APPENDIX B

INDIANA 1-HOUR SULFUR DIOXIDE

BACKGROUND DETERMINATION

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Indiana's 1-Hour SO_2 Background Determination

U.S. EPA revised the SO_2 National Ambient Air Quality Standard (NAAQS) by instituting a 1-hour standard of 75 parts per billion (ppb). Therefore, an analysis was necessary to determine ambient 1-hour SO_2 background concentrations representative for all regions in the state. This determination is needed in order to make attainment designations and attainment demonstrations and perform New Source Review (NSR) and Prevention of Significant Deteoriation (PSD) modeling. Indiana has reviewed the 1-hour SO_2 monitoring and meteorological data from 2011 through 2013 to calculate representative ambient 1-hour SO_2 background concentrations. U.S. EPA's "Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions, April 2014" was followed to calculate the background concentrations in order to eliminate overly conservative cumulative impacts from nearby major SO_2 emission sources when performing air quality dispersion modeling.

Overview

Indiana has twenty-one SO_2 monitors located throughout the state. As of the end of the 2013 monitoring season, six of the SO_2 monitors recorded 1-hour design values (99th percentile) above the 1-hour SO_2 NAAQS of 75 ppb. These six monitors reside in the following five counties: Daviess, Marion, Morgan, Pike and Vigo. Vigo County has two SO_2 monitors which measured concentrations above the 1-hour SO_2 NAAQS. For this analysis, the Vigo County controlling monitor (Fort Harrison Road) was analyzed. Table 1 shows the 99th percentile values for the years 2011, 2012 and 2013 and the 2011-2013 1-hour SO_2 design values.

Table 1
1-Hour SO_2 Design Values for All SO_2 Monitors in Indiana 2011-2013

County	Monitor ID	2011 99th Percentile	2012 99th Percentile	2013 99th Percentile	2011-2013 Design Value
Daviess	18-027-0002	**100**	**78**	**150**	**109**
Marion	18-097-0057	63	**92**	**78**	**78**
Marion	18-097-0073	60	56	42	53
Marion	18-097-0078	60	61	70	64
Morgan	18-109-1001	**96**	**82**	64	**81**
Pike	18-125-0005	**119**	**140**	**169**	**143**
Vigo	18-167-0018	**95**	73	**79**	**82**
Vigo	18-167-1014	**139**	**128**	**103**	**123**

N/O Not operational
N/A Not available

Data Retrieval

Monitoring data for all the SO_2 monitors in the state were retrieved from U.S. EPA's AirData database. The concentration data was supplied for each hour and day of every month from 2011 through 2013. In the event that a monitor was moved during the retrieval period, the data from each site was used to determine ambient background concentrations. Meteorological data was collected in order to correlate the wind directions and concentrations for each hour of each day of every month. Meteorological data was either collected at the SO_2 monitor, a monitor near the monitoring site or the nearest National Weather Service (NWS) station or Automated Surface Observation Station (ASOS). This data was collected and distributed by the Midwest Regional Climate Center (mrcc.isws.illinois.edu). The nearest meteorological data site to each of the SO_2 monitor in the state is summarized below.

Table 2
Locations of SO_2 Monitors and Meteorological Stations for Background Analysis

County	Monitor ID	Monitor Location	Meteorological Station	Station Location	Distance
Daviess	18-027-0002	38.57° N 87.21° W	Evansville - NWS station	38.05° N 87.52° W	39.6 miles
Marion	18-097-0057	39.75° N 86.19° W	Harding St. monitor and meteorological station	39.75° N 86.19° W	0 mile
Marion	18-097-0073	39.79° N 86.06° W	Harding St. monitor and meteorological station	39.75° N 86.19° W	7.4 miles
Marion	18-097-0078	39.81° N 86.11° W	Harding St. monitor and meteorological station	39.75° N 86.19° W	5.9 miles
Morgan	18-109-1001	39.52° N 86.39° W	Indianapolis NWS station	39.73° N 86.27° W	15.8 miles
Pike	18-125-0005	38.52° N 87.25° W	Evansville NWS station	38.05° N 87.52° W	35.6 miles
Vigo	18-167-0018	39.51° N 87.41° W	Terre Haute NWS station	39.46° N 87.30° W	6.8 miles
Vigo	18-167-1014	39.49° N 87.40° W	Terre Haute NWS station	39.46° N 87.30° W	5.7 miles

Methodology for Determining Ambient SO_2 Background Concentrations

Each set of SO_2 data was paired with the corresponding meteorological conditions for every hour of the year in order to determine the wind direction for each hour that SO_2 concentrations were recorded. Initially, data was processed in chronological order with daily and seasonal trends analyzed. This analysis showed diurnal trends when higher SO_2 concentrations occurred.

Once data for all SO_2 monitors in the state were processed, data was re-formatted in order to calculate the hourly-seasonal 99th percentile averages over a 3-year period, as detailed in EPA's draft "Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions: Appendix A. Section 8 – Background Concentrations". The 99th percentile concentrations based on each hour of the day and each of the four seasons of the year were calculated for each SO_2 monitor.

In order to calculate the seasonal hourly 99th percentile average, the data was grouped by the seasonal months. Spring was represented by concentrations recorded in March, April and May; summer represented by June, July and August; fall represented by September, October and November and winter represented by December, January and February. Once this data was grouped by seasons, the 99th percentile was calculated for each hour of the day, making twenty-four separate 99th percentiles for each SO_2 monitoring site per season. The average of the twenty-four 99th percentiles over the three-year period represents the hourly-seasonal 1-hour SO_2 background.

The initial analysis created pollution roses to determine the wind directions from which the highest SO_2 concentrations were impacting each SO_2 monitor. This analysis helped to identify the nearest upwind SO_2 emission sources impacting the SO_2 monitor. With those wind directions identified, the SO_2 concentrations (10 ppb and above) resulting from the upwind SO_2 emission sources were removed from the analysis, in order to calculate a representative ambient SO_2 background concentration for each SO_2 monitor in the state. This analysis helps to prevent double-counting SO_2 emission source impacts in an air quality modeling analysis.

The results of the seasonal analysis can be found below in Table 3 and are divided into geographical regions of the states. Most monitors show higher SO_2 concentrations in the winter. By calculating the ambient SO_2 background values, as taken from the draft EPA guidance methodology, the resulting 99th percentile concentrations fall within a range of 7.3 ppb to 9.9 ppb with the average concentration over the season from the SO_2 monitoring site with the highest design value from each county being 8.2 ppb.

Table 3
99th percentiles for 1-Hour SO_2 Background Values (ppb) for 2011-2013
(without upwind major source impacts)

	Vigo Co.	Marion Co.	Morgan Co.	Daviess Co.	Pike Co.
	18-167-1014	18-097-0057	18-109-1001	18-027-0002	18-125-0005
1-Hour DV ('11-'13)	123	78	81	109	143
Hourly Ave	3.5	1.9	1.8	2.4	3.5
Hourly 99th %	8.8	8.6	9.4	8.6	9.9
Winter 99th %	9.3	8.1	8.8	8.8	10.5
Spring 99th %	7.9	8.3	7.9	7.8	10.1
Summer 99th %	8.4	7.9	7.9	7.6	9.0
Fall 99th %	8.1	8.2	7.2	6.6	8.4

Summary

Calculations to determine 1-hour SO_2 background concentrations calculations were made according to U.S. EPA "Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions: Appendix A. Section 8 – Background Concentrations". This approach calls for the removal of SO_2 concentrations emitted from SO_2 emission sources directly upwind of a SO_2 monitor. This allows for more representative ambient background values to be determined, not overly conservative values that could possibly double-count direct source impact and background concentrations in air quality modeling.

As of the end of the 2013 monitoring season, there were twenty-one SO_2 monitors throughout the state with six of the SO_2 monitors recording 1-hour design values above the 1-hour SO_2 NAAQS of 75 ppb. These six monitors reside in the following five counties: Daviess, Marion, Morgan, Pike and Vigo (two monitors). The U.S. EPA guidance approach for calculating SO_2 background values showed the maximum hourly-seasonal 99th percentiles for all SO_2 monitors over the latest 3 years of available SO_2 monitoring ranged between 7.3 ppb to 9.9 ppb

Tables, Charts and Graphs of 1-hour SO_2 Concentrations

HARDING STREET

Marion County SO_2 Monitor

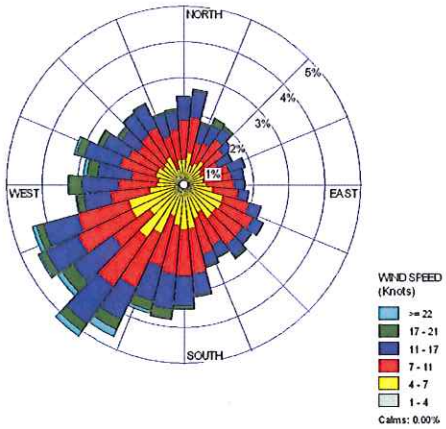
2011 – 2013

Harding Street SO_2 Concentration Summary (2011-2013)

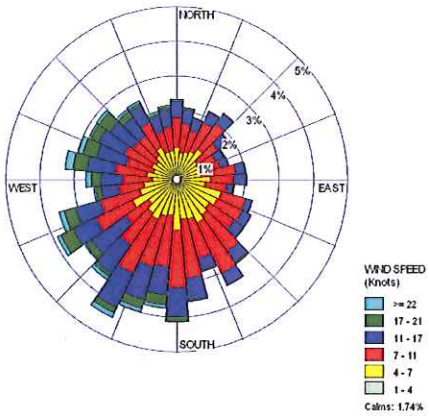
Site ID 18-097-0057	2011	2012	2013
Design Value (3 yr-ending)	80 ppb	86 ppb	78 ppb
Maximum Concentration	129 ppb	209 ppb	113ppb
Average Concentration	2.1 ppb	2.7 ppb	2.9 ppb

Indianapolis Airport National Weather Service Wind Roses

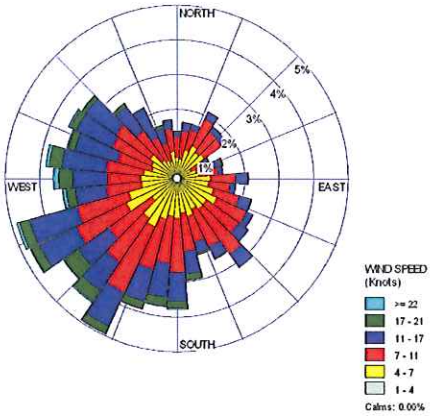
Indianapolis Wind Rose 2011



Indianapolis Wind Rose 2012



Indianapolis Wind Rose 2013

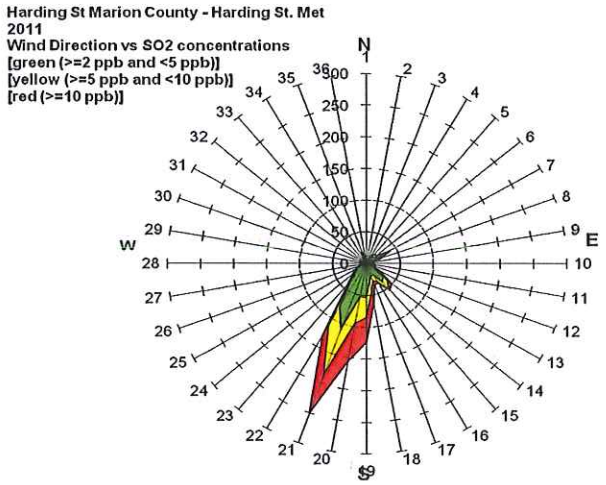


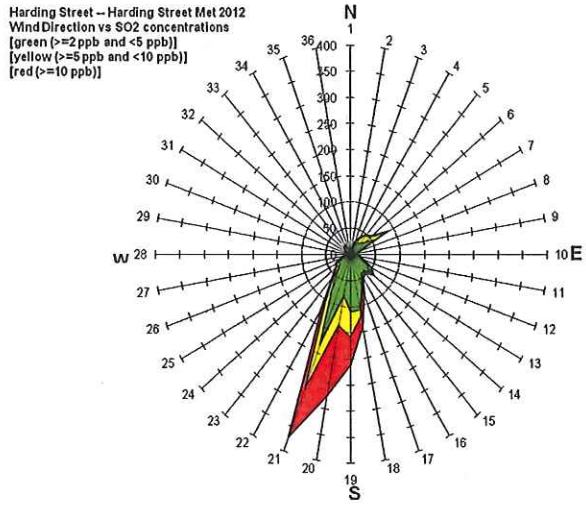
EPA's Seasonal and Temporal SO_2 Background Determination

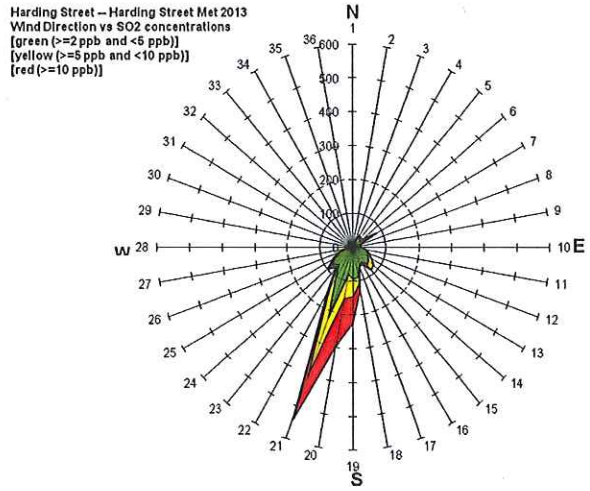
Marion County	Concentrations with all values (ppb)	Concentrations without upwind sources (ppb)
1-Hour DV (11-13)	78	78
Hourly Ave	2.8	1.9
Hourly Ave 99th	25.7	8.6
Winter 99th	19.7	8.1
Spring 99th	27.2	8.3
Summer 99th	19.1	7.9
Fall 99th	29.2	8.2

Harding Street Pollution Roses

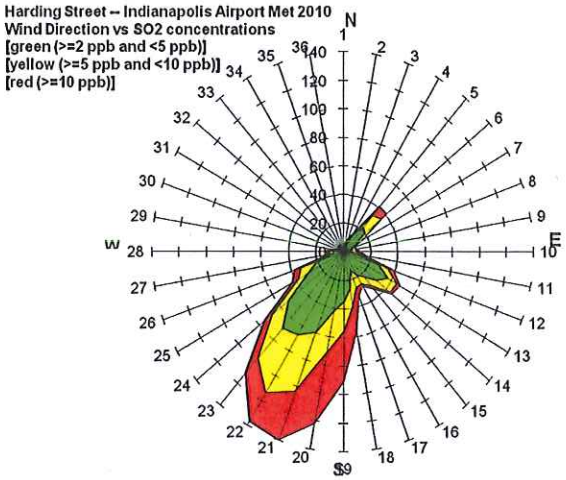
Harding Street Meteorology

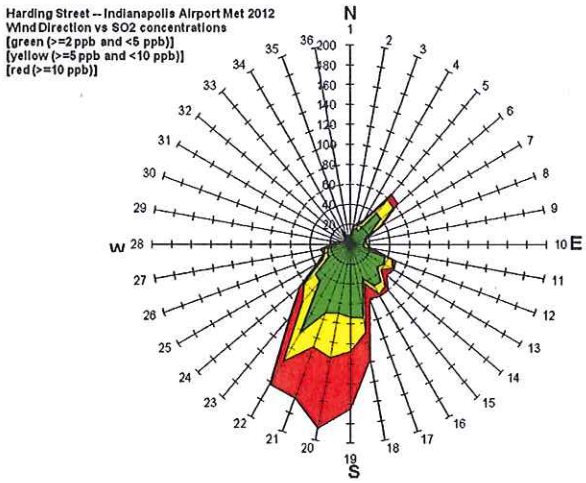


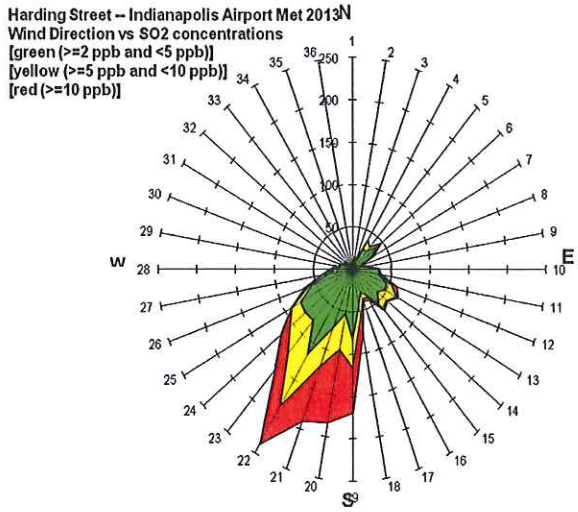


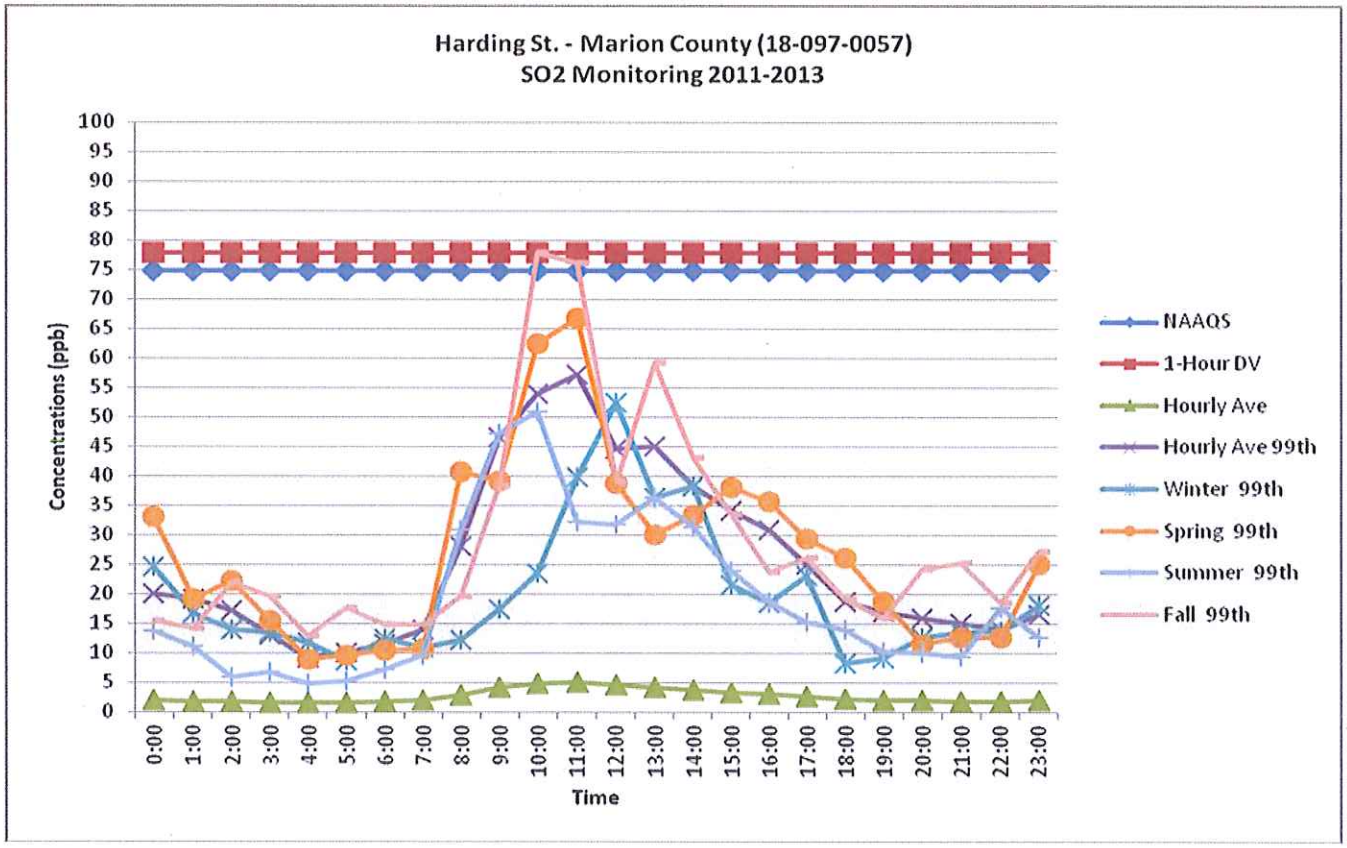


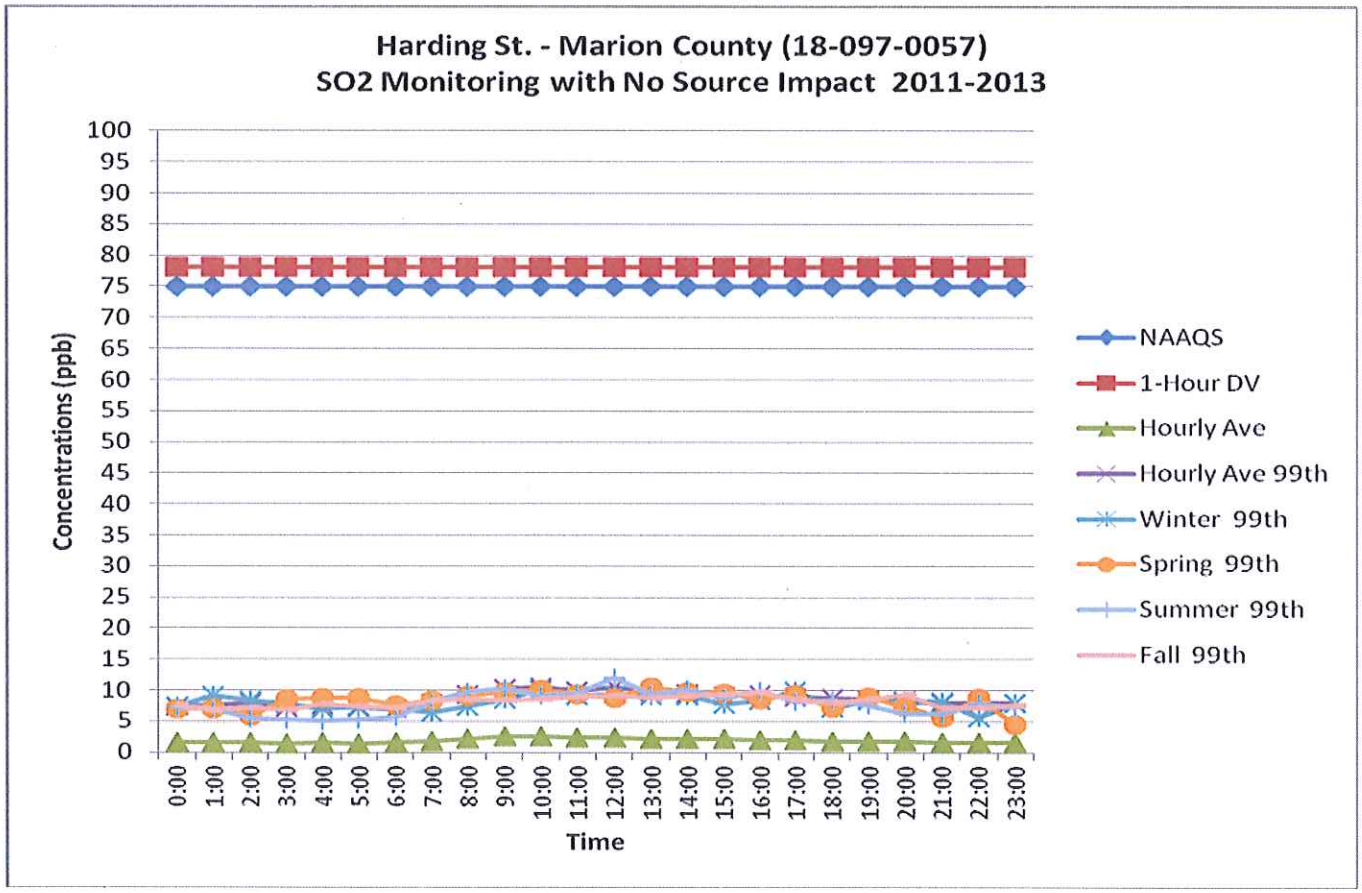
Indianapolis Airport NWS Meteorology








Harding St. - Marion County (18-097-0057)
SO2 Monitoring 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th


Harding St. - Marion County (18-097-0057)
SO2 Monitoring with No Source Impact 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th

IPL Centerton Grade School

Morgan County SO_2 Monitor

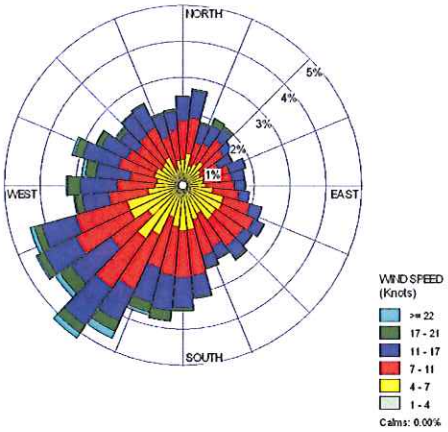
2011 – 2013

IPL Centerton Grade School SO_2 Concentration Summary (2011-2013)

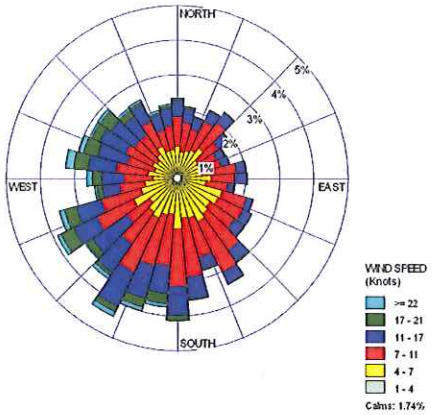
Site ID 18-109-1001	2011	2012	2013
Design Value (3 yr-ending)	100 ppb	94 ppb	81 ppb
Maximum Concentration	143 ppb	147 ppb	71 ppb
Average Concentration	3.4 ppb	2.4 ppb	1.8 ppb

Indianapolis Airport National Weather Service Wind Roses

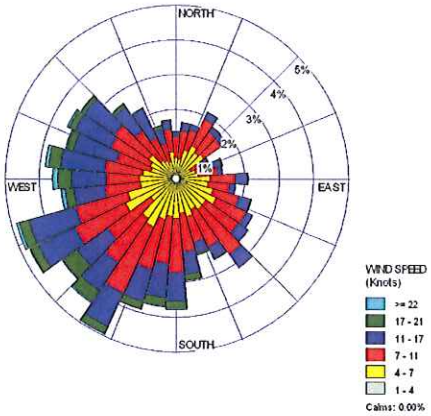
Indianapolis Wind Rose 2011



Indianapolis Wind Rose 2012



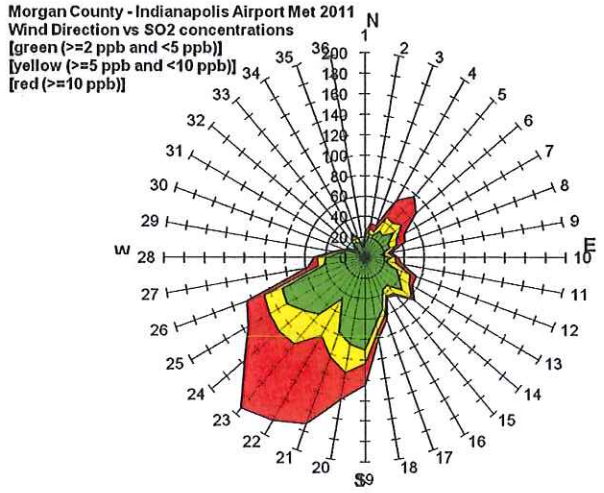
Indianapolis Wind Rose 2013

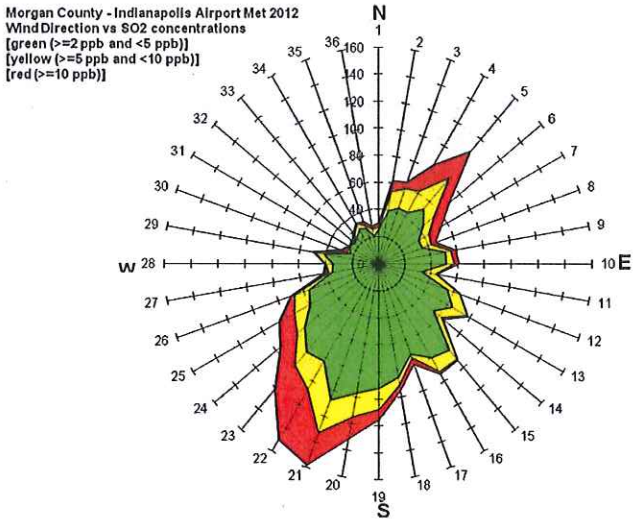


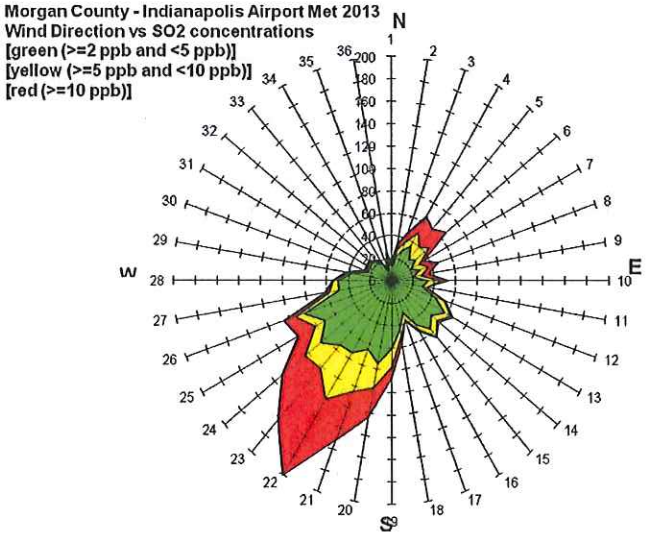
EPA's Seasonal and Temporal 1-Hour SO_2 Background Determination

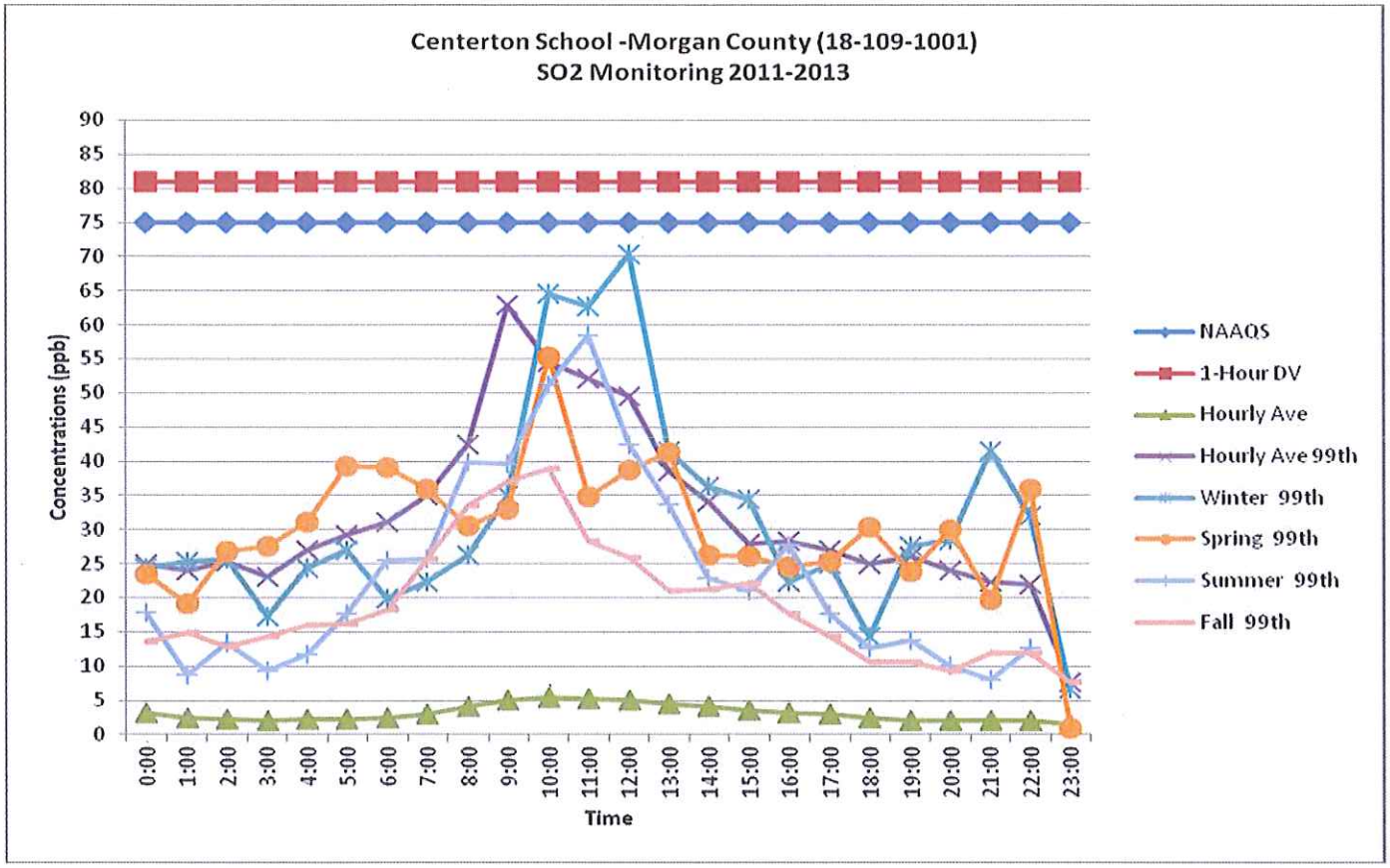
Morgan County	Concentrations with all values (ppb)	Concentrations without upwind sources (ppb)
1-Hour DV (11-13)	81	81
Hourly Ave	3.1	1.8
Hourly Ave 99th	31.8	9.4
Winter 99th	31.5	8.8
Spring 99th	29.9	7.9
Summer 99th	23.5	7.9
Fall 99th	18.9	7.2

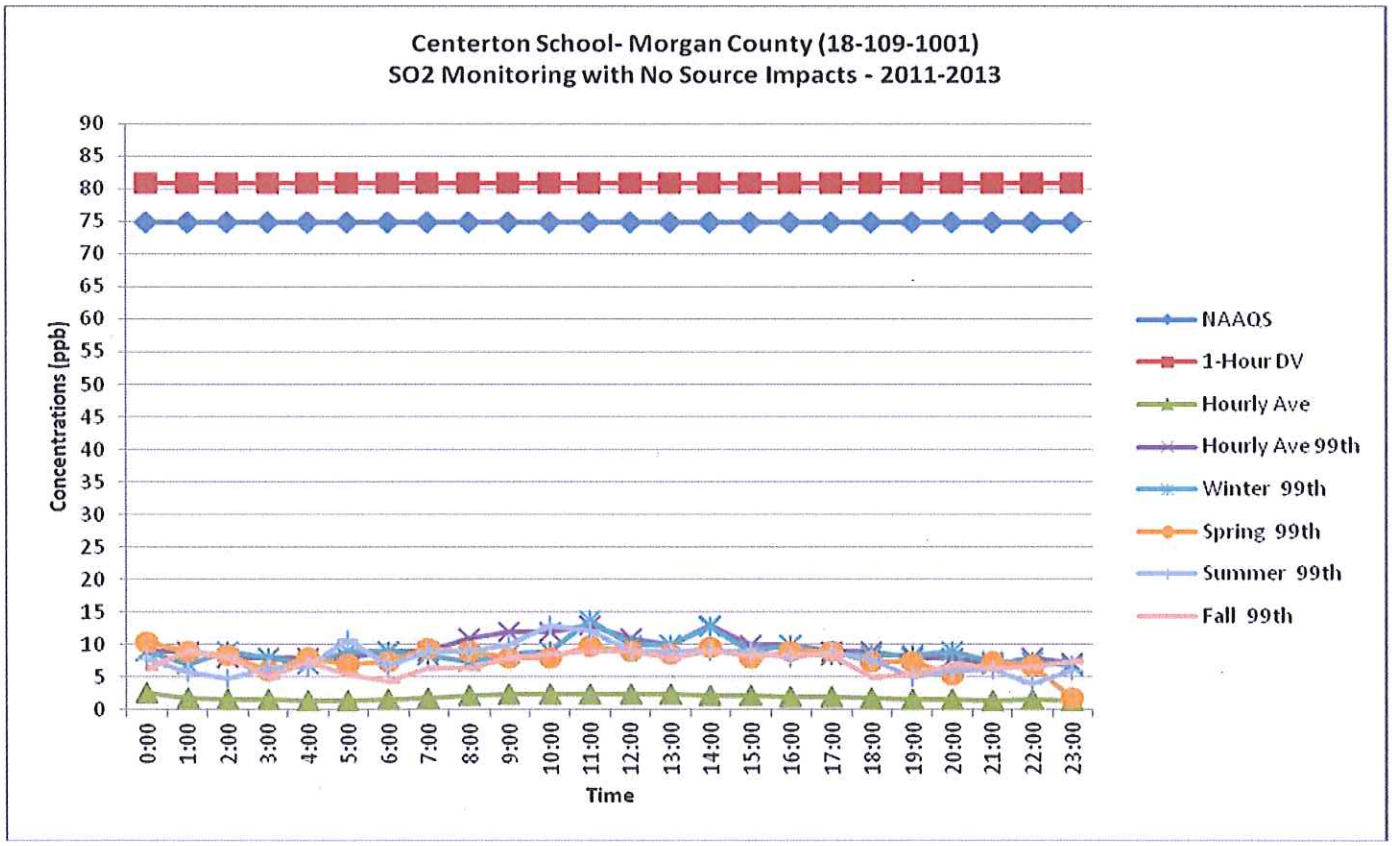
Morgan County/Indianapolis Airport Pollution Roses








Centerton School -Morgan County (18-109-1001)
SO2 Monitoring 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th


Centerton School- Morgan County (18-109-1001)
SO2 Monitoring with No Source Impacts - 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th

Fort Harrison Road - Terre Haute

Vigo County SO_2 Monitor

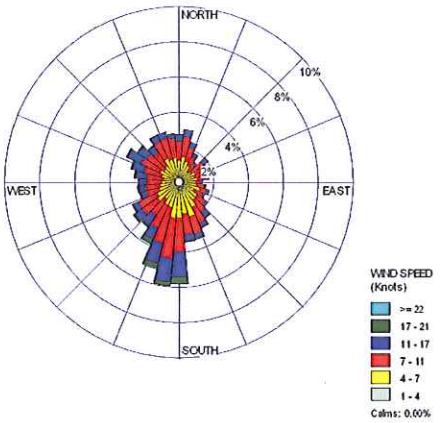
2011 – 2013

Fort Harrison Road SO_2 Concentration Summary (2011-2013)

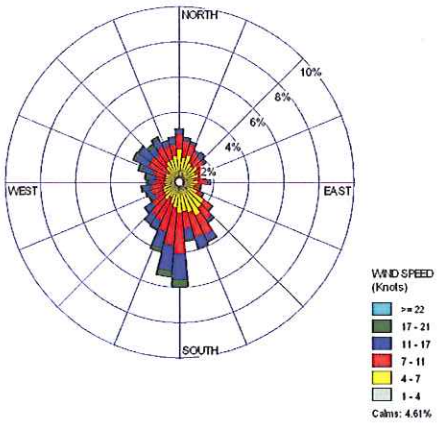
Site ID 18-167-1014	2011	2012	2013
Design Value 3 yr -ending	150 ppb	145 ppb	123 ppb
Maximum Concentration	208 ppb	150 ppb	151 ppb
Average Concentration	5.2 ppb	4.7 ppb	4.0 ppb

Terre Haute Airport-National Weather Service Wind Roses

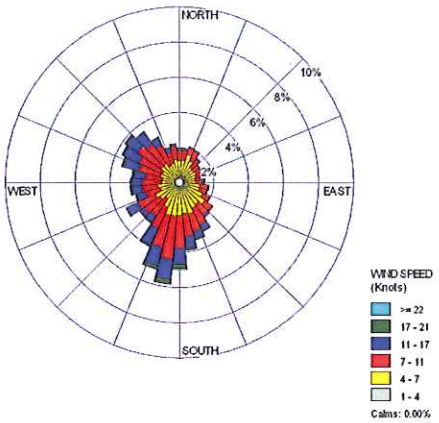
Terre Haute Wind Rose 2011



Terre Haute Wind Rose 2012



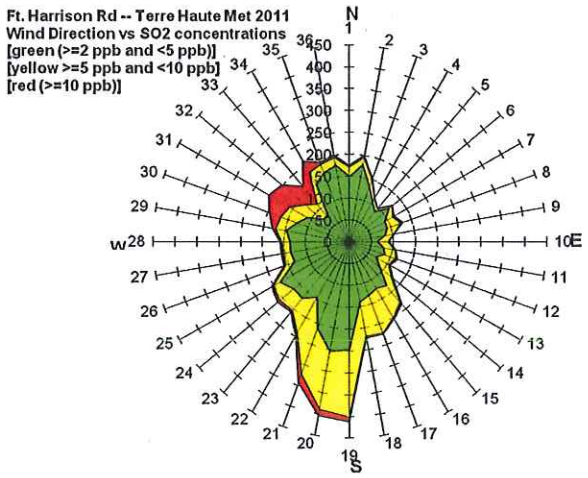
Terre Haute Wind Rose 2013

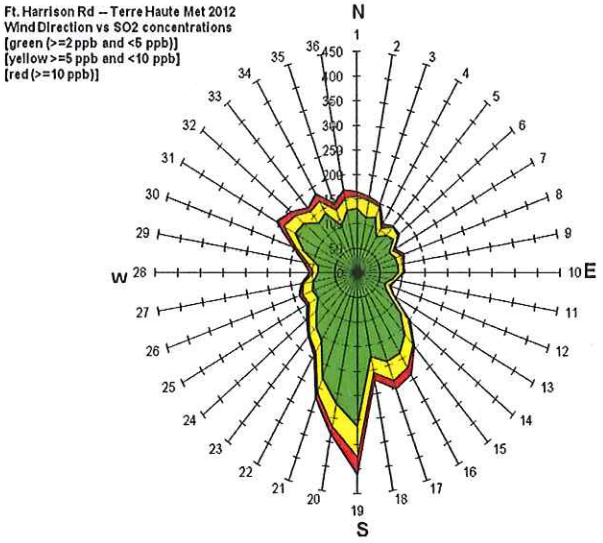


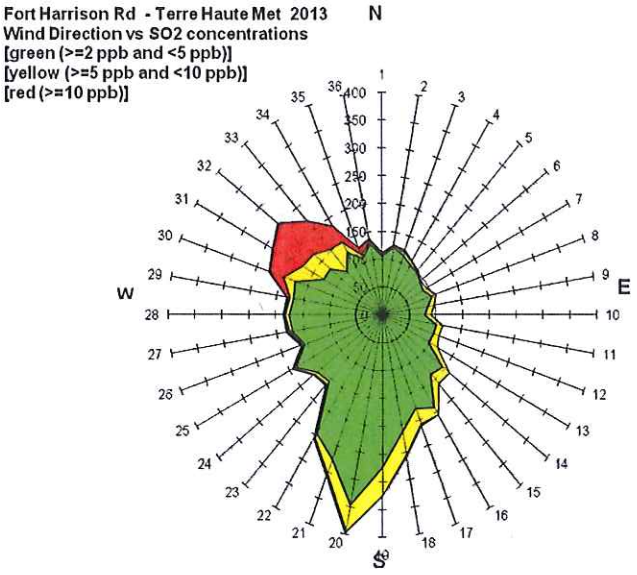
EPA's Seasonal and Temporal 1-Hour SO_2 Background Determination

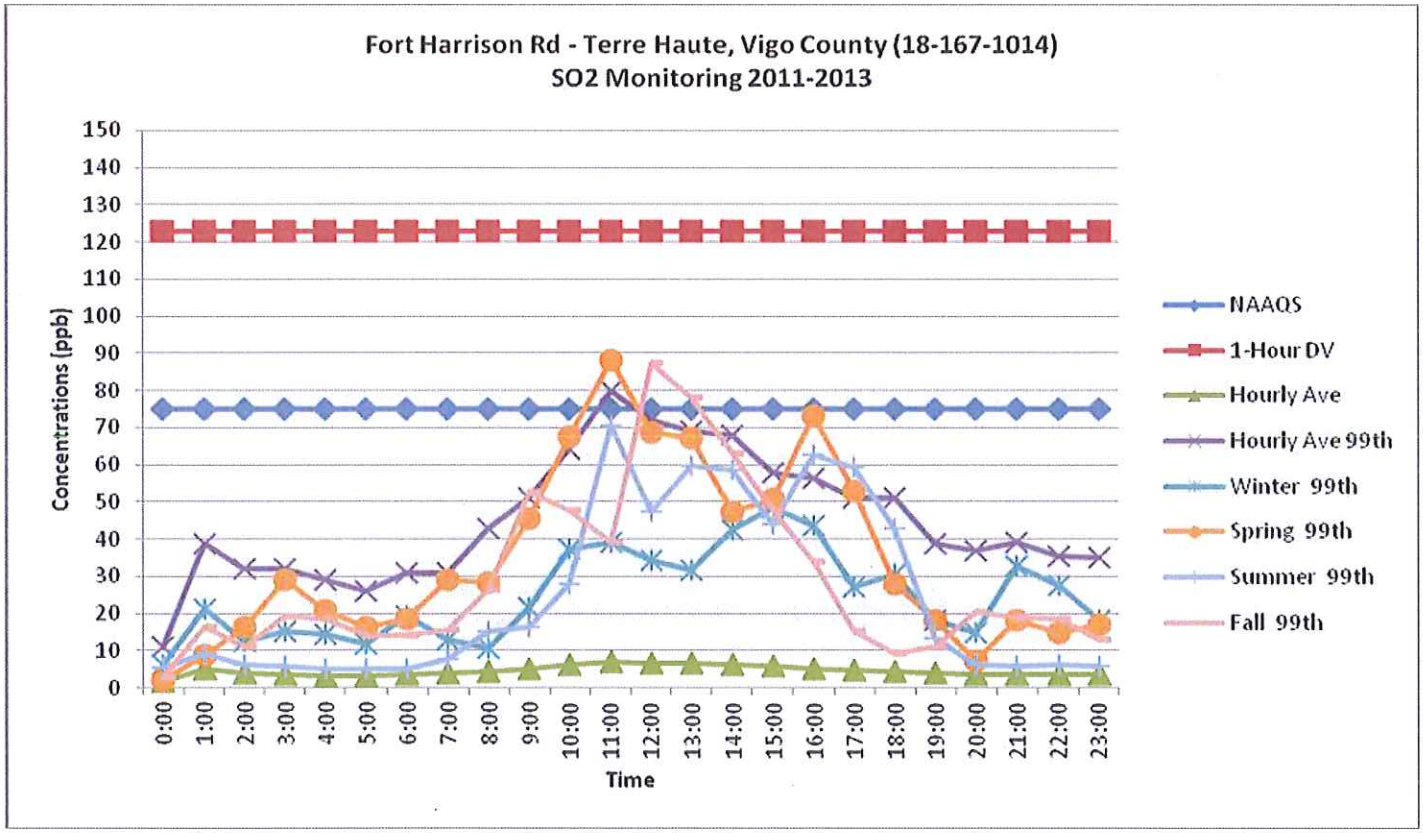
Vigo County	Concentrations with all values (ppb)	Concentrations without upwind sources (ppb)
1-Hour DV (10-12)	123	123
Hourly Ave	4.6	3.5
Hourly Ave 99th	45.0	8.8
Winter 99th	24.7	9.3
Spring 99th	34.8	7.9
Summer 99th	24.7	8.4
Fall 99th	29.0	8.1

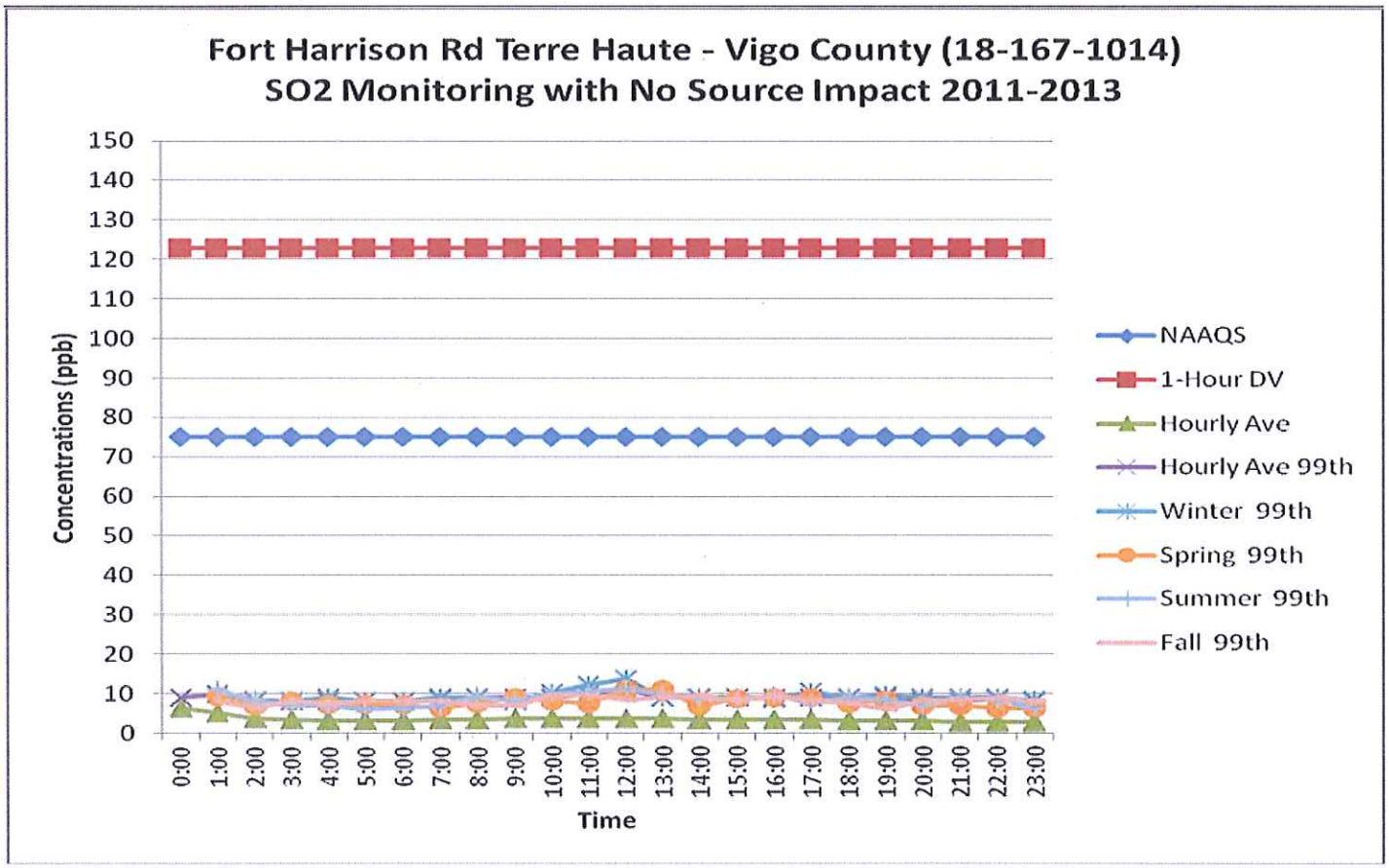
Fort Harrison Road/Terre Haute NWS Meteorology Pollution Roses








Fort Harrison Rd - Terre Haute, Vigo County (18-167-1014)
SO2 Monitoring 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th


Fort Harrison Rd Terre Haute - Vigo County (18-167-1014)
SO2 Monitoring with No Source Impact 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th

West of SR 57

Daviess County SO_2 Monitor

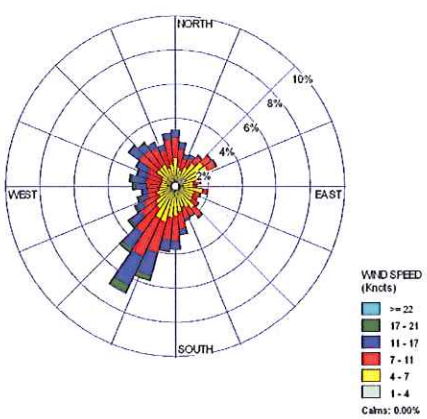
2011 – 2013

Daviess County SO_2 Concentration Summary (2011-2013)

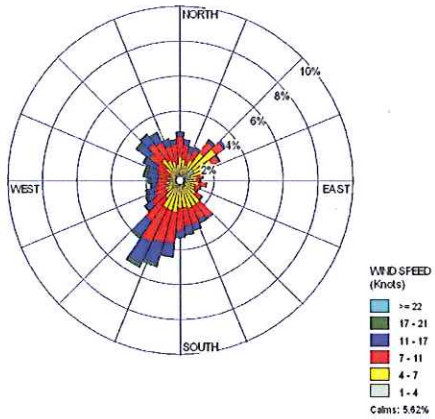
Site ID 18-027-0002	2011	2012	2013
Design Value (3 yr – ending)	118 ppb	98 ppb	109 ppb
Maximum Concentration	130 ppb	147 ppb	202 ppb
Average Concentration	4.4 ppb	2.5 ppb	2.9 ppb

Evansville Airport-National Weather Service Wind Roses

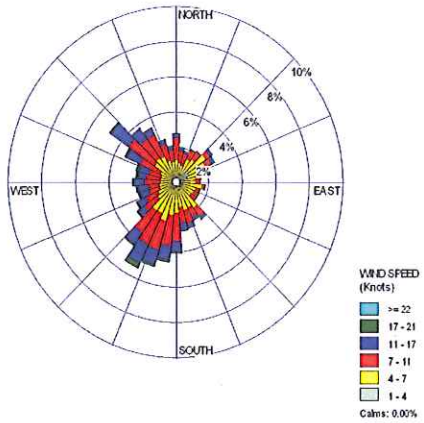
Evansville Wind Rose 2011



Evansville Wind Rose 2012



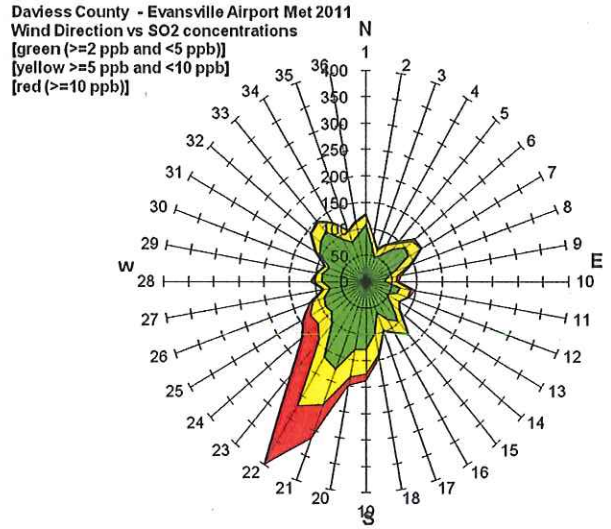
Evansville Wind Rose 2013

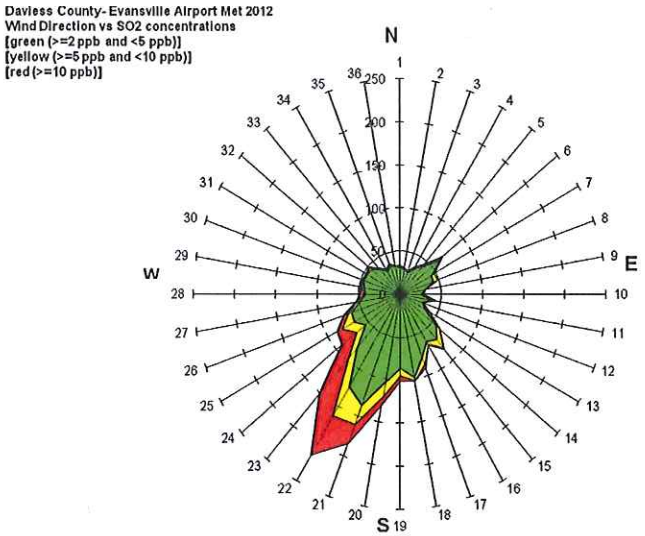


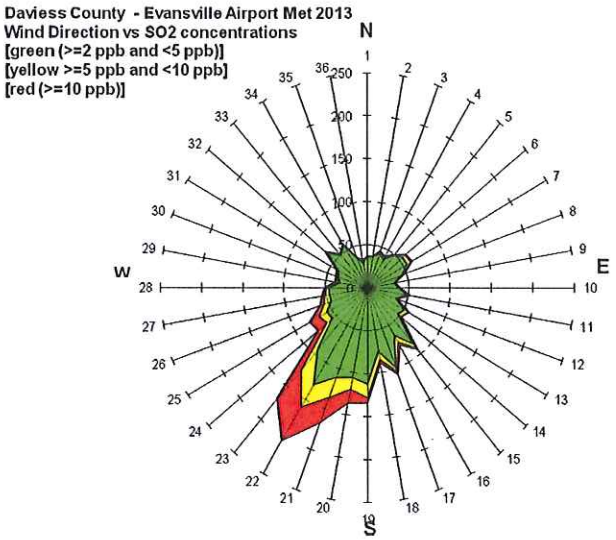
EPA's Seasonal and Temporal 1-Hour SO_2 Background Determination

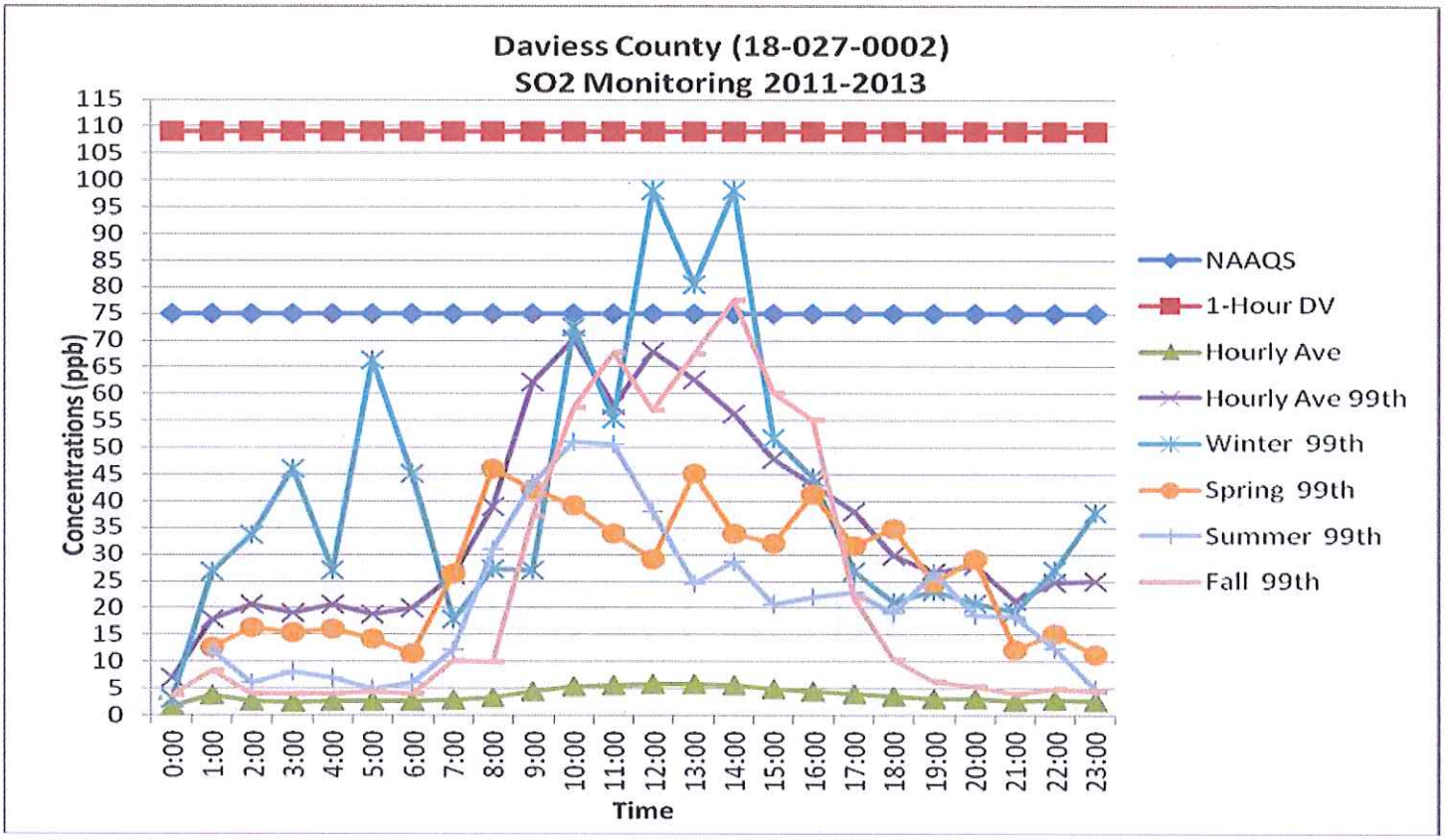
Daviess County	Concentrations with all values (ppb)	Concentrations without upwind sources (ppb)
1-Hour DV (11-13)	109	109
Hourly Ave	3.7	2.4
Hourly Ave 99th	35.5	8.6
Winter 99th	41.5	8.8
Spring 99th	26.7	7.8
Summer 99th	21.2	7.6
Fall 99th	24.6	6.6

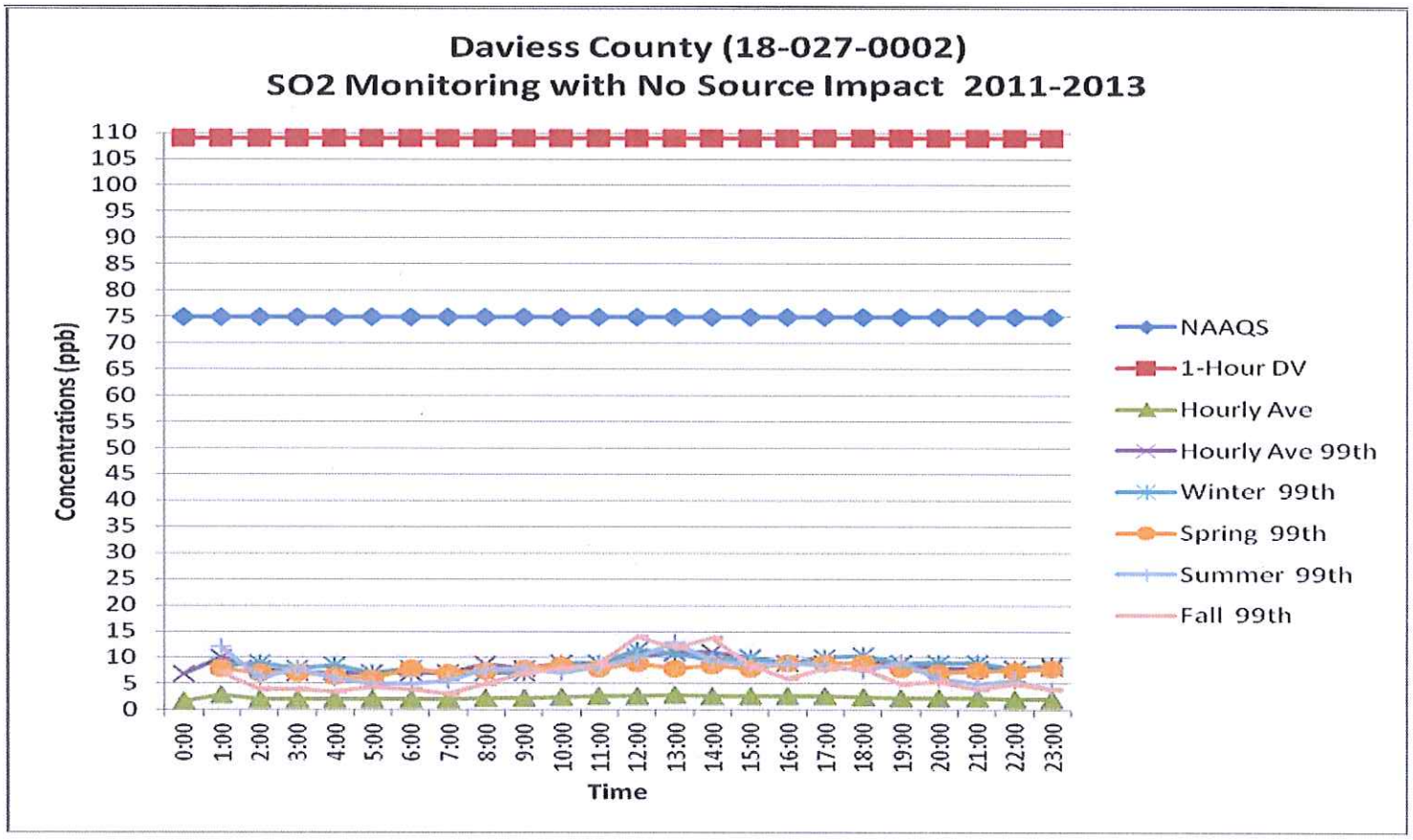
Daviess County/Evansville NWS Meteorology Pollution Roses








Daviess County (18-027-0002)
SO2 Monitoring 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th


Daviess County (18-027-0002)
SO2 Monitoring with No Source Impact 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th

Arda Lane

Pike County SO_2 Monitor

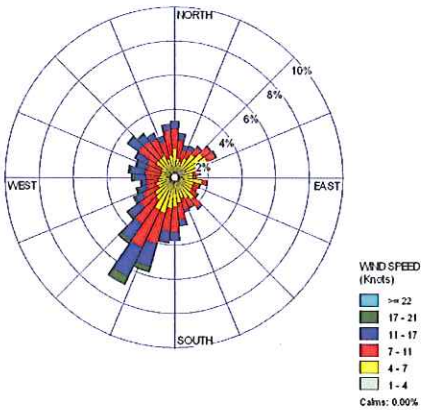
2011 – 2013

Arda Lane SO_2 Concentration Summary (2011-2013)

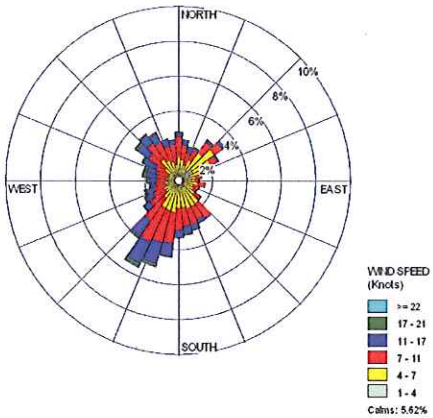
Site ID 18-125-0005	2011	2012	2013
Design Value (3 yr – ending)	175 ppb	157 ppb	143 ppb
Maximum Concentration	198 ppb	212 ppb	293 ppb
Average Concentration	5.9 ppb	5.0 ppb	3.4 ppb

Evansville Airport-National Weather Service Wind Roses

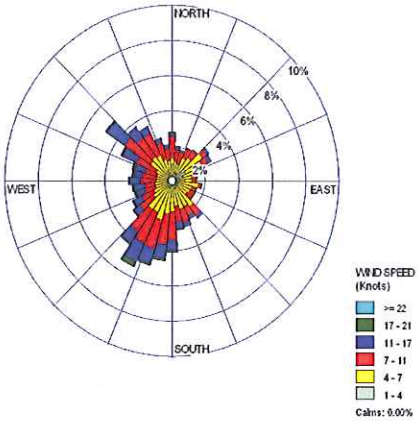
Evansville Wind Rose 2011



Evansville Wind Rose 2012



Evansville Wind Rose 2013

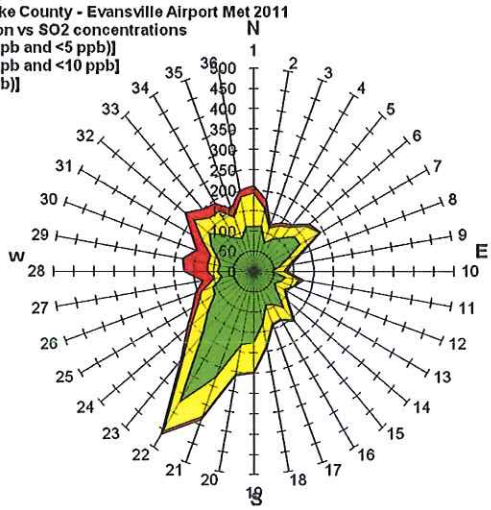


EPA's Seasonal and Temporal 1-Hour SO_2 Background Determination

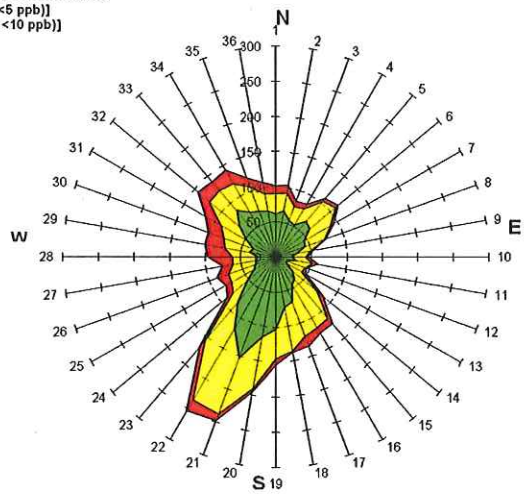
Pike County	Concentrations with all values (ppb)	Concentrations without upwind sources (ppb)
1-Hour DV (11-13)	143	143
Hourly Ave	5.7	3.5
Hourly Ave 99th	48.2	9.9
Winter 99th	55.8	10.5
Spring 99th	38.5	10.1
Summer 99th	28.8	9.0
Fall 99th	29.6	8.4

Pike County/Evansville NWS Meteorology Pollution Roses

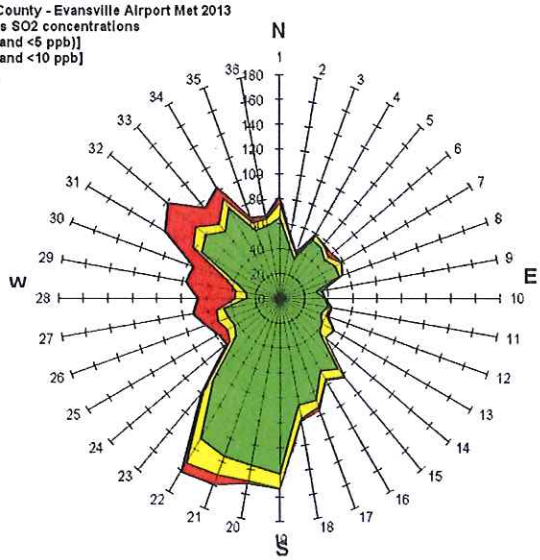
Arda Lane Pike County - Evansville Airport Met 2011
Wind Direction vs SO2 concentrations
[green (>=2 ppb and <5 ppb)]
[yellow >=5 ppb and <10 ppb]
[red (>=10 ppb)]

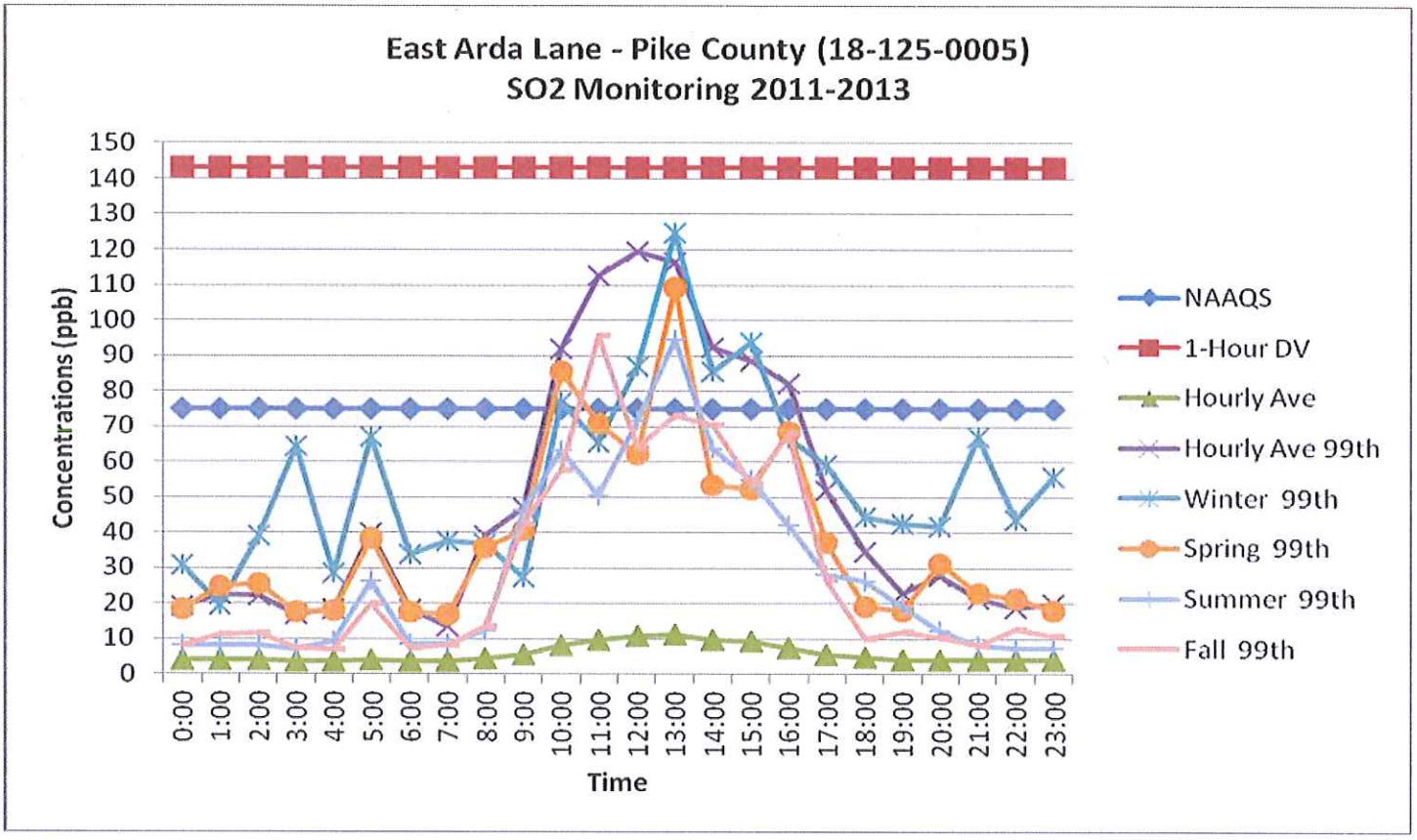


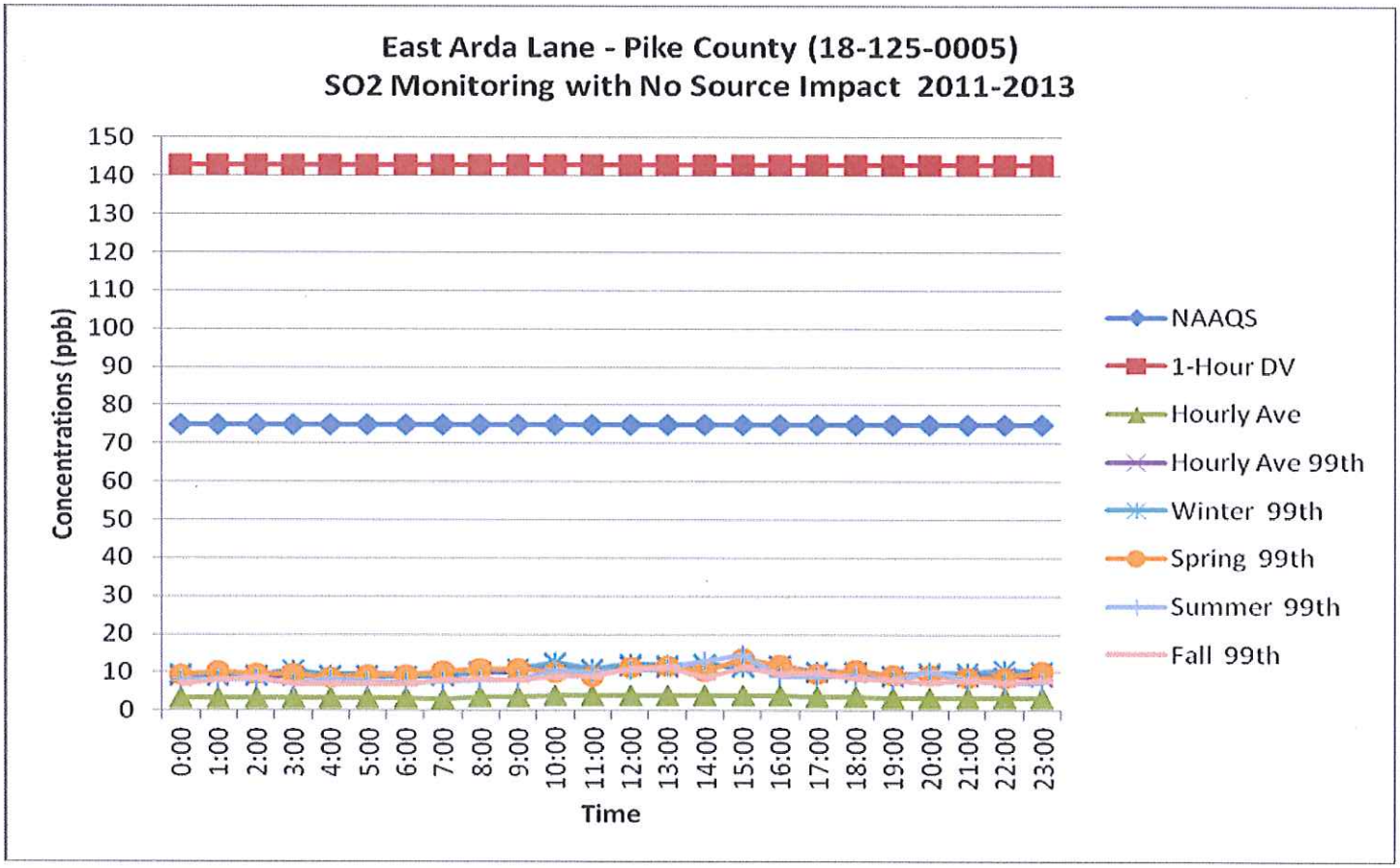
Arda Lane Pike County- Evansville Airport Met 2012
Wind Direction vs SO2 concentrations
[green (>=2 ppb and <5 ppb)]
[yellow (>=5 ppb and <10 ppb)]
[red (>=10 ppb)]



Arda Lane Pike County - Evansville Airport Met 2013
Wind Direction vs SO2 concentrations
[green (>=2 ppb and <5 ppb)]
[yellow >=5 ppb and <10 ppb]
[red (>=10 ppb)]




East Arda Lane - Pike County (18-125-0005)
SO2 Monitoring 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th


East Arda Lane - Pike County (18-125-0005)
SO2 Monitoring with No Source Impact 2011-2013
Concentrations (ppb)
Time
NAAQS
1-Hour DV
Hourly Ave
Hourly Ave 99th
Winter 99th
Spring 99th
Summer 99th
Fall 99th

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APPENDIX C

ATTAINMENT DEMONSTRATION MODELING RESULTS FOR 1-HOUR SULFUR DIOXIDE NAAQS NONATTAINMENT AREAS

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DAVIESS COUNTY ATTAINMENT DEMONSTRATION MODELING RESULTS

Hoosier Energy - Frank E. Ratts Generating Station (Ratts)

Table 1
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 1	6.00	1,160	6,960
Boiler 2	6.00	1,160	6,960
Auxiliary Boiler	0.05	20	1

Table 2
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Hoosier Energy - Frank E. RattsGenerating Station
Modeled Concentration ($\mu g/m^3$)	951. 71
Background ($\mu g/m^3$)	22.59
Total Concentration ($\mu g/m^3$)	**974.21**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 3
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 1	0.05	1,160	58
Boiler 2	0.05	1,160	58
Auxiliary Boiler	0.05	20	1

Table 4
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits

Concentration	Hoosier Energy - Frank E. Ratts Generating Station
Modeled Concentration ($\mu g/m^3$)	8.28
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**30.78**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Indianapolis Power and Light - Petersburg Generating Station

Table 1
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 1	6.00	2,200	13,200
Unit 2	6.00	4,144	24,864
Unit 3	1.2	5,540	6,648
Unit 4	1.2	5,550	6,660

Table 2
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Indianapolis Power and Light - Petersburg Generating Station
Modeled Concentration ($\mu g/m^3$)	1,681.11
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**1,703.61**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 3
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 1	0.15	2,200	330
Unit 2	0.15	4,144	621.6
Unit 3	0.37	5,540	2,049.8
Unit 4	0.35	5,550	1,942.5

Table 4
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits

Concentration	Indianapolis Power and Light - Petersburg Generating Station
Modeled Concentration ($\mu g/m^3$)	165.15
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	187.65
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

MARION COUNTY ATTAINMENT DEMONSTRATION MODELING RESULTS

Belmont Wastewater Treatment Plant

Table 1
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/ton	tons/hr	lbs/hr
Main Stack I1-I4	8	10.4	56.76*
Incinerator 5	2.00	2.6	14.19*
Incinerator 6	2.00	2.6	14.19*
Incinerator 7	2.00	2.6	14.19*
Incinerator 8	2.00	2.6	14.19*

*Limited SO_2 emission rate for incinerated sludge plus No.2 fuel oil-fired auxiliary burners' emissions.

Table 2
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Belmont Wastewater Treatment Plant
Modeled Concentration ($\mu g/m^3$)	2,909.6
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**2932.1**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 3
Hourly Emission Rates for New SO_2 Emission Rate Limits
to Comply with Subpart MMMM of 40 CFR Part 60

Emission Unit	lbs/ton	tons/hr	lbs/hr
Main Stack I1-I4	8	10.4	9.466*

*Limited SO_2 emission rate for incinerated sludge plus No.2 fuel oil-fired auxiliary burners' emissions.

Table 4
Modeled Highest 4th High at New SO_2 Emission Rate Limits
to Comply with Subpart MMMM of 40 CFR Part 60

Concentration	Belmont Wastewater Treatment Plant
Modeled Concentration ($\mu g/m^3$)	122.7
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**145.2**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Table 5
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits
Maximized to Comply with 1-Hour SO_2 NAAQS

Emission Unit	lbs/ton	tons/hr	lbs/hr
Main Stack I1-I4	8	10.4	12.5*

*Limited SO_2 emission rate for incinerated sludge plus No.2 fuel oil-fired auxiliary burners' emissions.

Table 6
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits
Maximized to Comply with 1-Hour SO_2 NAAQS

Concentration	Belmont Wastewater Treatment Plant
Modeled Concentration ($\mu g/m^3$)	162.0
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**184.5**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Citizens Thermal, C.C. Perry K Steam Plant

Table 7
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 11	0.30	368	110.4
Boiler 12	0.30	352	105.6
Boiler 13	3.00	403	1,209
Boiler 14	3.00	403	1,209
Boiler 15	3.00	324	972
Boiler 16	3.00	324	972
Boiler 17	0.30	228	68.4
Boiler 18	0.30	228	68.4

Table 8
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Citizens Thermal
Modeled Concentration ($\mu g/m^3$)	765.6
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**788.1**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 9
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 11	0.2	368	73.6
Boiler 12	0.0006	439	0.2634
Boiler 13	0.2	403	80.6
Boiler 14	0.2	403	80.6
Boiler 15	0.0006	340	0.204
Boiler 16	0.0006	340	0.204
Boiler 17	0.3	242	72.6
Boiler 18	0.3	242	72.6

Table 10
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits

Concentration	Citizens Thermal
Modeled Concentration ($\mu g/m^3$)	66.5
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	89.0
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Indianapolis Power and Light Company - Harding Street Plant

Table 11
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr	Controlled/ Limited lbs/hr
Boiler 9	0.35	527	184.45	
Boiler 10	0.35	527	184.45	
Boiler 50	4.7	1,017	4,779.9	
Boiler 60	4.7	1,017	4,779.9	
Boiler 70	5.3	4,123	21,851.9	655.557 (97% control)
Gas Turbine 1	0.35	299	104.65	
Gas Turbine 2	0.35	299	104.65	
Gas Turbine 4	0.35	875	306.25	
Gas Turbine 5	0.5	867	433.5	
Gas Turbine 6	0.008	1,660	1.26	NG at 0.08% sulfur
Emergency Generator	0.5	27.6	13.8	0.48 (500 hrs/yr)

Table 12
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Indianapolis Power and Light - Harding Generating Station
Modeled Concentration ($\mu g/m^3$)	1,823.8
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**1,846.3**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 13
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr	Controlled/ Limited lbs/hr
Boiler 50	0.0006	1,017	0.6102	
Boiler 60	0.0006	1,017	0.6102	
Boiler 70	0.0006	4,123	2.4738	
Gas Turbine 1	0.1	299	29.9	
Gas Turbine 2	0.1	299	29.9	
Gas Turbine 4	0.1	875	87.5	
Gas Turbine 5	0.1	867	86.7	
Gas Turbine 6	0.0006	1,660	0.996	
Emergency Generator	0.5	27.6	13.8	500 hrs/yr

Table 14
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits

Concentration	Indianapolis Power and Light - Harding Generating Station
Modeled Concentration ($\mu g/m^3$)	165.1
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	187.6
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Table 15
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Main Stack S-100			73.2
Unit 2 WESP Stack			342.8

Table 16
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Quemetco
Modeled Concentration ($\mu g/m^3$)	1,083.5
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**1,106**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 17
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 2 WESP Stack			52

Table 18
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits

Concentration	Quemetco
Modeled Concentration ($\mu g/m^3$)	165.6
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	188.1
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Rolls Royce Corporation

Table 19
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits w/o Engine Test Cells

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 0070-58	2.1	44	92.4
Boiler 0070-59	2.1	44	--
Boiler 0070-62	2.1	244	512.4
Boiler 0070-63	2.1	244	512.4
Boiler 0070-64	2.1	244	512.4
Boiler 0070-65	2.1	244	--
2 Gas Turbine Engines 0070-66	0.5	107	107
12 Gas Turbine Engines 0070-67	0.5	27.2	163.2
2 Gas Turbine Engines 0070-68a and 0070-68b	0.5	39	39
6 Gas Turbine Engines 0070-68c, 0070-68d, and 0070-68e	0.5	27.2	81.6
3 Gas Turbine Engines 0070-69	0.5	27.2	40.8
Three Shack Heaters 0070-70	0.6	90	162
Generating Turbine 0070-80	0.15	68	10.2
501k Turbine Generator	0.5	35	17.5
Rental Generator			3.83

Table 20
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits w/o Engine Test Cells

Concentration	Rolls Royce
Modeled Concentration ($\mu g/m^3$)	4,801.9
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**4,824.4**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 21

Hourly Emission Rates for Proposed SO_2 Emission Rate Limits with Engine Test Cells

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 0070-58 or 0070-59	0.0015	44	0.07
Boiler 0070-62 or 0070-63	0.0015	244	0.37
Boiler 0070-64	0.01	244	2.44
Boiler 0070-65	0.01	244	2.44
2 Gas Turbine Engines 0070-66	0.1	107	21.4
12 Gas Turbine Engines 0070-67	0.05	27.2	16.32
2 Gas Turbine Engines 0070-68a and 0070-68b	0.0006	39	0.0468
3 Gas Turbine Engines 0070-68c, 0070-68d, and 0070-68e	0.05	27.2	4.08
3 Gas Turbine Engines 0070-69	0.05	27.2	4.08
Three Shack Heaters 0070-70	0.0006	90	0.162
Generating Turbine 0070-80	0.01	68	0.68
Rental Generators	0.0015	15.3	0.023
Engine Test Cells at Plant 5	0.05		
Engine Test Cells at Plant 8	0.1		
Engine Test Cell Plant 5 0070-N16 Jet Fuel 2000 Hours	25 foot vertical stack		
Engine Test Cell Plant 5 0070-N19 Jet Fuel 100 Hours	20 foot vertical stack		
Engine Test Cell Plant 5 0070-N20 Jet Fuel 100 Hours	18 foot vertical stack		
Engine Test Cell Plant 5 0070-N21 Jet Fuel 100 Hours	20 foot vertical stack		
Engine Test Cell Plant 5 0070-N22 Jet Fuel 200 Hours	20 foot vertical stack		
Engine Test Cell Plant 5 0070-N23 Jet Fuel 200 Hours	30 foot vertical stack		
Engine Test Cell Plant 5 0070-N24 Jet Fuel 200 Hours	20 foot vertical stack		

Table 22

Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits with Engine Test Cells

Concentration	Rolls Royce
Modeled Concentration ($\mu g/m^3$)	163.1
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	185.6
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Table 23
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
70K Boiler 70-2722W	1.25	91.8	114.75
30K Boiler 30-2726S	1.25	39.3	49.125
28K Boiler 28-186N	1.25	36.8	46
Boiler CB-70K	0.5	91.1	45.55
BM Furnace BM2724W	1.25	21.38	26.725
Box Furnace BX2707V	1.25	16	20
DAB Furnace 732714	1.25	56.5	70.625
Born Heater 722804	0.05	6.7	0.335
Born Heater Furnace BXS2706Q	0.05	6	0.3
EP Furnace EP2729Q	1.25	3	3.75
CB20 CB600-300 Boiler	0.05	25.1	1.255
50K CN5-400 Boiler	0.05	61.1	3.055
BD Furnace BD2714V	1.25	15	18.75
Heater BS2740Q	1.25	6	7.5
Heater BT2728S	1.25	6	7.5
Furnace HW-925-001	1.25	9.8	12.25

Table 24
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Vertellus
Modeled Concentration ($\mu g/m^3$)	824.4
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**846.9**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 25
Hourly Emission Rates for Requested SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
70K Boiler 70-2722W	0.20	91.8	18.36
30K Boiler 30-2726S	0.25	39.3	9.825
28K Boiler 28-186N	0.27	36.8	9.936
Boiler CB-70K	0.0006	91.1	0.05466
BM Furnace BM2724W	0.05	21.38	1.069
Box Furnace BX2707V	0.05	16	0.0096
DAB Furnace 732714	0.05	56.5	0.0339
Born Heater 722804	0.05	6.7	0.00402
Born Heater Furnace BXS2706Q	0.05	6	0.0036
EP Furnace EP2729Q	0.05	3	0.0018
CB20 CB600-300 Boiler	0.09	25.1	0.01506
50K CN5-400 Boiler	0.09	61.1	0.03666
BD Furnace BD2714V	0.05	15	0.75
Heater BS2740Q	0.05	6	0.3
Heater BT2728S	0.05	6	0.3
Furnace HW-925-001	1.25	9.8	12.25
CS Kettle Born Heater Natural Gas	0.0006	5	0.003
CS Still Born Heater Natural Gas	0.0006	8.48	0.005088
Born Hot Oil Furnace (Process Heater) Unit 2607T Natural Gas Only	0.0006	3.6	0.00216

Table 26
Modeled Highest 4th High at Requested SO_2 Emission Rate Limits

Concentration	Vertellus
Modeled Concentration ($\mu g/m^3$)	138.0
Background ($\mu g/m^3$)	22.5
Total Concentration ($\mu g/m^3$)	**160.5**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

MORGAN COUNTY ATTAINMENT DEMONSTRATION MODELING RESULTS

Indianapolis Power and Light - Eagle Valley Generating Station

Table 1
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr	Modeled
Unit 1	0.37	524	193.88	318.89
Unit 2	0.37	524	193.88	
Unit 3	0.37	524	193.88	
Unit 4	3.04	741	2,252.64	1,083.08
Unit 5	3.04	741	2,252.64	
Unit 6	3.04	1,017	3,091.68	5,344.32
Diesel Generator	0.5	28.4	14.2	0.49

Table 2
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Indianapolis Power and Light - Eagle Valley Generating Station
Modeled Concentration ($\mu g/m^3$)	1,666.4
Background ($\mu g/m^3$)	24.6
Total Concentration ($\mu g/m^3$)	**1,691**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 3
Hourly Emission Rates for PSD Permitted and Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Combustion Turbine 1	0.0014	2,542	3.5588
Combustion Turbine 2	0.0014	2,542	3.5588
Aux. Boiler	0.0014	79.3	0.11102
Dew Point Heater	0.0014	20.8	0.02912
Emergency Generator	0.0015	14.8	0.0222
Emergency Fire Pump	0.0015	3.85	0.005775

Table 4
Modeled Highest 4th High at PSD Permitted and Proposed Emission Rate Limits

Concentration	Indianapolis Power and Light - Eagle Valley Generating Station
Modeled Concentration ($\mu g/m^3$)	11.3
Background ($\mu g/m^3$)	24.6
Total Concentration ($\mu g/m^3$)	**35.9**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

PIKE COUNTY ATTAINMENT DEMONSTRATION MODELING RESULTS

Hoosier Energy - Frank E. Ratts Generating Station (Ratts)

Table 1
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 1	6.00	1,160	6,960
Boiler 2	6.00	1,160	6,960
Auxiliary Boiler	0.05	20	1

Table 2
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Hoosier Energy - Frank E. Ratts Generating Station
Modeled Concentration ($\mu g/m^3$)	1316.71
Background ($\mu g/m^3$)	25.9
Total Concentration ($\mu g/m^3$)	**1342.61**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 3
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Boiler 1	0.05	1,160	58
Boiler 2	0.05	1,160	58
Auxiliary Boiler	0.05	20	1

Table 4
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits

Concentration	Hoosier Energy - Frank E. Ratts Generating Station
Modeled Concentration ($\mu g/m^3$)	11.31
Background ($\mu g/m^3$)	25.9
Total Concentration ($\mu g/m^3$)	**37.21**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Indianapolis Power and Light - Petersburg Generating Station

Table 1
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 1	6.00	2,200	13,200
Unit 2	6.00	4,144	24,864
Unit 3	1.2	5,540	6,648
Unit 4	1.2	5,550	6,660

Table 2
Modeled Highest 4th High at Allowable SO_2 Emission Rate Limits

Concentration	Indianapolis Power and Light - Petersburg Generating Station
Modeled Concentration ($\mu g/m^3$)	1,668.78
Background ($\mu g/m^3$)	25.9
Total Concentration ($\mu g/m^3$)	**1,694.68**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 3
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 1	0.15	2,200	330
Unit 2	0.15	4,144	621.6
Unit 3	0.37	5,540	2,049.8
Unit 4	0.35	5,550	1,942.5

Table 4
Modeled Highest 4th High at Proposed SO_2 Emission Rate Limits

Concentration	Indianapolis Power and Light - Petersburg Generating Station
Modeled Concentration ($\mu g/m^3$)	163.78
Background ($\mu g/m^3$)	25.9
Total Concentration ($\mu g/m^3$)	189.68
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

VIGO COUNTY ATTAINMENT DEMONSTRATION MODELING RESULTS

Duke Energy - Wabash River Generation Station

Table 1
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 2	4.04	913.8	3691.75
Unit 3	4.04	922.9	3728.52
Unit 4	4.04	922.9	3728.52
Unit 5	4.04	1,096.2	4428.65
Unit 6	4.04	2,999.0	12,115.96

Table 2
Modeled Highest 4th High at Allowable SO_2 Emissions Rate Limits

Concentration	Duke Energy - Wabash River Generation Station
Modeled Concentration ($\mu g/m^3$)	524.81
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**547.81**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
County Models Attainment	**NO**

Table 3
Hourly Emission Rates for Proposed SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 6	0.5	2,999.0	1,499.5

Table 4
Modeled Highest 4th High at Proposed SO_2 Emissions Rate Limits

Concentration	Duke Energy - Wabash River Generation Station
Modeled Concentration ($\mu g/m^3$)	41.53
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**64.53**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Wabash River Combined Cycle Plant

Table 5
Hourly Emission Rates for Allowable SO_2 Emission Rate Limits

Emission Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 1A	0.195	1,709.1	333.27

Table 6
Modeled Highest 4th High at Allowable SO_2 Emissions Rate Limits

1-Hour SO_2 DV	Wabash River Combined Cycle Plant
Modeled Concentration ($\mu g/m^3$)	13.56
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**36.56**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Table 7
Hourly Emission Rates for Allowable SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 1	--	52.0	527
Unit 2*	0.3	2,634.45	790.34

*The lb/MMBtu and MMBtu/hr values represent the emissions factor and heat input of the raw material, not of the flare.

Table 8
Modeled Highest 4th High at Allowable SO_2 Emissions Rate Limits

1-Hour SO_2 DV	sgSolutions
Modeled Concentration ($\mu g/m^3$)	195.65
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**218.65**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 9
Hourly Emission Rates for Proposed SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr	Controlled/ Limited lbs/hr
Unit 1	--	52.0	527.00	
Unit 2*	0.3	2,634.45	790.34	500 hrs/yr

*The lb/MMBtu and MMBtu/hr value represents the emissions factor and heat input of the raw material, not of the flare.

Table 10
Modeled Highest 4th High at Proposed SO_2 Emissions Rate Limits

1-Hour SO_2 DV	sgSolutions
Modeled Concentration ($\mu g/m^3$)	165.91
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**188.91**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Sony Digital Audio Disc

Table 11
Hourly Emission Rates for Allowable SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 001	0.36	10.462	3.77
Unit 002	0.36	10.462	3.77
Unit 003	0.5	9.863	4.93
Unit 004	0.5	9.863	4.93
Unit 005	0.5	16.8	8.4
Unit 006	0.5	16.8	8.4
Unit 018	0.5	8.36	4.18

Table 12
Modeled Highest 4th High at Allowable SO_2 Emissions Rate Limits

1-Hour SO_2 DV	Sony Digital Audio Disc
Modeled Concentration ($\mu g/m^3$)	1,297.91
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**1,320.91**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 13
Hourly Emission Rates for Proposed SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Unit 001	0.05	10.462	0.523
Unit 002	0.05	10.462	0.523
Unit 003	0.05	9.863	0.493
Unit 004	0.05	9.863	0.493
Unit 005	0.05	16.8	0.84
Unit 006	0.05	16.8	0.84
Unit 018	0.05	8.36	0.418

Table 14
Modeled Highest 4th High at Proposed SO_2 Emissions Rate Limits

1-Hour SO_2 DV	Sony Digital Audio Disc
Modeled Concentration (µg/m3)	147.35
Background (µg/m3)	23.0
Total Concentration (µg/m3)	**170.35**
1-Hour SO_2 NAAQS (µg/m^3)	**196.2**
Models Attainment?	**YES**

Taghleef Industries, Inc.

Table 15

Hourly Emission Rates for Allowable SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Murray Iron Works Boiler	0.51	25.0	12.5
Murray Iron Works Boiler	0.51	25.0	12.5
Clayton Standby Boiler	0.51	20.992	10.496
Nebraska Boiler	0.51	35.37	17.685

Table 16

Modeled Highest 4th High at Allowable SO_2 Emissions Rate Limits

1-Hour SO_2 DV	Taghleef Industries, Inc.
Modeled Concentration ($\mu g/m^3$)	3,743.47
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**3,766.47**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**NO**

Table 17

Hourly Emission Rates for Proposed SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Clayton Standby Boiler	0.0015	20.992	0.03
Boiler Nebraska Boiler	0.0015	35.37	0.05
New Nebraska-D Boiler	0.0006	25.200	15.12

Table 18

Modeled Highest 4th High at Proposed SO_2 Emissions Rate Limits

1-Hour SO_2 DV	Taghleef Industries, Inc.
Modeled Concentration ($\mu g/m^3$)	11.23
Background ($\mu g/m^3$)	23
Total Concentration ($\mu g/m^3$)	**34.23**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Terre Haute Regional Hospital

Table 19
Hourly Emission Rates for Allowable SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
#1 Boiler	0.45	12.5	5.625
#2 Boiler	0.45	12.5	5.625

Table 20
Modeled Highest 4th High at Allowable SO_2 Emissions Rate Limits

1-Hour SO_2 DV	Terre Haute Regional Hospital
Modeled Concentration ($\mu g/m^3$)	18.47
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**41.47**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

Terre Haute Union Hospital

Table 21
Hourly Emission Rates for Allowable SO_2 Emissions Rate Limits

Emissions Unit	lbs/MMBtu	MMBtu/hr	lbs/hr
Keller Boiler 1	0.36	39.1	14.076
Keller Boiler 2	0.36	39.1	14.076

Table 22
Modeled Highest 4th High at Allowable SO_2 Emissions Rate Limits

1-Hour SO_2 DV	Terre Haute Union Hospital
Modeled Concentration ($\mu g/m^3$)	4.96
Background ($\mu g/m^3$)	23.0
Total Concentration ($\mu g/m^3$)	**27.96**
1-Hour SO_2 NAAQS ($\mu g/m^3$)	**196.2**
Models Attainment?	**YES**

APPENDIX D

IPL PETERSBURG POWER GENERATING STATION
EVALUATION
FOR
30-DAY ROLLING AVERAGE EMISSION LIMITS

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Assessment Protocol
30-day rolling average for Indianapolis Power and Light (IPL) facilities using Flue Gas Desulfurization (FGD) for Sulfur Dioxide (SO_2) Control

Step 1: Modeled Limits

Identify 1-hour limits that when modeled show attainment of the 1-hour SO_2 National Ambient Air Quality Standard (NAAQS). The current modeled values are: 0.15 lbs/MMBtu for IPL - Petersburg Generating Station Unit 1 (Pete 1) and Unit 2 (Pete 2), 0.37 lbs/MMBtu for Unit 3 (Pete 3), and 0.35 lbs/MMBtu for Unit 4 (Pete 4). IDEM's modeling of these emission rates, as well as the Hoosier Energy - Ratts Generating Station plus background, shows a result of 194.8 $\mu g/m^3$, meeting the 196.2 $\mu g/m^3$ standard.

Step 2: Compile Representative Emission Data Set

The data set selected and compiled is the 2006 through 2010 hourly CEM SO_2 emissions for the Pete 2 FGD stack. This data was selected as it is from a FGD controlled unit where the data set shows a relative consistency in the emission level achieved over a long period of time (five years). The emission variability in this data set is most representative of the emissions variability expected once the projected SIP limits are in affect and the facility is utilizing FGD controls on all 4 units to meet the emission limits associated with compliance with the one-hour standard.

The available data represents the lbs/MMBtu for each hour and the MMBtu for each hour as well as the operating time for each hour. This data was used to also calculate the lbs/hour SO_2 value for each hour.

Step 3: Calculate 30-day rolling averages.

The specific protocol used in this calculation was to sum the lbs SO_2/hour values over the previous 720 hours (30 days) and divide by the sum of the MMBtu/hour over the past 720 hours yielding the average lbs SO_2/MMBtu for each hour for each 30-day period. By doing the calculations in this manner, any hours showing zero emissions would not be counted. This calculation is consistent with the data requirements for 30-day averaging in the Mercury and Air Toxics Standard (MATS) rule. It should be noted that there are no values computed for the first 30 days in the overall data set since 30 days had not yet accumulated during this period of time.

Step 4: Calculate the 99th percentile values

The 99th percentile was determined for the 1-hour lb SO_2/MMBtu values compiled in step 2 over the five-year period. The result was 0.233 lbs SO_2/MMBtu. Similarly the 99th percentile of the 30-day rolling averages was determined from the calculations performed in Step 3. The result was 0.185 lbs SO_2/MMBtu

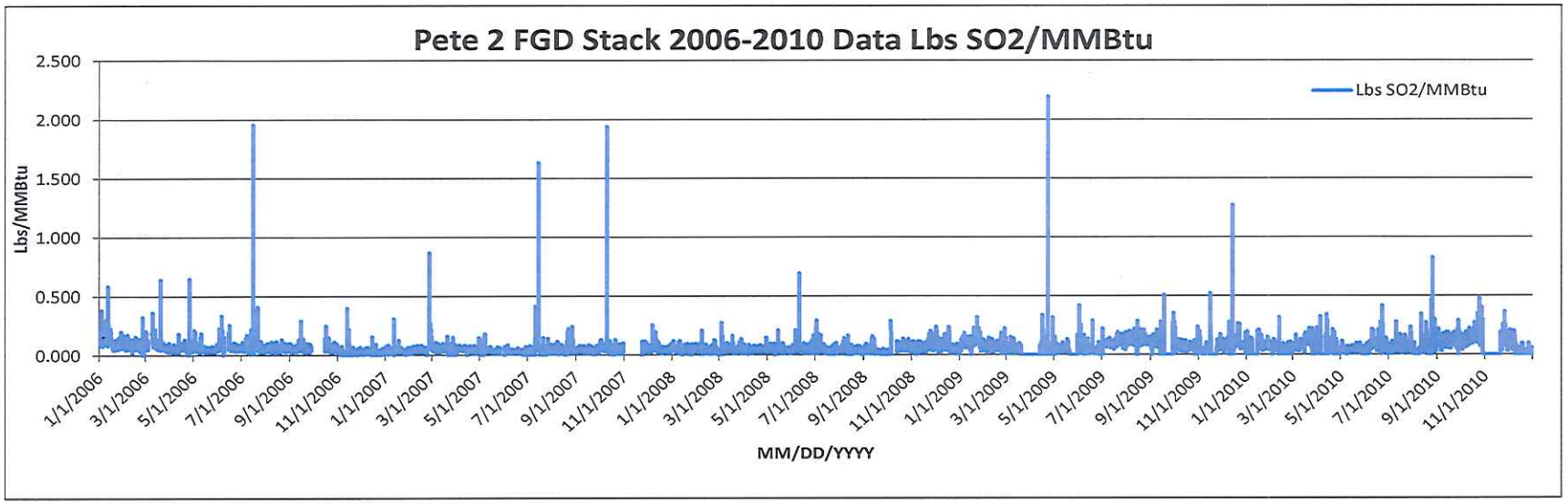
Step 5: Compute the ratio of 99th percentile 30-day and 1-hour values

This step merely involved dividing the 99th percentile values for the 30-day rolling data and 1-hour data developed in Step 4. The result was 79.7%

Step 6: Determine the 30-day rolling average limit.

This step merely involved multiplying the modeled values, determined in Step 1, by the ratio determined in Step 5. The proposed 30-day rolling average limits for the four units are as follows:

Pete 1: 0.15 lbs/MMBtu x 79.7% = 0.12 lbs SO_2/MMBtu
Pete 2: 0.15 lbs/MMBtu x 79.7% = 0.12 lbs SO_2/MMBtu
Pete 3: 0.37 lbs/MMBtu x 79.7% = 0.29 lbs SO_2/MMBtu
Pete 4: 0.35 lbs/MMBtu x 79.7% = 0.28 lbs SO_2/MMBtu


Pete 2 FGD Stack 2006-2010 Data Lbs SO2/MMBtu
Lbs SO2/MMBtu
Lbs/MMBtu
2.500
2.000
1.500
1.000
0.500
0.000
1/1/2006
3/1/2006
5/1/2006
7/1/2006
9/1/2006
11/1/2006
1/1/2007
3/1/2007
5/1/2007
7/1/2007
9/1/2007
11/1/2007
1/1/2008
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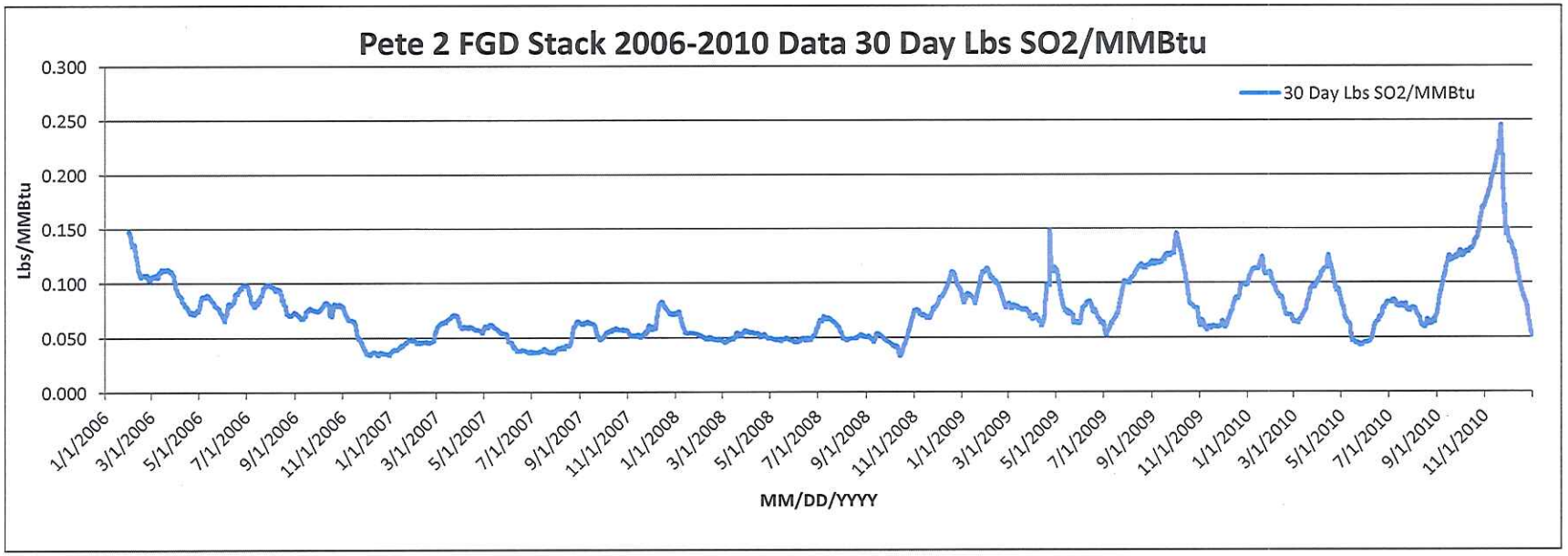
11/1/2010
MM/DD/YYYY


Pete 2 FGD Stack 2006-2010 Data 30 Day Lbs SO2/MMBtu
30 Day Lbs SO2/MMBtu
Lbs/MMBtu
0.300
0.250
0.200
0.150
0.100
0.050
0.000
1/1/2006
3/1/2006
5/1/2006
7/1/2006
9/1/2006
11/1/2006
1/1/2007
3/1/2007
5/1/2007
7/1/2007
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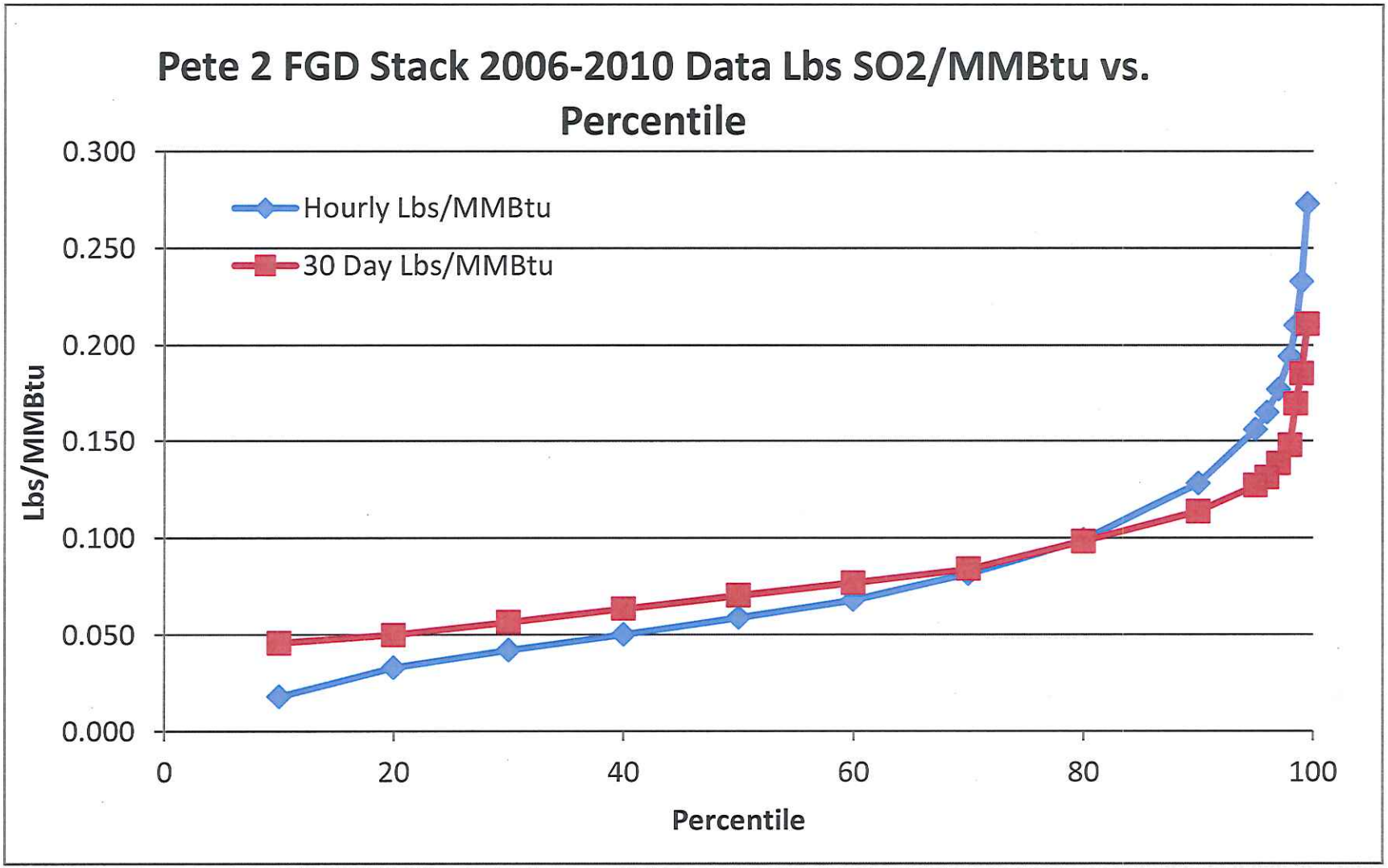
Pete 2 FGD Stack 2006-2010 Data Lbs SO2/MMBtu vs. Percentile
Hourly Lbs/MMBtu
30 Day Lbs/MMBtu
Lbs/MMBtu
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0
20
40
60
80
100
Percentile