



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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Michael R. Pence
Governor

Carol S. Comer
Commissioner

September 16, 2015

Ms. Susan Hedman
Regional Administrator
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3950

Re: Preliminary Recommendations Concerning
Round 2 Air Quality Designations for the
2010 Primary 1-Hour Sulfur Dioxide
National Ambient Air Quality Standard

Dear Ms. Hedman:

This letter is in response to the United States Environmental Protection Agency's (U.S. EPA's) March 20, 2015 updated guidance concerning air quality designations for the 2010 primary 1-hour sulfur dioxide (SO₂) National Ambient Air Quality Standard (NAAQS).

On March 2, 2015, the U.S. District Court for the Northern District of California accepted an enforceable order agreement (Consent Decree) between U.S. EPA, the Sierra Club, and the Natural Resources Defense Council to resolve litigation concerning deadlines for completing 1-hour SO₂ NAAQS air quality designations for the remainder of the country. U.S. EPA must complete remaining designations in three additional rounds: Round 2 by July 2, 2016, Round 3 by December 31, 2017, and Round 4 by December 31, 2020. U.S. EPA will complete these designations by designating areas as either nonattainment, attainment, or unclassifiable.

The court order directs U.S. EPA to designate two groups of areas under Round 2 air quality designations for the 2010 primary 1-hour SO₂ NAAQS: (1) areas that have current monitored design values in violation of the NAAQS that were not previously designated during Round 1 designations and (2) areas that contain any stationary source(s) that, according to U.S. EPA's Air Quality Markets Database either emitted more than 16,000 tons of SO₂ in 2012 or emitted more than 2,600 tons of SO₂ and had an annual average emission rate of at least 0.45 lbs SO₂/MMBtu (pounds per one million British thermal units) in 2012 and that has not been announced (as of March 2, 2015) for retirement.

U.S. EPA identified the following five coal-fired electric power plants in Indiana as meeting Round 2 criteria established in the Consent Decree:

County	Facility Name	2012 SO ₂ Emissions (tons)	2012 SO ₂ Emissions Rate (lbs/MMBtu)
Spencer	Rockport Generating Station	54,390	0.583
Jefferson	Clifty Creek Generating Station	52,839	1.767
Gibson	Gibson Generating Station	22,447	0.249
LaPorte	Michigan City Generating Station	11,584	1.006
Posey	A.B. Brown Generating Station	7,091	0.521

U.S. EPA is providing states the opportunity to submit updated recommendations and supporting information for consideration for the affected areas. The guidance indicates U.S. EPA's intention to propose state designations on or about February 3, 2016, and finalize them by July 2, 2016. As such, the guidance requests that states submit their recommendations for area designations by September 18, 2015.

Enclosed you will find Indiana's assessment to support final boundary determinations for Round 2 designations for the 2010 primary 1-hour SO₂ NAAQS (Enclosure 3). Indiana has also enclosed quality-assured ambient air quality monitoring data from 2012-2014 for Indiana's SO₂ monitoring network (Enclosure 2). Based on this data, there are no new areas in the state that monitored concentrations above the standard in addition to those identified in Round 1 air quality designations.

The following enclosures are included with this letter:

- Enclosure 1 Indiana's Preliminary Designation Recommendations Concerning Round 2 Air Quality Designation Recommendations for the 2010 Primary 1-Hour SO₂ Standard
- Enclosure 2 Indiana's 2012-2014 SO₂ Monitoring Data Summary Compared to the 1-Hour Standard
- Enclosure 3 Indiana's Assessment of Round 2 Air Quality Designations for the 2010 Primary 1-Hour SO₂ Standard

Indiana is recommending that U.S. EPA use county boundaries for the purposes of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area.

Based on the results of this evaluation, Indiana is recommending Gibson, Jefferson, LaPorte, Posey, and Spencer counties be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment, performed in accordance with U.S. EPA's "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standards" dated March 20, 2015 and draft SO₂ NAAQS Designations Modeling Technical Assistance Document guidance dated December 2013, clearly demonstrates that these facilities, based on 2012-2014 quality-assured ambient air quality monitoring data and ambient air quality modeling, are not located in an area currently violating the NAAQS or are causing or contributing to a monitored violation of the standard.

An electronic version of this request in PDF format, as well as a disk containing input and output files used to conduct appropriate air dispersion modeling analyses to support Indiana's assessment have been sent to Randy Robinson and John Summerhays of U.S. EPA Region 5.

Indiana reserves the right to supplement and/or revise the recommendations contained herein as additional monitoring and/or modeling information becomes available. I would like to thank you for this opportunity to provide feedback to U.S. EPA regarding Round 2 air quality designations for the 2010 primary 1-hour SO₂ NAAQS. We look forward to working with your staff as U.S. EPA moves forward with the designations process. If you have any questions regarding Indiana's designation recommendations, please feel free to contact me at (317) 232-8611 or by email at ccomer@idem.IN.gov or Keith Baugues, Assistant Commissioner, Office of Air Quality, at (317) 232-8222 or by e-mail at kbaugues@idem.IN.gov.

Sincerely,



Carol S. Comer
Commissioner

CSC/kb/sd/bc/gf
Attachments:

cc: George Czerniak, U.S. EPA Region 5 (no enclosure)
Chris Panos, U.S. EPA Region 5 (no enclosure)
Randy Robinson, U.S. EPA Region 5 (no enclosure)
John Summerhays, U.S. EPA Region 5 (no enclosure)
Doug Aburano, U.S. EPA Region 5 (no enclosure)
Keith Baugues, IDEM-OAQ (no enclosure)
Scott Deloney, IDEM-OAQ (no enclosure)
Brian Callahan, IDEM-OAQ (w/ enclosure)
Mark Derf, IDEM-OAQ (w/ enclosure)
Gale Ferris, IDEM-OAQ (w/ enclosure)
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Enclosure 1

Indiana's Preliminary Designation Recommendations Concerning Round 2 Air Quality Designations for the 2010 Primary 1-Hour Sulfur Dioxide National Ambient Air Quality Standard

County	Recommendation
Gibson	Attainment
Jefferson	Attainment
LaPorte	Attainment
Posey	Attainment
Spencer	Attainment

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Enclosure 2

Indiana Sulfur Dioxide (SO₂) 2012-2014 Monitoring Data Summary Compared to the 1-Hour Standard

County	Monitor Site ID	2012	2013	2014	2012-2014 Design Value
Bartholomew	18-005-0007		16.2*	17.4	17**
Daviess	18-027-0002	78	150	107	112
Floyd	18-043-0004	38	30	65	44
Floyd	18-043-1004	32	20.5	43.8	32
Fountain	18-045-0001	30	34	22	29
Gibson	18-051-0002	76	64	77	72
<i>Wabash, IL</i>	<i>17-185-0001</i>	<i>89</i>	<i>55</i>	<i>53</i>	<i>66</i>
Jasper	18-073-0002	33	40	25	33
Lake	18-089-0022	47	43.2	53.1	48
Lake	18-089-2008	28	23.7	20.2	24
LaPorte	18-091-0005	21	15*	15	17**
Marion	18-097-0057	91.5	78.1	105.6	92
Marion	18-097-0073	56	42.3	59.1	53
Marion	18-097-0078	61.1	70	80*	70**
Morgan	18-109-1001	82	64	90	79
Pike	18-125-0005	140.2	169.4	156.7	155
Porter	18-127-0011	36	36	27	33
Vanderburgh	18-163-0021	16.5	18.6	32.3	22
Vigo	18-167-0018	72.5	79.1	85	79
Vigo	18-167-1014	128	103	120	117
Wayne	18-177-0006	22.4	14.3	7	15
Whitley	18-183-0003		5.8	13.3	10**
* Not a complete year of data					
** Less than three years of data					
Design Value greater than or equal to 76 ppb					
<i>Illinois Monitor</i>					

Indiana SO₂ 2008-2014 Monitoring Data Summary Compared to the 1-Hour Standard

Note: U.S. EPA established a new 1-hour primary SO₂ standard on June 2, 2010. The new 1-hour standard is 75 parts per billion (ppb). Attainment is determined by evaluating the three-year average of the 99th percentile values of the daily maximum 1-hour average at each monitor within an area, which must not exceed 75 ppb. Any three-year design value over the 1-hour standard has been highlighted in yellow. Data prior to 2010 were compared to the annual and 24-hour SO₂ standards.

County	Site ID	99 th Percentile Values (ppb)							Three-Year Design Value (ppb)				
		2008	2009	2010	2011	2012	2013	2014	08-10	09-11	10-12	11-13	12-14
Bartholomew	18-005-0007	Monitor began operation on 05/02/2013.					16.2	17.4	Operation began operation on 05/02/2013.			16	17
Daviess	18-027-0002	122	138	115	100	78	150	107	125	118	98	109	112
Floyd	18-043-0004	117	87	72	36	38	30	65	92	65	49	35	44
Floyd	18-043-1004	138	125	123	38	32	20.5	43.8	129	95	64	30	32
Fountain	18-045-0001	236	38	26	29	30	34	22	100	31	28	31	29
Gibson	18-051-0002	90	65	74	68	76	64	77	76	69	73	69	72
Wabash, IL	17-185-0001	90	69	66	47	89	55	53	75	61	67	64	66
Jasper	18-073-0002	61	88	39	32	33	40	25	63	53	35	35	33
Lake	18-089-0022	67	59	57.2	58	47	43.2	53.1	61	58	54	49	48
Lake	18-089-2008	37	37	34.3	40	28	23.7	20.2	36	37	34	31	24
LaPorte	18-091-0005	29	23	30	19	21	15	15	27	24	23	18	17
Marion	18-097-0057	79	75	103.4	63	91.5	78.1	105.6	86	80	86	78	92
Marion	18-097-0073	29	61	47.7	59.5	56	42.3	59.1	46	56	54	53	53
Marion	18-097-0078	Monitor began operation in 2010.		20	59.7	61.1	70	80	20	40	47	64	70
Morgan	18-109-1001	91	98	105	96	82	64	90	98	100	94	81	79
Pike	18-125-0005	205	194	211	119	140.2	169.4	156.7	203	175	157	143	155
Porter	18-127-0011	82	51	62	44	36	36	27	65	52	47	39	33
Vanderburgh	18-163-0012/21	41	17	18.8	19.4	16.5	18.6	32.3	26	18	18	18	22
Vigo	18-167-0018	120	115	61.4	95.2	72.5	79.1	85	99	91	76	82	79
Vigo	18-167-1014	137	142	169	139	128	103	120	149	150	145	123	117
Wayne	18-177-0006	109	70	95.2	79.1	22.4	14.3	7	91	81	66	39	15
Whitley	18-183-0003	Monitor began operation in 2013.					5.8	13.3	Monitor began operation in 2013.			6	10

One Year of Data

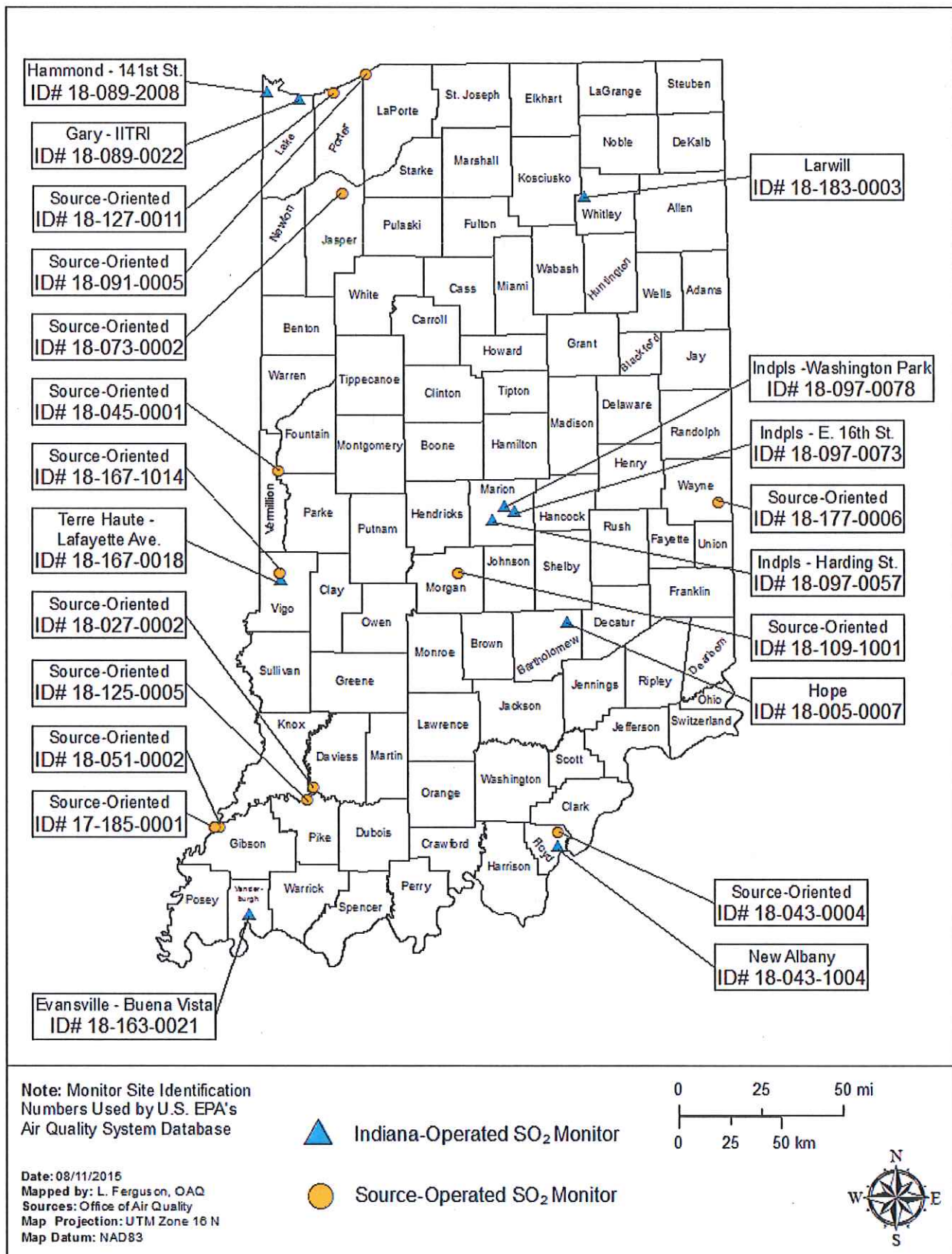
Two Years of Data

Incomplete Data

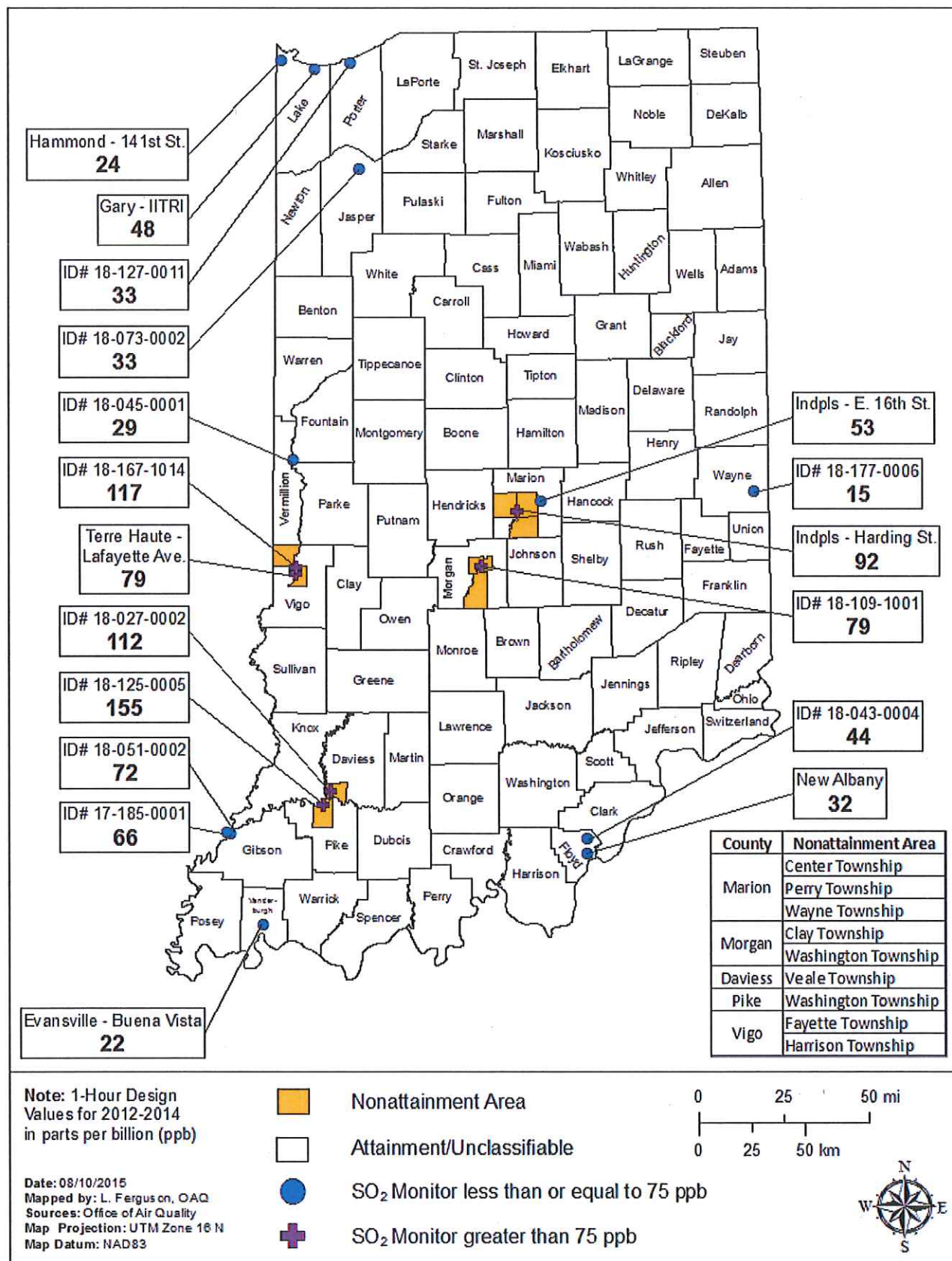
Illinois Monitor

Design Value greater than or equal to 76 ppb

2014 SO₂ Monitoring Network



SO₂ 1-Hour Design Values 2012-2014 and Round 1 SO₂ Nonattainment Areas



Enclosure 3

Indiana's Assessment of Round 2 Air Quality Designations for the 2010 Primary 1-Hour Sulfur Dioxide (SO₂) Standard

Background

On June 2, 2010, the United States Environmental Protection Agency (U.S. EPA) revised the primary National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO₂) [75 FR 35520]. U.S. EPA revoked both the previous 24-hour and annual primary SO₂ standards and established a new 1-hour SO₂ standard at a level of 75 parts per billion (ppb), based on the three year average of the annual 99th percentile of the 1-hour daily maximum concentrations.

On August 5, 2013, U.S. EPA published a notice announcing designations of twenty-nine (29) areas in sixteen (16) states as nonattainment for the 2010 primary 1-hour SO₂ NAAQS, based on certified ambient air quality monitoring data for the years 2009-2011 that showed these areas were violating the standard (78 FR 47191).¹ In the State of Indiana, four areas comprised of nine townships in five counties were designated nonattainment. However, at that time U.S. EPA was not yet prepared to issue designations for the remaining areas.

On March 2, 2015, the U.S. District Court for the Northern District of California accepted, as an enforceable order, an agreement between U.S. EPA, the Sierra Club, and the Natural Resources Defense Council to resolve litigation concerning the deadline for completing air quality designations for the remainder of the country.² The court's order directs U.S. EPA to complete remaining designations in three additional rounds: Round 2 by July 2, 2016, Round 3 by December 31, 2017, and Round 4 by December 31, 2020. U.S. EPA will complete these designations by designating areas as either nonattainment, attainment, or unclassifiable.

The court order directs U.S. EPA to designate two groups of areas under Round 2 of the air quality designations: (1) areas that have newly monitored violations of the 2010 primary SO₂ NAAQS that were not previously designated during Round 1 designations and (2) areas that contain any stationary source(s) that, according to U.S. EPA's Air Quality Markets Database, either emitted more than 16,000 tons of SO₂ in 2012 or emitted more than 2,600 tons of SO₂, had an annual average emission rate of at least 0.45 lbs SO₂/MMBtu (pounds per one million British thermal units) in 2012, and that has not been announced (as of March 2, 2015) for retirement.

¹ <http://www.gpo.gov/fdsys/pkg/FR-2013-08-05/pdf/2013-18835.pdf>

² <http://www.epa.gov/airquality/sulfurdioxide/designations/pdfs/201503FinalCourtOrder.pdf>

In response to the court's order, on March 20, 2015, U.S. EPA identified five coal-fired power plants in Indiana, as listed in Table 1, as meeting Round 2 criteria established in the court's order.

**Table 1:
Indiana SO₂ Sources Identified by U.S. EPA as Meeting
Round 2 Air Quality Designation Criteria**

County	Facility Name	2012 SO₂ Emissions (tons)	2012 SO₂ Emission Rate (lbs/MMBtu)
Spencer	Rockport Generating Station	54,390	0.583
Jefferson	Clifty Creek Generating Station	52,839	1.767
Gibson	Gibson Generating Station	22,447	0.249
LaPorte	Michigan City Generating Station	11,584	1.006
Posey	A.B. Brown Generating Station	7,091	0.521

The March 2, 2015, court order directs U.S. EPA to complete the second round of area designations by July 2, 2016. States may submit updated recommendations and supporting information to U.S. EPA for consideration for the affected areas by no later than September 18, 2015.

U.S. EPA's final area designations are expected to be based on 2012-2014 ambient air quality monitoring data reported from SO₂ monitors currently in place, as well as refined modeling states choose to conduct specifically for area designations. U.S. EPA expects to designate areas in the following manner:

- **Nonattainment:** An area that U.S. EPA has determined violates the 2010 primary 1-hour SO₂ NAAQS, based on the most recent three years of ambient air quality monitoring data or an appropriate modeling analysis, or that U.S. EPA has determined contributes to a violation in a nearby area.
- **Attainment:** An area that U.S. EPA has determined meets the 2010 primary 1-hour SO₂ NAAQS and does not contribute to a violation of the NAAQS in a nearby area based on either: a) the most recent three (3) years of ambient air quality monitoring data from a

monitoring network in an area that is sufficient to be compared to the NAAQS per U.S. EPA interpretations in the Monitoring Technical Assistance Document (TAD),³ or b) an appropriate modeling analysis.

- **Unclassifiable:** An area where U.S. EPA cannot determine based on available information whether the area is or is not meeting the 2010 primary 1-hour SO₂ NAAQS and whether the area contributes to a violation in a nearby area.

Indiana's Assessment

Consistent with U.S. EPA's March 20, 2015, guidance memorandum titled "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard,"⁴ the Indiana Department of Environmental Management (IDEM) has conducted a thorough review of the affected areas in Indiana. IDEM's review focused on the following analysis criteria outlined in the guidance:

- **Ambient air quality data or dispersion modeling results:** Indiana's evaluation is based on 2012-2014 monitoring data and air dispersion modeling results. The air quality analysis evaluated the three-year average of the 99th percentile of the yearly distribution of 1-hour daily maximum SO₂ concentrations. Ambient air quality monitoring data was retrieved from U.S. EPA's Air Quality System (AQS) and refined dispersion modeling was performed using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) version 15181 to assess air quality in a particular location. U.S. EPA Region V reviewed IDEM's modeling protocol and provided comments which were addressed. Modeling results were conducted using 4th high maximum daily 1-hour values averaged over the three-year modeled period combined with representative temporally varying seasonal SO₂ background concentrations to indicate whether the area violated the standard or contributed to a violation in a nearby area. Modeling was performed to show that the existing monitor(s) are properly sited to assess air quality in the area.
- **Emissions-related data:** Indiana examined detailed emissions information from the Clifty Creek Generating Station (Jefferson County), A.B. Brown Generating Station (Posey County), Michigan City Generating Station (LaPorte County), and Rockport Generating Station (Spencer County) and all other significant sources of SO₂ emissions located in nearby areas. Significant emission levels in nearby areas indicate potential for the area to contribute to observed or modeled violations of the standard. Tables

³ <http://www.epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf>

⁴ <http://www.epa.gov/airquality/sulfurdioxide/pdfs/20150320SO2designations.pdf>

identified in this analysis show all stationary sources with reported SO₂ emissions in tons per year (tpy) at the facility level.

- **Meteorology (weather and transport patterns):** Indiana performed source-oriented dispersion modeling to evaluate meteorological data to help determine how weather conditions, including wind speed and direction, affect the plume of sources contributing to ambient SO₂ concentrations.
- **Geography/topography:** The geography and topography analysis considered physical features and land use that might have an effect on the air shed and therefore, the distribution of pollutants over an area. Indiana does not have any significant topographic features that influence the distribution of SO₂ concentrations within the state.
- **Jurisdictional boundaries:** Indiana is recommending that U.S. EPA use county boundaries for the purpose of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the area.

Indiana has developed the following evaluation for determining area designations and appropriate area boundaries for the 2010 1-hour primary SO₂ standard. Indiana relied on 2012-2014 site-specific monitoring data in determining whether the Gibson Generating Station is located in an area that violates or contributes to a violation of the 1-hour SO₂ NAAQS in a nearby area. Indiana relied on AERMOD air dispersion modeling of the Clifty Creek Generating Station, A.B. Brown Generating Station, Michigan City Generating Station, and Rockport Generating Station for area attainment designation recommendations as there are no site-specific monitors associated with these facilities.

Based on the results of this evaluation, Indiana recommends that Gibson, Jefferson, LaPorte, Posey, and Spencer counties be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment, performed in accordance with U.S. EPA's updated guidance, clearly demonstrates that these facilities, based on 2012-2014 quality-assured monitoring data and ambient air quality modeling, are not located in an area currently violating the NAAQS or are causing or contributing to a violation in a nearby area.

Methodology for the Air Quality Modeling and Meteorology Inputs

U.S. EPA provided guidance in order to conduct appropriate air dispersion modeling analyses to support 1-hour SO₂ designation recommendations. U.S. EPA's SO₂ NAAQS Designations Modeling TAD guidance has several recommendations for modeling methodology for determining attainment designations including:

- 1) Use of actual emissions to assess modeled concentrations to reflect current air quality.
- 2) Use of 3 years of modeling results to calculate a simulated 1-hour SO₂ design value consistent with the 3-year monitoring period.
- 3) Placement of receptors only in locations where an air quality monitor could be placed.
- 4) Use of actual stack heights rather than following the Good Engineering Practice (GEP) stack height policy when modeling actual emissions.

Indiana followed U.S. EPA's recommendations to conduct 1-hour SO₂ designation modeling in order to meet the requirements of the Consent Decree to determine whether there are modeled violations of the 1-hour SO₂ NAAQS. Modeling results look at the 4th high maximum daily 1-hour concentration averaged over the 3-year modeled period combined with representative temporally varying seasonal SO₂ background concentrations to determine the attainment status of the area where the Consent Decree emission sources reside.

Model Selection

In accordance with Appendix A of Appendix W to 40 Code of Federal Regulations (CFR) Part 51, Indiana used AERMOD version 15181 for all dispersion modeling of the A.B. Brown Generating Station, Clifty Creek Generating Station, Michigan City Generating Station, and Rockport Generating Station, as well as nearby areas. Additionally, the regulatory default and rural mode options were selected. U.S. EPA's SO₂ NAAQS Designations Modeling TAD, specific to attainment designation modeling, recommended using actual stack heights when modeling actual emissions instead of following the GEP requirement.

AERMAP

The AERMOD terrain preprocessor mapping program, AERMAP, was used to determine all the elevation terrain heights for the receptor, building, and source locations using the Universal Transverse Mercator (UTM) coordinate system. The most recent AERMAP version 11103 was used to assign the elevations from the National Elevation Dataset (NED) using the North American Datum (NAD) 1983 as recommended in "40 CFR Part 51, Revision to the Guideline on Air Quality Models" Appendix W and later revised in the "AERMOD Implementation Guide."

Receptor Grid and Modeling Domain

The receptor grid and modeling domain was based on U.S. EPA's March 20, 2015, SO₂ guidance and SO₂ NAAQS Designations Modeling TAD. Indiana conducted modeling with a multi-nested rectangular receptor grid with appropriate spacing of receptors based on the distance from the modeled emission points to detect significant concentration gradients. Indiana has conducted

exploratory modeling on each of the Consent Decree sources. Maximum modeled 1-hour SO₂ impacts or source-culpable modeled violations did not extend out beyond three km from each source. To ensure all maximum 1-hour SO₂ concentrations were modeled, the modeling grid was extended out to 10 km from each source. The receptor spacing and distance each nested grid covered from the source is listed below.

- Receptor spacing at the fence line for each facility were placed every 50 meters.
- Receptor spacing at 100 meters out to a distance of 3,000 meters (3 km) beyond each facility (extended if modeling results warranted).
- Receptor spacing at 250 meters out to a distance of 5,000 meters (5 km) beyond each facility (extended if modeling results warranted).
- Receptor spacing at 500 meters out to a distance of 10,000 meters (10 km) beyond each facility (extended if modeling results warranted).

Based on the SO₂ NAAQS Designations Modeling TAD Section 4.2, Indiana placed modeling receptors only where it was feasible to place a monitor. Indiana matched up each modeling domain for the four sources modeled with Google Maps projections to ensure the proximity of receptor locations.

Modeled SO₂ Emissions

Indiana modeled the hourly continuous emissions monitoring (CEM) data from each source mentioned in the Consent Decree. Along with the hourly emission data, hourly stack gas flow rate and temperature of the exhaust stream (when available) were modeled as these parameters tend to vary. This variation can influence the dispersion characteristics of the exhaust stream and have an impact on modeled 1-hour SO₂ concentration(s). In some cases federally enforceable emission limits anticipated to be in place by the July 2, 2016, date for final SO₂ area designations were modeled. Documentation of all controls and/or emission limits implemented at the sources by the compliance date, contrary to the 2012-2014 CEMS data, are provided for each source's attainment designation recommendation.

Intermittent Sources

Intermittent sources, such as emergency generators, fire pumps, and startup/shutdown emissions will be handled consistent with U.S. EPA's March 1, 2011, guidance "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ NAAQS."⁵ This

⁵ http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf

guidance was followed to assess the 1-hour SO₂ attainment designations as well. U.S. EPA recommended using appropriate data based on emission scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of maximum daily 1-hour concentrations. Review of the hours of operation for combustion turbines, emergency generators, startup/shutdown, fire pumps, and other auxiliary operations associated with the sources mentioned in the Consent Decree were determined to operate much less than 500 hours per year and on a random and infrequent basis that cannot be anticipated. Exploratory modeling was conducted on these intermittent sources and results showed a negligible impact from these auxiliary or emergency processes on the maximum modeled 1-hour SO₂ receptors from the electric generating units (EGUs). Indiana believes the intent of the Consent Decree is to determine the attainment status of the area surrounding the EGUs based on the actual emissions coming from the EGUs identified by U.S. EPA; therefore the EGUs were Indiana's main focus in its assessment.

Treatment of Inventory Sources

Emission sources located in the vicinity of the Consent Decree sources were evaluated to determine if they could cause or contribute to a NAAQS violation near the Consent Decree source. Based on U.S. EPA's March 1, 2011 guidance, Indiana focused on areas within 10 km for each of the modeled Consent Decree sources. U.S. EPA's SO₂ NAAQS Designations Modeling TAD Section 4.1, page 7 mentions that the number of sources to be explicitly modeled should cause a significant concentration gradient and the number of those sources to be modeled would generally be small. Indiana retrieved a list of all SO₂ emission sources in the county of the source addressed by the Consent Decree, as well as SO₂ emission sources in adjacent counties in Indiana and Kentucky, in order to determine which sources should be included in the modeling analyses. Seven Indiana sources and six Kentucky sources were identified with SO₂ emissions of 250 tpy or more located within 30 km of one of the Consent Decree sources. Actual emissions taken from the year 2013, the most recently available year, were modeled for all sources.

Meteorological Data

As stated in 40 CFR Part 51, Appendix W, section 8.3.1.2 and the SO₂ NAAQS Designations Modeling TAD, Indiana used three years (2012-2014) of National Weather Service (NWS) surface and upper air meteorological data. The Indianapolis, Evansville, and South Bend NWS surface data and upper air data taken from Lincoln, Illinois and Wilmington, Ohio, were processed with the latest version of the AERMOD meteorological data preprocessor program, AERMET (version 15181), and used in the modeling of the Clifty Creek Generating Station, A.B. Brown Generating Station, Michigan City Generating Station, Rockport Generating Station, and nearby areas. Meteorological data, taken from the Gary-Illinois Institute of Technology

Research Institute (IITRI) meteorological monitoring station located in Lake County and near the shores of Lake Michigan, was preprocessed with the South Bend data to create a meteorological data set more representative of lakeshore conditions (i.e. lake breezes and other wind conditions associated with Lake Michigan). The Michigan City Generating Station was modeled using the Gary-IITRI meteorological dataset.

AERMINUTE/AERSURFACE

The NWS meteorological data can contain a number of calm wind speeds greater than ten percent of the 8,760 annual observation hours. The 1-minute wind speed and wind direction Automated Surface Observing System (ASOS) data from the NWS stations were processed with U.S. EPA's 1-minute data processor program, AERMINUTE version 14237.

U.S. EPA's program, AERSURFACE, was used to determine the surface characteristics: albedo, Bowen ratio, and surface roughness for the Indianapolis, Evansville, and South Bend NWS meteorological tower locations. Surface characteristics were determined at each NWS location for each of the 12 wind direction sectors with a recommended default radius of one km. The albedo and Bowen ratio surface characteristics were adjusted during the three winter months of January, February, and December in accordance with U.S. EPA Region V's document "Regional Meteorological Data Processing Protocol," dated August 2014. Additionally, a dry or wet Bowen ratio value was used during months when soil moisture conditions were abnormally dry or wet; otherwise the Bowen ratio value for average soil moisture conditions was used. The surface roughness value for snow cover was used if more than half of the month had days with at least one inch of snow on the ground. Otherwise, the no snow cover surface roughness value was used.

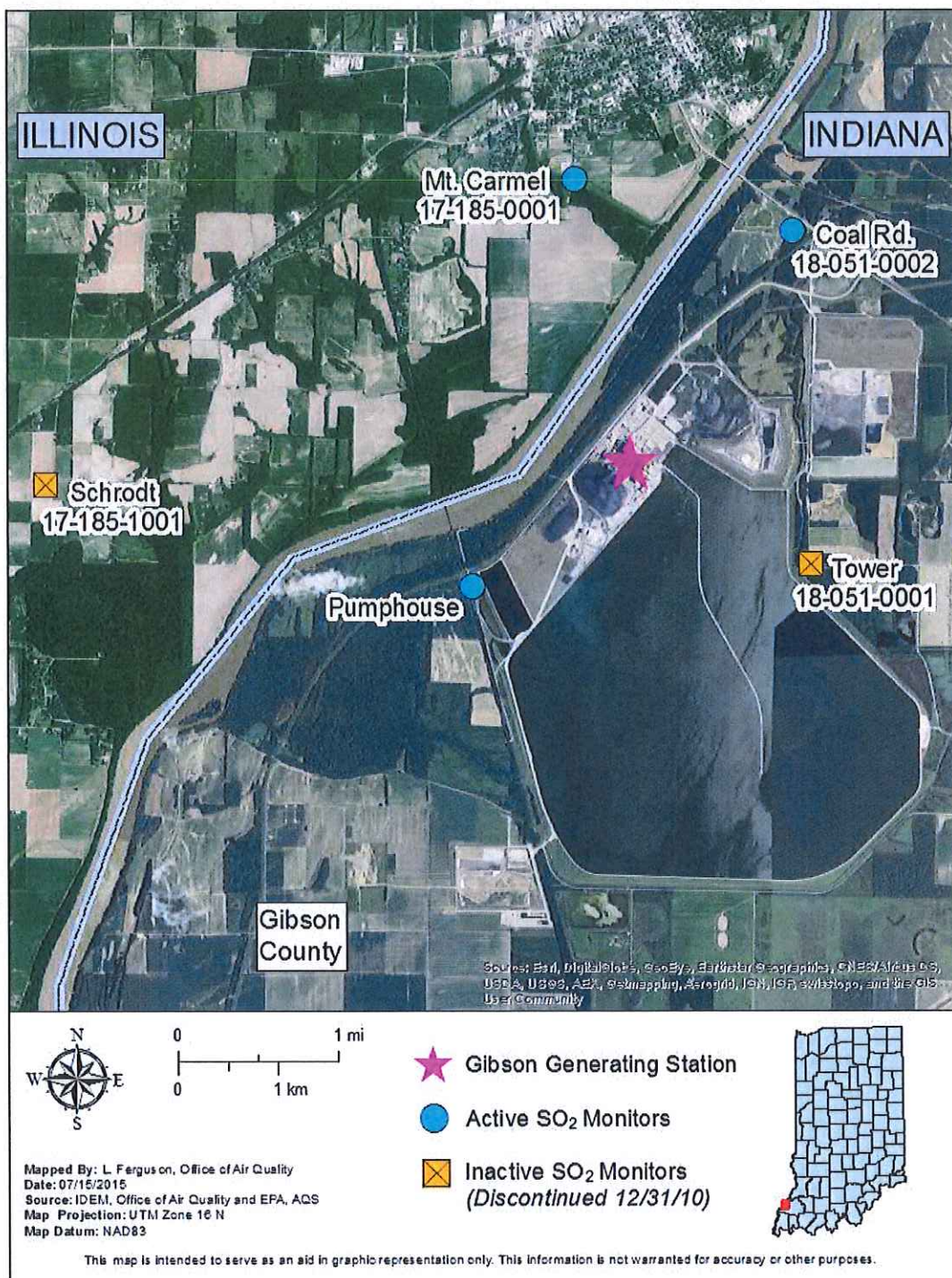
Indiana's Recommendations

Duke Energy Indiana, Inc. – Gibson Generating Station

The Gibson Generating Station (Gibson Station) is a coal-fired power plant consisting of five units that have a capacity to generate 3,342 megawatts (MW) of electricity combined. The Gibson Station is located on the bank of the Wabash River in Montgomery Township, Gibson County, Indiana, approximately 1.5 miles southeast of Mount Carmel, Illinois and 7.5 miles northwest of Owensville, Indiana. The plant is operated by Duke Energy Indiana, Inc. (DEI) and owned by DEI, Wabash Valley Power Association, Inc., and the Indiana Municipal Power Agency. Gibson Station is a stationary electric utility generating station with five coal-fired boilers; two boilers are rated at 5,875 MMBtu/hr, two boilers are rated at 5,987 MMBtu/hr, and a fifth boiler is rated at 5,900 MMBtu/hr.

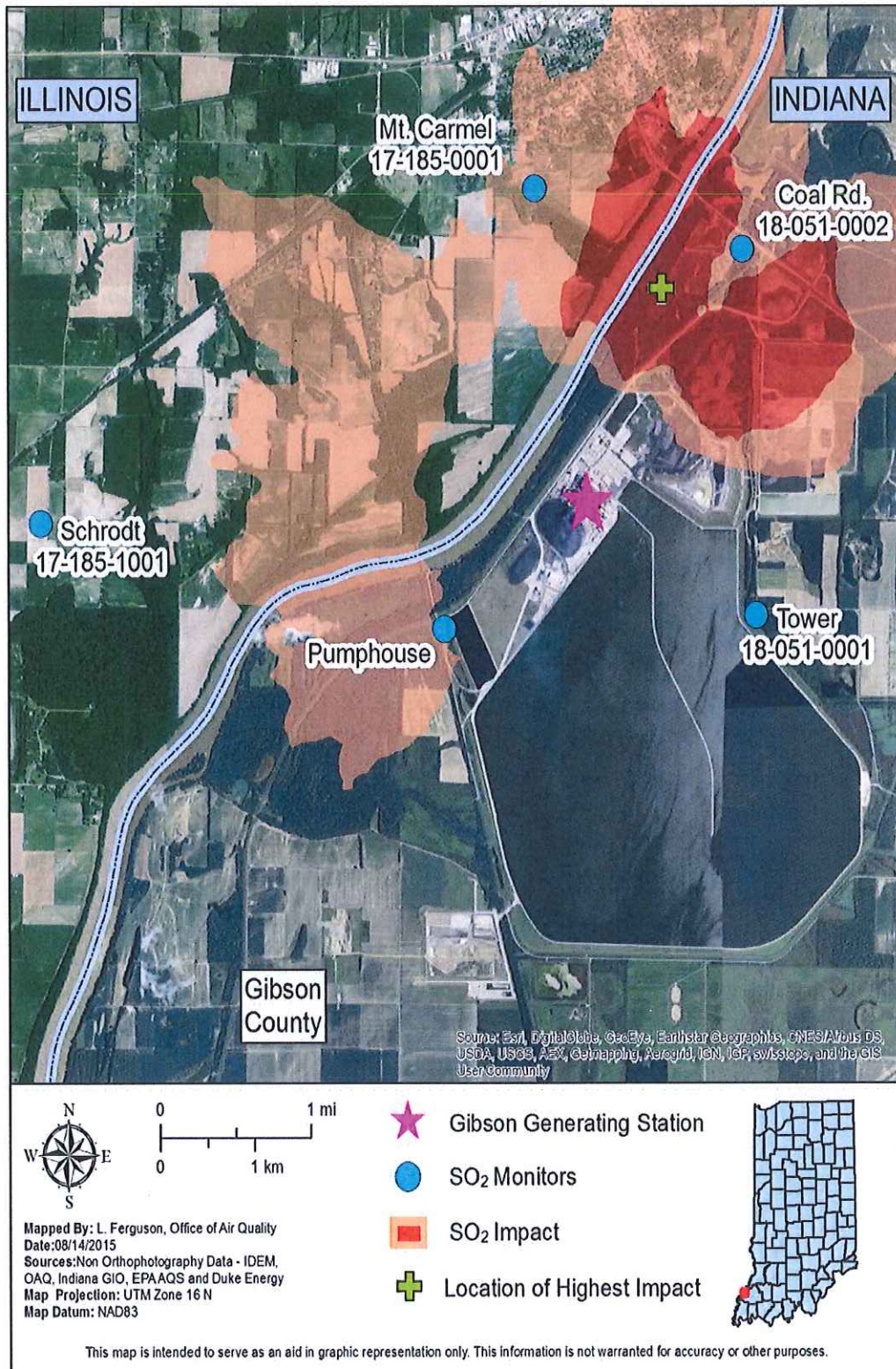
Due to conditions set forth in the Consent Decree and subsequent U.S. EPA guidance, Indiana relied on existing ambient air quality monitoring data from 2012-2014 to determine the attainment designation recommendation for the Gibson Station. Currently, there are three active monitors measuring ambient SO₂ concentrations in the area as depicted in Figure 1. The Coal Road and Pumphouse monitors are located on Gibson Station property northeast and southwest of the main stacks, respectively. The Mt. Carmel monitor is located north-northwest of the station in Wabash County, Illinois. The Coal Road and Mt. Carmel monitors have been in operation since 1979 and report data to U.S. EPA's AQS database. Two additional monitors, the Tower and Schrodts monitors, operated until December 2010 and also reported data to the AQS. The Pumphouse monitor, which became operational on August 21, 2014, is not reported to U.S. EPA's AQS and is, therefore, not comparable to the standard. The Pumphouse, Tower, and Schrodts monitors have been included as weight-of-evidence to illustrate that ambient SO₂ concentrations in the area have historically been, and currently are, below the standard and that the current ambient network is adequate to characterize potential impacts of the Gibson Station.

Figure 1:
SO₂ Monitors in the Vicinity of Gibson Station



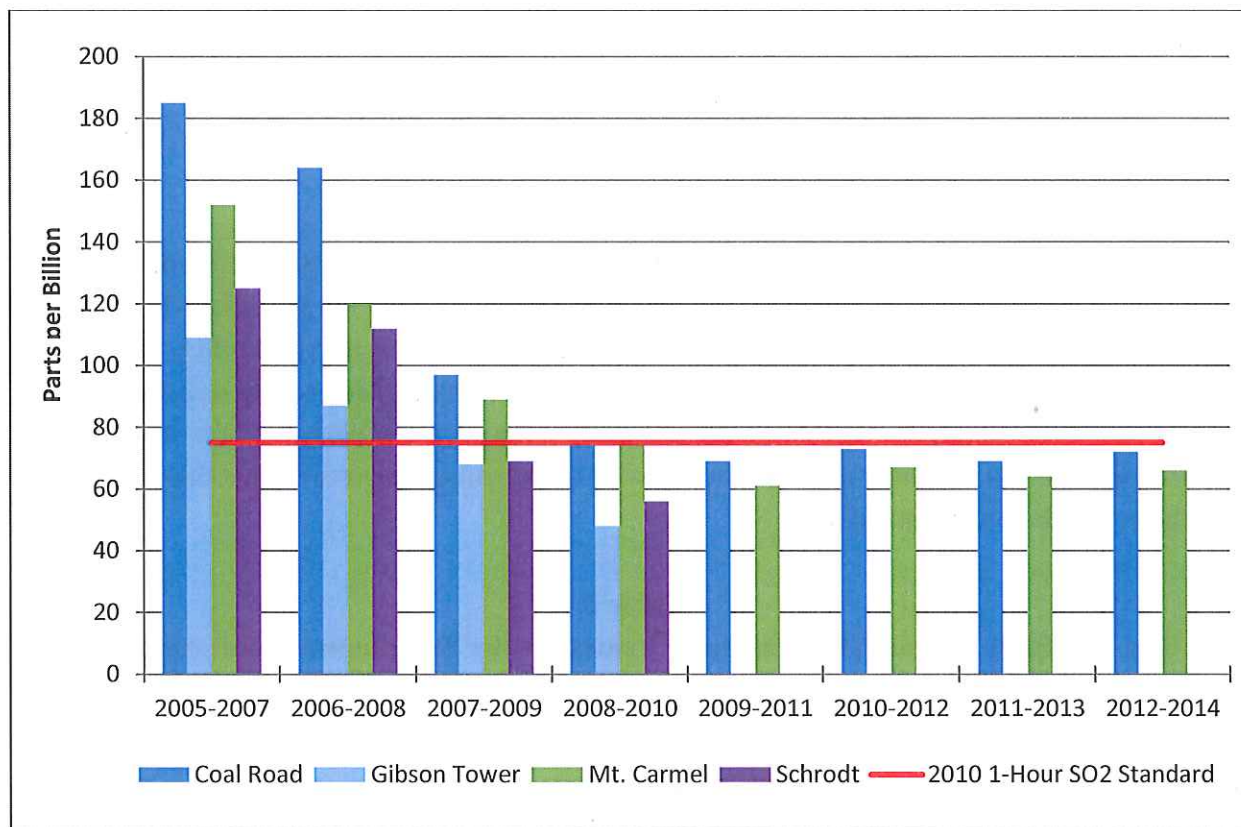
As shown in Figure 2, modeling has been performed which demonstrates that both the Coal Road and the Mt. Carmel monitors are in close proximity to the area of elevated impacts from the Gibson Station using 2012-2014 meteorological data. Modeling different years of meteorological data may shift the location of the highest impact slightly but, in general, given the prevailing south-southwest wind pattern as shown in Figure 3, the highest impacts are expected to be either at or very near the Coal Road and Mt. Carmel monitors. Therefore, the Coal Road and Mt. Carmel monitoring sites are properly located to adequately characterize peak ambient SO₂ concentrations and source-oriented impacts from the Gibson Station.

Figure 2:
Gibson Station Location of Elevated Impacts



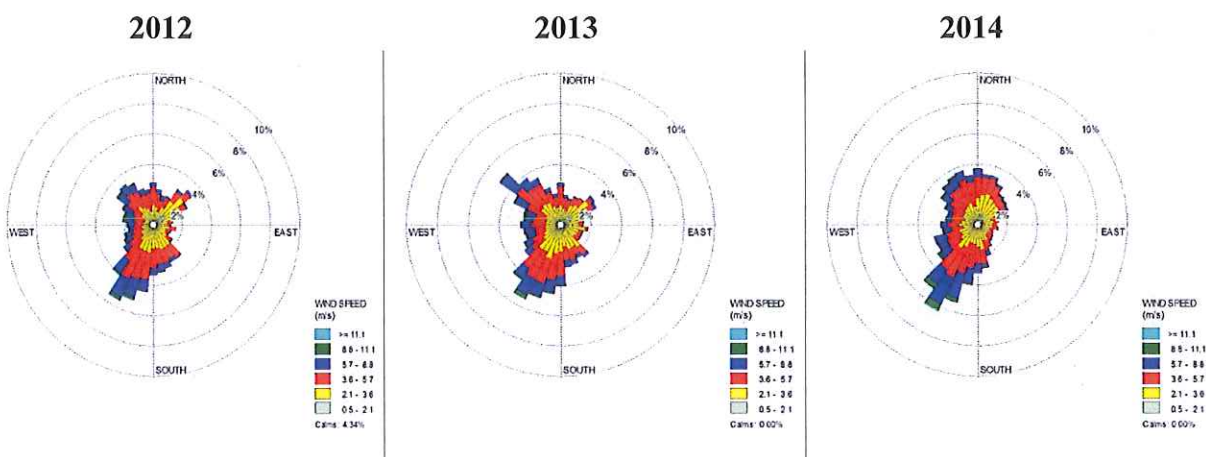
A comprehensive list of historical design values for monitors in the vicinity of the Gibson Station are shown in Graph 1 and demonstrate that all monitors at the Gibson Station are currently, and have been since 2010, below the SO₂ NAAQS. The Coal Road monitor used in this analysis is the same monitor used by U.S. EPA during Round 1 designations in 2013. It was established then that data from the monitor was appropriate for determining the attainment status of the area.

**Graph 1:
Gibson Station SO₂ Monitoring Network Historical Design Values**



The Evansville National Weather Service wind rose plots are shown in Figure 3. The wind roses show the frequency of the wind direction every 10 degrees for each of the wind speed ranges for the three-year modeled period of 2012-2014. The wind direction is the direction the wind is blowing from in compass degrees and the wind speeds are in meters per second (m/s). The wind roses demonstrate that the Coal Road monitor is sited appropriately to accurately characterize ambient SO₂ concentrations near the Gibson Station.

**Figure 3:
Evansville Wind Roses 2012-2014**



As shown in Figure 2, elevated levels of SO₂ were also found on Gibson Station property to the southwest of the main stacks. In response, Duke Energy installed the Pumphouse SO₂ monitor to assess ambient SO₂ concentrations. Table 2 outlines the daily 1-hour maximum SO₂ values for the Pumphouse monitoring site for August 21, 2014-July 31, 2015. Monitoring data from this monitor is not reported to U.S. EPA's AQS and is, therefore, not comparable to the standard, but has been included as weight-of-evidence to show SO₂ concentrations recorded at this monitor have been well below the standard.

**Table 2:
Top Ten Daily 1-Hour SO₂ Maximum Values for the Pumphouse Monitoring Site**

Rank	Daily 1-Hour Maximum Value (ppb)	Date
1	69	4/28/2015
2	64	5/13/2015
3	61	9/27/2014
4	60	10/22/2014
5	51	9/14/2014
6	48	3/2/2015
7	40	9/23/2014
8	38	9/7/2014
9	38	9/26/2014
10	37	8/25/2014

Indiana evaluated SO₂ sources within 30 km of the Gibson Station. The Gibson Station was the only significant source of SO₂ emissions identified in this area.

Indiana recommends that Gibson County, Indiana be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment, performed in accordance with U.S. EPA's updated guidance, clearly demonstrates that the Gibson Station, based on 2012-2014 quality-assured monitoring data, is not located in an area violating the NAAQS or causing or contributing to a violation of the NAAQS in a nearby area.

Indiana-Kentucky Electric Corporation – Clifty Creek Generating Station

The Clifty Creek Generating Station (Clifty Creek) is a coal-fired power plant on the northern bank of the Ohio River in Madison Township, Jefferson County, Indiana. The power plant is located at 1335 Clifty Hollow Road in Madison, Indiana. The plant is owned by Ohio Valley Electric Corporation (OVEC) and its wholly owned subsidiary, Indiana-Kentucky Electric Corporation (IKEC), a consortium of several power companies including American Electric Power (AEP). All six of its generating units are rated at 217.26 MW and have a capacity to generate 1,303.56 megawatts (MW) of electricity combined. Five (5) of the units are wet-bottom pulverized coal-fired boilers identified as Units 1 through 5, with construction completed in 1955, each with a rated capacity of 1,869 MMBtu/hr. The sixth unit is a wet-bottom pulverized coal-fired boiler identified as Unit 6, with construction completed in 1956, with a rated capacity of 1,869 MMBtu/hr. Clifty Creek installed a flue gas desulfurization (FGD) system to provide SO₂ controls for its six generating units. The FGD system came online in July 2013.

Due to conditions set forth in the Consent Decree and subsequent U.S. EPA guidance, Indiana relied on AERMOD air dispersion modeling to determine the attainment designation recommendation for the Clifty Creek Generating Station as there is no site-specific SO₂ air quality monitor associated with this facility. Modeling results were conducted using 4th high maximum daily 1-hour values averaged over the three-year modeled period combined with representative temporally varying seasonal SO₂ background concentrations to indicate whether the area violates the standard or causes or contributes to a violation of the standard.

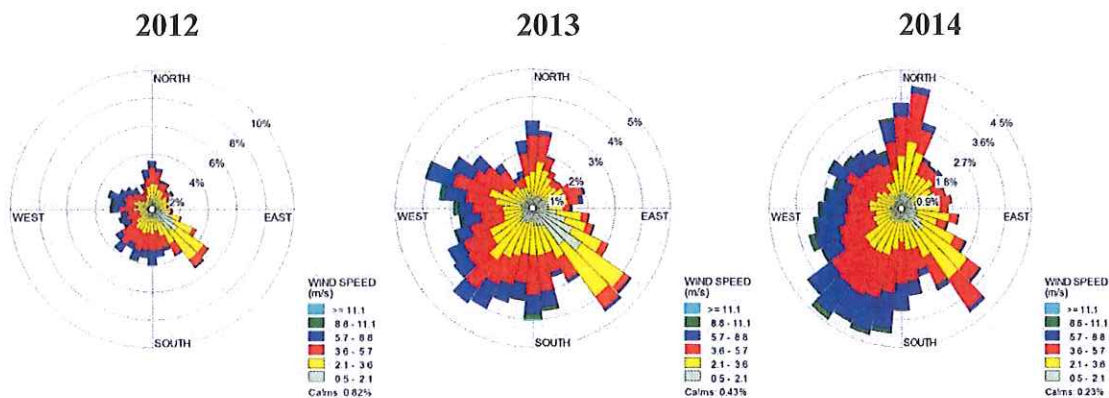
Indiana used meteorological data from the surface and upper air stations outlined in Table 3 to conduct modeling for Clifty Creek.

**Table 3:
Surface and Upper Air Meteorological Stations**

Facility	Surface Met	Upper Air Met
Clifty Creek Generating Station	Louisville, KY NWS	Wilmington, OH NWS

The Louisville National Weather Service wind rose plots are shown in Figure 4. A predominate southeast to southwest wind direction is shown in the Louisville wind rose plots with the higher wind speeds occurring when the wind directions are more southerly to southwesterly and westerly. Wind speeds are in meters per second (m/s).

Figure 4:
Louisville Wind Roses 2012-2014



Modeling of Clifty Creek used adjusted (i.e. without upwind major source impacts) temporally varying seasonal background concentrations. The New Albany SO₂ monitor data, listed in Table 4, is considered representative background for Jefferson County, Indiana. 99th percentile SO₂ concentrations by season (winter, spring, summer and fall) for each hour of the day were calculated for 2012-2014 to determine the temporally varying seasonal SO₂ background, which were used directly in the model.

Table 4:
99th Percentiles for Temporally Varying Seasonal SO₂
Background Values (ppb) for 2012-2014

	Hr 1	Hr 2	Hr 3	Hr 4	Hr 5	Hr 6	Hr 7	Hr 8
Winter	6.61	7.81	5.50	5.57	4.25	5.09	4.89	5.95
Spring	8.10	5.36	7.03	8.25	5.64	4.85	3.51	5.39
Summer	6.84	4.05	3.99	5.35	4.14	3.10	4.40	4.62
Fall	3.34	3.50	3.69	3.64	2.80	3.36	3.39	4.62

	Hr 9	Hr 10	Hr 11	Hr 12	Hr 13	Hr 14	Hr 15	Hr 16
Winter	6.01	6.62	8.56	12.67	14.03	10.43	12.31	10.94
Spring	9.23	8.91	9.18	10.11	16.50	13.28	11.34	9.50
Summer	6.16	18.31	11.77	11.11	14.61	12.95	9.45	9.50
Fall	5.98	6.91	9.44	9.38	11.14	11.24	8.95	8.96

	Hr 17	Hr 18	Hr 19	Hr 20	Hr 21	Hr 22	Hr 23	Hr 24
Winter	10.38	8.80	8.90	6.90	6.15	8.28	6.28	8.04
Spring	17.56	15.06	13.38	11.96	9.41	7.69	5.08	9.02
Summer	7.80	8.64	10.04	10.26	8.10	6.14	7.44	6.50
Fall	10.81	12.77	7.85	6.35	3.90	3.30	4.70	5.55

Meteorological data from the nearest station to the Floyd County New Albany monitor, the Charlestown State Park meteorological station listed in Table 5, was used to develop temporally varying seasonal SO₂ background values for Clifty Creek.

Table 5:
Location of the New Albany SO₂ Monitor and Charlestown State Park Meteorological Station for Background Analysis

SO₂ Monitor and ID #	Monitor Location	Meteorological Station and ID #	Station Location	Distance
New Albany 18-043-1004	38.31° N 85.83° W	Charlestown State Park 18-019-0008	38.39° N 85.66° W	10.7 miles

Indiana evaluated SO₂ sources within 30 km of Clifty Creek. Clifty Creek is the only significant source of SO₂ emissions in Indiana in that region; however there are two large SO₂ emission sources in the State of Kentucky that were evaluated to determine possible impacts on Clifty Creek. 2013 actual emissions for these facilities, listed in Table 6, were modeled to evaluate whether these sources could be causing or contributing to a NAAQS violation in the area.

Table 6:
Carroll and Trimble Counties-Kentucky: 1-Hour SO₂ Modeling Source Inventories

Source	Source ID	Location	2013 SO₂ Emissions (tpy)
Ghent Generating Station	21-041-00010	Carroll County, KY	3,522
Trimble County Generating Station	21-223-00002	Trimble County, KY	13,424

Intermittent Source Justification

Aside from Clifty Creek's six coal-fired EGUs, there are several smaller emission units that are intermittent and have random operational schedules or emit an insignificant level of SO₂ emissions.

- Four (4) No. 2 fuel oil-fired coal transfer station heaters, installed in 1993:
 - (1) One (1) with a design heat capacity of 1.25 MMBtu/hr for Station 2;
 - (2) One (1) with a design heat capacity of 1.75 MMBtu/hr for Station 5; and,
 - (3) Two (2) each with design heat capacities of 2.75 MMBtu/hr for Stations B3 and B4.
- Stationary emergency fire pumps

Based on information provided by Clifty Creek, the transfer station heaters' actual emissions are estimated to be less than one (1) ton per year as ultra-low sulfur diesel is used to fuel these heaters. Due to the operation of the stationary emergency fire pumps, emissions are estimated to be less than 0.25 tons per year.

All these units are listed in their Part 70 Title V permit as "insignificant activities" as defined in 326 IAC 2-7-1 (21). IDEM did not include these sources in the modeling analysis since their level of activity was insignificant, intermittent, and random in nature.

Initial modeling, using hourly CEM data from 2012-2014, showed high modeled 1-hour SO₂ concentrations. This modeling included emissions before and after Clifty Creek had installed the FGD system. A decrease of 90% or more of SO₂ emissions occurred as a result of the installation and operation of the FGD system. Pursuant to Section 5 of the SO₂ NAAQS Designations Modeling TAD, "sources that implement emission controls during the relevant 3-year period and that becomes subject to an emission limit requiring that control may wish to demonstrate that limit assures attainment, even though the 3-year average emissions level would be estimated to yield NAAQS violations." Further discussion with U.S. EPA Region V indicated that federally enforceable emission limits in place by the final SO₂ area designation date of July 2, 2016, would be recognized as an appropriate assessment of an area's attainment designation. Therefore, Indiana modeled the SO₂ emissions from Clifty Creek after the FGD system became operational to determine the attainment designation. Modeled concentrations for Clifty Creek including the impact of nearby large SO₂ emission sources and temporally varying seasonal SO₂ background concentrations, as outlined in Table 7, are well below the 1-hour SO₂ NAAQS.

Table 7:
Clifty Creek 1-Hour SO₂ Modeling Results

Modeled Source	Modeled Concentration Including Seasonal Hourly Background (µg/m³)	1-Hour SO₂ NAAQS (µg/m³)	Facility Models Attainment
Clifty Creek Generating Station	71.6	196.2	Yes

Indiana recommends that Jefferson County, Indiana be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment performed in accordance with U.S. EPA's updated guidance clearly demonstrates that the facility is not located in an area violating the NAAQS or causing or contributing to a violation of the NAAQS in a nearby area.

Vectren – A.B. Brown Generating Station

The A. B. Brown Generating Station (A.B. Brown) is a coal-fired power plant on the northern bank of the Ohio River in Marrs Township, Posey County, Indiana. The plant is located approximately 8 miles east of Mount Vernon, Indiana, and 5 miles southwest of Evansville, Indiana, just west of the Posey-Vanderburgh County Line. A.B. Brown is owned by Vectren (formerly Southern Indiana Gas and Electric Company). Each of the two coal-fired EGUs has a rated capacity of 265.2 MW. Unit No. 1, constructed in 1974 with a startup date of 1979, consists of one dry bottom, pulverized coal-fired boiler with a design fuel heat input capacity of 2,518 MMBtu/hr. Unit No. 2, also a dry bottom, pulverized coal-fired boiler with a design fuel heat input capacity of 2,530 MMBtu/hr, was constructed in 1979 and had a startup date of 1985.

Due to conditions set forth in the Consent Decree and subsequent U.S. EPA guidance, Indiana relied on AERMOD air dispersion modeling to determine the attainment designation recommendation for the A.B. Brown Station as there is no site-specific air quality monitor associated with this facility. Modeling results were conducted using 4th high maximum daily 1-hour values averaged over the three-year modeled period combined with representative temporally varying seasonal SO₂ background concentrations to indicate whether the area violates the standard or causes or contributes to a violation of the standard.

Indiana used meteorological data from the surface and upper air stations, outlined in Table 8, to conduct modeling for A.B. Brown.

Table 8:
Surface and Upper Air Meteorological Stations

Facility	Surface Met	Upper Air Met
A.B. Brown Generating Station	Evansville, IN NWS	Lincoln, IL NWS

Modeling of A.B. Brown used adjusted (i.e. without upwind major source impacts) temporally varying seasonal background concentrations. The Evansville-Buena Vista monitor data, listed in Table 9, is considered representative background for Vanderburgh County, Indiana. Because A.B. Brown and the modeled inventory sources (see Table 11) are located southwest of the Evansville-Buena Vista monitor, impacts from the southwest direction were removed from the monitoring data. 99th percentile SO₂ concentrations by season (winter, spring, summer and fall) for each hour of the day were calculated for 2012-2014 to determine the temporally varying seasonal SO₂ background, which were used directly in the model.

Table 9:
99th Percentiles for Temporally Varying Seasonal SO₂
Background Values (ppb) for 2012-2014

	Hr 1	Hr 2	Hr 3	Hr 4	Hr 5	Hr 6	Hr 7	Hr 8
Winter	6.00	4.22	3.88	4.27	6.02	4.95	5.25	7.43
Spring	4.99	3.83	4.30	4.34	3.30	4.47	7.75	9.52
Summer	2.71	2.22	1.00	1.00	2.87	3.45	3.34	5.99
Fall	3.46	3.30	2.85	3.52	4.00	4.35	4.80	5.28

	Hr 9	Hr 10	Hr 11	Hr 12	Hr 13	Hr 14	Hr 15	Hr 16
Winter	8.89	11.94	13.62	10.29	14.74	19.17	19.48	19.76
Spring	9.82	9.05	13.37	13.25	15.49	12.02	9.34	10.70
Summer	10.12	12.58	9.14	7.55	7.47	4.65	4.08	6.05
Fall	7.73	11.66	15.88	11.70	11.26	10.28	10.03	9.08

	Hr 17	Hr 18	Hr 19	Hr 20	Hr 21	Hr 22	Hr 23	Hr 24
Winter	16.64	16.70	9.18	6.89	8.01	6.59	6.74	6.22
Spring	13.01	12.93	11.32	8.26	5.59	3.81	5.90	6.10
Summer	7.88	8.56	7.12	2.71	2.72	2.22	2.86	3.40
Fall	10.11	9.85	8.87	8.51	5.70	2.59	3.06	3.31

Meteorological data from the nearest station to the Evansville-Buena Vista monitor, the Evansville, IN NWS station, listed in Table 10, was used to develop temporally varying seasonal SO₂ background values.

Table 10:
Location of the Evansville-Buena Vista SO₂ Monitor and Evansville NWS
Meteorological Station for Background Analysis

SO₂ Monitor and ID #	Monitor Location	Meteorological Station	Station Location	Distance
Evansville-Buena Vista 18-163-0021	38.01° N 87.58° W	Evansville, IN NWS	38.05° N 87.52° W	4.3 miles

Indiana evaluated SO₂ sources within 30 km of A.B. Brown. Posey County, Indiana has two additional sources, listed in Table 11, contributing SO₂ emissions above 250 tpy. 2013 actual emissions for these facilities were modeled to evaluate whether these sources could be causing or contributing to a NAAQS violation of the standard in the area.

Table 11:
Posey County, Indiana: 1-Hour SO₂ Modeling Source Inventories

Source	Source ID	Location	2013 SO₂ Emissions (tpy)
SABIC Innovative Plastics	129-00002	Posey County, IN	5,407
Countrymark Refining and Logistics	129-00003	Posey County, IN	476

Intermittent Source Justification

Aside from A.B. Brown's two coal-fired EGUs, there are several smaller emission units that are intermittent with random operational schedules or emit small amounts of SO₂ emissions.

- One (1) simple-cycle, natural gas-fired combustion turbine, designated as unit ABB No. 3, constructed in 1991, with a design fuel heat input capacity of 897.4 MMBtu/hr (nominal low heating value), utilizing distillate oil (No. 2 fuel oil) as a backup fuel with a CEM system for nitrogen oxides (NO_x) and SO₂, with a water injection system for control of NO_x emissions, exhausting to Stack No. 3.
- One (1) simple cycle, natural gas-fired combustion turbine, designated as unit ABB No. 4, constructed in 2002, with a design fuel heat input capacity of 1,146 MMBtu/hour (maximum high heating value) with inlet fogger for power augmentation during high ambient temperature operation, with CEM system for NO_x and SO₂, with dry low-NO_x combustion, exhausting to Stack No. 4.

Based on 2012-2014 CEM data, ABB No. 3 emitted, on average, less than 650 pounds of SO₂ per year and ABB No. 4 emitted, on average, less than 885 pounds of SO₂ per year. The actual operational hours for the turbines varied each quarter. The maximum number of hours of operation for any year was 435 hours. IDEM did not include these sources in the modeling analysis since their level of activity was insignificant, intermittent, and random in nature.

Specifically Regulated Insignificant Sources

Insignificant activities at A.B. Brown, as covered by 326 Indiana Administrative Code 2-7-1(21), include:

- Two (2) diesel generators not exceeding 1,600 horsepower. The distillate oil-fired emergency generators were installed in 1974 and are rated at 398 boiler horsepower (bhp) each.
- One (1) additional distillate oil-fired fire pump was installed in 1974 and is rated at 200 bhp.

The total emissions from all three units are no more than 0.55 tpy based on a maximum of 500 hours of operation. IDEM did not include these sources in the analysis since their level of activity was insignificant, intermittent, and random in nature.

Initial modeling, using A.B. Brown's hourly CEM data from 2012-2014, showed that modeled 1-hour SO₂ concentrations from A.B. Brown and inventory sources would be above the 1-hour SO₂ NAAQS. After follow-up discussions with A.B. Brown, the company has agreed to modify their current PSD/Title V permit to lower their SO₂ emission's limit for coal-fired EGU No. 1 from 1.2 lbs/MMBtu to 0.8571 lbs/MMBtu, while maintaining the 0.69 lbs/MMBtu limit for Unit No. 2. This equates to emission rates of 3,021.6 lbs/hr for Unit No. 1 and 1,745.7 lbs/hr for Unit No. 2. Both units can never exceed 2,158.2 lbs/hr when operating together. As such, Unit No. 1 cannot operate at full capacity when Unit No. 2 is running at 0.69 lbs/MMBtu. The revised emission's limit for Unit No. 1 would account for a total SO₂ emissions reduction of 2,609.1 lbs/hr. A.B. Brown plans on moving forward with the permit modification request and having controls installed and operational on Unit No. 1 by no later than March 2016 in order to meet the lower SO₂ emission's limit, well in advance of the July 2, 2016 consent decree deadline.

Indiana modeled the proposed SO₂ emission limits recommended by A.B. Brown. Five scenarios were modeled. Modeled concentrations for the worst case scenario (i.e. Unit No. 2 operating at 0.69 lbs/MMBtu and Unit No. 1 operating at 0.164 lbs/MMBtu) added to the temporally varying seasonal SO₂ background concentrations, as outlined in Table 12, are below the 1-hour SO₂ NAAQS.

**Table 12:
A.B. Brown 1-Hour SO₂ Modeling Results**

Modeled Source	Modeled Concentration Including Seasonal Hourly Background (µg/m³)	1-Hour SO₂ NAAQS (µg/m³)	Facility Models Attainment
A.B. Brown Generating Station	196.08	196.2	Yes

Indiana recommends that Posey County, Indiana be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment, performed in accordance with U.S. EPA's updated guidance, demonstrates that the facility is not located in an area violating the NAAQS or causing or contributing to a violation of the NAAQS in a nearby area. Furthermore, limits supported by IDEM's attainment modeling will be incorporated into the applicable permit well in advance of the effective date of designations to ensure ongoing compliance with the 1-hour SO₂ NAAQS.

Northern Indiana Public Service Company – Michigan City Generating Station

The Michigan City Generating Station is a coal and natural gas-fired power plant on the southern shore of Lake Michigan in Michigan Township, LaPorte County, Indiana. The power plant is located at 101 Wabash Street in Michigan City, Indiana. The facility is owned by the Northern Indiana Public Service Company (NIPSCO) and operated by NiSource. The facility consists of one cyclone coal-fired boiler, identified as Boiler 12, with a design heat input capacity of 4,650 MMBtu/hr, an activated carbon injection system for control of mercury emissions permitted in 2014, and an electrostatic precipitator with a flue gas conditioning system for control of particulate matter, exhausting to Stack 4. Construction on Boiler 12 was completed in May 1974. Natural gas can be fired during startup, shutdown, and malfunctions. Boiler 12 has a selective catalytic reduction (SCR) system for NO_x control. A circulating dry scrubber FGD system and a fabric filter baghouse were permitted to be installed on Boiler 12 in 2013.

Due to conditions set forth in the Consent Decree and subsequent U.S. EPA guidance, Indiana relied on AERMOD air dispersion modeling to determine the attainment designation recommendation for the Michigan City Generating Station. The receptor grid for the Michigan City Generating Station was revised in order to account for Lake Michigan and the inability to place a monitor in the water. Therefore, no modeling receptors were placed at locations that lie over Lake Michigan. There is one monitor that measured ambient SO₂ air quality monitoring data in the area through the year 2014. The monitor, as shown in Figure 5 with ID# 18-091-

0005, is located approximately 0.5 km southeast of the Michigan City Generating Station at 341 West 4th Street in Michigan City, Indiana. Monitoring data, as outlined in Table 13, shows the annual 99th percentile 1-hour daily maximum SO₂ values for the years 2012-2014, as well as the 2012-2014 1-hour SO₂ design value. Indiana is including this monitoring data as weight-of-evidence to show that the years 2012-2014 are all well below the standard.

Figure 5:
Michigan City, Indiana Area SO₂ Monitors

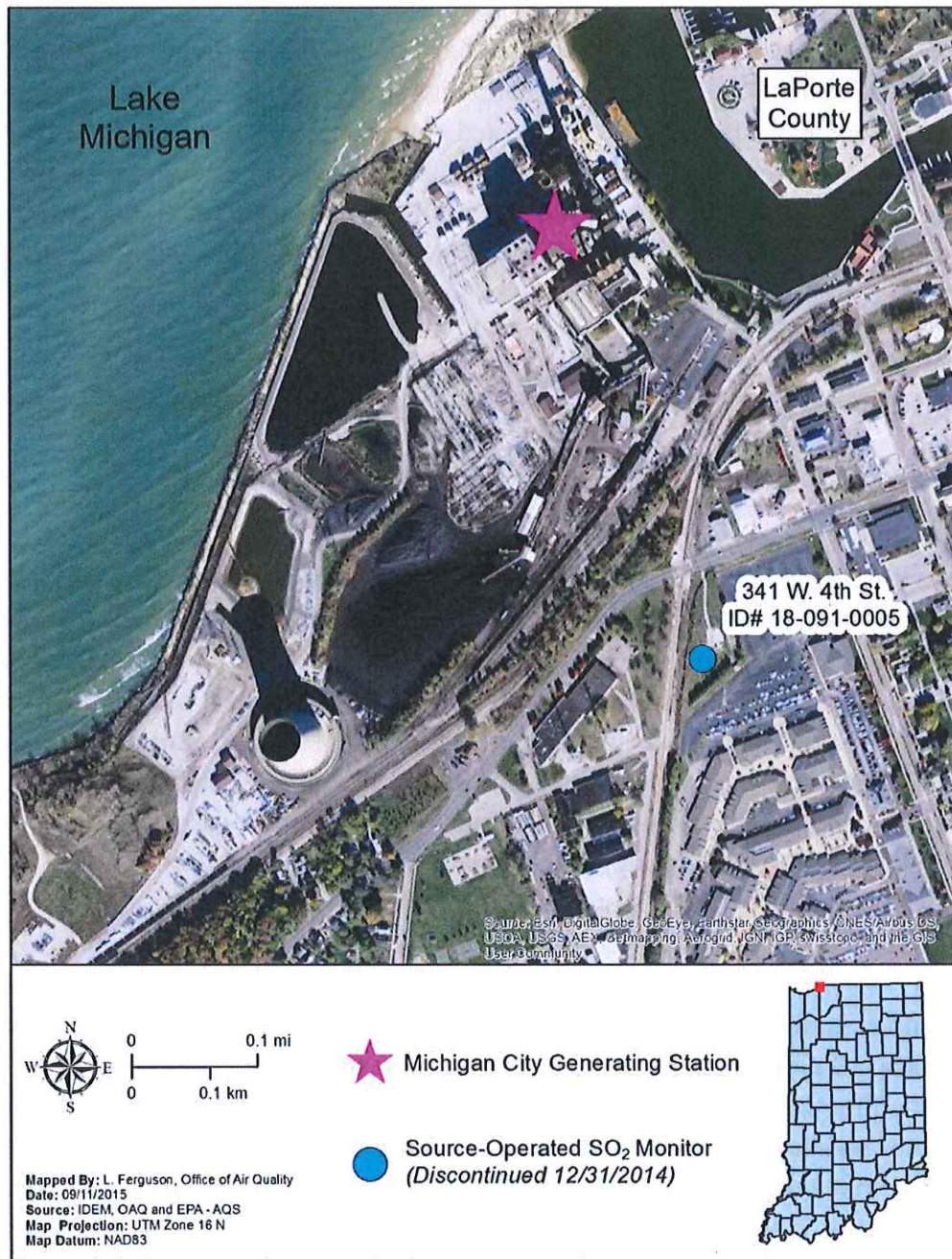


Table 13:
2012-2014 Annual 99th Percentiles and 1-Hour SO₂ Design Value (ppb) for
Monitor ID# 18-091-0005

Location	Monitor ID	Monitor	2012 99th Percentile	2013 99th Percentile	2014 99th Percentile	2012-2014 Design Value
LaPorte County, IN	18-091-0005	Michigan City	21	15*	15	17*

*Incomplete data

Indiana used meteorological data from the surface and upper air stations outlined in Table 14 to conduct modeling for the Michigan City Generating Station. In order to address U.S. EPA Region V's comments on Indiana's consent decree modeling protocol, Indiana processed wind and meteorological parameters from IDEM's Gary-IITRI monitoring station in northern Lake County. The Gary-IITRI meteorological parameters were processed with South Bend data to compile a meteorological dataset representative of the Northwest Indiana area. The Gary-IITRI monitoring location was used with AERSURFACE for determining the first priority surface characteristics. However, since snow depth and precipitation data are not readily available from the Gary-IITRI monitoring site, adjustments to the albedo and Bowen ratio surface characteristics still used the precipitation, soil moisture, and snow depth data during the winter months from the South Bend NWS location.

Table 14:
Surface and Upper Air Meteorological Stations

Facility	Surface Met	Upper Air Met
Michigan City Generating Station	Gary-IITRI monitoring station/South Bend, IN NWS	Lincoln, IL NWS

Modeling of the Michigan City Generating Station used adjusted (i.e. without upwind major source impacts) temporally varying seasonal background concentrations. The ID# 18-091-0005 monitor, listed in Table 15, is considered representative background for LaPorte County, Indiana. 99th percentile SO₂ concentrations by season (winter, spring, summer and fall) for each hour of the day were calculated for 2012-2014 to determine the temporally varying seasonal SO₂ background, which were included directly into the model.

Table 15:
99th Percentiles for Temporally Varying Seasonal Hourly SO₂
Background Values (ppb) for 2012-2014

	Hr 1	Hr 2	Hr 3	Hr 4	Hr 5	Hr 6	Hr 7	Hr 8
Winter	8.00	7.76	7.00	8.77	8.00	8.67	7.00	7.00
Spring	7.85	8.88	8.87	8.85	8.00	8.00	8.85	8.88
Summer	7.00	6.71	6.00	6.00	6.00	7.00	6.00	7.00
Fall	5.69	5.69	6.00	6.66	6.26	5.67	6.71	6.69

	Hr 9	Hr 10	Hr 11	Hr 12	Hr 13	Hr 14	Hr 15	Hr 16
Winter	7.00	8.00	9.00	8.00	8.00	9.00	7.00	8.00
Spring	7.92	7.99	8.00	9.00	7.94	8.00	7.90	6.00
Summer	8.00	8.91	7.92	8.91	7.88	7.00	8.00	8.00
Fall	7.76	8.00	8.00	8.00	8.73	8.54	7.76	6.71

	Hr 17	Hr 18	Hr 19	Hr 20	Hr 21	Hr 22	Hr 23	Hr 24
Winter	7.79	7.00	7.00	8.00	7.56	7.00	6.80	7.00
Spring	6.98	7.00	6.96	7.00	7.00	7.86	8.00	8.00
Summer	8.86	6.00	7.00	6.00	7.00	6.75	6.00	8.00
Fall	5.65	6.28	6.16	6.00	5.60	5.61	5.00	5.00

Meteorological data from the nearest station to the Michigan City monitor, i.e. the Gary-IITRI meteorological station, listed in Table 16, was used to develop temporally varying seasonal SO₂ background values for the Michigan City Generating Station.

Table 16:
Location of the Michigan City SO₂ Monitor and Gary-IITRI
Meteorological Station for Background Analysis

Monitor ID	Monitor Location	Meteorological Station and ID #	Station Location	Distance
18-091-0005	41.72° N 86.91° W	Gary-IITRI 18-089-0022	41.61° N 87.30° W	21.5 miles

The South Bend NWS wind rose plots are shown in Figure 6, and the Gary-IITRI meteorological data site wind rose plots are shown in Figure 7. As shown in a comparison of the two wind roses, the Gary-IITRI wind rose has a higher frequency of northeast and northerly wind directions and southerly wind directions indicating the Gary-IITRI meteorological site is capturing the Lake Michigan lake/land breeze influence. This provides the justification for using

the Gary-IITRI meteorological data for the NIPSCO Michigan City Consent Decree modeling analysis since the NIPSCO facility is located on the Lake Michigan shoreline as shown in Figure 5. Wind speeds are in m/s.

Figure 6:
South Bend Wind Roses 2012-2014

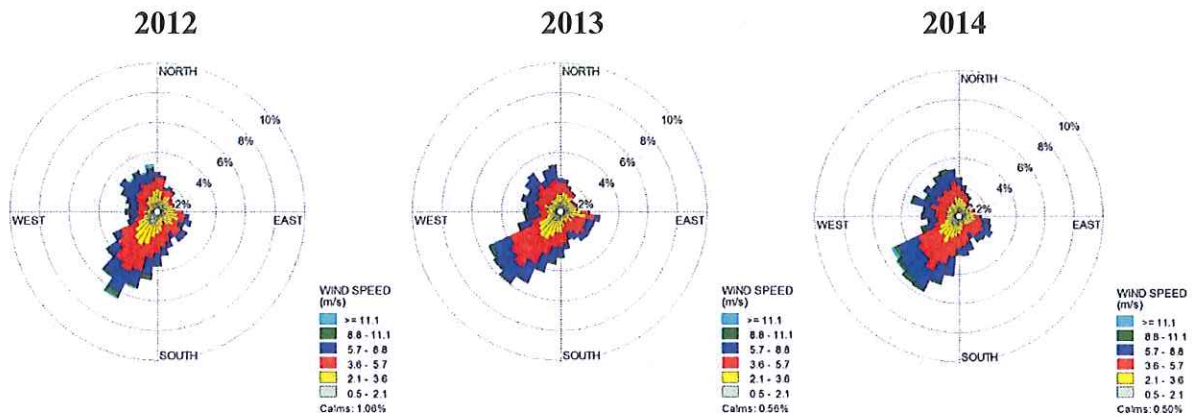
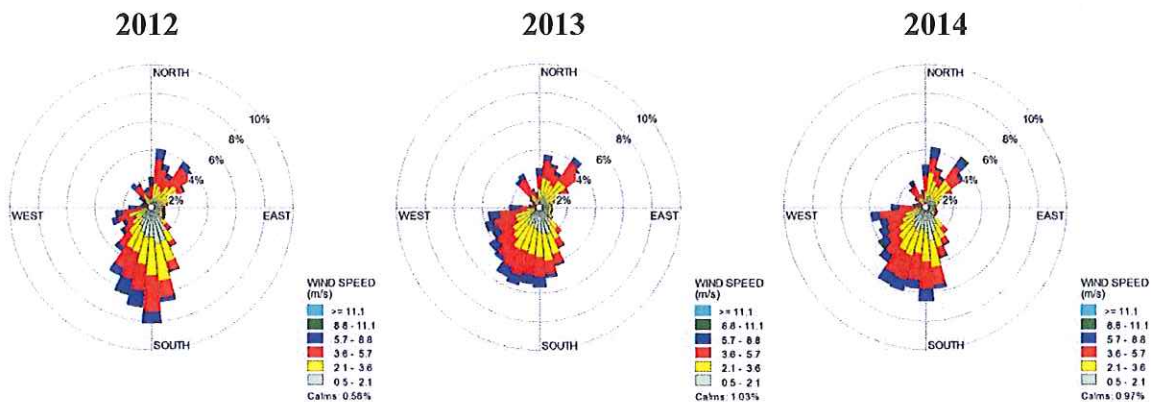


Figure 7:
Gary-IITRI Wind Roses 2012-2014



Indiana evaluated SO₂ sources within 30 km of the Michigan City Generating Station. Porter County, Indiana has two sources, listed in Table 17, contributing SO₂ emissions above 250 tpy. 2013 actual emissions for these facilities were modeled to evaluate whether these sources could be causing or contributing to a NAAQS violation in the area.

**Table 17:
Porter County, Indiana: 1-Hour SO₂ Modeling Source Inventories**

Source	Source ID	Location	2013 SO₂ Emissions (tpy)
NIPSCO Bailly Station	127-00002	Porter County	2,474
ArcelorMittal Burns Harbor	127-00001	Porter County	13,864

Intermittent Source Justification

Aside from Michigan City Generating Station's coal-fired boiler, there are several smaller emission units that are intermittent with random operational schedules or emit small amounts of SO₂ emissions.

- One (1) natural gas-fired auxiliary boiler, identified as AUX1, rated at 109 MMBtu/hr, constructed in 2003, equipped with low NO_x burners, exhausting to Stack AUX1, with a CEMS for NO_x.

Boiler AUX1 operated 2,062 hours in 2013, the highest annual operating hours of any of the last three years (i.e. 2012-2014). Based on these hours of operation, Boiler AUX1 emitted approximately 134.88 pounds of SO₂ in 2013. Since the total annual SO₂ emissions were very low from this auxiliary boiler, IDEM did not include this emission source in the modeling analysis.

Specifically Regulated Insignificant Activities

Insignificant activities at Michigan City Generating Station, as covered by 326 Indiana Administrative Code 2-7-1(21), include:

- One (1) 480,000 British thermal unit (BTU) boiler located in the Gate House, constructed in 1964.
- One (1) 297,000 BTU boiler located in the Relay House (Substation Bldg. #G15), constructed in 1953.

Due to the fact that SO₂ emissions from these types of sources are typically very low and the boilers have a heat input capacity of less than 1 MMBtu/hr, IDEM did not include these emission sources in the modeling analysis.

Modeling, using Michigan City Generating Station's hourly CEM data from 2012-2014, showed that modeled 1-hour SO₂ concentrations from the Michigan City Generating Station and inventory sources, listed in Table 17, would be below the 1-hour SO₂ NAAQS. Modeled concentrations for the Michigan City Generating Station when added to the temporally varying seasonal SO₂ background concentrations, as outlined in Table 18, are well below the 1-hour SO₂ NAAQS.

**Table 18:
Michigan City Generating Station 1-Hour SO₂ Modeling Results**

Modeled Source	Modeled Concentration Including Seasonal Hourly Background (µg/m³)	1-Hour SO₂ NAAQS (µg/m³)	Facility Models Attainment
Michigan City Generating Station	169.9	196.2	Yes

Indiana recommends that LaPorte County, Indiana be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment performed in accordance with U.S. EPA's updated guidance clearly demonstrates that the facility is not located in an area violating the NAAQS or causing or contributing to a violation of the NAAQS in a nearby area.

American Electric Power – Rockport Generating Station

The Rockport Generating Station (Rockport Station) is a coal-fired power plant located along the Ohio River in Ohio Township, Spencer County, Indiana. The power plant is located near Rockport, Indiana along U.S. Route 231, approximately one mile north of the William H. Natcher Bridge spanning the Ohio River. The facility is owned by Indiana Michigan Power, a unit of AEP. Each of the two coal-fired electric generating units has a rated capacity of 12,374 MMBtu/hr. The boilers consist of two dry-bottom, pulverized coal-fired opposed wall boilers, identified as units MB1 and MB2, both constructed in 1977 with startup dates of 1984 and 1989. Emissions from MB1 and MB2 are exhausted through a common stack, Stack CS012. The facility also has two No. 2 fuel oil-fired boilers, Auxiliary Boiler 1 and Auxiliary Boiler 2, constructed in 1977 with a startup date of 1983 and each with a design heat input capacity of 603 MMBtu/hr, both exhausting through Stack AB12.

Due to conditions set forth in the Consent Decree and subsequent U.S. EPA guidance, Indiana relied on AERMOD air dispersion modeling to determine the attainment designation recommendation for the Rockport Station as there is no site-specific air quality monitor associated with this facility. Modeling results were conducted using 4th high maximum daily 1-hour values averaged over the three-year modeled period, combined with representative temporally varying seasonal SO₂ background concentrations to indicate whether the area violates the standard or causes or contributes to a violation in a nearby area.

Indiana used meteorological data from the surface and upper air stations outlined in Table 19 to conduct modeling for the Rockport Station.

**Table 19:
Surface and Upper Air Meteorological Stations**

Facility	Surface Met	Upper Air Met
Rockport Generating Station	Evansville, IN NWS	Lincoln, IL NWS

Modeling for the Rockport Station used adjusted (i.e. without upwind major source impacts) temporally varying seasonal background concentrations. The Evansville-Buena Vista SO₂ monitor data, listed in Table 20, is considered representative background for Spencer County, Indiana. 99th percentile SO₂ concentrations by season (winter, spring, summer and fall) for each hour of the day were calculated for 2012-2014 to determine the temporally varying seasonal SO₂ background, which was included directly into the model.

**Table 20:
99th Percentiles for Temporally Varying Seasonal Hourly SO₂
Background Values (ppb) for 2012-2014**

	Hr 1	Hr 2	Hr 3	Hr 4	Hr 5	Hr 6	Hr 7	Hr 8
Winter	6.00	4.25	3.81	4.20	5.75	4.76	5.66	7.41
Spring	4.48	3.87	3.57	4.06	2.91	3.31	4.47	8.25
Summer	2.37	2.38	1.00	1.00	3.60	3.90	3.83	4.26
Fall	2.23	2.28	2.22	3.20	3.54	3.00	3.99	5.26

	Hr 9	Hr 10	Hr 11	Hr 12	Hr 13	Hr 14	Hr 15	Hr 16
Winter	8.86	10.80	12.58	10.87	14.64	19.51	19.33	19.31
Spring	8.36	8.89	13.01	11.98	8.85	11.87	10.46	12.29
Summer	5.55	12.12	8.41	8.80	5.72	4.40	4.81	5.27
Fall	7.56	11.32	11.34	11.68	10.07	10.39	7.16	7.79

	Hr 17	Hr 18	Hr 19	Hr 20	Hr 21	Hr 22	Hr 23	Hr 24
Winter	15.65	17.13	9.25	10.40	8.60	8.35	6.29	6.12
Spring	12.28	13.04	11.68	8.29	5.26	3.81	5.76	6.06
Summer	6.35	9.76	7.11	4.74	4.04	2.21	3.04	1.00
Fall	10.68	10.11	6.67	4.68	4.42	2.59	2.80	2.79

The modeling analysis used temporally varying seasonal background values taken from the Evansville-Buena Vista SO₂ monitor located in Evansville, Vanderburgh County, Indiana. 1-hour SO₂ impacts from the southeast direction were removed from the monitoring data because the Rockport Station and the modeled inventory sources are located southeast of the monitor.

Meteorological data from the nearest station to the Evansville-Buena Vista monitor, i.e. the Evansville NWS station, listed in Table 21, was used for 1-hour SO₂ background values for the Rockport Station.

Table 21:
Location of the Evansville-Buena Vista SO₂ Monitor and Evansville NWS
Meteorological Station for Background Analysis

SO₂ Monitor and ID #	Monitor Location	Meteorological Station	Station Location	Distance
Evansville-Buena Vista 18-063-0021	38.01° N 87.58° W	Evansville NWS Station	38.05° N 87.52° W	4.3 miles

Indiana evaluated SO₂ sources within 30 km of the Rockport Station. Warrick County, Indiana has three additional sources contributing SO₂ emissions above 250 tpy. Four SO₂ emission sources in the State of Kentucky were also included in the modeling analysis to determine possible impacts. 2013 actual emissions for these facilities, listed in Table 22, were modeled to evaluate whether these sources could be causing or contributing to a NAAQS violation in the area.

Table 22:
Warrick County, Indiana and Daviess and Hancock Counties, Kentucky:
1-Hour SO₂ Modeling Source Inventories

Source	Source ID	Location	2013 SO ₂ Emissions (tpy)
ALCOA Warrick Power Plant	18-173-00002	Warrick County, IN	5,699
ALCOA Warrick Operations	18-173-00007	Warrick County, IN	3,853
SIGECO Culley	18-173-00001	Warrick County, IN	1,948
Big Rivers Electric Corp	21-091-00003	Hancock County, KY	8,146
Owensboro Municipal Utilities	21-059-00027	Daviess County, KY	8,064
Century Aluminum of KY	21-091-00004	Hancock County, KY	2,262
Owensboro Grain Co.	21-059-00039	Daviess County, KY	382

Intermittent Source Justification

Aside from AEP Rockport Station's two coal-fired Main Boilers, MB1 and MB2, there are several smaller emission units that are intermittent with random operating schedules or emit small amounts of SO₂ emissions.

- Two (2) No. 2 fuel oil-fired boilers, identified as Auxiliary Boiler 1 and Auxiliary Boiler 2, constructed in 1977 with a startup date of 1983, each with a design heat input capacity of 603 MMBtu/hr, both exhausting through Stack AB12.
- Three (3) No. 2 fuel oil-fired emergency diesel generators, identified as DG1, DG2, and DG3, each with a design heat input capacity of 25.16 MMBtu/hr.

The highest annual operating hours for Auxiliary Boiler 1 and Auxiliary Boiler 2, during the last three years, 2012-2014, were 149 hours and 108 hours, respectively. In 2014, annual SO₂ emissions from both auxiliary boilers totaled 0.4 tpy. Emergency diesel generators DG1, DG2, and DG3 are restricted to operating no more than 780 hours per twelve (12) consecutive month period when main boilers MB1 and MB2 are in operation. In 2014, annual SO₂ emissions from the emergency diesel generators totaled 0.02 tpy. IDEM did not include these sources in the modeling analysis since their level of activity was insignificant, intermittent, and random in nature and annual emissions were well below 1 tpy.

Specifically Regulated Insignificant Activities

Insignificant activities at Rockport Station, as covered by 326 Indiana Administrative Code 2-7-1(21), include:

- Six (6) No. 2 fuel oil-fired space heaters, identified as WHU-5, WHU-6, WHU-7, WHU-8, WHU-9, and WHU-10 with design heat input capacities of 4.5 MMBtu/hr, 3.0 MMBtu/hr, 2.75 MMBtu/hr, 3.5 MMBtu/hr, 4.5 MMBtu/hr, and 2.2 MMBtu/hr, respectively.
- Two (2) No. 2 fuel oil-fired space heaters, identified as WHU-1 and WHU-2, each with design heat input capacities of 1.1 MMBtu/hr.

Since the total annual SO₂ emissions from these insignificant activities were not reported through Indiana's Emission Inventory Tracking System (EMITS) and are not expected to be significant, IDEM did not include these emission sources in the modeling analysis.

Modeling, using Rockport Station's hourly CEM data from 2012-2014, showed that modeled 1-hour SO₂ concentrations from the Rockport Station and inventory sources would be below the 1-hour SO₂ NAAQS. Modeled concentrations for the Rockport Station, when added to the temporally varying seasonal SO₂ background concentrations, as outlined in Table 23, are well below the 1-hour SO₂ NAAQS.

**Table 23:
Rockport Generating Station 1-Hour SO₂ Modeling Results**

Modeled Source	Modeled Concentration Including Seasonal Hourly Background (µg/m³)	1-Hour SO₂ NAAQS (µg/m³)	Facility Models Attainment
Rockport Generating Station	152.1	196.2	Yes

Indiana recommends that Spencer County, Indiana be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment performed in accordance with U.S. EPA's updated guidance clearly demonstrates that the Rockport Station is not located in an area violating the NAAQS or causing or contributing to a violation of the NAAQS in a nearby area.

Summary of Recommendations

Based on the results of this evaluation, Indiana recommends that Gibson, Jefferson, LaPorte, Posey, and Spencer counties be designated as attainment under the 2010 1-hour primary SO₂ standard. This recommendation is based on the fact that Indiana's assessment, performed in accordance with U.S. EPA's updated guidance, clearly demonstrates that these facilities, based on 2012-2014 quality-assured monitoring data and ambient air quality modeling, are not located in an area currently violating the NAAQS or causing or contributing to a violation of the NAAQS in a nearby area.