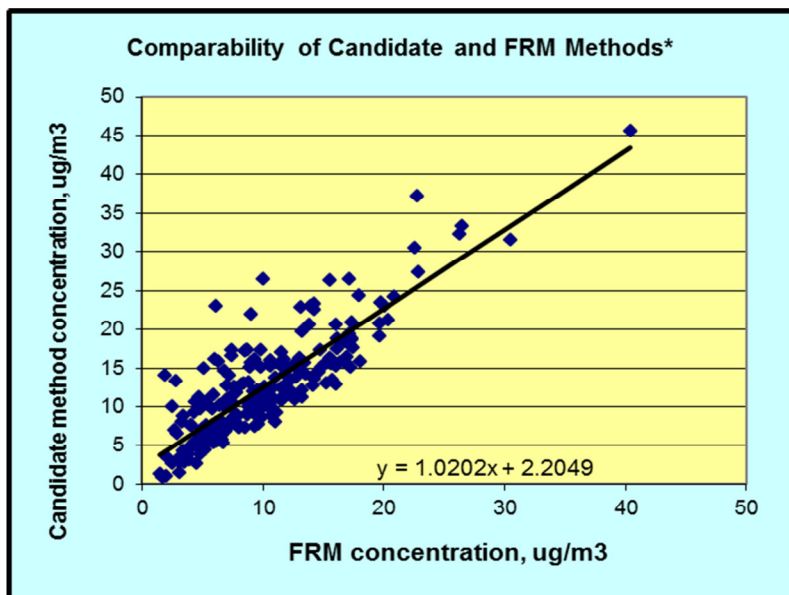


Table 8
South Bend - Shields Dr.

Site Name South Bend - Shields Dr
City South Bend
AQS # 181410015
POC 3
Instrument Met One BAM 1020
Method Description Beta Attenuation

PM2.5 Continuous Data Period		Continuous/FRM Sample Pairs Per Season			Slope Criteria			Intercept Criteria			Correlation Criteria				Data Status
Begin Date	End Date	Season	# of Pairs	Meets Req?	Acceptable Range	Slope (m)	Meets Req?	Acceptable Range	Intercept (y)	Meets Req?	CCV	Acceptable Correlation Range	Correlation	Meets Req?	
1/1/2013	12/31/2014	Winter =	56	Yes	1 +/-0.10	0.9425	Yes	2.0000 to -1.2740	3.0656	No	0.520	>=0.9500	0.8394	No	Exclude
		Spring =	57												
		Summer =	41												
		Fall =	44												
		Total =	198												

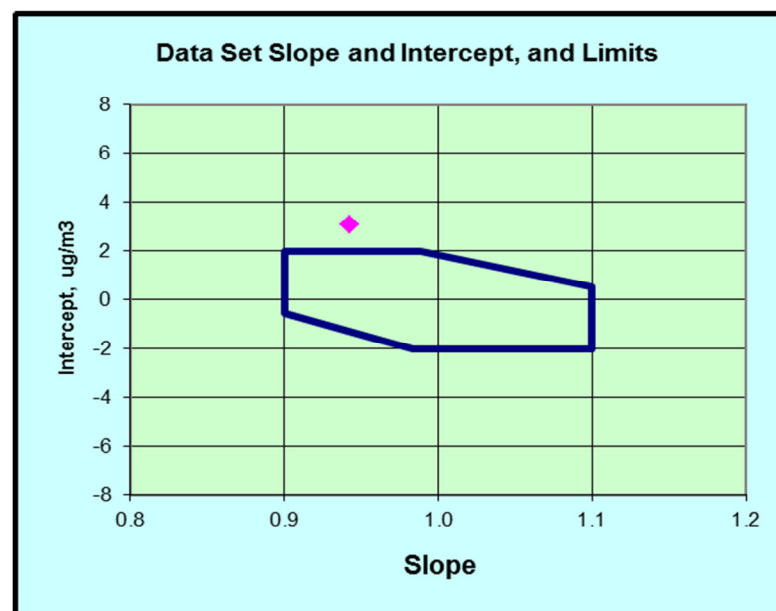
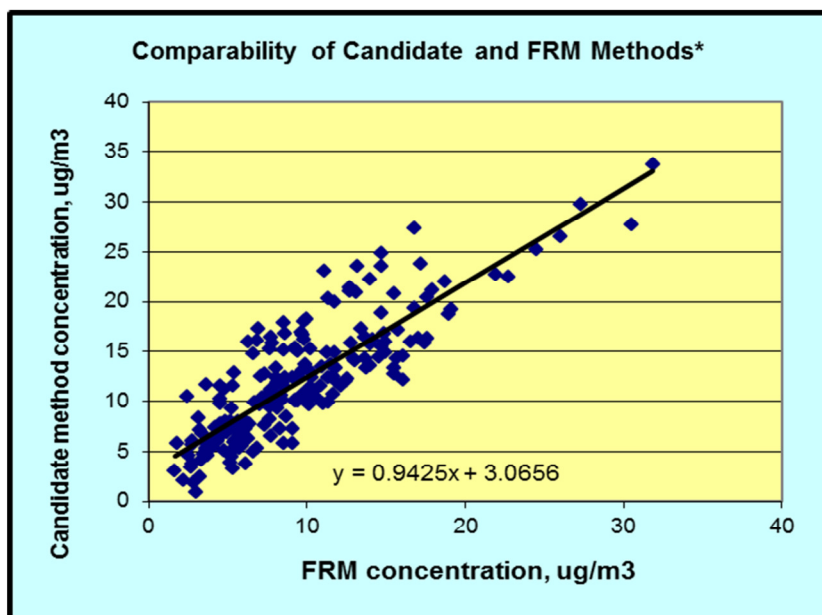


Table 9
Terre Haute - Lafayette Ave.

Site Name Terre Haute - Lafayette Ave
City Terre Haute
AQS # 181670018
POC 3 & 4
Instrument Met One BAM 1020
Method Description Beta Attenuation

PM2.5 Continuous Data Period		Continuous/FRM Sample Pairs Per Season			Slope Criteria			Intercept Criteria			Correlation Criteria				Data Status
Begin Date	End Date	Season	# of Pairs	Meets Req?	Acceptable Range	Slope (m)	Meets Req?	Acceptable Range	Intercept (y)	Meets Req?	CCV	Acceptable Correlation Range	Correlation	Meets Req?	
1/16/2013	12/31/2014	Winter =	51	Yes	1 +/-0.10	0.9732	Yes	2.0000 to -1.8058	-0.0309	Yes	0.510	0.9500	0.9706	Yes	Accept
		Spring =	57												
		Summer =	53												
		Fall =	52												
		Total =	213												

