



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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Eric J. Holcomb
Governor

Brian C. Rockensuess
Commissioner

February 21, 2022

Ms. Debra Shore
Regional Administrator
U.S. EPA, Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3950

Re: Request for Redesignation and Maintenance
Plan for Attainment of Indiana's Portion (Clark
and Floyd Counties) of the Louisville, Kentucky
– Indiana (KY-IN), 2015 8-Hour Ozone
Nonattainment Area

Dear Ms. Shore:

The Indiana Department of Environmental Management (IDEM) submits a Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion (Clark and Floyd counties) of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area.

The attached document consists of the following:

Request for Redesignation and Maintenance Plan

- A formal request that Indiana's portion of the Louisville, Kentucky – Indiana (KY-IN), Nonattainment Area for the 2015 8-hour ozone standard be redesignated to "attainment" and reclassified as "maintenance". It contains and meets the requirements set forth in Section 107 of the Clean Air Act (CAA) and in United States Environmental Protection's (U.S. EPA's) Redesignation Guidance.
- The appendices of the document contain Air Quality System (AQS) monitoring data (Appendix A), and Classification and Regression Tree and Temperature Analyses (Appendix B) for the Louisville, Kentucky – Indiana, 2015 8-Hour Ozone Nonattainment Area.
- A maintenance year of 2035 is established and 2030 is analyzed as an interim year.

Motor Vehicle Emissions Budgets

- Section 2.6.2.3.4 of the Request for Redesignation and Maintenance Plan contains new Motor Vehicle Emissions Budgets for 2035 for the Louisville KY-IN area. The Kentuckiana Regional Planning & Development Agency (KIPDA) travel demand forecasting model and U.S. EPA's Motor Vehicle Emissions Simulator (MOVES) 3.0.2 software program were used to determine emissions for the 8-hour nonattainment area. Please refer to the supporting document in Appendix C for further information.
- A conservative margin of safety was applied to 2035 projected emissions.
- The travel demand model was updated with the best available assumptions.

Throughout the development of these submittals IDEM staff worked with U.S. EPA Region 5 to ensure that any potential concerns regarding this submission were addressed. IDEM would appreciate U.S. EPA's continued efforts to communicate regularly with us as it reviews and processes these submittals.

IDEM provided a 30-day public comment period and an opportunity for a public hearing concerning this submittal on the *Request for Redesignation and Maintenance Plan for Attainment in Indiana's Portion of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area*. A public hearing was not requested and there were not any comments received. Please refer to the supporting document in Appendix D for further information and dates regarding the public participation process.

This submittal consists of one (1) hard copy of the required documentation. An electronic version of the submittal in PDF format that is identical to the hard copy has been sent to Sarah Arra, Chief of U.S. EPA Region 5's Attainment Planning and Maintenance Section and Chris Panos of U.S. EPA Region 5.

IDEM requests that U.S. EPA proceed with review and approval of this submittal. If you have any question or need additional information, please contact Brian Callahan, Section Chief, Air Quality Standards and Implementation, Office of Air Quality, IDEM, at (317) 232-8244 or bcallaha@idem.IN.gov.

Sincerely,



Matthew Stuckey
Assistant Commissioner
Office of Air Quality

Ms. Debra Shore

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MS/sd/bc/gf/mb

Enclosure:

Request for Redesignation and Maintenance Plan for Attainment in Indiana's
Portion of the Louisville, Kentucky – Indiana, (KY-IN), 2015 8-Hour Ozone
nonattainment Area

cc: Sarah Arra, U.S. EPA Region 5 (no enclosures)
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REQUEST FOR REDESIGNATION
AND
MAINTENANCE PLAN FOR
ATTAINMENT OF INDIANA'S
PORTION OF THE LOUISVILLE,
KENTUCKY – INDIANA (KY-IN), 2015
8-HOUR OZONE NONATTAINMENT
AREA

Clark and Floyd Counties, Indiana

Prepared By:
The Indiana Department of
Environmental Management

February 2022

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- A Air Quality System (AQS) Monitoring Data Values for Indiana’s Portion (Clark and Floyd Counties) and Kentucky’s Portion of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area

- B Classification and Regression Tree (CART) and Temperature Analysis for Louisville, Kentucky - Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area, 2005-2020

- C MOVES3 Documentation, Louisville Air Pollution Control District (APCD) and Kentuckiana Regional Planning Development Agency (KIPDA)

- D Public Participation Process Documentation

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**REQUEST FOR REDESIGNATION AND MAINTENANCE PLAN FOR ATTAINMENT
OF INDIANA'S PORTION OF THE LOUISVILLE, KENTUCKY – INDIANA (KY – IN)
2015 8-HOUR OZONE NONATTAINMENT AREA**

CLARK AND FLOYD COUNTIES, INDIANA

1.0 INTRODUCTION

This document supports the Indiana Department of Environmental Management's (IDEM's) request that the Indiana portion (Clark and Floyd counties in Southeast Indiana) of the Louisville, Kentucky (KY)-Indiana (IN), marginal nonattainment area be redesignated to attainment of the 2015 8-hour ozone standard. The Kentucky Department of Environmental Protection (KDEP), in conjunction with the Louisville Air Pollution Control District (APCD) intends to submit a request for their portion of the Louisville, KY-IN, marginal nonattainment area to be redesignated to attainment of the 2015 8-hour ozone standard. The entire Louisville, KY-IN, marginal nonattainment area has recorded three (3) years of complete, quality-assured ambient air quality monitoring data for the years 2019-2021 demonstrating attainment with the 2015 8-hour ozone standard.

Indiana's request is based on Section 107(d)(3)(D) of the Clean Air Act (CAA), which states:

- (D) The Governor of any State may, on the Governor's own motion, submit to the Administrator a revised designation of any area or portion thereof within the State. Within 18 months of receipt of a complete State redesignation submittal, the Administrator shall approve or deny such redesignation. The submission of a redesignation by a Governor shall not affect the effectiveness or enforceability of the applicable implementation plan for the State.

Section 107(d)(3)(E) of the CAA establishes specific requirements to be met in order for an area to be considered for redesignation, including:

- (a) A determination that the area (or a portion thereof) has attained the 2015 8-hour ozone National Ambient Air Quality Standard (NAAQS).
- (b) A state implementation plan (SIP) for the area under Section 110(k) of the CAA that is fully approved.
- (c) A determination that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the SIP or other federal requirements.
- (d) A maintenance plan under Section 175A of the CAA that is fully approved.

- (e) A determination that all Section 110 and Part D requirements of the CAA have been met.

Indiana is formally requesting a redesignation of Indiana's portion (Clark and Floyd counties in Southeast Indiana) of the Louisville, KY-IN, marginal nonattainment area to attainment.

This document addresses each of these requirements in Section 2.0 and provides additional information to support continued compliance with the 2015 8-hour ozone standard.

1.1 Ozone

Ground level ozone is not emitted directly into the air but is created by chemical reactions with nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. Ozone formation is promoted by strong sunlight, warm temperatures, and light winds; elevated levels predominantly occur during the hot summer months. In accordance with Table D-3 of Appendix D of 40 Code of Federal Regulations (CFR) Part 58, for the 2015 8-hour standard, United States Environmental Protection Agency (U.S. EPA) mandates seasonal monitoring of ambient ozone concentrations in Indiana and Kentucky from March 1st through October 31st.

Due to the fact that ozone is formed in the ambient air, control of ozone focuses upon the reduction of precursor emissions (i.e., NO_x and VOCs). NO_x is formed from the high-temperature reaction of nitrogen and oxygen during combustion processes in sources such as electric utility boilers, industrial fuel-burning sources, and motor vehicles. VOCs include many industrial solvents and coatings, as well as the hydrocarbons (HCs) that are emitted by motor vehicles as evaporative losses from gasoline and tailpipe emissions of unburned hydrocarbon. Ground level ozone is associated with several adverse health and environmental impacts, including respiratory impairment and damage to crops and forests.

1.2 National Ambient Air Quality Standards

Ozone is one of the six criteria air pollutants that scientists have identified as being particularly harmful to humans and the environment. NAAQS have been developed for these six pollutants and are used as measurements of air quality. The CAA requires U.S. EPA to set primary standards at a level judged to be "requisite to protect the public health with an adequate margin of safety" and establish secondary standards that are requisite to protect public welfare from "any known or anticipated effects associated with the pollutant in the ambient air," including effects on crops, vegetation, wildlife, buildings and national monuments, and visibility.

The CAA requires areas designated nonattainment for the NAAQS for ozone to develop SIPs to expeditiously attain and maintain the standard. In 1997, U.S. EPA revised the air quality standards for ozone thus, replacing the 1979 1-hour standard with an 8-hour ozone standard set at 0.08 parts per million (ppm). The standard was challenged legally and upheld by the U.S. Supreme Court in February of 2001.

U.S. EPA designated areas under the 1997 8-hour ozone standard on April 15, 2004, as attainment, nonattainment, or unclassifiable. Effective June 15, 2004, U.S. EPA designated Clark and Floyd counties, nonattainment under Subpart 1 of the 1997 8-hour ozone NAAQS as part of the Louisville, KY-IN nonattainment area.

The Louisville, KY-IN (Clark and Floyd counties) area was subjected to nonattainment area rulemakings under the 1979 1-hour ozone standard, and the 1997 8-hour ozone standard. The 1-hour ozone standard was revoked on June 15, 2005. U.S. EPA approved Indiana's redesignation request for attainment under the 1997 8-hour ozone standard on July 19, 2007 (72 FR 39571), and the area remains classified as maintenance. Kentucky's portion was also redesignated to attainment and classified as maintenance under the 1997 8-hour ozone standard on July 5, 2007 (72 FR 36601).

On October 1, 2015, U.S. EPA significantly strengthened the 8-hour ozone standard to a level of 0.070 ppm, as shown in Table 1.1 (80 FR 65291). An exceedance of the 2015 8-hour ozone NAAQS occurs when a monitor measures ozone above 0.070 ppm on average for an 8-hour period. A violation occurs when the average of the annual fourth highest daily maximum 8-hour ozone values over three consecutive years is greater than 0.070 ppm. This three-year average is termed the "design value" for the monitor. The design value for a nonattainment area is the highest monitor design value in the area. U.S. EPA designated the Louisville, KY-IN area nonattainment under the 2015 8-hour ozone standard on June 4, 2018, effective August 3, 2018 (83 FR 25776).

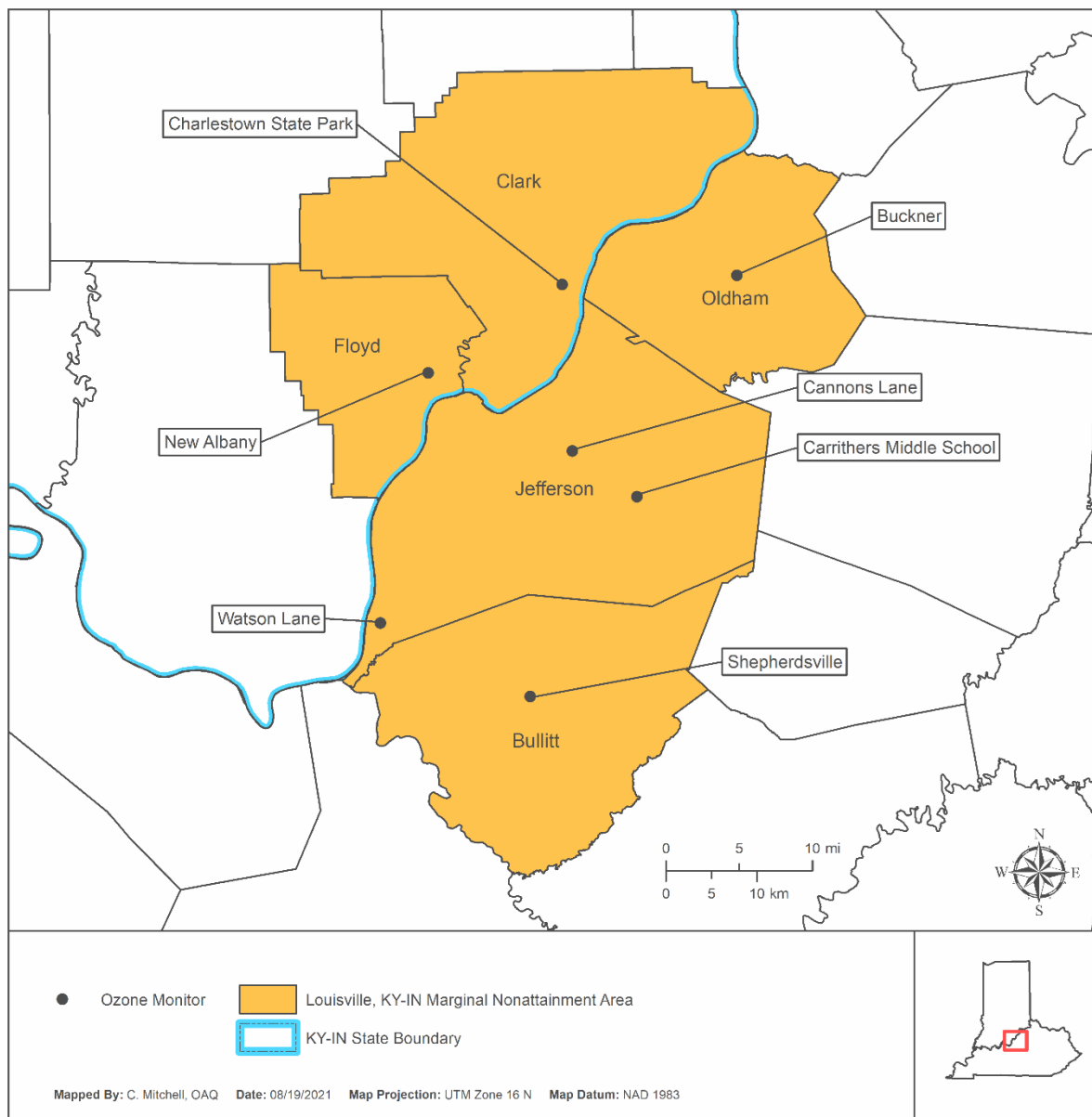
Table 1.1: National Ambient Air Quality Standards for Ozone

	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
1997 Ozone Standards	0.08 ppm	Three-year average of the fourth highest 8-hour ozone value recorded each year.	Same as primary	
2008 Ozone Standards	0.075 ppm	Three-year average of the fourth highest 8-hour ozone value recorded each year.	Same as primary	
2015 Ozone Standard	0.070 ppm	Three-year average of the fourth highest 8-hour ozone value recorded each year.	Same as primary	

1.3 Geographical Description

The specific counties that comprise the Louisville, KY-IN, nonattainment area as defined in 83 FR 25776, include: Bullitt, Jefferson, and Oldham counties located in north central Kentucky and Clark and Floyd counties located in southeastern Indiana. The Louisville Marginal Nonattainment Area is shown in Figure 1.1.

Figure 1.1: Map of the Louisville, Kentucky-Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area



1.4 Status of Air Quality

There are currently seven (7) Federal Reference Method monitors measuring ozone concentrations in the Louisville, KY-IN, nonattainment area. Two monitors are located in Indiana's portion of the nonattainment area and are operated by IDEM's Office of Air Quality (OAQ). Five monitors are located in Kentucky's portion of the nonattainment area and are operated by the APCD and KDEP. Monitor data from 2016-2021 are shown in Tables 2.1 and 2.2 as well as Appendix A. Graph 2.1 depicts the 2019-2021 design values for the monitors within Clark and Floyd counties, Indiana, while Graph 2.3 displays the values from Kentucky's monitors. Indiana's and Kentucky's monitor values were retrieved from U.S. EPA's Air Quality System (AQS) database. The data from all ozone monitoring sites meet U.S. EPA requirements for completeness (as described in Appendix P to 40 CFR Part 50) for the years 2019-2021. The locations of the monitoring sites for this nonattainment area are shown in Figure 1.1.

2.0 REQUIREMENTS FOR REDESIGNATION

Section 110 and Part D of the CAA lists several requirements that must be met by nonattainment areas prior to consideration for redesignation to attainment. In addition, U.S. EPA has published detailed guidance in a document titled *Procedures for Processing Requests to Redesignate Areas to Attainment*, issued September 4, 1992, to Regional Air Directors.¹ This document is hereafter referred to as "Redesignation Guidance". This request for redesignation and maintenance plan is based on the Redesignation Guidance and supplemented with additional guidance received from staff of the Attainment Planning and Maintenance Section of U.S. EPA Region V. The specific requirements for redesignation are listed below.

2.1 Attainment of the Ozone National Ambient Air Quality Standard (NAAQS)

- 1) A demonstration that the NAAQS for ozone, as published in 40 CFR 50.15, has been attained. Ozone monitoring data must show that violations of the ambient standard are no longer occurring.
- 2) Ambient monitoring data, quality assured in accordance with 40 CFR 58.15, have been recorded in the U.S. EPA AQS database and made available for public view.

2.1.1 Ambient Air Monitoring Data

As explained in 40 CFR Part 50, Appendix P, three (3) complete years of ozone monitoring data are required to demonstrate attainment at a monitoring site. The 8-hour primary and secondary ozone ambient air quality standards are met at an ambient air quality monitoring site when the three-year average of the annual fourth-highest daily

¹ https://www.epa.gov/sites/production/files/2016-03/documents/calagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf

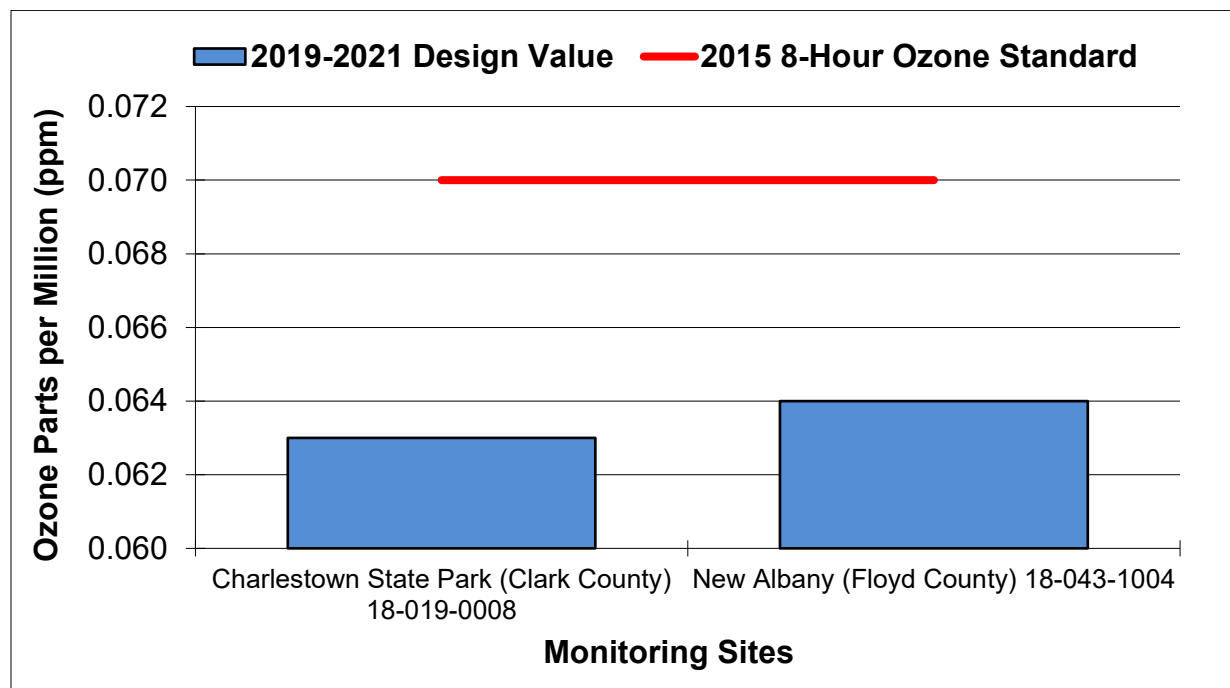
maximum 8-hour average ozone concentration is less than or equal to 0.070 ppm. When this occurs, the site is deemed to be in attainment. A maximum of three (3) significant digits are carried in the computations and digits to the right of the third decimal place are truncated (i.e., any computation greater than 0.070 ppm is truncated to 0.070 ppm). Values equal to or below 0.070 ppm meet the standard; values equal to or greater than 0.071 ppm exceed the standard. These data handling procedures are applied on an individual basis at each monitor in the area. An individual site's three-year average of the annual fourth highest daily maximum 8-hour average ozone concentration is called the site's design value. The air quality design value for the area is the highest design value among all sites in the area.

Table 2.1 outlines the annual fourth high values for 2016-2021 and the three-year design values for 2016-2018 through 2019-2021 for the two active Indiana monitoring sites in the Louisville, KY-IN nonattainment area. During this period, the design values for Indiana's portion of the nonattainment area demonstrate that the 2015 8-hour NAAQS for ozone has been attained. For the most recent design value (2019-2021), both monitors measured less than or equal to 0.064 ppm. Graph 2.1 demonstrates that the 2019-2021 design values for Indiana's portion of the nonattainment area are well below the 2015 8-hour ozone NAAQS. A comprehensive list of the fourth-highest daily maximum 8-hour average ozone concentrations over this period is included in Appendix A.

Table 2.1: Monitoring Sites' 2016-2021 Annual 4th Highs and Three-Year Design Values for 2016-2018 through 2019-2021 - Clark and Floyd Counties, Indiana

AQS# Site County	Annual 4 th High (ppm)						Design Values (Average of 4th highs, ppm)			
	2016	2017	2018	2019	2020	2021	2016- 2018	2017- 2019	2018- 2020	2019- 2021
18-019-0008 Charlestown State Park Clark	0.072	0.068	0.071	0.064	0.062	0.063	0.070	0.067	0.065	0.063
18-043-1004 New Albany Floyd	0.073	0.074	0.073	0.063	0.066	0.064	0.073	0.070	0.067	0.064

Graph 2.1: Monitoring Sites' 2019-2021 Design Values - Clark and Floyd Counties, Indiana



Graph 2.2 shows the trend in three-year design values in Clark and Floyd counties, Indiana, from 2004-2006 through 2019-2021. The area's design values trend downward as emissions have declined due to such programs as the Acid Rain program and cleaner automobiles and fuels both regionally and locally. U.S. EPA's rule to control nitrogen oxides from specific source categories (40 CFR Parts 51, 72, 75, and 96, published on October 17, 1998, and referred to as the "NO_x SIP Call") has significantly reduced emissions from large electric generating units (EGUs), industrial boilers, and cement kilns. EGUs are now regulated by the federal Cross-State Air Pollution Rule (CSAPR). The SIP submittals for NO_x reductions of other Midwest states were also approved in this timeframe.

Graph 2.2: Highest Monitor Design Values from 2006-2021 Compared to the 1997, 2008, and 2015 8-hour Ozone Standards – Clark and Floyd Counties, Indiana

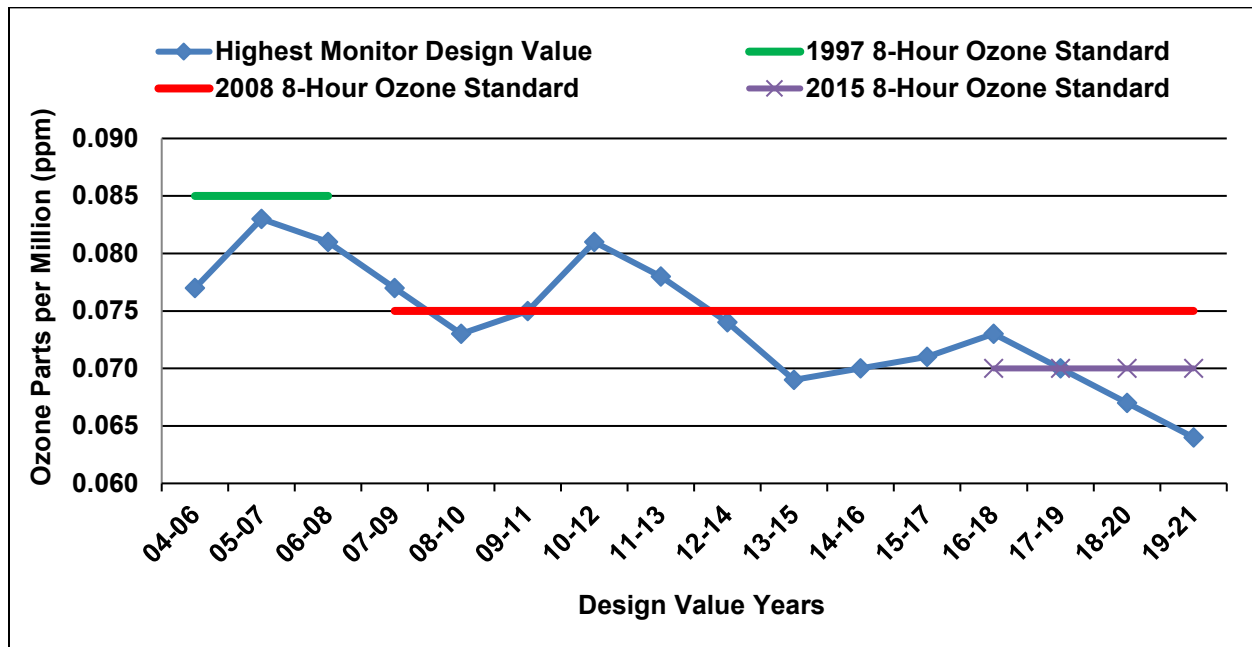
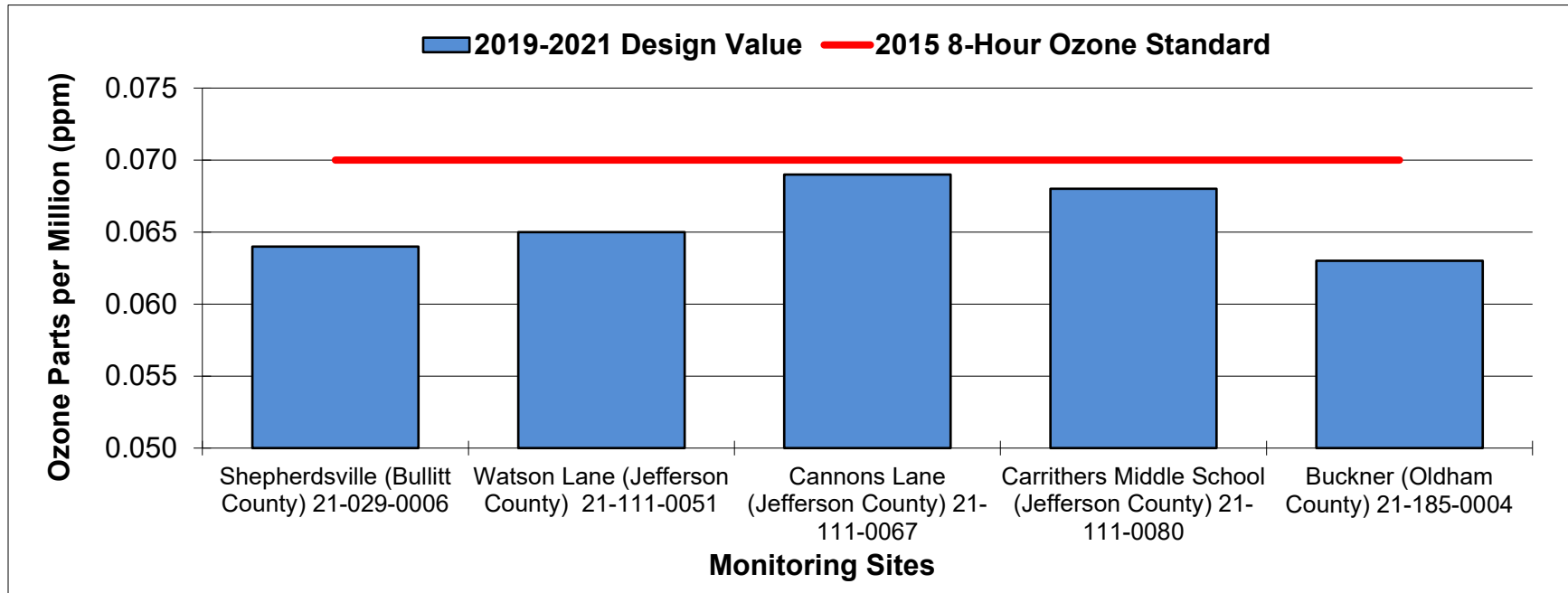


Table 2.2 outlines the annual fourth-high values for 2016-2021 and three-year design values for 2016-2018 through 2019-2021 for five (5) active Kentucky monitoring sites. The Bates (Site ID# 211110027) monitor located in Jefferson County; Kentucky was discontinued on October 31, 2017. All sites recorded design values at or below the 2015 8-hour ozone NAAQS of 0.070 ppm for the most recent design value years of 2019-2021 as shown in Graph 2.3. Graph 2.4 illustrates the general downward trend of Kentucky's monitors in the Louisville nonattainment demonstrating attainment of the 2015 8-hour ozone NAAQS.

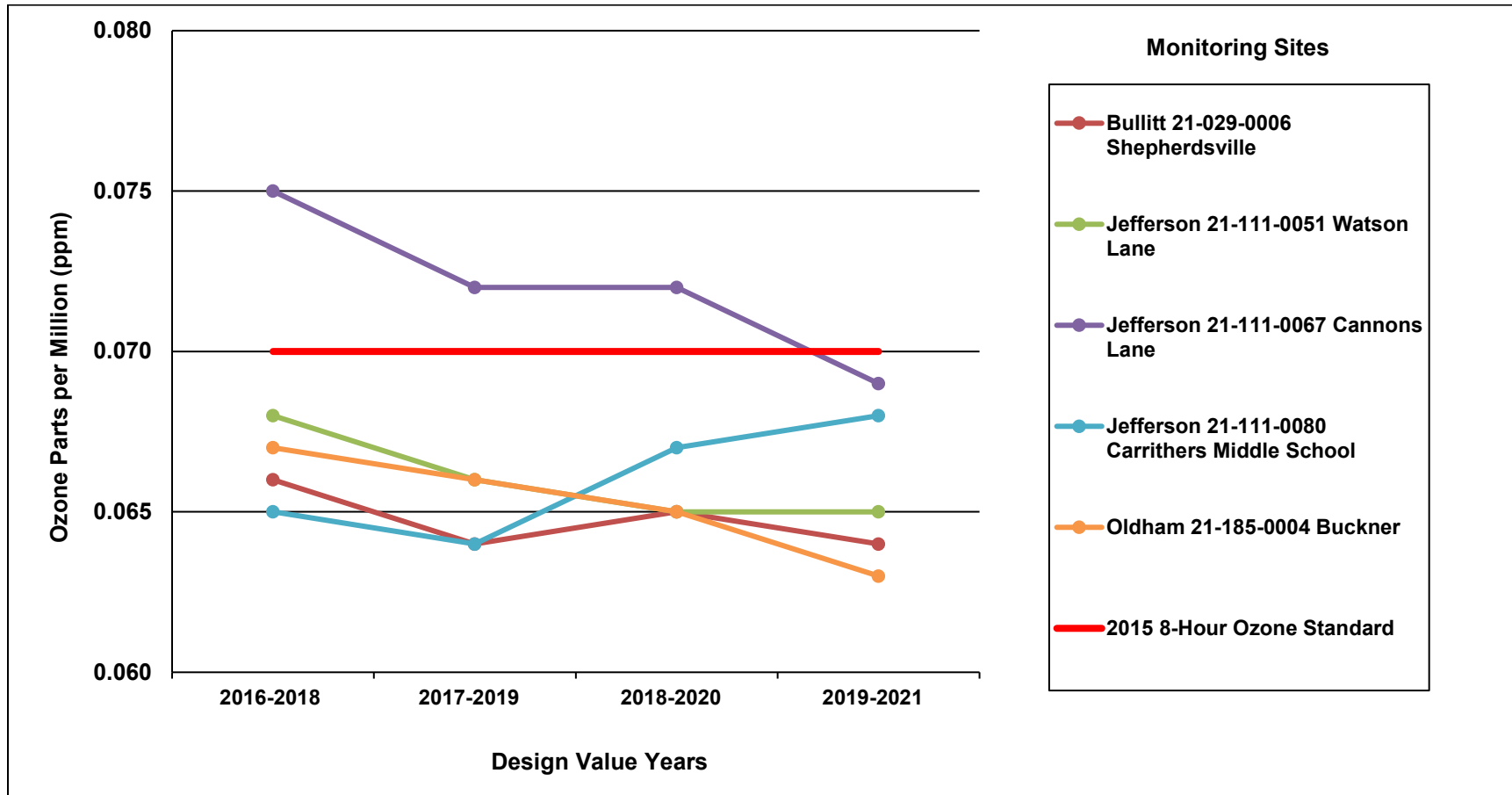
Table 2.2: Monitoring Site's Annual 4th Highs 2016-2021 and Design Values for Kentucky, 2016-2018 through 2019-2021

	Annual 4 th High (ppm)						Design Values (Average of 4th highs) (ppm)			
AQS# Site County	2016	2017	2018	2019	2020	2021	2016- 2018	2017- 2019	2018- 2020	2019- 2021
21-029-0006 Shepherdsville Bullitt	0.067	0.063	0.068	0.063	0.065	0.065	0.066	0.064	0.065	0.064
21-111-0027 Bates Jefferson	0.073	0.065	Site discontinued 10/31/2017				-----	-----	-----	-----
21-111-0051 Watson Lane Jefferson	0.070	0.066	0.069	0.065	0.063	0.067	0.068	0.066	0.065	0.065
21-111-0067 Cannons Lane Jefferson	0.076	0.072	0.077	0.068	0.071	0.069	0.075	0.072	0.072	0.069
21-111-0080 Carrithers Middle School Jefferson	Site began 03/01/2018		0.070	0.064	0.068	0.073	-----	-----	0.067	0.068
21-185-0004 Buckner Oldham	0.069	0.064	0.069	0.065	0.061	0.065	0.067	0.066	0.065	0.063

Graph 2.3: Monitoring Sites' 2019-2021 Design Values - Kentucky



Graph 2.4: Monitoring Sites' 2016-2021 Design Value Trends - Kentucky



2.1.2 Atmospheric Dispersion Modeling

Although U.S. EPA's Redesignation Guidance does not require modeling for ozone nonattainment areas seeking redesignation, extensive modeling has been performed covering the Louisville, KY-IN, nonattainment area to determine the effect of national emission control strategies on ozone levels. This region includes Clark and Floyd counties in Indiana. These modeling analyses determined that this region is significantly impacted by ozone and ozone precursor transport, and regional NO_x and VOC emission reductions have helped the area attain and additional future reductions will ensure continued compliance (maintenance) with the 2015 8-hour ozone NAAQS well into the future.

2.1.2.1 U.S. EPA Modeling Analysis for the Final Revised Cross-State Air Pollution Rule Update

The most recent photochemical modeling released by the U.S. EPA was for the Final Revised Cross-State Air Pollution Rule (CSAPR) Update. This latest modeling was released in March 2020 and is included in the "Air Quality Modeling Technical Support Document for the Final Revised Cross-State Air Pollution Rule."² This modeling shows that the monitors in the Louisville non-attainment area are projected to have ozone design values below the 2015 NAAQS. Paired with current monitoring data, this analysis demonstrates that the area has attained and will continue to maintain compliance of the 2015 ozone standard well into the future with an increasing margin of safety over time.

This modeling was conducted to identify ozone monitoring sites that are projected to be nonattainment or have maintenance problems in 2023 and beyond for the 2008 ozone NAAQS. While the purpose of this redesignation is regarding the 2015 ozone NAAQS, this 2008 NAAQS modeling shows the area will meet the more restrictive 2015 standard. The photochemical model used for this modeling was the Comprehensive Air Quality Model with Extensions (CAMx) version 7beta 6. The modeling domain consisted of 12-kilometer (km) x 12 km coarse grid covering the continental United States and portions of Canada and Mexico, and 25 vertical layers from the surface up through the troposphere, to a height of 50 millibars of pressure. Base-year 2016 emissions were modeled, with modeled emissions projected to 2023 and 2028. Meteorology from 2016 was created using the Weather Research Forecasting (WRF) Model version 3.8 and used for the base case and future year modeling runs.

² www.epa.gov/sites/default/files/2021-03/documents/air_quality_modeling_tsd_final_revised_csapr_update.pdf

Table 2.3 shows the results of U.S. EPA’s “Revised CSAPR Update” modeling for ozone impacts at the ozone monitors in the Louisville region. The monitor identification number, county, and state locations are listed, as well as the 2016 centered average 8-hour ozone design values that were used to determine future year 2023 and 2028 modeling results. Model results are used in a relative rather than absolute sense. Relative use of the model results calculates the fractional change in maximum concentrations based on two different emission scenarios 2023 and 2028 emissions when compared to base case year modeled results for this exercise. This fractional change, also known as a relative response factor (RRF), can be applied to each monitor’s average base-year design value to determine ozone impacts. This approach differs from using the absolute or actual modeled result, which may show under or over-predictions with the actual monitored values. The 2016 centered average design values were multiplied by the corresponding RRF to determine all future year base case design values. The 2023 and 2028 projected emissions were modeled to determine the future year design values. Note that for 2028, blacked out cells indicate that the monitor did not have enough modeled days above 60 parts per billion (ppb) to calculate an appropriate RRF.

Table 2.3: Attainment Test Results in 2023 and 2028 (Future-Years) for the Louisville, KY-IN, 2015 8-Hour Ozone Nonattainment Area

Air Quality System (AQS) ID	State	County	2016-Centered Average Design Value (ppb)	U.S. EPA 2023 Modeled Future Year (ppb)	U.S. EPA 2028 Modeled Future Year (ppb)
21-111-0051	Kentucky	Jefferson	68.3	59.9	59.1
21-111-0067	Kentucky	Jefferson	74.3	65.2	63.1
21-029-0006	Kentucky	Bullitt	65.7	57.2	55.9
18-019-0008	Indiana	Clark	70.3	61.0	
18-043-1004	Indiana	Floyd	71.0	62.4	60.3

In summary, the U.S. EPA “Revised CSAPR Update” modeled results show compliance with the 2015 8-hour ozone NAAQS of 70 ppb at all monitors in the Louisville, KY-IN 2015 8-hour ozone nonattainment area by 2023. Continued ozone concentration decreases are evident as the modeled results are even lower for 2028 at all monitors in the modeling analysis.

2.1.3 Meteorological Analysis

A meteorological analysis was performed to demonstrate that the reductions in monitored ozone were the result of permanent and enforceable reductions in precursor emissions and not the result of unusually favorable meteorology. A Classification and Regression Tree (CART) analysis for years 2019-2020 and a temperature analysis for years 2019-2021, performed by the Lake Michigan Air Directors Consortium (LADCO)

clearly demonstrates that the improvement in air quality was not the result of favorable meteorology. The analyses can be found in Appendix B.

2.2 Approved State Implementation Plan

On December 6, 2018, U.S. EPA finalized the “Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements; Final Rule” (herein referred to as “Implementation Rule”).³ In the Implementation Rule, U.S. EPA states “Under CAA section 182(a), states are not required to submit an attainment demonstration SIP for Marginal areas.” Therefore, an attainment demonstration has not been developed for Indiana’s portion of the Louisville, KY-IN nonattainment area.

2.3 NO_x Reasonably Available Control Technology (RACT)

Sections 172(c)(1) and 182(f) of the CAA require a demonstration that the state has adopted all reasonable and available control measures to demonstrate attainment as expeditiously as practicable and that no additional measures that are reasonably available will advance the attainment date. Specifically, Section 182(f) of the CAA requires States to adopt RACT for all major stationary sources of NO_x.

However, as stated in the Implementation Rule, “For each nonattainment area for which an attainment demonstration is required... the state must provide for implementation of all control measures needed for attainment as expeditiously as possible.” As such, because the Louisville, KY-IN nonattainment area is classified as marginal and an attainment demonstration is not required, NO_x RACT requirements are not applicable to Clark and Floyd counties.

2.4 Permanent and Enforceable Improvement in Air Quality

Permanent and enforceable reductions of NO_x and VOCs have resulted in attainment of the 2015 8-hour ozone standard. Some of these reductions were due to the application of RACT rules and some were due to the application of tighter federal standards on new vehicles. Also, Title IV of the CAA and the NO_x SIP Call, and subsequent Clean Air Interstate and Cross-State Air Pollution Rule programs, required the reduction of NO_x from utility sources. Covered sources are prohibited from reducing or removing emissions controls (anti-backsliding) following the redesignation of the area unless such a change is first approved by U.S. EPA as a revision to Indiana’s SIP, consistent with Section 110(l) of the CAA.

³ <https://www.govinfo.gov/content/pkg/FR-2018-12-06/pdf/2018-25424.pdf>

2.4.1 Reasonably Available Control Technology (RACT) and other State Volatile Organic Compound (VOC) Rules

As required by Section 172 of the CAA, Indiana has promulgated several rules requiring RACT for emissions of VOCs since the mid 1990's. In addition, other statewide rules for controlling VOCs have also been promulgated. The Indiana VOC rules are found in 326 IAC 8. The following is a listing of statewide rules that assist with the reduction of VOCs in the state:

326 IAC 8-1-6	New facilities; general reduction requirements (Best Available Control Technology for Non-Specific Sources)
326 IAC 8-2	Surface Coating Emission Limitations
326 IAC 8-3	Organic Solvent Degreasing Operations
326 IAC 8-4	Petroleum Sources
326 IAC 8-5	Miscellaneous Operation
326 IAC 8-6	Organic Solvent Emission Limitations
326 IAC 8-14	Architectural and Industrial Maintenance Coatings
326 IAC 8-15	Standards for Consumer and Commercial Products

2.4.2 Implementation of Past State Implementation Plans (SIP) Revisions

Clark and Floyd counties were previously nonattainment under the 1-hour ozone standard. The area met all its 1-hour SIP obligations, including a U.S. EPA-approved attainment demonstration. All the control measures outlined within the plans have been fully implemented. The area was also designated nonattainment for ozone under the 1997 8-hour standard in 2004. Since that time, the area has attained the 1997 8-hour ozone standard and was redesignated to attainment effective July 19, 2007. Therefore, no further SIP revisions are required under the 1997 8-hour ozone standard.

2.4.3 Controls Specific to Clark and Floyd Counties, Indiana

Local control measures, including some RACT rules specific to Clark and Floyd counties, have helped reduce VOC emissions and other types of emissions in Southeast Indiana. These measures include:

326 IAC 8-7	Specific VOC Reduction Requirements
326 IAC 8-8	Municipal Solid Waste Landfills
326 IAC 8-9	Volatile Organic Liquid Storage Vessels
326 IAC 8-10	Automobile Refinishing
326 IAC 8-11	Wood Furniture Coatings
326 IAC 8-12	Shipbuilding or Ship Repair Operations
326 IAC 13	Motor Vehicle Emission and Fuel Standards
326 IAC 4-1-4.1(c)	Ban on residential burning in Clark and Floyd counties
40 CFR 80.70(f)(3)	Federal requirement for the use of federal reformulated gasoline (RFG) in Clark and Floyd counties

2.4.4 Controls to Remain in Effect

Indiana commits to maintain the control measures listed above after redesignation, or submit to U.S. EPA as a SIP revision, any changes to its rules or emission limits applicable to NO_x or VOC sources as required for maintenance of the 2015 8-hour ozone standard in Clark and Floyd counties, Indiana. Indiana, through IDEM's OAQ and its Compliance and Enforcement Branch, has the legal authority and necessary resources to actively enforce any violations of its rules or permit provisions. After redesignation, IDEM intends to continue enforcing all rules that relate to the emission of ozone precursors in Clark and Floyd counties, Indiana.

2.4.5 New Source Review (NSR) Provisions⁴

Indiana has a long standing and fully implemented NSR program that is outlined in 326 IAC 2. The rule includes provisions for the Prevention of Significant Deterioration (PSD) permitting program in 326 IAC 2-2 and the Emission Offset Permitting Program in 326 IAC 2-3. Indiana's PSD program was conditionally approved in the March 3, 2003, *Federal Register* (FR) published at 68 FR 9892 and received final approval on May 20, 2004 (69 FR 29071) by U.S. EPA as part of the SIP.

Any facility that is not listed in the 2019 emission inventory, or for which emission reduction credit through closing was taken in demonstrating attainment, will not be allowed to construct, reopen, modify, or reconstruct without meeting all applicable permit rule requirements. The review process will be identical to that used for new sources. Once the Louisville, KY-IN nonattainment area is redesignated to attainment, the OAQ will implement NSR for major sources in Clark and Floyd counties, Indiana through the PSD program. This program requires an air quality analysis to evaluate whether the new source will threaten the NAAQS. Together, these rules will substantially reduce local and regional sources of ozone precursors.

2.5 Approved Maintenance Plan

A maintenance plan provides for the continued attainment of the air quality standard for a period of 10 years after U.S. EPA has formally redesignated the area to attainment. The plan also provides assurances that if there is a subsequent violation of the air quality standard, measures in the maintenance plan will prevent any future occurrences through contingency measures that would be triggered.

Indiana submits the maintenance plan found in Section 3.0 of this document for U.S. EPA's consideration and approval. Once the maintenance plan is approved, the area will have a fully approved implementation plan under section 110(a) of the CAA.

⁴ [04-11337.pdf \(govinfo.gov\)](#)

2.6 Section 110 and Part D Requirements

Prior to redesignation, a state containing a nonattainment area must demonstrate compliance with all requirements applicable to the area under section 110 and Part D of the CAA. This means the state must meet all requirements that applied to the area prior to, and at the time of, the submission of a complete request for redesignation to attainment.

2.6.1 Section 110 CAA Requirements

Section 110(a) of the CAA contains the general requirements for a SIP. Only the Section 110 requirements that are linked with a particular area's designation are the relevant measures to consider in evaluating a redesignation request. Further, Indiana believes that other Section 110 elements that are not connected with nonattainment plan submissions and not linked with an area's attainment status are also not applicable requirements for purposes of redesignation as a state remains subject to these requirements after an area is redesignated to attainment. The requirements of CAA Section 110(a)(2) that are statewide requirements and that are not linked to the 2015 8-hour ozone attainment status of Indiana's portion of the Louisville, KY-IN nonattainment area (Clark and Floyd counties) are therefore not applicable requirements for purposes of review of Indiana's redesignation request.

On November 2, 2018, Indiana submitted an infrastructure SIP to U.S. EPA for the 2015 8-hour standard to satisfy Section 110(a) CAA requirements.

2.6.2 CAA Part D Plan Requirements for Nonattainment Areas

Part D of the CAA contains requirements applicable to all areas designated nonattainment. Ozone nonattainment areas must meet the general provisions of Subpart 1 and the specific ozone provisions in Subpart 2. The maintenance plan associated with this request for redesignation for Clark and Floyd counties, Indiana is a SIP revision for Indiana's portion of an area designated as a nonattainment area and meets the applicable requirements of Part D of Title 1 of the CAA.

2.6.2.1 Section 172(c) CAA Requirements

Section 172(c) of the CAA contains general requirements for nonattainment plans. These requirements include reasonable further progress, emission inventories, permitting provisions, and other measures for attainment.

2.6.2.2 Section 173 CAA Requirements

These provisions outline requirements related to permitting of air pollution sources in nonattainment areas. Stationary sources of air pollution are subject to the applicable regulations of 326 IAC 2. These regulations include:

- Prevention of Significant Deterioration (PSD) Permitting Requirements (326 IAC 2-2)
- Emission Offset Permitting Program Requirements (326 IAC 2-3)

These permitting, stationary source monitoring and reporting, preconstruction review, offset ratios, and enforceable emission limitation requirements were adopted to implement the federally mandated requirements in Sections 110, 172, and 173 of the CAA.

2.6.2.3 Section 176(c) CAA Requirements

Transportation conformity is required under Section 176(c) of the CAA to ensure that federally supported highway and transit project activities are consistent with (i.e., “conform to”) the purpose of the SIP. Indiana’s general conformity rules were approved into Section 176(c) of the CAA on January 14, 1998 (63 FR 2146). Transportation conformity, as discussed below, applies to areas that are designated nonattainment and those areas redesignated attainment after 1990 (i.e., “maintenance areas”) with plans developed under Section 175A of the CAA for transportation-related criteria pollutants.

U.S. EPA requirements outlined in 40 CFR 93.118(e)(4) stipulate that mobile source emissions budgets (MVEBs) for NO_x and VOC be established as part of a SIP. The MVEBs are necessary to demonstrate conformance of transportation plans and improvement programs with the SIP. A general summary of the Motor Vehicle Emission Simulator (MOVES) methodology used in this area can be found in Appendix C.

2.6.2.3.1 On-Road Emission Estimations

KIPDA along with the APCD are the planning organizations for the area that includes Clark and Floyd counties. These organizations maintain a travel demand forecast model that is used to simulate the traffic in the area and is used to predict what that traffic will be like in future years given growth expectations. The model is used mostly to identify where travel capacity will be needed and to determine the infrastructure requirements necessary to meet that need. It is also used to support the calculation of mobile source emissions. The travel demand forecast model is used to predict the total daily Vehicle Miles Traveled (VMT) and a U.S. EPA software program called MOVES is used to calculate the emissions per mile. The product of these two outputs, once combined, is the total amount of pollution emitted by on-road vehicles for the analyzed area.

2.6.2.3.2 Overview

Broadly described, MOVES is used to determine “emission factors,” which are the average emissions per mile (grams/mile) for the ozone precursors: NO_x and VOC. There are numerous variables that can affect the emission factors. The vehicle fleet (vehicles on the road) age and the vehicle types have a major effect on the emission

factors. The facility-type upon which the vehicles are traveling (MOVES facility types are Freeway and Arterial and distinguish between urban and rural areas) and the vehicle speeds also affect the emission factor values. Meteorological factors, such as hourly air temperature and humidity, affect the emission factors as well. These data are estimated using the best available data to generate emission factors for appropriate ozone precursors, NO_x and VOC. VMT data is generated by the region's travel demand model. Once emission factors are determined, the emission factor(s) is multiplied by the VMT to ultimately determine the quantity of vehicle emissions.

2.6.2.3.3 Emission Estimates

Table 2.4 outlines the on-road emission estimations for the Louisville KY-IN ozone nonattainment area for the years 2017, 2019, and 2035 which are based on the actual travel demand model network runs generating estimated emissions for those years under the Connecting Kentuckiana 2050 Metropolitan Transportation Plan.

Table 2.4: Emission Estimations and Projections for On-Road Mobile Sources – Louisville KY-IN Nonattainment Area 2017 (Base-Year), 2019 (Attainment-Year), and 2035 (Maintenance-Year)

	2017	2019	2035
NO _x , tpsd	38.09	33.03	14.94
VOC, tpsd	15.23	13.65	4.79

2.6.2.3.4 Motor Vehicle Emission Budget

Table 2.5 contains the motor vehicle emissions budgets for the Louisville KY-IN ozone nonattainment area for the year 2035.

Table 2.5: Motor Vehicle Emission Budgets Louisville KY-IN Ozone Nonattainment Area

	2019	2035
NO _x , tpsd	33.03	17.18
VOC, tpsd	13.65	5.51

This budget includes the projected emission estimates for 2035 with a 15% margin of safety applied to NO_x and VOC emission estimates. Since assumptions change over time, IDEM determined a 15% margin of safety as described above to be reasonable to account for such changes within the conformity process. The emission estimates derive from the KIPDA travel demand model and MOVES3.0.2 as described above under the Connecting Kentuckiana 2050 Metropolitan Transportation Plan. The emissions calculation methodology, latest planning assumptions, and margin of safety were

determined through the interagency consultation process described in the Interagency Consultation Group Conformity Consultation Guidance.⁵

2.6.2.4 Section 191(a) CAA Requirements

Section 191(a) of the CAA identifies requirements related to nonattainment plan submission and attainment deadlines. Indiana has submitted all required SIP elements for this area in either previous submittals, or as part of this submittal.

3.0 MAINTENANCE PLAN

On June 4, 2018, U.S. EPA designated Clark and Floyd counties and the entire area as nonattainment and reclassified it as “marginal”. This designation became effective on August 3, 2018. However, ozone data from all monitors within the Louisville, (KY-IN) nonattainment area for the 2019-2021 design value period demonstrate that the 2015 8-hour ozone standard was attained at the end of 2021. In order for the Louisville, (KY-IN) Nonattainment Area to be redesignated to attainment, Indiana and Kentucky must submit, and U.S. EPA must approve, a SIP showing maintenance of the 2015 8-hour ozone NAAQS within the nonattainment area for at least 10 years after redesignation.

According to U.S. EPA’s *Redesignation Guidance*, states may generally demonstrate maintenance of the standard “by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by modeling to show that the future mix of sources and emissions rates will not cause a violation of the NAAQS”. Per U.S. EPA guidance, Indiana is relying on the attainment inventory approach to demonstrate maintenance of the 2015 ozone 8-hour NAAQS. Emission projections outlined in this document clearly illustrate that NO_x and VOC emissions in Clark and Floyd counties, Indiana, as well as the entire nonattainment area, will continue to decline between the 2019 attainment-year and the 2035 maintenance-year. The following plan has been developed in support of Indiana’s request for redesignation.

U.S. EPA’s Redesignation Guidance states that the maintenance plan must consist of the following items:

- Attainment Inventory
- Demonstration of Maintenance
- Continued Operation of Monitoring Network
- Verification of Continued Attainment
- Contingency Plan

⁵ https://d16db69sqbolil.cloudfront.net/mpo-website/downloads/Air-Quality/AirQuality_InteragencyConsultationGroupConformityConsultationGuidance.pdf

3.1 Emission Inventory

In consultation with U.S. EPA and Kentucky, a base-year of 2017, an attainment-year of 2019, an interim-year of 2030, and a maintenance-year of 2035 were selected. The 2017 base-year emissions inventory represents a comprehensive, accurate, and current inventory of actual emissions from all sources of NO_x and VOCs in Clark and Floyd counties. The 2017 Emissions Modeling platform⁶ was used to collect data for the 2017 NEI year. Point source (including EGU's), area, and non-road emissions were compiled from the data available on U.S. EPA's Emissions Modeling Clearinghouse website for the entire Louisville, (KY-IN) nonattainment area. On-road values for Clark and Floyd counties were provided by KIPDA with the assistance of APCD. The MOVES2014a was run using the "inventory mode" for the years 2015 and 2020, which has been interpolated to arrive at 2017 NO_x and VOC tons per summer day totals. Biogenic emissions are not included in these summaries.

The 2019 inventory includes point sources (including EGU emissions), area, and non-road emissions compiled from the data available on U.S. EPA's Emission Modeling Platform 2016v2.⁷ The modeling platform provides emission estimates for 2016 and projections to 2023, 2026, and 2032. Daily estimates of emissions by sector and county were provided on the 2016v2 Data File and Summaries site. The estimated tons per summer day were calculated by performing a query to find an average for the days in the summer months.

The projected inventory for 2030 was a straight-line interpolation between the projected modeling inventories for 2023, 2026, and 2032. The interpolations were performed at the sector level. The 2035 projected inventory utilized the FORECAST.LINEAR function in Microsoft Excel with inventory data points from 2016, 2023, 2026, and 2032. This inventory was estimated at the sector level as well. If the FORECAST.LINEAR function resulted in a negative value, the emissions were assumed to not change.

3.2 Attainment Inventory

U.S. EPA's Redesignation Guidance requires states to identify the level of emissions in an affected area that is sufficient to attain and maintain the NAAQS. To satisfy this requirement, Indiana is submitting the inventory shown in Tables 3.1 through Table 3.3. This inventory is a comprehensive inventory of ozone precursor emissions (i.e., NO_x and VOC) representative of the year when the area achieved attainment of the ozone air quality standard.

⁶ [2017 Emissions Modeling Platform | US EPA](#)

⁷ <https://www.epa.gov/air-emissions-modeling/2014-2016-version-7-air-emissions-modeling-platforms>

**Table 3.1: Clark and Floyd Counties, Indiana NO_x Attainment-Year (2019)
Emission Inventory Totals (Tons per Summer Day)**

Sector	NO_x
Point	4.18
Area	0.42
Non-road	2.76
On-road	7.73
TOTAL	15.09

**Table 3.2: Clark and Floyd Counties, Indiana VOC Attainment-Year (2019)
Emission Inventory Totals (Tons per Summer Day)**

Sector	VOC
Point	0.20
Area	8.33
Non-road	1.43
On-road	3.37
TOTAL	13.33

Table 3.3: Entire Louisville, Kentucky – Indiana (KY-IN) Nonattainment Area NO_x and VOC Attainment-Year (2019) Emission Inventory (Tons per Summer Day)

Sector	NO _x Total	VOC Total
Indiana		
Point	4.18	0.20
Area	0.42	8.33
Non-road	2.76	1.43
On-road	7.73	3.37
Total	15.09	13.33
Kentucky		
Point	34.04	33.45
Area	6.77	36.76
Non-road	3.38	4.36
On-road	25.31	10.28
Total	69.50	84.85
Total Nonattainment Area		
Point	38.22	33.65
Area	7.19	45.09
Non-road	6.14	5.79
On-road	33.04	13.65
TOTAL	84.59	98.18

3.3 Demonstration of Maintenance

As mentioned in Section 3.0, Indiana is relying on the emissions inventory approach to demonstrate maintenance of the 2015 8-hour ozone NAAQS. That is, emissions projected at least ten years following redesignation (i.e., the maintenance year) must not increase above the attainment-year inventory.

3.3.1 Projected Inventory

Maintenance is demonstrated when the future-year (2035) projected NO_x and VOC emission totals are below the 2019 attainment year.

Tables 3.4 and 3.5 illustrate projected anthropogenic NO_x emissions for both Clark and Floyd counties, Indiana, and the entire Louisville, (KY-IN) nonattainment area. Tables 3.6 and 3.7 illustrate projected anthropogenic VOC emissions for both Clark and Floyd counties, Indiana, and the entire Louisville, (KY-IN) nonattainment area.

Table 3.4: Clark and Floyd Counties, Indiana NO_x Emission Inventory Totals (Tons per Summer Day)

Sector	2017 Base	2019 Attainment	2030 Interim	2035 Maintenance	Safety Margin
Point	2.70	4.18	2.36	2.50	-1.68
Area	2.05	0.42	0.42	0.42	0
Nonroad	1.92	2.76	1.80	1.25	-1.51
Onroad	12.49	7.73	4.31	4.07	-3.66
TOTAL	19.16	15.09	8.89	8.24	-6.85

Table 3.5: NO_x Emission Inventory Totals for the Indiana and Kentucky portions of the Louisville, KY-IN Nonattainment Area (Tons per Summer Day)

Sector	2017 Base	2019 Attainment	2030 Interim	2035 Maintenance	Safety Margin
Indiana					
Point	2.70	4.18	2.36	2.50	-1.68
Area	2.05	0.42	0.42	0.42	0
Nonroad	1.92	2.76	1.80	1.25	-1.51
Onroad	12.49	7.73	4.31	4.07	-3.66
TOTAL	19.16	15.09	8.89	8.24	-6.85
Kentucky					
Point	35.78	34.04	24.39	21.24	-12.80
Area	7.21	6.77	5.84	5.41	-1.36
Nonroad	3.46	3.38	2.91	2.69	-0.69
Onroad	25.60	25.31	11.66	10.87	-14.44
TOTAL	72.05	69.50	44.80	40.21	-29.29
Total Nonattainment Area					
Point	38.48	38.22	26.75	23.74	-14.48
Area	9.26	7.19	6.26	5.83	-1.36
Nonroad	5.38	6.14	4.71	3.94	-2.20
Onroad	38.09	33.04	15.97	14.94	-18.10
TOTAL	91.21	84.59	53.69	48.45	-36.14

**Table 3.6: Clark and Floyd Counties, Indiana VOC Emission Inventory Totals
(Tons per Summer Day)**

Sector	2017 Base	2019 Attainment	2030 Interim	2035 Maintenance	Safety Margin
Point	2.15	0.20	0.21	0.21	0.01
Area	11.21	8.33	8.55	8.65	0.32
Nonroad	1.14	1.43	1.31	1.22	-0.21
Onroad	5.94	3.37	1.41	1.24	-2.13
TOTAL	20.44	13.33	11.48	11.32	-2.01

**Table 3.7: VOC Emission Inventory Totals for the Indiana and Kentucky portions
of the Louisville, KY-IN Nonattainment Area (Tons per Summer Day)**

Sector	2017 Base	2019 Attainment	2030 Interim	2035 Maintenance	Safety Margin
Indiana					
Point	2.15	0.20	0.21	0.21	0.01
Area	11.21	8.33	8.55	8.65	0.32
Nonroad	1.14	1.43	1.31	1.22	-0.21
Onroad	5.94	3.37	1.41	1.24	-2.13
TOTAL	20.44	13.33	11.48	11.32	-2.01
Kentucky					
Point	30.92	33.45	24.52	21.61	-11.84
Area	40.14	36.76	31.48	29.08	-7.68
Nonroad	4.37	4.36	4.31	4.28	-0.08
Onroad	9.29	10.28	4.04	3.55	-6.73
TOTAL	84.72	84.85	64.35	58.52	-26.33
Total Nonattainment Area					
Point	33.07	33.65	24.73	21.82	-11.83
Area	51.35	45.09	40.03	37.73	-7.36
Nonroad	5.51	5.79	5.62	5.50	-0.29
Onroad	15.23	13.65	5.45	4.79	-8.86
TOTAL	105.16	98.18	75.83	69.84	-28.34

Overall emissions of NO_x and VOC within the Louisville, KY-IN nonattainment area are projected to decrease as shown in Table 3.8. The overall decrease in NO_x and VOC emissions has helped the area attain the standard and additional projected future emission reductions will ensure the area continues to attain the standard well into the future.

Table 3.8: Entire Louisville, KY-IN Nonattainment Area Comparison of 2019 Attainment Year and 2030 and 2035 Projected Emission Estimates (Tons per Summer Day)

Pollutant	2019	2030	Difference Between 2019 and 2030	2035	Difference Between 2019 and 2035
<i>Indiana</i>					
NO _x	15.09	8.89	-6.20	8.24	-6.85
VOC	13.33	11.48	-1.85	11.32	-2.01
<i>Kentucky</i>					
NO _x	69.50	44.80	-24.70	40.21	-29.29
VOC	84.85	64.35	-20.50	58.52	-26.33
<i>Total Nonattainment Area</i>					
NO _x	84.59	53.69	-30.90	48.45	-36.14
VOC	98.18	75.83	-22.35	69.84	-28.34

U.S. EPA's transportation conformity regulations allow for allocation, through a revision to the SIP, of all or some portion of the area's overall safety margin (emission reductions from 2019 to 2035) to the motor vehicle emission budget projections for future conformity. As identified in Table 3.8, projected NO_x and VOC emission reductions from 2019 to 2035 within the Louisville, KY-IN nonattainment area allows for a 15% margin of safety being applied to the 2035 MVEBs.

3.3.2 Modeling Demonstration

Although U.S. EPA's Redesignation Guidance does not require modeling for ozone nonattainment areas, IDEM is providing the most recent photochemical modeling released by the U.S. EPA for the Final Revised Cross-State Air Pollution Rule (CSAPR) Update, March 2020. It shows the monitors in the non-attainment area are projected to have 2023 and 2028 ozone design values below the 2015 ozone NAAQS. Paired with current monitoring data, this analysis demonstrates the area has attained and will continue to maintain compliance with the 2015 8-hour ozone NAAQS well into the future with an increased margin of safety over time. See Section 2.1.2 for a discussion of photochemical modeling.

3.4 Monitoring Network

Indiana commits to continue monitoring ozone levels at the sites indicated in Table 2.1. IDEM will consult with U.S. EPA Region V staff prior to making changes to the existing monitoring network, should changes become necessary in the future. IDEM will continue to quality assure the monitoring data to meet the requirements of 40 CFR 58. Updates to IDEM's website will provide real time availability of the data and knowledge

of any exceedances.⁸ IDEM will enter all data into AQS in a timely manner in accordance with federal guidelines.

Indiana and Kentucky have quality-assured their 2019-2021 data shown in Appendix A in accordance with 40 CFR 58.15. Indiana and Kentucky have each recorded their 2019-2021 data in the AQS database making the data available to the public. Further, according to the applicable requirements in 40 CFR 58.10, Indiana will consult with U.S. EPA through the annual review of Indiana's monitoring network prior to making any changes to the existing monitoring network.

3.5 Verification of Continued Attainment

According to U.S. EPA's "Procedures for Processing Requests to Redesignate Area to Attainment", each State should ensure that it has the legal authority to implement and enforce all measures necessary to attain and maintain the 2015 8-hour NAAQS for ozone. Indiana maintains the legal authority, necessary resources, and structural components of its air quality management program to implement and enforce all measures necessary to maintain the NAAQS.

In order to track the progress of the maintenance plan, Indiana commits to periodically reevaluate the emissions inventory, as well as monitor contingency plan indicators and triggers as discussed in Section 3.6.

3.6 Contingency Plan

As required by Section 175A(b) of the CAA, Indiana commits to submit to the Administrator, eight (8) years after redesignation, an additional revision of the SIP. The revision will contain Indiana's plan for maintaining the 2015 8-hour NAAQS for ozone for an additional ten (10) years beyond the first ten (10) year maintenance period after redesignation.

Indiana commits to adopt and expeditiously implement necessary corrective actions in response to exceeding specified levels or if future violations of the ambient standard occur. Indiana hereby commits to adopt and implement necessary corrective actions in the following circumstances:

3.6.1 Warning Level Response

A Warning Level Response shall be prompted whenever an annual (1-year) 4th high monitored value of 0.074 ppm or greater occurs in a single ozone season or a two-year average 4th high monitored value of 0.071 ppm or greater occurs within the maintenance area. A Warning Level Response will consist of a study to determine whether the ozone value indicates a trend toward higher ozone values or whether emissions appear to be increasing. The study will evaluate whether the trend, if any, is

⁸ [IDEM: Air Monitoring: Air Quality Data](#)

likely to continue and, if so, the control measures necessary to reverse the trend. It will also take into consideration ease and timing for implementation, as well as economic and social considerations. Implementation of necessary controls in response to a Warning Level Response trigger will take place as expeditiously as possible, but in no event later than twelve (12) months from the conclusion of the most recent ozone season.

Should it be determined through the Warning Level study that action is necessary to reverse the noted trend, procedures for control selection and implementation outlined under “Action Level Response” shall be followed.

3.6.2 Action Level Response

An Action Level Response shall be prompted whenever a violation of the standard (three-year average 4th high value of 0.071 ppm or greater) occurs within the maintenance area. If the Action Level is triggered and is not found to be due to an exceptional event, malfunction, or noncompliance with a permit condition or rule requirement, IDEM will determine additional control measure(s) needed to assure future attainment of the 2015 8-ozone standard. In this case, measures that can be implemented in a short time will be selected and be in place within eighteen (18) months from the close of the ozone season that prompted the Action Level. Should it be determined that any of the above action is necessary, the following procedures for control selection and implementation shall be followed.

3.6.2.1 Control Measure Selection and Implementation

Adoption of any additional control measure(s) is subject to the necessary administrative and legal process. This process will include posting of notices, an opportunity for public hearings, and other measures required by Indiana law for rulemaking by the State of Indiana’s Environmental Rules Board.

If new measures or control is already promulgated and scheduled to be implemented at the federal or state level and that measure or control is determined to be sufficient to address the upward trend in air quality, additional local measures may be unnecessary. Furthermore, Indiana will submit to U.S. EPA an analysis to demonstrate that the proposed measure(s) are adequate to return the area to attainment.

3.6.3 Contingency Measures

Contingency measures to be considered will be selected from a comprehensive list of measures deemed appropriate and effective at the time the selection is made. Listed below are example measures that may be considered. The selection of measures will be based upon cost-effectiveness, emission-reduction potential, economic and social considerations, or other factors that IDEM deems appropriate. IDEM will solicit input from all interested and affected persons in the maintenance area prior to selecting appropriate contingency measures. All the listed contingency measures are potentially

effective or proven methods of obtaining significant reductions of ozone precursor emissions. It is not possible at this time to determine what control measure(s) will be appropriate at an unspecified time in the future. Therefore, the list of contingency measures outlined below is not comprehensive. Indiana anticipates that if contingency measures should ever be necessary, it is unlikely that a significant number (i.e., all those listed below) will be required.

1. A modern vehicle/maintenance program
2. Asphalt paving (lower VOC formulation)
3. Diesel exhaust retrofits
4. Traffic flow improvements
5. Idle reduction programs
6. Portable fuel container regulation (statewide)
7. Park and ride facilities
8. Rideshare/carpool program
9. VOC cap/trade program for major stationary sources
10. NO_x Reasonably Available Control Technology

At the time these measures are under consideration an opportunity for full public participation will be provided, during which the relative costs and benefits of individual measures can be fully evaluated. No contingency measures will be implemented without providing the opportunity for full public participation.

4.0 PUBLIC PARTICIPATION

In accordance with 40 CFR 51.102, public participation in this request was provided as follows:

Notice of availability of the complete document and a request for the opportunity for a public hearing was made available on IDEM's website on January 19, 2022, [IDEM: Public Notices \(in.gov\)](#). It remained posted on the site until at least February 18, 2022.

5.0 CONCLUSIONS

Clark and Floyd counties, along with the remaining portion of the Louisville, (KY-IN) nonattainment area, have attained the 2015 8-hour NAAQS for ozone. This petition demonstrates that Clark and Floyd counties have complied with the applicable provisions of the CAA regarding redesignation of ozone nonattainment areas. IDEM has prepared a request for redesignation and maintenance plan that meets the requirement of Section 110(a)(1) of the CAA.

Indiana has performed an analysis that shows the air quality improvements are due to permanent and enforceable measures. Some of these reductions were due to the application of RACT rules and some were due to the application of tighter federal standards on new vehicles. Also, Title IV of the CAA and the NO_x SIP Call, and subsequent CAIR and CSAPR programs, required the reduction of NO_x from utility

sources through the implementation of a trading program. Covered sources are prohibited from reducing or removing emissions controls (anti-backsliding) following the redesignation of the area unless such a change is first approved by U.S. EPA as a revision to Indiana's SIP, consistent with Section 110(l) of the CAA.

Under the previous 1-hour ozone standard and the 1997 8-hour ozone standard, controls have been implemented in Clark and Floyd counties that are more stringent than in any other portion of Indiana. These controls are comparable to controls implemented elsewhere within the nonattainment area and shall remain in effect following redesignation to ensure continued compliance with the standard. In addition to the corrective actions (should they be necessary) outlined in this submittal, Indiana continues to participate in the regional air quality planning efforts sponsored by LADCO. The current goal of the planning process is to establish a regional control strategy that provides for attainment of the ozone standard throughout the states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. Along with the other LADCO states, Indiana is developing local and statewide emission control measures where photochemical modeling culpability analyses demonstrate a clear need. Cost effectiveness analyses justify the implementation of such measures. These actions will provide for an even greater margin of safety for this area and ensure continued maintenance with the standard well into the future.

Based on this presentation, Indiana's portion of the Louisville, (KY-IN) nonattainment area (Clark and Floyd counties) meets the requirements for redesignation under Section 107(d)(3) of the CAA and U.S. EPA guidance. Furthermore, because this area is subject to transport, additional regional NO_x and VOC reductions will ensure continued compliance (maintenance) with the 2015 8-hour ozone standard and provide an increased margin of safety. As such, the submitted plan is complete and meets the requirements necessary for full approval and the redesignation of the area.

Consistent with the authority granted to U.S. EPA under Section 107(d)(3) of the CAA, Indiana requests that Clark and Floyd counties be redesignated from nonattainment to attainment of the 2015 8-hour ozone standard simultaneously with U.S. EPA approval of the request for redesignation and maintenance plan provisions contained herein.

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APPENDIX A

Air Quality System (AQS) Monitoring Data Values for Indiana's Portion (Clark and Floyd Counties) and Kentucky's Portion of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area

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User ID: BJR

DESIGN VALUE REPORT

Report Request ID: 1983133

Report Code: AMP480

Jan. 11, 2022

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	18	019									
	18	043									
	21	029									
	21	111									
	21	185									

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
DESIGN VALUE	44201		

SELECTED OPTIONS

Option Type	Option Value
SINGLE EVENT PROCESSING	EXCLUDE REGIONALLY CONCURRED EVENTS
MERGE PDF FILES	YES
AGENCY ROLE	PQAO
USER SITE METADATA	STREET ADDRESS
QUARTERLY DATA IN WORKFILE	NO
WORKFILE DELIMITER	,
USE LINKED SITES	YES

DATE CRITERIA

Start Date	End Date
2018	2021

APPLICABLE STANDARDS

Standard Description
Ozone 8-hour 2015

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

Pollutant: Ozone(44201)
Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2018
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

		Level: .07				State: Indiana										
Site ID	Poc STREET ADDRESS	2018		4th	Cert& Eval	2017		4th	Cert& Eval	2016		4th	Cert& Eval	3 - Year		D. V.
		Valid	Percent			Valid	Percent			Valid	Percent			Percent	Design	
		Days	Complete	Max		Days	Complete	Max		Days	Complete	Max		Complete	Value	Validity
18-019-0008	12500 St. Rd. 62- Charlestown State Park/ Indiana Armory	239	98	.071	Y	242	99	.068	Y	179	98	.072	Y	98	.070	Y
18-043-1004	2230 GREEN VALLEY ROAD/GREEN VALLEY ELEMENTARY SCHOOL	235	96	.073	Y	244	100	.074	Y	176	96	.073	Y	97	.073	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

Pollutant: Ozone(44201)
Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2019
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

			Level: .07				State: Indiana										
Site ID	Poc	STREET ADDRESS	2019				2018				2017				3 - Year		
			Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Percent	Design	D. V.
			Days	Complete	Max	Eval	Days	Complete	Max	Eval	Days	Complete	Max	Eval	Complete	Value	Validity
18-019-0008		12500 St. Rd. 62- Charlestown State Park/ Indiana Armory	244	100	.064	Y	239	98	.071	Y	242	99	.068	Y	99	.067	Y
18-043-1004		2230 GREEN VALLEY ROAD/GREEN VALLEY ELEMENTARY SCHOOL	240	98	.063	Y	235	96	.073	Y	244	100	.074	Y	98	.070	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

Pollutant: Ozone(44201)
Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2020
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

			Level: .07				State: Indiana										
Site ID	Poc	STREET ADDRESS	2020				2019				2018				3 - Year		
			Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Percent	Design	D. V.
			Days	Complete	Max	Eval	Days	Complete	Max	Eval	Days	Complete	Max	Eval	Complete	Value	Validity
18-019-0008		12500 St. Rd. 62- Charlestown State Park/ Indiana Armory	240	98	.062	Y	244	100	.064	Y	239	98	.071	Y	99	.065	Y
18-043-1004		2230 GREEN VALLEY ROAD/GREEN VALLEY ELEMENTARY SCHOOL	244	100	.066	Y	240	98	.063	Y	235	96	.073	Y	98	.067	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

Pollutant: Ozone(44201)
Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2021
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

		Level: .07				State: Indiana										
Site ID	Poc STREET ADDRESS	2021		4th	Cert& Eval	2020		4th	Cert& Eval	2019		4th	Cert& Eval	3 - Year		D. V.
		Valid	Percent			Valid	Percent			Valid	Percent			Percent	Design	
		Days	Complete	Max		Days	Complete	Max		Days	Complete	Max		Complete	Value	Validity
18-019-0008	12500 St. Rd. 62- Charlestown State Park/ Indiana Armory	245	100	.063	M	240	98	.062	Y	244	100	.064	Y	99	.063	Y
18-043-1004	2230 GREEN VALLEY ROAD/GREEN VALLEY ELEMENTARY SCHOOL	244	100	.064	M	244	100	.066	Y	240	98	.063	Y	99	.064	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

Pollutant: Ozone(44201)
Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2018
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

		Level: .07				State: Kentucky										
Site ID	Poc STREET ADDRESS	2018		4th	Cert&	2017		4th	Cert&	2016		4th	Cert&	3 - Year		D. V.
		Valid	Percent			Valid	Percent			Valid	Percent			Percent	Design	
		Days	Complete	Max	Eval	Days	Complete	Max	Eval	Days	Complete	Max	Eval	Complete	Value	Validity
21-029-0006	SECOND & CARPENTER STREETS	230	94	.068	S	232	95	.063	Y	234	96	.067	Y	95	.066	Y
21-111-0027	7601 BARDSTOWN RD, BATES ELEMENTARY SCH				*	244	100	.065	Y	213	87	.073	Y	62	.069	N
21-111-0051	7201 WATSON LN, WATSON LN ELEMENTARY SCH	235	96	.069	Y	234	96	.066	Y	235	96	.070	Y	96	.068	Y
21-111-0067	2730 CANNONS LANE, BOWMAN FIELD	346	95	.077	Y	360	99	.072	Y	243	99	.076	Y	98	.075	Y
21-111-0080	4320 Billtown Road	215	88	.070	Y				*				*	29	.070	N
21-185-0004	KYTC MAINTENANCE FACILITY, 1601 SOUTH HWY 393	242	99	.069	S	236	96	.064	Y	237	97	.069	Y	97	.067	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

Pollutant: Ozone(44201)
Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2019
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

		2019				2018				2017				3 - Year		
		Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Percent	Design	D. V.
		Days	Complete	Max	Eval	Days	Complete	Max	Eval	Days	Complete	Max	Eval	Complete	Value	Validity
21-029-0006	SECOND & CARPENTER STREETS	241	98	.063	Y	230	94	.068	S	232	95	.063	Y	96	.064	Y
21-111-0027	7601 BARDSTOWN RD, BATES ELEMENTARY SCH				*				*	244	100	.065	Y	33	.065	N
21-111-0051	7201 WATSON LN, WATSON LN ELEMENTARY SCH	244	100	.065	Y	235	96	.069	Y	234	96	.066	Y	97	.066	Y
21-111-0067	2730 CANNONS LANE, BOWMAN FIELD	358	98	.068	Y	346	95	.077	Y	360	99	.072	Y	97	.072	Y
21-111-0080	4320 Billtown Road	236	96	.064	Y	215	88	.070	Y				*	61	.067	N
21-185-0004	KYTC MAINTENANCE FACILITY, 1601 SOUTH HWY 393	241	98	.065	Y	242	99	.069	S	236	96	.064	Y	98	.066	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

Pollutant: Ozone(44201)
Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2020
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

		2020				2019				2018				3 - Year		
		Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Percent	Design	D. V.
		Days	Complete	Max	Eval	Days	Complete	Max	Eval	Days	Complete	Max	Eval	Complete	Value	Validity
21-029-0006	SECOND & CARPENTER STREETS	237	97	.065	Y	241	98	.063	Y	230	94	.068	S	96	.065	Y
21-111-0051	7201 WATSON LN, WATSON LN ELEMENTARY SCH	244	100	.063	Y	244	100	.065	Y	235	96	.069	Y	99	.065	Y
21-111-0067	2730 CANNONS LANE, BOWMAN FIELD	363	99	.071	Y	358	98	.068	Y	346	95	.077	Y	97	.072	Y
21-111-0080	4320 Billtown Road	242	99	.068	Y	236	96	.064	Y	215	88	.070	Y	94	.067	Y
21-185-0004	KYTC MAINTENANCE FACILITY, 1601 SOUTH HWY 393	237	97	.061	Y	241	98	.065	Y	242	99	.069	S	98	.065	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

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Standard Units: Parts per million(007)
NAAQS Standard: Ozone 8-hour 2015
Statistic: Annual 4th Maximum

Design Value Year: 2021
REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

		2021				2020				2019				3 - Year		
		Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Valid	Percent	4th	Cert&	Percent	Design	D. V.
		Days	Complete	Max	Eval	Days	Complete	Max	Eval	Days	Complete	Max	Eval	Complete	Value	Validity
21-029-0006	SECOND & CARPENTER STREETS	233	95	.065	Y	237	97	.065	Y	241	98	.063	Y	97	.064	Y
21-111-0051	7201 WATSON LN, WATSON LN ELEMENTARY SCH	240	98	.067	Y	244	100	.063	Y	244	100	.065	Y	99	.065	Y
21-111-0067	2730 CANNONS LANE, BOWMAN FIELD	302	83	.069	Y	363	99	.071	Y	358	98	.068	Y	93	.069	Y
21-111-0080	4320 Billtown Road	224	91	.073	Y	242	99	.068	Y	236	96	.064	Y	95	.068	Y
21-185-0004	KYTC MAINTENANCE FACILITY, 1601 SOUTH HWY 393	242	99	.065	Y	237	97	.061	Y	241	98	.065	Y	98	.063	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Jan. 11, 2022

CERTIFICATION EVALUATION AND CONCURRENCE FLAG MEANINGS

FLAG	MEANING
M	The monitoring organization has revised data from this monitor since the most recent certification letter received from the state.
N	The certifying agency has submitted the certification letter and required summary reports, but the certifying agency and/or EPA has determined that issues regarding the quality of the ambient concentration data cannot be resolved due to data completeness, the lack of performed quality assurance checks or the results of uncertainty statistics shown in the AMP255 report or the certification and quality assurance report.
S	The certifying agency has submitted the certification letter and required summary reports. A value of "S" conveys no Regional assessment regarding data quality per se. This flag will remain until the Region provides an "N" or "Y" concurrence flag.
U	Uncertified. The certifying agency did not submit a required certification letter and summary reports for this monitor even though the due date has passed, or the state's certification letter specifically did not apply the certification to this monitor.
X	Certification is not required by 40 CFR 58.15 and no conditions apply to be the basis for assigning another flag value
Y	The certifying agency has submitted a certification letter, and EPA has no unresolved reservations about data quality (after reviewing the letter, the attached summary reports, the amount of quality assurance data submitted to AQS, the quality statistics, and the highest reported concentrations).

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

APPENDIX B

Classification and Regression Tree (CART) and
Temperature Analyses for Louisville, Kentucky -
Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment
Area, 2005-2020

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Classification and Regression Tree (CART) Analyses for Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area

A classification and regression tree (CART) analysis is a statistical tool to classify data. Here, it is applied to 8-hour ozone and meteorological data to determine the meteorological conditions most associated with high-ozone days in the Louisville, KY-IN, 2015 8-hour ozone nonattainment area. Once days are classified by their meteorology, ozone concentration trends among days with the same meteorological conditions can be developed. When trends on days with similar meteorology are examined, the influence of year-to-year meteorological variability on ozone concentrations is minimized, and any remaining trend is assumed to be the result of reductions in emissions of ozone precursors and other non-meteorological factors.

The CART analyses were conducted by the Lake Michigan Air Directors Consortium (LADCO) using 8-hour ozone monitoring data selected from the Louisville 2015 8-hour ozone nonattainment area. The analyses included data from the years 2005 - 2020 (excluding data from 2015 because of data quality) and therefore addresses long-term trends of meteorological conditions associated with ambient ground-level ozone concentrations. The goal of the analyses was to determine the meteorological conditions associated with high ozone episodes in the Louisville, KY-IN air-shed, and to construct trends for the days identified as sharing similar meteorological characteristics.

The CART analyses for the Louisville-area ozone study processed multiple meteorological variables for each day to determine which are the most effective at predicting ozone concentrations. Meteorological data collected for the analyses was taken from the Louisville Muhammad Ali International Airport National Weather Service (NWS) station and processed by LADCO. Meteorological variables included:

- daily precipitation
- cloud cover
- maximum daily temperature, dew point, relative humidity, and pressure
- average daily wind speed
- average wind direction during the day, morning and afternoon as North/South, East/West wind vectors
- morning, afternoon, and evening dew point and pressure
- previous day's average temperature, pressure, wind speed, and wind direction
- change in temperature and pressure from previous day
- 2- and 3-day average wind speed and temperature
- other meteorological parameters

Regression trees, where each branch describes the meteorological conditions associated with different ozone concentrations, were developed to classify each

summer day (May – September). Although the exact selection of predictive variables changes from site-to-site, the universally common predictors are temperature, wind direction, and relative humidity. These are included in the dataset as daily averages and maximums as well as averages at specific times throughout the day (morning represented as 7-10 a.m. and afternoon represented as 1-4 p.m., etc.). Similar days were assigned to nodes, which are equivalent to branches of the regression tree. When days with similar meteorology are grouped, the influence of meteorological variability on the underlying trend in ozone concentrations is partially removed. The remaining trend is presumed to be due to precursor emissions or other non-meteorological influences. Ozone trends of these nodes were then plotted.

The CART analyses were performed for three groups of monitors in the Louisville nonattainment area: Jefferson County, KY (Bates), Jefferson County, KY (Watson Lane); and Jefferson County, KY (Carrithers Middle School). (The Bates monitor was relocated to Carrithers Middle School in 2018).

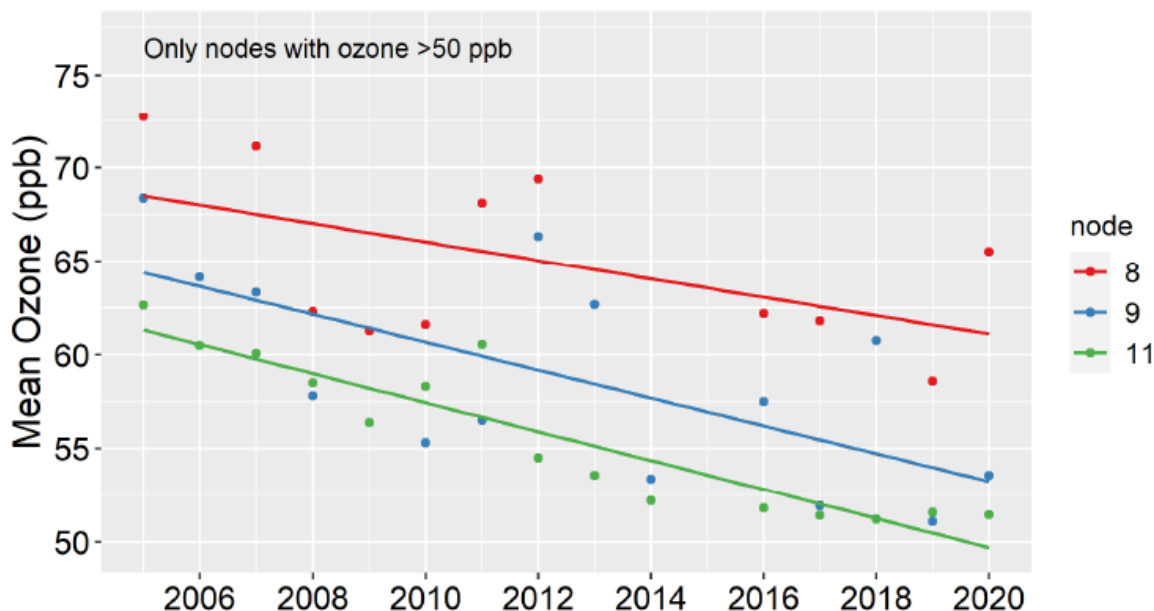
Table 1 shows the shared meteorological conditions for each high-ozone node and ozone concentrations for the first group of monitors.

Table 1: Description of Each High-Ozone Node for the Louisville, KY Monitors

Node 8	Node 9	Node 11
66 ppb O ₃	59 ppb O ₃	56 ppb O ₃
Midday RH <40%	Midday RH <40%	Midday RH <56% & >40%
PM Temp >82 °F	PM Temp >82 °F	PM Temp >82 °F
3-day winds <2.4 m/s	3-day winds >2.4 m/s	24-hour wind run (transport) <547 km

The high-ozone nodes from the CART analysis for the Louisville monitors generally have hot temperatures and low relative humidity. Relative humidity-related parameters appear to be the most important variables for ozone production in the area. Mean ozone concentrations in all the high-ozone nodes have decreased from 2005 to 2020. Chart 1 plots the 2005 – 2020 ozone trends for each node identified as having ozone averages greater than 50 ppb.

Chart 1: Ozone Trends by CART Node for Louisville, KY



These analyses demonstrate that ozone concentrations, for a given set of high-ozone meteorological conditions, have generally decreased over time in the Louisville-area. While maximum temperatures play an important role in the formation of ozone, the CART analyses reveal that other meteorological parameters (such as pressure, relative humidity, transport, and wind speed) also play important roles in creating conditions conducive for ozone formation.

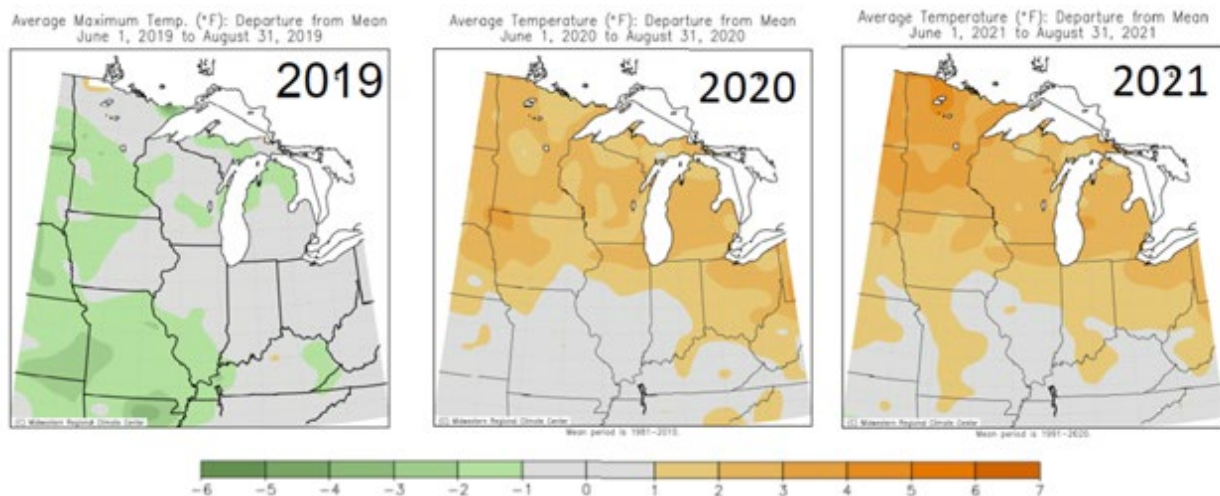
By using a CART analysis to analyze 8-hour ozone data in the Louisville-area, the influence of variations in meteorology can be mitigated such that comparisons of high ozone days with similar meteorological conditions can be made to determine if ozone values have decreased over time due to anthropogenic emission reductions. In general, ozone trends in the Louisville-area have declined since 2005. These analyses demonstrate that the observed reductions in ozone concentrations have not been driven by favorable meteorological conditions. These results further suggest that progress in reducing ozone precursor emissions is likely an important driver of the observed reductions in 8-hour ozone concentrations in the Louisville nonattainment area.

Temperature Analysis for 2019-2021 for the Louisville, Kentucky - Indiana, (KY-IN), 2015 8-Hour Ozone Nonattainment Area

Maximum daily temperature is an important meteorological indicator for ozone formation. Higher daily maximum temperatures tend to lead to conducive weather conditions that form ozone and allow for higher 8-hour concentrations.

Chart 2 shows the average maximum temperature as a departure from the mean for years 2019 – 2021 for the time-period June 1st to August 31st for the nonattainment area and surrounding region. This timeframe corresponds to the time of year when ozone concentrations are generally the highest. As shown, 2019 was a normal year for temperature. Years 2020 and 2021 were warmer than normal with maximum daily temperatures of 1 – 3 °F above normal.

Chart 2: Average Maximum Temperature Departure from Mean



This analysis demonstrates that the observed reductions in ozone concentrations have not been driven by favorable meteorological conditions as warmer temperatures in 2020 and 2021 did not produce higher ozone values and higher ozone design values.

APPENDIX C

MOVES3 Documentation, Louisville Air Pollution
Control District (APCD) and Kentuckiana Regional
Planning Development Agency (KIPDA)

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MOVES (version 3.0.2) calculations for NO_x, VOC, and CO for Louisville Metro 5 county area for 2019 and projected out to 2035. These calculations made use of KIPDA supplied VMT (speed and mileage) data. Fleet data inputs were projected using MOVES default growth factors and EPA supplied shifts in age distribution.

-- 12/28/21 *Craig Butler*

This summary data provides 2019 and 2035 NO_x and VOC tons per summer day totals for Clark and Floyd counties in Indiana, and Bullitt, Jefferson and Oldham counties in Kentucky. These were calculated using MOVES 3.0.2 in inventory mode. These inputs incorporated KIPDA supplied VMT by road type and speed bin for the fleet mix of each county for 2019 on 12/17/21 and for 2035 on 8/3/21. Indiana fleet mix data incorporated into the runs were provided by IDEM in May 2020 with VIN-decoded vehicle data for 2017. The 2018 Kentucky fleet mix inputs were developed by APCD using VIN-decoded data provided by KYDAQ in July 2019. Weekday and weekend days were both incorporated into the calculations by MOVES. Meteorology data represented worst case summer temperatures and humidity from Louisville Standiford Field weather station (month of July only). Complete MOVES run spec files included separately.

APCD Mobile Suite version:	V18s	2017 IN fleet data, 2018 KY fleet data
Purpose:	SIP Dev	Ozone - tons per summer day
Date:	Jan. 10, 2022	Run with MOVES 3.0.2

Ozone / Summer (tons per summer day)						
	2019			2035		
	NOx	VOC	CO	NOx	VOC	CO
Clark	4.80	2.01	33.15	2.61	0.74	14.56
Floyd	2.92	1.36	22.07	1.46	0.49	9.60
Bullitt	3.67	1.26	21.76	1.85	0.43	8.80
Jefferson	19.97	8.41	151.41	8.07	2.83	53.38
Oldham	1.67	0.61	9.74	0.95	0.29	5.01
5 County Total	33.03	13.65	238.13	14.94	4.79	91.34

County	Year	Pollutant	PollutantID	DayofWeek	TonsPerDay
Bullitt County	2019	Carbon Monoxide (CO)	2	Weekdays	22.6127
Bullitt County	2019	Carbon Monoxide (CO)	2	Weekend	19.6311
Bullitt County	2019	Oxides of Nitrogen (NOx)	3	Weekdays	3.8300
Bullitt County	2019	Oxides of Nitrogen (NOx)	3	Weekend	3.2788
Bullitt County	2019	Volatile Organic Compounds	87	Weekdays	1.2969
Bullitt County	2019	Volatile Organic Compounds	87	Weekend	1.1516
Bullitt County	2035	Carbon Monoxide (CO)	2	Weekdays	9.1693
Bullitt County	2035	Carbon Monoxide (CO)	2	Weekend	7.8815
Bullitt County	2035	Oxides of Nitrogen (NOx)	3	Weekdays	1.9391
Bullitt County	2035	Oxides of Nitrogen (NOx)	3	Weekend	1.6198
Bullitt County	2035	Volatile Organic Compounds	87	Weekdays	0.4441
Bullitt County	2035	Volatile Organic Compounds	87	Weekend	0.3997

County	Year	Pollutant	PollutantID	DayofWeek	TonsPerDay
Clark County	2019	Carbon Monoxide (CO)	2	Weekdays	34.7006
Clark County	2019	Carbon Monoxide (CO)	2	Weekend	29.2896
Clark County	2019	Oxides of Nitrogen (NOx)	3	Weekdays	5.0472
Clark County	2019	Oxides of Nitrogen (NOx)	3	Weekend	4.1918
Clark County	2019	Volatile Organic Compounds	87	Weekdays	2.0810
Clark County	2019	Volatile Organic Compounds	87	Weekend	1.8263
Clark County	2035	Carbon Monoxide (CO)	2	Weekdays	15.2848
Clark County	2035	Carbon Monoxide (CO)	2	Weekend	12.7392
Clark County	2035	Oxides of Nitrogen (NOx)	3	Weekdays	2.7607
Clark County	2035	Oxides of Nitrogen (NOx)	3	Weekend	2.2488
Clark County	2035	Volatile Organic Compounds	87	Weekdays	0.7666
Clark County	2035	Volatile Organic Compounds	87	Weekend	0.6806

County	Year	Pollutant	PollutantID	DayofWeek	TonsPerDay
Floyd County	2019	Carbon Monoxide (CO)	2	Weekdays	23.2454
Floyd County	2019	Carbon Monoxide (CO)	2	Weekend	19.1142
Floyd County	2019	Oxides of Nitrogen (NOx)	3	Weekdays	3.0916
Floyd County	2019	Oxides of Nitrogen (NOx)	3	Weekend	2.4974
Floyd County	2019	Volatile Organic Compounds	87	Weekdays	1.4121
Floyd County	2019	Volatile Organic Compounds	87	Weekend	1.2268
Floyd County	2035	Carbon Monoxide (CO)	2	Weekdays	10.0600
Floyd County	2035	Carbon Monoxide (CO)	2	Weekend	8.4406
Floyd County	2035	Oxides of Nitrogen (NOx)	3	Weekdays	1.5320
Floyd County	2035	Oxides of Nitrogen (NOx)	3	Weekend	1.2682
Floyd County	2035	Volatile Organic Compounds	87	Weekdays	0.5085
Floyd County	2035	Volatile Organic Compounds	87	Weekend	0.4551

County	Year	Pollutant	PollutantID	DayofWeek	TonsPerDay
Jefferson County	2019	Carbon Monoxide (CO)	2	Weekdays	160.3604
Jefferson County	2019	Carbon Monoxide (CO)	2	Weekend	129.0469
Jefferson County	2019	Oxides of Nitrogen (NOx)	3	Weekdays	21.2411
Jefferson County	2019	Oxides of Nitrogen (NOx)	3	Weekend	16.7826
Jefferson County	2019	Volatile Organic Compounds	87	Weekdays	8.7742
Jefferson County	2019	Volatile Organic Compounds	87	Weekend	7.5154
Jefferson County	2035	Carbon Monoxide (CO)	2	Weekdays	56.5798
Jefferson County	2035	Carbon Monoxide (CO)	2	Weekend	45.3709
Jefferson County	2035	Oxides of Nitrogen (NOx)	3	Weekdays	8.6090
Jefferson County	2035	Oxides of Nitrogen (NOx)	3	Weekend	6.7209
Jefferson County	2035	Volatile Organic Compounds	87	Weekdays	2.9407
Jefferson County	2035	Volatile Organic Compounds	87	Weekend	2.5690

County	Year	Pollutant	PollutantID	DayofWeek	TonsPerDay
Oldham County	2019	Carbon Monoxide (CO)	2	Weekdays	10.2349
Oldham County	2019	Carbon Monoxide (CO)	2	Weekend	8.4855
Oldham County	2019	Oxides of Nitrogen (NOx)	3	Weekdays	1.7584
Oldham County	2019	Oxides of Nitrogen (NOx)	3	Weekend	1.4362
Oldham County	2019	Volatile Organic Compounds	87	Weekdays	0.6360
Oldham County	2019	Volatile Organic Compounds	87	Weekend	0.5557
Oldham County	2035	Carbon Monoxide (CO)	2	Weekdays	5.2706
Oldham County	2035	Carbon Monoxide (CO)	2	Weekend	4.3484
Oldham County	2035	Oxides of Nitrogen (NOx)	3	Weekdays	1.0076
Oldham County	2035	Oxides of Nitrogen (NOx)	3	Weekend	0.8105
Oldham County	2035	Volatile Organic Compounds	87	Weekdays	0.2944
Oldham County	2035	Volatile Organic Compounds	87	Weekend	0.2616

Sample SQL query for data extraction

```
use v18_out_bu19s
SELECT movesdb20210726.county.countyName AS County,
v18_out_bu19s.movesoutput.yearID AS Year,
movesdb20210726.pollutant.pollutantName AS Pollutant,
movesdb20210726.pollutant.pollutantID AS PollutantID,
movesdb20210726.dayofanyweek.dayName AS DayofWeek,
Round (sum(v18_out_bu19s.movesoutput.emissionQuant) * 0.00220462/2000, 6)
AS TonsPerDay
INTO OUTFILE "bu19v18s.xls"
FROM v18_out_bu19s.movesoutput
LEFT JOIN movesdb20210726.county ON v18_out_bu19s.movesoutput.countyID =
movesdb20210726.county.countyID
LEFT JOIN movesdb20210726.pollutant ON
v18_out_bu19s.movesoutput.pollutantID =
movesdb20210726.pollutant.pollutantID
LEFT JOIN movesdb20210726.dayofanyweek ON
v18_out_bu19s.movesoutput.DayID =
movesdb20210726.dayofanyweek.dayID
WHERE v18_out_bu19s.movesoutput.pollutantID in (2,3,87) AND
v18_out_bu19s.movesoutput.processID not in (18,19)
GROUP BY countyName, yearID, PollutantID, dayName
ORDER BY countyName, yearID, PollutantID, dayName;
```

APPENDIX D

Public Participation Process Documentation

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LEGAL NOTICE OF PUBLIC HEARING

Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area

Clark and Floyd Counties, Indiana

Note: Legal notices for public hearings are no longer published in newspapers, but can be found on the Indiana Department of Environmental Management's web site at:

<https://www.in.gov/idem/public-notices/>

Notice is hereby given under 40 Code of Federal Regulations (CFR) 51.102 that the Indiana Department of Environmental Management (IDEM) is accepting written comment and providing an opportunity for a public hearing regarding the *Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area – Clark and Floyd Counties, Indiana*. All interested persons are invited and will be given reasonable opportunity to express their views concerning this submittal.

Clark and Floyd counties were designated nonattainment for the 2015 8-hour ozone standard in 2018 using 2015-2017 monitoring data. The area was classified as "marginal" with an attainment date of August 3, 2021.

Ozone monitoring data for the most recent three (3) years, 2019-2021, demonstrates that the air quality meets the 2015 8-hour ozone standard in the nonattainment area. This fact, accompanied by the permanent and enforceable decreases in emission levels discussed in Section 2.3 of the Request for Redesignation and Maintenance Plan, justifies a redesignation to attainment for Indiana's nonattainment area based on Section 107(d)(3)(D) of the CAA.

The draft documents will be made available for review on or before January 19, 2022, on the following web page:

[IDEM: State Implementation Plans: Clark, Floyd, and Jefferson Counties
Requests for Redesignation and Maintenance Plans](#)

- Indiana Department of Environmental Management, Office of Air Quality, Indiana Government Center North, 100 North Senate Avenue, Room N1003, Indianapolis, Indiana.
- New Albany – Floyd County Public Library, 180 West Spring Street, New Albany, Indiana 47150
- Jeffersonville Township Library, 211 East Court Avenue, Jeffersonville, Indiana 47130

- Clarksville Branch Library, 1312 Eastern Boulevard, Clarksville, Indiana 47219

Any person may submit written comments on the *Draft Request for Redesignation and Maintenance Plan for Attainment of the Indiana's Portion (Clark and Floyd Counties) of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area - Clark and Floyd Counties, Indiana*. Written comments should be directed to: Mrs. Michele Boner, Indiana Department of Environmental Management, Office of Air Quality, Room 1003, 100 North Senate Avenue, Indianapolis, Indiana 46204. Written comments can also be submitted via fax (317) 233-5967 or e-mail at mboner@idem.in.gov. Comments must be submitted by February 18, 2022.

A public hearing on the *Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion (Clark and Floyd Counties) of the Louisville, Kentucky _ Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area-Clark and Floyd Counties, Indiana Nonattainment Area* will be held if a request is received by February 18, 2022. If requested, the hearing will be held on February 24, 2022, and the comment period will be extended to March 3, 2022. If held, the hearing will convene at 6:00 p.m. local time at the Clarksville Branch Library, 1312 Eastern Blvd., Clarksville, Indiana 47129. Interested parties may present written or oral comments at the public hearing, if held. If a hearing is held, oral statements will be heard, but for the accuracy of the record, a written copy of the statements should be submitted. If a request is not received by February 18, 2022, the public hearing will be cancelled.

Interested parties can check the online IDEM calendar at <https://events.in.gov/idem> or contact Mrs. Michele Boner at (317) 233-6844 or mboner@idem.in.gov, after February 18, 2022, to see if the hearing has been cancelled.

If a public hearing is held, a transcript of the public hearing and all written submissions provided as part of the public hearing shall be open to public inspection at IDEM and copies may be made available to any person upon payment of reproduction costs. Any person heard or represented at the hearing or requesting notice shall be given written notice of actions resulting from the hearing.

For additional information contact Mrs. Michele Boner, at the Indiana Department of Environmental Management, Office of Air Quality, Room N1003, Indiana Government Center North, 100 North Senate Avenue, Indianapolis, IN 46204, via e-mail at mboner@idem.in.gov, or via telephone at (317) 233-6844 (direct) or (800) 451-6027 (toll free in Indiana).

.....

Speech and hearing impaired callers may contact the agency via the Indiana Relay Service at 1-800-743-3333. Individuals requiring reasonable accommodations for participation in this hearing should contact the IDEM Americans with Disabilities Act (ADA) coordinator at: Attn: ADA Coordinator, Indiana Department of Environmental Management – Mail Code 50-10, 100 North Senate Avenue, Indianapolis, IN 46204-2251, or call (317) 233-1785 (voice) or (317) 233-6565 (TDD). Please provide a minimum of 72 hours notification.

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INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment.

100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Eric J. Holcomb
Governor

Brian C. Rockensuess
Commissioner

January 13, 2022

CERTIFICATE OF PUBLICATION

This is to certify that the Indiana Department of Environmental Management (IDEM) Notice of the opportunity for a Public Hearing regarding the following:

- Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion of the Louisville, Kentucky – Indiana (KY-IN), 2015 8-Hour Ozone Nonattainment Area

was published on IDEM's web site on January 13, 2022. It is expected that it will remain posted on the site until at least February 18, 2022.

The notice in full was available online at the following web address, under "Southeast":

<https://www.in.gov/idem/public-notices/public-notices-southeast-indiana/>

The draft document was posted online January 13, 2022, at the following web address under "Ozone/2015 8-Hour Ozone Standard":

<https://www.in.gov/idem/sips/redesignation-petitions-and-maintenance-plans/clark-and-floyd-counties-redesignation-plans/>

Web publication of the notice was at the request of Scott Deloney, Branch Chief, Programs Branch, Office of Air Quality, IDEM.

By:

Mike Finklestein
IDEM Webmaster

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