Guidance on the Use of EPA's Modeled Emission Rates for Precursors (MERPs) for Secondary Pollutant Formation in Kentucky PSD Projects

TEAM KENTUCKY®

ENERGY AND ENVIRONMENT CABINET

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Kentucky Division for Air Quality

Air Dispersion Modeling Section

300 Sower Boulevard, 2nd Floor

Frankfort, KY 40601

Introduction

On April 30, 2024, the US Environmental Protection Agency (EPA) released a memorandum updating the primary annual $PM_{2.5}$ significant impact level (SIL), while retaining the 2018 Ozone and $PM_{2.5}$ 24-hour SILs[1]. The change in the primary annual $PM_{2.5}$ SIL came in response to a change in the primary annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) from 12.0 μg/m^3 to 9.0 μg/m^3, which went into effect on May 6, 2024. The EPA released an additional memorandum[2] on April 30, 2024, providing clarifying information on the development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 demonstration tool for ozone and $PM_{2.5}$ under the PSD permitting program to account for changes in the recommended $PM_{2.5}$ SIL values.

The Kentucky Division for Air Quality has reviewed the updated EPA 2024 guidance and has revised its 2018 State Guidance on the usage of MERPs in Kentucky PSD applications to reflect the revised SIL value and changes in modeling and permitting procedures since original publication. This guidance was originally adapted from the Georgia Environmental Protection Division's Guidance on MERPs[3].

Hypothetical Modeled Sources in Kentucky

Appendix A of the 2019 Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program[4] provides modeled hypothetical sources that permitting agencies can use to develop representative MERPs. These modeled sources are also accessible via the EPA's MERPs VIEW Qlik tool[5]. The Division has identified the hypothetical sources listed in Table 1 and mapped in Figure 1 as being most representative for Kentucky sources.

Table 1: Selected Hypothetical Sources

Domain	FIPS	Source Location	Representative Area	Emission Rates (tpy)
Central US	18037	Dubois County, IN	Northern/Central KY	500, 1000, 3000
Eastern US	21009	Barren County, KY	Central KY	500, 1000, 3000
Eastern US	37009	Ashe County, NC	Eastern KY	500, 1000, 3000
Contiguous US	21019	Boyd County, KY	Eastern KY	500, 1000
Contiguous US	21187	Owen County, KY	Northern/Central KY	500, 1000
Contiguous US	29155	Pemiscot County, MO	Western KY	500, 1000

[1] *Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*. EPA Office of Air Quality Planning and Standards. April 30, 2024. https://www.epa.gov/system/files/documents/2024-04/supplement-to-the-guidance-on-significant-impact-levels-for-ozone-and-fine-particles-in-the-psd-permitting-program-4-30-2024.pdf

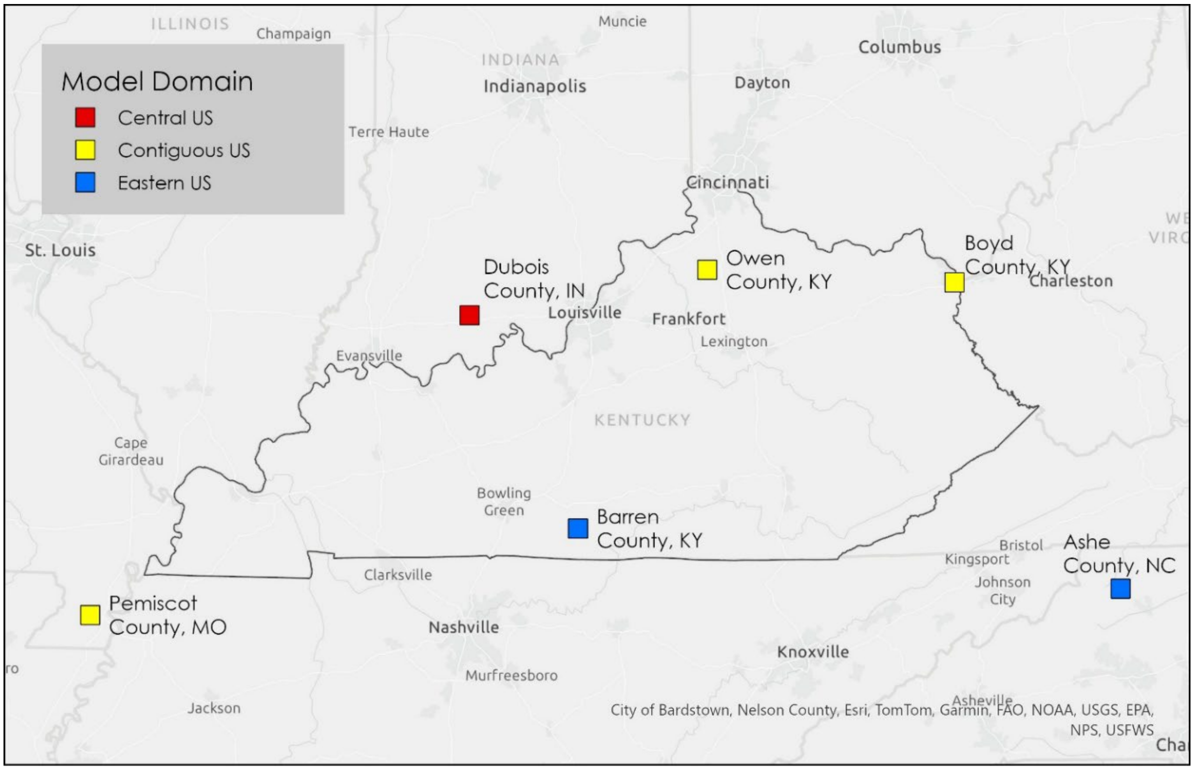
[2] *Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and* $PM_{2.5}$ *under the PSD Permitting Program*. EPA Office of Air Quality Planning and Standards. April 30, 2024. https://www.epa.gov/sites/default/files/2020-09/documents/epa-454_r-19-003.pdf

[3] *Guidance on the Use of EPA's MERPs to Account for Secondary Formation in Georgia*. Georgia EPD. 2018

[4] *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and* $PM_{2.5}$ *under the PSD Permitting Program*. EPA OAQPS. April 30, 2019.

[5] https://www.epa.gov/scram/merps-view-qlik

Figure 1: Map of Selected Hypothetical Sources in Kentucky



Calculation of Default MERPs for Kentucky

The Division calculates MERPs values based on Equation 1 provided by the EPA in the 2019 guidance:

$$MERP\ (tpy) = Significant\ Impact\ Level \times \frac{Precursor\ Emissions\ Rate\ (tpy)}{Maxium\ Model\ Impact} \qquad \text{(Eq. 1)}$$

Table 2 contains the most recent SILs by pollutant and averaging time, which was last revised by the EPA on April 30, 2024.

Table 2: Significant Impact Levels (SILs)

Criteria Pollutant	Averaging Time	NAAQS SIL Concentration
Ozone	8-Hour	1.0 ppb
$PM_{2.5}$	Annual	0.13 µg/m^3
$PM_{2.5}$	24-Hour	1.2 µg/m^3

Table 3 identifies the most conservative (lowest) MERPs developed by the Division, which serve as the default MERPs for Tier 1 demonstrations in Kentucky.

Table 3: Default MERP Values for Kentucky PSD Applications

Precursor	8-Hour Ozone	Daily $PM_{2.5}$	Annual $PM_{2.5}$
NOx	170	2,922	5,476
SO_2	-	1,443	6,321
VOC	2,939	-	-

Alternative MERPs may be considered if an applicant chooses not to use the default values provided in this guidance with appropriate justification provided in a modeling protocol. This narrative should provide a technically credible justification that the source characteristics (e.g., stack height, emissions rate) of the specific project source described in a permit application and the chemical and physical environment (e.g., meteorology, background pollutant concentrations, and regional/local emissions) near that project source are adequately represented by the selected hypothetical source(s). Use of an alternative MERP is subject to approval of the Division. Alternative MERPs tables are included in Appendix B for each pollutant and its precursor(s).

Source Impact Analysis

Source impact analyses assess air quality impacts from the proposed new source/modification only. The projected air quality impact from a source is calculated and compared to the applicable SIL to determine if the Tier 1 demonstration is satisfied, or if a cumulative impact analysis is necessary.

MERPs can be instrumental when using the following equations to determine if proposed emission increases from a facility will result in primary and/or secondary impacts. All relevant pollutants must be included in the analysis. No further analysis is needed if emission increases from all relevant pollutants are below the respective Significant Emission Rates (SER).

Table 4: Significant Emission Rates

Pollutant	Significant Emission Rate (SER)
$PM_{2.5}$	10 tpy
SO_2	40 tpy
NOx	40 tpy
VOC	40 tpy

Ozone

To evaluate ozone for source impact analysis, the ozone secondary impacts equation is used:

$$\frac{NOx\ Emission\ Rate}{NOx\ MERP} + \frac{VOC\ Emission\ Rate}{VOC\ MERP} < 1 \qquad \text{(Eq. 2)}$$

In equation 2, all units should be in tons per year (tpy). NOx Emission Rate and VOC Emission Rate are the proposed emission increases for the PSD Project.

Using the result of equation 2,

If Sum of Ratios < 1 → Impacts for secondary ozone below SIL → No cumulative analysis

If Sum of Ratios ≥ 1 → Impacts for secondary ozone above SIL → Applicant performs cumulative analysis

$PM_{2.5}$

To evaluate $PM_{2.5}$ for source impact analysis, the $PM_{2.5}$ secondary impacts equation is used:

$$\frac{MAX\ PM_{2.5}\ Modeled\ Concentration}{PM_{2.5}\ SIL} + \frac{SO_2\ Emission\ Rate}{SO_2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP} < 1 \qquad \text{(Eq. 3)}$$

In equation 3, the max $PM_{2.5}$ modeled concentration is the highest value (annual or H1H averaged over 5 years) of direct $PM_{2.5}$ emission increases modeled using AERMOD, in µg/m^3. The SO_2 and NOx emission rate represent the proposed emission increase for SO_2 and NOx in tpy for the PSD project.

Using the results of equation 3,

If Sum of Ratios < 1 → Impacts for $PM_{2.5}$ below SIL → No cumulative analysis

If Sum of Ratios ≥ 1 → Impacts for $PM_{2.5}$ above SIL → Applicant performs cumulative analysis

Cumulative Analysis

A cumulative analysis can be performed using MERPs for increases in all precursor pollutant emissions. A cumulative analysis assesses total air quality concentrations of individual criteria pollutants from a proposed new source/modification and all existing sources (nearby and other background) that also contribute to concentrations within the modeling domain. Total air quality concentrations are compared to the applicable NAAQS, if there is no modeled violation then the Tier 1 demonstration is satisfied.

Ozone

For an ozone cumulative analysis, the following equation is used:

$$O_3\ Background + \left(\frac{NOx\ Emission\ Rate}{NOx\ MERP} + \frac{VOC\ Emission\ Rate}{VOC\ MERP}\right) \times O_3\ SIL \leq O_3\ NAAQS \qquad \text{(Eq. 4)}$$

In equation 4, the ozone background value is calculated as a three-year design value from a representative ozone monitor (ppb). NOx Emission Rate and VOC Emission Rate are the proposed emission increases for the PSD Project, in the same unit as the MERP (tpy).

Using the results of equation 4,

If Sum of Values ≤ 70 ppb → Proposed emission increases will not contribute to a violation of Ozone NAAQS, Tier 1 demonstration complete.

If Sum of Values > 70 ppb → Tier 2 demonstration will need to be considered, or reevaluate Tier 1 with a less conservative MERP, given sufficient justification.

$PM_{2.5}$

For a $PM_{2.5}$ cumulative analysis, the following equation is used:

$$PM_{2.5}\ Background + PM_{2.5}\ DV + \left(\frac{SO_2\ Emission\ Rate}{SO_2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP}\right) \times PM_{2.5}SIL \leq PM_{2.5}\ NAAQS \quad \text{(Eq. 5)}$$

In equation 5, the $PM_{2.5}$ background value is calculated as a three-year design value from a representative $PM_{2.5}$ monitor ($\mu g/m^3$). The $PM_{2.5}$ design value (DV) is the AERMOD modeled maximum ambient concentration resulting from the proposed direct $PM_{2.5}$ emission increases, including the direct $PM_{2.5}$ emissions from nearby sources. SO_2 Emission Rate and NOx Emission Rate are the proposed emission increases for the PSD Project (in units of tpy).

For Annual $PM_{2.5}$, using the results of equation 5,

If Sum of Values ≤ 9.0 $\mu g/m^3$ (annual standard) → Proposed emission increases will not contribute to a violation of $PM_{2.5}$ annual NAAQS, Tier 1 demonstration complete.

If Sum of Values > 9.0 $\mu g/m^3$ (annual standard) → Tier 2 demonstration will need to be considered, or reevaluate Tier 1 with a less conservative MERP, given sufficient justification.

For 24-Hour $PM_{2.5}$, using the results of equation 5,

If Sum of Values ≤ 35.0 $\mu g/m^3$ (24-Hr standard) → Proposed emission increases will not contribute to a violation of $PM_{2.5}$ annual NAAQS, Tier 1 demonstration complete.

If Sum of Values > 35.0 $\mu g/m^3$ (24-Hr standard) → Tier 2 demonstration will need to be considered, or reevaluate Tier 1 with a less conservative MERP, given sufficient justification.

Appendix A – Examples

Using the equations outlined in this guidance, this appendix provides examples of calculations used in a PSD application to perform Source Impact and Cumulative Analyses for $PM_{2.5}$ and Ozone.

Hypothetical Facility Data:

Table A-1: Facility Emissions

Precursor	Emissions (tpy)
NOx	500
SO_2	500
$PM_{2.5}$	500
VOC	500

Table A-2: Example Maximum Modeled Impacts

Pollutant	Highest Modeled Concentration (HMC)	HMC + Nearby Source Impacts (Design Value)
Annual $PM_{2.5}$	0.15 μg/m^3	2.5 μg/m^3
Daily $PM_{2.5}$	0.5 μg/m^3	3.0 μg/m^3

Table A-3: Example Background Monitor Concentrations

Pollutant	Background Concentration
Ozone	67 ppb
Annual $PM_{2.5}$	7.2 μg/m^3
Daily $PM_{2.5}$	29 μg/m^3

Table A-4: Default MERP values (tpy) for Kentucky PSD Applications

Precursor	8-Hour Ozone	Daily $PM_{2.5}$	Annual $PM_{2.5}$
NOx	170	2,922	5,476
SO_2	-	1,443	6,321
VOC	2,939	-	-

Table A-5: NAAQS Standards

Pollutant	NAAQS Standard
Ozone	70 ppb
Annual $PM_{2.5}$	9.0 μg/m^3
Daily $PM_{2.5}$	35 μg/m^3

Example Source Impact Analysis Calculations

8-HR Ozone:

Using Equation 2, $\frac{NOx\ Emission\ Rate}{NOx\ MERP} + \frac{VOC\ Emission\ Rate}{VOC\ MERP} < 1$ → $\frac{500\ tpy}{170\ tpy} + \frac{500\ tpy}{2939\ tpy} = 3.1$ → Since 3.1 > 1, a cumulative analysis is required for ozone.

Annual $PM_{2.5}$:

Using Equation 3, $\frac{MAX\ PM_{2.5}\ Modeled\ Concentration}{PM_{2.5}\ SIL} + \frac{SO_2\ Emission\ Rate}{SO_2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP} < 1$ → $\frac{0.15\ \mu g/m^3}{0.13\ \mu g/m^3} + \frac{500\ tpy}{6321\ tpy} + \frac{500\ tpy}{5476\ tpy} = 1.32$ → Since 1.32 > 1, a cumulative analysis is required for annual $PM_{2.5}$

Daily $PM_{2.5}$:

Using Equation 3, $\frac{MAX\ PM_{2.5}\ Modeled\ Concentration}{PM_{2.5}\ SIL} + \frac{SO_2\ Emission\ Rate}{SO_2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP} < 1$ → $\frac{0.5\ \mu g/m^3}{1.2\ \mu g/m^3} + \frac{500\ tpy}{1443\ tpy} + \frac{500\ tpy}{2922\ tpy} = 0.93$ → Since 0.93 < 1, a cumulative analysis is not required for daily $PM_{2.5}$

Example Cumulative Analysis Calculations

8-HR Ozone:

Using Equation 4, $O_3\ Background + \left(\frac{NOx\ Emission\ Rate}{NOx\ MERP} + \frac{VOC\ Emission\ Rate}{VOC\ MERP}\right) \times O_3\ SIL \leq O_3\ NAAQS$ → $67\ ppb + \left(\frac{500\ tpy}{170\ tpy} + \frac{500\ tpy}{2939\ tpy}\right) \times 1\ ppb = 70.11\ ppb$ → Truncate to 70 ppb → Since 70 ppb ≤ 70 ppb, the increased emissions do not exceed the ozone NAAQS → No further analysis is required.

Annual $PM_{2.5}$:

Using Equation 5, $PM_{2.5}\ Background +\ PM_{2.5}\ DV + \left(\frac{SO_2\ Emission\ Rate}{SO_2\ MERP} + \frac{NOx\ Emission\ Rate}{NOx\ MERP}\right) \times PM_{2.5}SIL \leq PM_{2.5}NAAQS$ → $7.2\ \mu g/m^3 +\ 2.5\ \mu g/m^3 + \left(\frac{500\ tpy}{6321\ tpy} + \frac{500\ tpy}{5476\ tpy}\right) \times 0.13\ \mu g/m^3 = 9.72\ \mu g/m^3$ → Since 9.72 $\mu g/m^3 > 9.0\ \mu g/m^3$, the cumulative analysis calculates a result that is above the annual $PM_{2.5}$ NAAQS standard → Tier 2 demonstration required or justify non-default MERPs.

Appendix B – Alternative Kentucky MERPs Tables

- Most conservative (KY Default) MERPs value shown in bold red on each table for each precursor.
- MERP Values presented in Appendix B are based on NAAQS (Class II) SILs. To use in a Class I analysis for $PM_{2.5}$, recalculate MERP Value with equation 1 using the Class I SIL (24-hr: 0.27 $\mu g/m^3$, Annual: 0.05 $\mu g/m^3$).
- Release Height: L indicates surface level release height (10m); H indicates elevated emissions release height (90m).
- Average Elevation is the average terrain in meters within 50km of the source.
- Note: Proper justification for usage of less conservative MERP value must be provided in a modeling protocol to the Division and is subject to Division approval.

Table B-1: NOx MERP Values for Ozone

SIL = 1.0 ppb

Precursor	Emissions (tpy)	Height	FIPS	State	County	Average Elevation (m)	Max Impact (ppb)	MERP Value (tpy)
NOx	500	L	18037	Indiana	Dubois	163	2.13E+00	234
NOx	500	H	18037	Indiana	Dubois	163	2.11E+00	237
NOx	1000	H	18037	Indiana	Dubois	163	3.76E+00	266
NOx	3000	H	18037	Indiana	Dubois	163	8.83E+00	340
NOx	500	L	21009	Kentucky	Barren	229	2.91E+00	172
NOx	500	H	21009	Kentucky	Barren	229	2.95E+00	**170**
NOx	1000	H	21009	Kentucky	Barren	229	5.03E+00	199
NOx	3000	H	21009	Kentucky	Barren	229	1.07E+01	281
NOx	1000	L	21019	Kentucky	Boyd Co	242	3.97E+00	252
NOx	1000	H	21019	Kentucky	Boyd Co	242	3.79E+00	264
NOx	500	L	21187	Kentucky	Owen	236	1.63E+00	306
NOx	500	H	21187	Kentucky	Owen	236	1.58E+00	317
NOx	1000	H	21187	Kentucky	Owen	236	2.74E+00	365
NOx	500	L	29155	Missouri	Pemiscot	82	1.13E+00	444
NOx	500	H	29155	Missouri	Pemiscot	82	1.11E+00	452
NOx	1000	H	29155	Missouri	Pemiscot	82	1.94E+00	515
NOx	500	L	37009	North Carolina	Ashe	731	1.81E+00	276
NOx	500	H	37009	North Carolina	Ashe	731	1.87E+00	268
NOx	1000	H	37009	North Carolina	Ashe	731	3.14E+00	319
NOx	3000	H	37009	North Carolina	Ashe	731	6.34E+00	473

Table B-2: VOC MERP Values for Ozone

SIL = 1.0 ppb

Precursor	Emissions (tpy)	Height	FIPS	State	County	Average Elevation (m)	Max Impact (ppb)	MERP Value (tpy)
VOC	500	L	18037	Indiana	Dubois	163	9.22E-02	5424
VOC	1000	L	18037	Indiana	Dubois	163	1.87E-01	5347
VOC	1000	H	18037	Indiana	Dubois	163	1.73E-01	5782
VOC	3000	H	18037	Indiana	Dubois	163	7.89E-01	3802
VOC	500	L	21009	Kentucky	Barren	229	6.02E-02	8306
VOC	500	H	21009	Kentucky	Barren	229	6.01E-02	8317
VOC	1000	H	21009	Kentucky	Barren	229	1.30E-01	7703
VOC	3000	H	21009	Kentucky	Barren	229	8.96E-01	3350
VOC	500	L	21019	Kentucky	Boyd Co	242	1.70E-01	**2939**
VOC	500	L	21187	Kentucky	Owen	236	5.20E-02	9611
VOC	500	L	29155	Missouri	Pemiscot	82	8.57E-02	5831
VOC	500	L	37009	North Carolina	Ashe	731	6.25E-02	8002
VOC	500	H	37009	North Carolina	Ashe	731	3.42E-02	14634
VOC	1000	H	37009	North Carolina	Ashe	731	7.82E-02	12794
VOC	3000	H	37009	North Carolina	Ashe	731	3.63E-01	8273

Table B-3: NOx MERP Values for Daily $PM_{2.5}$

SIL = 1.2 µg/m^3

Precursor	Emissions (tpy)	Height	FIPS	State	County	Average Elevation (m)	Max Impact (µg/m³)	MERP Value (tpy)
NOx	500	L	18037	Indiana	Dubois	163	1.57E-01	3829
NOx	500	H	18037	Indiana	Dubois	163	5.84E-02	10271
NOx	1000	L	18037	Indiana	Dubois	163	4.11E-01	**2922**
NOx	1000	H	18037	Indiana	Dubois	163	1.25E-01	9588
NOx	3000	H	18037	Indiana	Dubois	163	4.79E-01	7518
NOx	500	L	21009	Kentucky	Barren	229	1.07E-01	5615
NOx	500	H	21009	Kentucky	Barren	229	4.87E-02	12315
NOx	1000	H	21009	Kentucky	Barren	229	8.86E-02	13550
NOx	3000	H	21009	Kentucky	Barren	229	2.03E-01	17710
NOx	1000	L	21019	Kentucky	Boyd Co	242	2.02E-01	5945
NOx	1000	H	21019	Kentucky	Boyd Co	242	7.90E-02	15183
NOx	500	L	21187	Kentucky	Owen	236	4.96E-02	12092
NOx	500	H	21187	Kentucky	Owen	236	2.50E-02	24032
NOx	1000	H	21187	Kentucky	Owen	236	4.98E-02	24077
NOx	500	L	29155	Missouri	Pemiscot	82	1.61E-01	3717
NOx	500	H	29155	Missouri	Pemiscot	82	6.54E-02	9172
NOx	1000	H	29155	Missouri	Pemiscot	82	1.17E-01	10266
NOx	500	L	37009	North Carolina	Ashe	731	5.16E-02	11619
NOx	500	H	37009	North Carolina	Ashe	731	4.08E-02	14704
NOx	1000	H	37009	North Carolina	Ashe	731	7.74E-02	15507
NOx	3000	H	37009	North Carolina	Ashe	731	2.22E-01	16214

Table B-4: SO2 MERP Values for Daily $PM_{2.5}$

SIL = 1.2 $\mu g/m^3$

Precursor	Emissions (tpy)	Height	FIPS	State	County	Average Elevation (m)	Max Impact ($\mu g/m^3$)	MERP Value (tpy)
SO_2	500	L	18037	Indiana	Dubois	163	2.69E-01	2228
SO_2	500	H	18037	Indiana	Dubois	163	1.48E-01	4067
SO_2	1000	L	18037	Indiana	Dubois	163	8.32E-01	**1443**
SO_2	1000	H	18037	Indiana	Dubois	163	3.67E-01	3272
SO_2	3000	H	18037	Indiana	Dubois	163	1.37E+00	2630
SO_2	500	L	21009	Kentucky	Barren	229	1.29E-01	4658
SO_2	500	H	21009	Kentucky	Barren	229	6.01E-02	9988
SO_2	1000	H	21009	Kentucky	Barren	229	1.11E-01	10851
SO_2	3000	H	21009	Kentucky	Barren	229	2.64E-01	13614
SO_2	1000	L	21019	Kentucky	Boyd Co	242	5.64E-01	2128
SO_2	1000	H	21019	Kentucky	Boyd Co	242	3.43E-01	3502
SO_2	500	L	21187	Kentucky	Owen	236	1.09E-01	5516
SO_2	500	H	21187	Kentucky	Owen	236	4.91E-02	12225
SO_2	1000	H	21187	Kentucky	Owen	236	9.15E-02	13122
SO_2	500	L	29155	Missouri	Pemiscot	82	3.23E-01	1855
SO_2	500	H	29155	Missouri	Pemiscot	82	1.02E-01	5882
SO_2	1000	H	29155	Missouri	Pemiscot	82	1.97E-01	6076
SO_2	500	L	37009	North Carolina	Ashe	731	2.74E-01	2187
SO_2	500	H	37009	North Carolina	Ashe	731	2.36E-01	2545
SO_2	1000	H	37009	North Carolina	Ashe	731	4.29E-01	2800
SO_2	3000	H	37009	North Carolina	Ashe	731	8.89E-01	4052

Table B-5: NOx MERP Values for Annual $PM_{2.5}$

SIL = 0.13 µg/m^3

Precursor	Emissions (tpy)	Height	FIPS	State	County	Average Elevation (m)	Max Impact (µg/m^3)	MERP Value (tpy)
NOx	500	L	18037	Indiana	Dubois	163	1.09E-02	5977
NOx	500	H	18037	Indiana	Dubois	163	3.25E-03	19987
NOx	1000	L	18037	Indiana	Dubois	163	2.37E-02	**5476**
NOx	1000	H	18037	Indiana	Dubois	163	7.12E-03	18252
NOx	3000	H	18037	Indiana	Dubois	163	2.58E-02	15096
NOx	500	L	21009	Kentucky	Barren	229	7.19E-03	9036
NOx	500	H	21009	Kentucky	Barren	229	2.13E-03	30498
NOx	1000	H	21009	Kentucky	Barren	229	3.99E-03	32556
NOx	3000	H	21009	Kentucky	Barren	229	1.03E-02	37789
NOx	1000	L	21019	Kentucky	Boyd Co	242	1.50E-02	8643
NOx	1000	H	21019	Kentucky	Boyd Co	242	4.50E-03	28872
NOx	500	L	21187	Kentucky	Owen	236	3.14E-03	20706
NOx	500	H	21187	Kentucky	Owen	236	1.04E-03	62419
NOx	1000	H	21187	Kentucky	Owen	236	2.01E-03	64676
NOx	500	L	29155	Missouri	Pemiscot	82	8.43E-03	7707
NOx	500	H	29155	Missouri	Pemiscot	82	2.91E-03	22360
NOx	1000	H	29155	Missouri	Pemiscot	82	5.59E-03	23241
NOx	500	L	37009	North Carolina	Ashe	731	3.71E-03	17532
NOx	500	H	37009	North Carolina	Ashe	731	1.93E-03	33706
NOx	1000	H	37009	North Carolina	Ashe	731	3.71E-03	35054
NOx	3000	H	37009	North Carolina	Ashe	731	1.04E-02	37428

Table B-6: SO2 MERP Values for Annual $PM_{2.5}$

SIL = 0.13 µg/m^3

Precursor	Emissions (tpy)	Height	FIPS	State	County	Average Elevation (m)	Max Impact (µg/m^3)	MERP Value (tpy)
SO_2	500	L	18037	Indiana	Dubois	163	5.26E-03	12362
SO_2	500	H	18037	Indiana	Dubois	163	2.95E-03	22066
SO_2	1000	L	18037	Indiana	Dubois	163	1.62E-02	8046
SO_2	1000	H	18037	Indiana	Dubois	163	8.14E-03	15979
SO_2	3000	H	18037	Indiana	Dubois	163	5.00E-02	7793
SO_2	500	L	21009	Kentucky	Barren	229	3.93E-03	16545
SO_2	500	H	21009	Kentucky	Barren	229	2.22E-03	29317
SO_2	1000	H	21009	Kentucky	Barren	229	4.47E-03	29056
SO_2	3000	H	21009	Kentucky	Barren	229	1.37E-02	28564
SO_2	1000	L	21019	Kentucky	Boyd Co	242	1.26E-02	10281
SO_2	1000	H	21019	Kentucky	Boyd Co	242	7.44E-03	17468
SO_2	500	L	21187	Kentucky	Owen	236	2.89E-03	22480
SO_2	500	H	21187	Kentucky	Owen	236	1.71E-03	37931
SO_2	1000	H	21187	Kentucky	Owen	236	3.44E-03	37843
SO_2	500	L	29155	Missouri	Pemiscot	82	7.46E-03	8715
SO_2	500	H	29155	Missouri	Pemiscot	82	2.81E-03	23168
SO_2	1000	H	29155	Missouri	Pemiscot	82	5.51E-03	23581
SO_2	500	L	37009	North Carolina	Ashe	731	1.03E-02	**6321**
SO_2	500	H	37009	North Carolina	Ashe	731	6.97E-03	9325
SO_2	1000	H	37009	North Carolina	Ashe	731	1.31E-02	9922
SO_2	3000	H	37009	North Carolina	Ashe	731	3.31E-02	11796