

# SO<sub>2</sub> Redesignation Request Emissions Summary and Projections

## Campbell, KY – Clermont, OH

### Introduction

In January 2015, the Kentucky Division for Air Quality collaborated with the Ohio Environmental Protection Agency (Ohio EPA) to prepare a redesignation request for the sulfur dioxide (SO<sub>2</sub>) National Ambient Air Quality Standard (NAAQS). This redesignation request relates to the interstate area of portions of Campbell County in Kentucky and Clermont County in Ohio. For Campbell County, the portion includes five Census Tracts: 519.01, 519.03, 529.00, 531.00, and 533.01. And for Clermont County, the portion is Pierce Township.

### Selection of Years

In developing this SO<sub>2</sub> redesignation request, the initial step was to select the years from base year to maintenance year. After discussions between representatives from the Kentucky Division for Air Quality and the Ohio EPA, the appropriate years were selected. For the base year, 2011 was selected to develop a comprehensive SO<sub>2</sub> emissions inventory for which projected emissions could be estimated for several future years.

For the attainment year, 2014 was selected since it corresponds to one of the years in the design value showing attainment. These design value years are 2012, 2013, and 2014. The 2014 attainment year also corresponds to the year where the permanent and enforceable improvement in air quality leading to attainment occurred due to Clermont County's Walter C. Beckjord facility permanently ceasing operations.

Below is a summary of the years chosen for each state.

#### YEARS FOR SO<sub>2</sub> REDESIGNATION REQUEST – KENTUCKY AND OHIO

Year	Year Type	Kentucky	Ohio
2011	Base Year	√	√
2014	Attainment Year	√	√
2017	Interim Maintenance Year	√	
2020	Interim Maintenance Year		√
2022	Interim Maintenance Year	√	
2027	Maintenance Year	√	√

Therefore, the years for both states used in this redesignation request are:

2011, 2014, 2017, 2020, 2022, and 2027

The 2011 National Emissions Inventory (NEI) was used for area and non-highway mobile source emissions. Along with Census and projected Census data, additional years of 2010 Census, 2020

Census, and 2030 Census years are also used as part of the population and growth rate calculations.

Below are detailed explanations for projections on population growth factors and future year SO<sub>2</sub> emissions from point, area, highway mobile, and non-highway mobile sources. The Kentucky Division for Air Quality has provided all emission and projection data for both counties in an *Excel* spreadsheet. Unless otherwise noted, the following narrative applies to both Campbell County in Kentucky and Clermont County in Ohio.

## Population Growth

There are a total of five growth rates used for projecting Future Year SO<sub>2</sub> emissions. These growth rates can be divided into three groups based on the specific calculation type.

- 1) There is only one growth rate in the first group: the 2011-2014 growth rate. This growth rate, from the base year to the attainment year, was calculated by simply dividing the 2014 population by the 2011 population.
- 2) There are two growth rates in the second group: the 2014-2017 growth rate and the 2014-2020 growth rate. Projected from the 2014 attainment year, or Present Year, these growth rates were projected out towards and including the Future Year. For this growth rate group, the Future Year was 2020 as it would result in more-accurate growth rates. The following formula was used in *Excel* to calculate these growth rates.

$$\text{Growth Factor} = \text{EXP}(\text{RATE}(Y, -\text{PY}, \text{FY}))^n$$

Where Y = Total Years between Present and Future Years

PY = Present Year, in this case, 2014

FY = Future Year, in this case, 2020

n = Number of Years Out From Present Year

Using an example for a growth rate out to the year 2017, the following formula is used.

$$\text{2014-2017 Growth Factor} = \text{EXP}(\text{RATE}(6, -2014, 2020))^3$$

where 6 represents the total years between 2014 (Present Year) and 2020 (Future Year). From 2014, projecting 3 years (n) out would represent 2017. A similar formula is also applied to calculate the growth rate for 2020.

- 3) The final two growth rates are in the third group: the 2014-2022 growth rate and the 2014-2027 growth rate. Again, projected from the 2014 attainment year, or Present Year, these growth rates were projected out towards and including the Future Year. For this growth rate group, the Future Year was 2030 as it would result in more-accurate growth rates. The 2030 year was also used since 2022 and 2027 falls outside of the range using the Future Year 2020 indicated in the second growth rate group. The following formula was used in *Excel* to calculate these growth rates.

$$\text{Growth Factor} = \text{EXP}(\text{RATE}(Y, -\text{PY}, \text{FY}))^n$$

Where Y = Total Years between Present and Future Years

PY = Present Year, in this case, 2014

FY = Future Year, in this case, 2030

n = Number of Years Out From Present Year

Using an example for a growth rate out to the year 2022, the following formula is used.

$$2014\text{-}2022 \text{ Growth Factor} = \text{EXP}(\text{RATE}(16, -2014, 2030))^8$$

where 16 represents the total years between 2014 (Present Year) and 2030 (Future Year). From 2014, projecting 8 years (n) out would represent 2022. A similar formula is also applied to calculate the growth rate for 2027.

### **Point Source Emissions**

For Campbell County, Kentucky, point source facilities were first identified within the five Census Tracts. There were a total of 11 facilities located within these Census Tract boundaries. After the facility locations were found, the 2011 base year emissions from those point sources were obtained from the Kentucky Emissions Inventory database. Finally, point source emissions were projected for the years 2014 attainment year, 2017, 2020, 2022, and 2027. Growth rates for these projected years were used as described in the section titled, "Population Growth."

For Pierce Township in Clermont County, Ohio, the only point source facility is Walter C. Beckjord Station. However, in a letter from Duke Energy Ohio, Inc. to the Southwest Ohio Air Quality Agency that is dated October 14, 2014, the six coal-fired emissions units (B001, B002, B003, B004, B005, and B006) "are permanently shut down and removed from service." The letter continues to indicate "that authorization to operate the affected units has ceased as of October 1, 2014." According to Ms. Jennifer Van Vlerah (Ohio EPA), the facility actually ceased operation on September 1, 2014. Therefore, this facility only operated for the first eight months of 2014.

### **Area Source Emissions**

The 2011 NEI, the most-recent NEI, was used to obtain 2011 base year area source emissions for both Campbell County, Kentucky and Clermont County, Ohio. These emissions represent the entire counties.

The appropriate population percentages were applied to each county (29.0% for Campbell County, 7.3% for Clermont County). By applying these percentages to the county emissions for area sources, the five Census Tracts and Pierce Township are now represented.

With the 2011 base year area source emissions now established for the county portions, those emissions were multiplied by the 2011-2014 growth rate to obtain the 2014 emissions. The 2014

attainment year emissions were then projected for 2017, 2020, 2022, and 2027 by using the growth rates explained in the section titled, "Population Growth."

### **Highway Mobile Source Emissions**

The Ohio-Kentucky-Indiana Regional Council of Governments, or OKI, provided the highway mobile source emissions for 2011 base year, 2014 attainment year, 2017, 2020, 2022, and 2027. The emissions for the specific county portions were not calculated based on population percentages. Rather, the emissions were more accurately reflected by dividing the vehicle miles traveled in the portion by the vehicle miles traveled in the entire county.

### **Non-Highway Mobile Source Emissions**

Just like area source emissions, the 2011 NEI was used to obtain 2011 base year non-highway mobile source emissions for both Campbell County, Kentucky and Clermont County, Ohio. These emissions represent the entire counties.

The appropriate population percentages were applied to each county (29.0% for Campbell County, 7.3% for Clermont County). By applying these percentages to the county emissions for non-highway mobile source sources, the five Census Tracts and Pierce Township are now represented.

With the 2011 base year non-highway mobile source emissions now established for the county portions, those emissions were multiplied by the 2011-2014 growth rate to obtain the 2014 emissions. The 2014 attainment year emissions were then projected for 2017, 2020, 2022, and 2027 by using the growth rates explained in the section titled, "Population Growth."

### **Summary of Emissions**

As indicated in the *Excel* worksheet titled, "Total Emissions Summary," there is a very significant reduction in SO<sub>2</sub> emissions for the subject portions in Campbell County, Kentucky and Clermont County, Ohio.

# REDESIGNATION REQUEST: POPULATION AND GROWTH DATA

Enter Pollutant(s) Here:	SO2	Enter Area Here: Campbell-Clermont Counties, KY-OH (Portions)						
		Census 2010 <sup>1</sup>	Base Year 2011 <sup>2</sup>	Attain 2014	Proj 2017	Census 2020 <sup>1</sup>	Proj 2027	Census 2030 <sup>1</sup>
ENTIRE COUNTY		90,336	90,946	91,178	91,410	91,642	90,954	90,731
Campbell, KY		197,363	198,543	201,762	205,028	208,330	207,846	214,090
<b>COUNTY GROWTH RATES FOR EMISSION PROJECTIONS</b>								
COUNTY DECENTENNIAL GROWTH*		'10-'20	'20-'30	COUNTY	'11-'14	'14-'17	'14-'20	'14-'27
Campbell, KY		1.446%	-0.994%	Campbell, KY	1.0025	1.0025	1.0051	0.9975
Clermont, OH		5.557%	2.765%	Clermont, OH	1.0162	1.0162	1.0326	1.0495
<b>CAMPBELL COUNTY</b>								
CENSUS TRACTS / TOWNSHIP		Census 2010	Base Year 2011*	Attain 2014*	Proj 2017*	Census 2020*	Proj 2022*	Census 2030*
Campbell, KY -- Census Tracts		26,368	26,406	26,520	26,634	26,749	26,502	26,483
Campbell, KY -- Population %		29.2%	29.0%	29.1%	29.1%	29.2%	29.1%	29.2%
Clermont, OH (Pierce Township) <sup>4</sup>		14,378	14,458	14,684	14,914	15,146	15,208	15,747
Clermont, OH -- Population %		7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.4%
<b>CAMPBELL COUNTY</b>								
Census Tract		Census 2010 <sup>3</sup>	Base Year 2011*	Attain 2014*	Proj 2017*	Census 2020*	Proj 2022*	Census 2030*
519.01		4,986	4,993	5,015	5,036	5,058	5,011	5,008
519.03		5,316	5,324	5,347	5,370	5,393	5,343	5,339
529.00		5,362	5,370	5,393	5,416	5,440	5,389	5,385
531.00		5,810	5,818	5,843	5,869	5,894	5,839	5,835
533.01		4,894	4,901	4,922	4,943	4,965	4,919	4,915
<b>TOTAL ("Census Tracts" above)</b>		<b>26,368</b>	<b>26,406</b>	<b>26,520</b>	<b>26,634</b>	<b>26,749</b>	<b>26,502</b>	<b>26,483</b>

The area for this SO<sub>2</sub> redesignation request includes five Census Tracts in Campbell County, KY (519.01, 519.03, 529.00, 531.00, and 533.01) and Pierce Township in Clermont County, OH.

1) Population Projections 2015-2050, Census Data for 2010, 2020, and 2030, "Total Population", Kentucky State Data Center, <http://ksdc.louisville.edu/index.php/kentucky-demographic-data/projections>

2) Population Estimates for 2011 and 2012, "Total Population (2013)", Kentucky State Data Center, <http://ksdc.louisville.edu/index.php/kentucky-demographic-data/estimates/population-and-housing-units>

3) 2010 Census Tract and Block Data -- Campbell County, Kentucky State Data Center, <http://ksdc.louisville.edu/index.php/kentucky-demographic-data/decennial-census>

4) E-mail from Jennifer Van Vlerah, Ohio EPA, Population Data for Pierce Township in Clermont County, Ohio December 8, 2014.

\* Indicates that county-wide growth factors were applied due to limited access to specific localized population data.

# POINT SOURCE EMISSIONS

POLLUTANT(S):	SO2	AREA:				Campbell-Clermont Counties, KY-OH (Portions)				
		Base Year 2011 tpy	Attainment 2014 tpy	Projected 2017 tpy	Projected 2020 tpy	Projected 2022 tpy	Projected 2027 tpy			
<b>Campbell, KY</b>										
2103700008	Prestress Services Industries LLC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700060	Barrett Paving Materials	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
2103700061	Archer Daniel Midland Corp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700066	Fischer Special Manufacturing Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700090	Continental Silver Grove LLC	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.64
2103700091	DTE Silver Grove LLC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700106	Griffin Industries Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700107	Insight KY Partners II LP - Highland Heights	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700108	Insight KY Partners II LP - Alexandria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700112	Verizon Wireless - Cold Spring II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103700115	Verizon Wireless - Carthage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<b>TOTAL</b>	<b>0.78</b>	<b>0.78</b>	<b>0.79</b>	<b>0.79</b>	<b>0.79</b>	<b>0.79</b>	<b>0.78</b>	<b>0.78</b>	<b>0.78</b>
<b>Clermont, OH</b>										
1413100008	Walter C. Beckjord	90,834.50	32,602.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<b>TOTAL</b>	<b>90,834.50</b>	<b>32,602.44</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
	<b>POINT TOTAL</b>	<b>90,835.28</b>	<b>32,603.22</b>	<b>0.79</b>	<b>0.79</b>	<b>0.79</b>	<b>0.78</b>	<b>0.78</b>	<b>0.78</b>	<b>0.78</b>

The area for this SO<sub>2</sub> redesignation request includes five Census Tracts in Campbell County, KY (519.01, 519.03, 529.00, 531.00, and 533.01) and Pierce Township in Clermont County, OH.

2011 baseyear point source emissions were determined based on location within these specific localized areas in each county. For Campbell County, 2011 point source emissions were obtained through the Kentucky Emissions Inventory database. Growth rates in the "Pop Growth" worksheet, shaded in gray, were then applied to the Future Year emissions for 2014 (attainment year), 2017, 2020, 2022, and 2027. The Walter C. Beckjord facility in Clermont County permanently closed during 2014.

Data Source #1 : Kentucky Emissions Inventory database (2011)

Data Source #2 : E-mail from Jennifer Van Vlerah, Ohio EPA, Point Source Emissions for Pierce Township in Clermont County, Ohio, December 17, 2014

# AREA SOURCE EMISSIONS

POLLUTANT(S):	SO2		Campbell-Clermont Counties, KY-OH (Portions)							
	ENTIRE	AREA:	PORTION	PORTION	PORTION	PORTION	PORTION	PORTION	PORTION	PORTION
	Base Year	Base Year	Attainment	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	2011	2011	2014	2017	2020	2022	2027			
COUNTY	tpy	tpy	tpy	tpy	tpy	tpy	tpy			
Campbell, KY	20.77	6.03	6.04	6.06	6.08	6.03	6.02			
Clermont, OH	103.06	7.51	7.63	7.75	7.88	7.86	8.00			
<b>AREA TOTAL</b>	<b>123.83</b>	<b>13.53</b>	<b>13.67</b>	<b>13.81</b>	<b>13.95</b>	<b>13.89</b>	<b>14.02</b>			

The area for this SO<sub>2</sub> redesignation request includes five Census Tracts in Campbell County, KY (519.01, 519.03, 529.00, 531.00, and 533.01) and Pierce Township in Clermont County, OH.

2011 baseyear area source emissions were obtained from the National Emissions Inventory (U.S. EPA). Growth rates in the "Pop Growth" worksheet, shaded in gray, were then applied to project the Future Year SO<sub>2</sub> emissions for 2014 (attainment year), 2017, 2020, 2022, and 2027. County portions were applied by multiplying the 2011 emissions for the entire county by the Population %. Emissions from the portions were then be projected out to Future Years.

Data Source: National Emissions Inventory (2011), U.S. EPA

# HIGHWAY MOBILE SOURCE EMISSIONS

POLLUTANT(S):	SO2		AREA:				Campbell-Clermont Counties, KY-OH (Portions)	
	PORTION Base Year	PORTION Attainment	PORTION Projected	PORTION Projected	PORTION Projected	PORTION Projected	PORTION Projected	
COUNTY	2011 tpy	2014 tpy	2017 tpy	2020 tpy	2022 tpy	2027 tpy		
Campbell, KY	1.547	1.506	1.441	1.396	1.368	1.260		
Clermont, OH	0.340	0.331	0.316	0.306	0.300	0.277		
<b>HWY MOBILE</b>	<b>1.887</b>	<b>1.837</b>	<b>1.757</b>	<b>1.702</b>	<b>1.668</b>	<b>1.537</b>		

The area for this SO<sub>2</sub> redesignation request includes five Census Tracts in Campbell County, KY (519.01, 519.03, 529.00, 531.00, and 533.01) and Pierce Township in Clermont County, OH.

Andy Reser from the Ohio-Kentucky-Indiana Regional Council of Governments, or OKI, provided the highway mobile source emissions for 2011 baseyear, 2014 (attainment year), 2017, 2020, 2022, and 2027. The emissions for the specific portions of each county were not calculated based on population percentages. Instead, the emissions were more accurately reflected by dividing the vehicle miles traveled in the portion by the vehicle miles traveled in the entire county.

Data Source : Ohio-Kentucky-Indiana (OKI) Regional Council of Governments



# TOTAL EMISSIONS SUMMARY

POLLUTANT(S):	SO2		AREA: Campbell-Clermont Counties, KY-OH (Portions)			
	PORTION Base Year 2011 tpy	PORTION Attainment 2014 tpy	PORTION Projected 2017 tpy	PORTION Projected 2020 tpy	PORTION Projected 2022 tpy	PORTION Projected 2027 tpy
<b>COUNTY</b>						
<b>Campbell, KY</b>						
Point	0.78	0.78	0.79	0.79	0.78	0.78
Area	6.03	6.04	6.06	6.08	6.03	6.02
Hwy Mobile	1.55	1.51	1.44	1.40	1.37	1.26
Non-Hwy	0.20	0.20	0.20	0.20	0.20	0.20
<b>TOTAL</b>	<b>8.56</b>	<b>8.53</b>	<b>8.49</b>	<b>8.46</b>	<b>8.38</b>	<b>8.26</b>
<b>Clermont, OH</b>						
Point	90,834.50	32,602.44	-	-	-	-
Area	7.51	7.63	7.75	7.88	7.86	8.00
Hwy Mobile	0.34	0.33	0.32	0.31	0.30	0.28
Non-Hwy	0.17	0.18	0.18	0.18	0.18	0.19
<b>TOTAL</b>	<b>90,842.52</b>	<b>32,610.58</b>	<b>8.25</b>	<b>8.37</b>	<b>8.34</b>	<b>8.47</b>
<b>AREA TOTAL</b>	<b>90,851.08</b>	<b>32,619.11</b>	<b>16.73</b>	<b>16.82</b>	<b>16.72</b>	<b>16.73</b>

The area for this SO<sub>2</sub> redesignation request includes five Census Tracts in Campbell County, KY (519.01, 519.03, 529.00, 531.00, and 533.01) and Pierce Township in Clermont County, OH.

2011 baseyear emissions were obtained from a variety of sources. Point source emissions were obtained from state emissions inventory databases. 2011 baseyear area and non-highway mobile source emissions were obtained from the National Emissions Inventory (U.S. EPA). All highway mobile source emissions were obtained from the Ohio-Kentucky-Indiana Regional Council of Governments, or OKI, in Cincinnati, Ohio. Growth rates in the "Pop Growth" worksheet, shaded in gray, were then applied to project the Future Year SO<sub>2</sub> emissions for 2014 (attainment year), 2017, 2020, 2022, and 2027. Where applicable (area and non-highway), county portions were applied by multiplying the 2011 baseyear emissions for the entire county by the Population %. Emissions from the portions were then be projected out to Future Years.