DRAFT

Redesignation Request and Maintenance Plan for the Illinois Portion of the Chicago Ozone Nonattainment Area for the 2008 Ozone Standard

AQPSTR 19-07

March 2020

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LIST OF ACRONYMS

AERR	Annual Emissions Reporting Rule
AQPSTR	Air Quality Planning Section Technical Report
AQS	Air Quality System
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CART	classification and regression tree
CFR	Code of Federal Regulations
Chicago NAA	Chicago-Naperville, Illinois-Indiana-Wisconsin Nonattainment Area
CMAP	Chicago Metropolitan Agency for Planning
CPP	Clean Power Plan
CPS	Combined Pollutant Standards
CSAPR	Cross-State Air Pollution Rule
EDMS	Emissions and Dispersion Modeling System
EGU	electrical generating unit
ERC	emission reduction credit
ERTAC	Eastern Regional Technical Advisory Committee
FC	functional class
GVWR	gross vehicle weight rating
IDEM	Indiana Department of Environmental Management
IDOT	Illinois Department of Transportation
Illinois EPA	Illinois Environmental Protection Agency
I/M	[vehicle] inspection and maintenance
IPM	Integrated Planning Model
LADCO	Lake Michigan Air Directors Consortium
MACT	Maximum Achievable Control Technology
MATS	Mercury and Air Toxics Standard
MOVES	Motor Vehicle Emissions Simulator
MPS	Multi Pollutant Standards
MW	megawatt
MY	model year

MY96+	model year 1996 and newer
MY07+	model year 2007 and newer
NAA	nonattainment area
NAAQS	National Ambient Air Quality Standard
NCDC	National Climatic Data Center
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	oxides of nitrogen
NSPS	New Source Performance Standards
NWS	National Weather Service
OBD	On-Board Diagnostics
ppm	parts per million
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RFG	reformulated gasoline
RD	registration distribution
RVP	Reid vapor pressure
SIP	State Implementation Plan
USEPA	United States Environmental Protection Agency
VMT	vehicle miles traveled
VOM	volatile organic material
WDNR	Wisconsin Department of Natural Resources

EXECUTIVE SUMMARY

Illinois is requesting that the U.S. Environmental Protection Agency ("USEPA") redesignate the Illinois portion of the Chicago-Naperville, Illinois-Indiana-Wisconsin nonattainment area ("Chicago NAA") from nonattainment of the 2008 ozone National Ambient Air Quality Standard ("NAAQS") to attainment. In order to redesignate a nonattainment area to attainment, USEPA must determine that violations of the NAAQS are no longer occurring, that the improvement in air quality has been achieved by permanent and enforceable emission reductions, and that the state's maintenance plan is adequate to maintain the NAAQS in the area.

This document provides the necessary information for USEPA to make that determination, and describes Illinois' Maintenance Plan for the Illinois portion of the Chicago NAA, as well as providing additional technical information required to support a redesignation request. Motor vehicle emissions estimates developed using USEPA's Motor Vehicle Emissions Simulator ("MOVES") model are also incorporated. The Illinois Environmental Protection Agency ("Illinois EPA") has prepared this plan in consultation with the Indiana Department of Environmental Management ("IDEM"), the Wisconsin Department of Natural Resources ("WDNR"), the Lake Michigan Air Directors Consortium ("LADCO"), and USEPA. IDEM is submitting a redesignation request for the Indiana portion of the Chicago NAA, and WDNR is submitting a redesignation request for the Wisconsin portion of the Chicago NAA.

Ozone air quality has improved in the Lake Michigan region as a result of implementation of State and Federal control measures since the designation of the Chicago area as marginal nonattainment in 2008. The Chicago NAA has three years of complete and certified ambient air quality monitoring data for 2017 - 2019 that demonstrates compliance with the 2008 ozone NAAQS. These air quality improvements are due to permanent and enforceable emission control measures.

This Maintenance Plan provides for continued attainment of the 2008 ozone air quality standard for the Chicago NAA for a period of ten years after USEPA has formally redesignated the area to attainment. The Plan also provides assurances that, even if there is a subsequent violation of the air quality standard, the Plan will prevent any future occurrences through contingency measures that would be triggered upon such an occurrence. Finally, the Plan includes on-road motor vehicle emissions budgets for use in transportation conformity determinations to assure that any increases in emissions from this sector do not jeopardize continued attainment of the 2008 ozone standard during the ten-year maintenance period.

1.0 INTRODUCTION

This document describes Illinois' Maintenance Plan for the Illinois portion of the Chicago ozone NAA. A maintenance plan is required before the area can be redesignated from nonattainment to attainment of the ozone NAAQS promulgated by USEPA in 2008. Illinois EPA has prepared this plan in consultation with IDEM, WDNR, LADCO, and USEPA. IDEM is submitting a redesignation request for the Indiana portion of the Chicago NAA, and WDNR is submitting a redesignation request for the Wisconsin portion of the Chicago NAA.

The Chicago NAA has three years of complete certified ambient air quality monitoring data for 2017 - 2019, demonstrating attainment with the 2008 ozone NAAQS.

This document also provides the technical information needed to support a request to redesignate the Chicago area to attainment of the 2008 ozone NAAQS. Section 107 of the Clean Air Act ("CAA") establishes specific requirements to be met in order for a nonattainment area to be considered for redesignation: USEPA must make a determination that the area has attained the ozone NAAQS based on at least three complete years of ambient monitoring data. USEPA must have approved a State Implementation Plan ("SIP") for the area under Section 110 and Part D of the CAA. The state must demonstrate that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the SIP and other federal requirements. Finally, the state must submit, and USEPA must approve, a maintenance plan under Section 175(A) of the CAA, including provisions for contingency measures that will be implemented if future violations of the ozone NAAQS are measured.

This Maintenance Plan provides for the continued attainment of the 2008 ozone NAAQS for the Chicago NAA for a period of at least ten years after USEPA has formally redesignated the area to attainment. The Plan also provides assurances that even if a subsequent violation of the ozone NAAQS occurs, provisions in the Plan will prevent additional future occurrences through contingency measures that would be triggered upon such occurrence.

This document addresses the maintenance plan requirements established by the CAA and USEPA, and includes additional information to support continued compliance with the ozone NAAQS.

1.1 Regulatory Background

The CAA, as amended in 1990, requires areas that fail to meet the NAAQS for ozone to develop SIPs to expeditiously attain and maintain the NAAQS. Historically, exceedances of the ozone NAAQS have been monitored in Cook and Lake Counties in Illinois, and in portions of Wisconsin, Indiana, and Michigan immediately downwind of the Chicago, Gary, and Milwaukee metropolitan areas.

The Chicago NAA has been unchanged in spatial definition for both Illinois and Indiana since it was originally designated as nonattainment in 2004, and includes Lake and Porter Counties in northwest Indiana. A portion of Kenosha County, Wisconsin, was added to

the Chicago NAA when the marginal nonattainment designation was promulgated with the lowering of the ozone standard to 0.075 parts per million ("ppm"). Figure 1.1 depicts the current Chicago NAA.

Figure 1.1 Map of the Lake Michigan Ozone Nonattainment Areas

The following is a list of the counties, and portions thereof, contained in the Chicago ozone nonattainment area:

- Cook County, IL
- Lake County, IL
- DuPage County, IL
- McHenry County, IL
- Kane County, IL
- Will County, IL
- Grundy County, IL (Aux Sable and Goose Lake Townships)
- Kendall County, IL (Oswego Township)
- Lake County, IN
- Porter County, IN
- Kenosha County, WI (from the I-94 corridor to the lakeshore)

The emission reductions needed to attain the ozone NAAQS include both State and Federal measures that have reduced ozone precursor emissions both locally and regionally. These measures have allowed the Chicago NAA to attain the ozone standard.

1.2 Status of Air Quality

Ozone monitoring data for the most recent three-year period, 2017 through 2019, demonstrates that air quality has met the 2008 ozone NAAQS in the Chicago NAA. Table A.1 of Appendix A to this document contains the monitoring data that demonstrates that the Chicago NAA has been in attainment of the standard in the 2017-2019 period. That data includes the single year "fourth high" values for each year, and the average of those values, or "design value," for each ozone monitor in the NAA.

2.0 REDESIGNATION AND MAINTENANCE PLAN REQUIREMENTS

Sections 107 and 110 of the CAA list a number of requirements that must be met by nonattainment areas prior to consideration for redesignation to attainment. One of those requirements is the maintenance plan, which describes a state's plan for maintaining the NAAQS for a ten-year period after redesignation to attainment. USEPA has published guidance for the preparation of maintenance plans and redesignation requests. This guidance is contained in a document entitled "Procedures for Processing Requests to Redesignate Areas to Attainment" (September 4, 1992).

Before a redesignation to attainment can be promulgated, USEPA must:

- Determine that the NAAQS for ozone, as published in 40 CFR 50.4, has been attained. Ozone monitoring data must show that violations of the NAAQS are no longer occurring. This showing must rely on three consecutive years of data. The ambient air monitoring data must be quality assured in accordance with 40 CFR 58.10, recorded in USEPA's Air Quality System ("AQS") database, and be available to the public.

- Determine that the improvement in air quality between the year violations occurred and the year that attainment was achieved is based on permanent and enforceable emission reductions.

- Approve the state's maintenance plan. The requirements for the maintenance plan are discussed below.

- Determine that all other requirements applicable to nonattainment areas have been met.

To be approvable, the state is required to have a public comment period and provide the opportunity for a public hearing on the maintenance plan prior to adoption. The maintenance plan must contain the following elements:

- A comprehensive emissions inventory of the precursors of ozone completed for the "attainment year";

- A projection of the emissions inventory forward to a year at least ten years after redesignation and a demonstration that the projected level of emissions is sufficient to maintain the ozone NAAQS;

- A commitment that, once redesignated, the state will continue to operate an appropriate monitoring network to verify maintenance of the attainment status;

- A demonstration of legal authority to implement and enforce all control measures contained in the SIP;

- Provisions for future updates of the inventory to enable tracking of emissions levels, including an annual emissions statement from major sources;

- Motor vehicle emissions budgets for transportation conformity for the ten-year maintenance period;

- A commitment to submit a revised maintenance plan eight years after redesignation;

- A commitment to enact and implement additional contingency control measures expeditiously in the event that future violations of the NAAQS occur; and

- A list of potential contingency measures that would be implemented in such an event.

Illinois' Maintenance Plan has been prepared in accordance with the requirements specified in USEPA's guidance document and additional guidance received from USEPA staff. Upon approval by the USEPA of the applicable SIP revisions submitted by the Illinois EPA, Illinois will have a fully approved SIP for the Illinois portion of the Chicago area under CAA Section 110(k).

The following sections of this document describe how USEPA's requirements have been met.

3.0 OZONE MONITORING AND MODELING

USEPA's published guidance document, "Procedures for Processing Requests to Redesignate Areas to Attainment" (September 4, 1992), details specific requirements regarding the collection and use of ambient air monitoring data needed to support a redesignation request. Before the Chicago NAA can be redesignated, Illinois must demonstrate that the ozone NAAQS, as published in 40 CFR 50.4, has been attained.

The following subsections describe how each of these requirements has been addressed.

3.1 Monitored Design Values

There are currently 21 ozone monitors located in the nonattainment counties in the Lake Michigan region; five are located in northwestern Indiana, 15 in northeastern Illinois, and one in far southeastern Wisconsin. Their locations in the Chicago NAA are depicted in Figure 3.1.

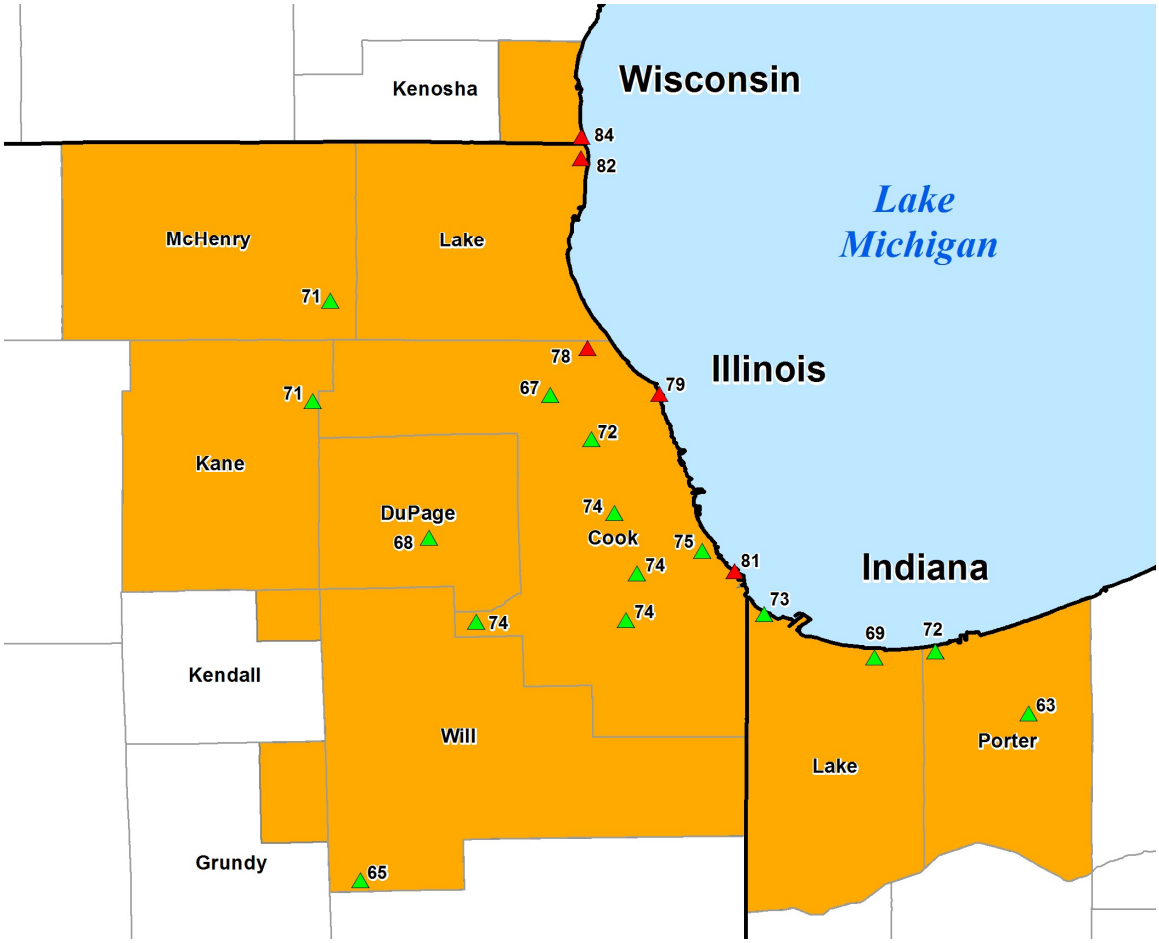
Figure 3.1 Ozone Monitors in the Lake Michigan Area

To determine whether the NAAQS is being exceeded, the design value must be calculated, which involves averaging the fourth highest daily maximum 8-hour value for

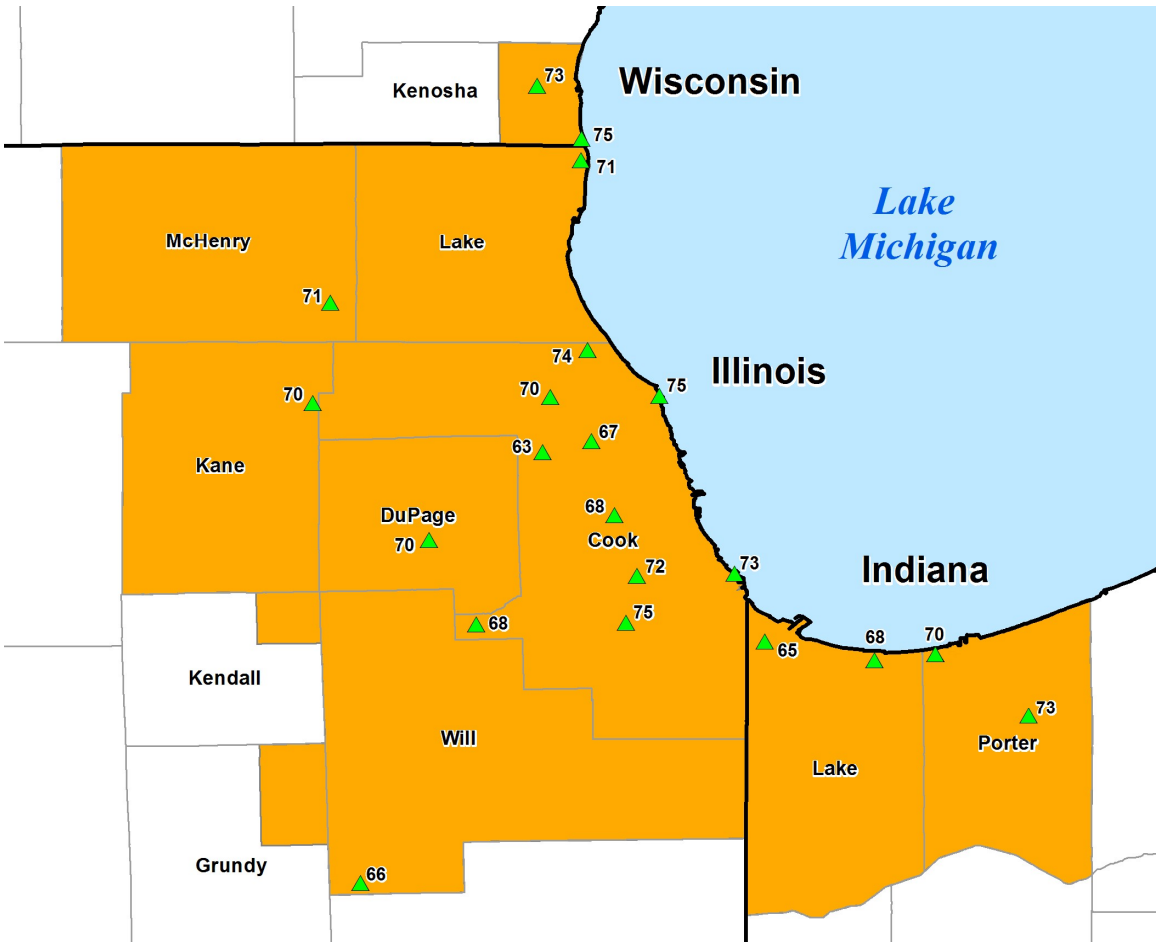
each year over the three-year period. The calculated ozone design values for the monitors in the Lake Michigan region for 2017-2019 are included as Appendix A of this report. Figure 3.2 compares the design values for the 2010-2012 period for monitoring stations in the Lake Michigan region to the corresponding design values from 2017-2019. The design values at the critical monitors at Chiwaukee, WI, and Zion, IL, fell 9 ppb and 11 ppb, respectively, over this period. The design values at other monitors in the NAA also fell as much as 10 ppb. Additionally, the design values at monitors near the south border (that is, the upwind edge) of the NAA actually increased 1 ppb at Braidwood, IL, and increased 10 ppb at Porter County, IN, demonstrating that ozone concentrations from background sources did not improve. However, emission reductions within the NAA have led to large reductions of ozone in the urban areas and at key downwind monitors. The data demonstrate that ozone air quality has improved dramatically throughout the Chicago NAA and that the NAAQS for ozone has been attained for the 2017-2019 period.

Figure 3.2 Comparison of Ozone Design Values for the Lake Michigan Region Between 2010-2012 and 2017-2019

2010-2012



2017-2019



3.2 Influences of Meteorology on Ozone Formation

A statistical analysis that constructs ozone concentration trends for high ozone days having similar meteorological characteristics, called a classification and regression tree ("CART") analysis, was completed by LADCO. The purpose of this analysis is to minimize the effect of meteorological variability on the trend in ozone concentrations. The resulting trend in ozone concentrations is due to reductions of anthropogenic emissions.

The CART analysis, presented in more detail in Appendix B, uses ozone concentrations from the Zion and Chiwaukee monitors for the period 2000-2015. These two monitors were chosen because Chiwaukee is the controlling monitor for the Chicago NAA, and the Zion monitor is very near the location of the Chiwaukee monitor. Both monitors are north of the urban center, as well as being near the Lake Michigan shoreline.

The results are that days with high ozone as well as high temperatures and southerly winds show a marked decrease in ozone concentrations over the 16-year period. The

analysis demonstrates that the decrease in ozone concentrations leading to attainment of the ozone standard in the Chicago NAA is caused by actual reductions in emissions, not by favorable meteorological conditions.

3.3 Quality Assurance

Illinois EPA has quality assured all Illinois ozone monitoring data shown in Appendix A for 2017-19 in accordance with 40 CFR 58.10 and the Illinois EPA's Quality Assurance Plan, which describes Illinois EPA's standard operating procedures for operating the ambient monitoring network and validating the data. The other states in the Lake Michigan region have similar quality assurance plans. Illinois EPA has recorded the data in USEPA's AQS database, as have Indiana and Wisconsin. USEPA's AQS database is available to the public.

3.4 Continued Monitoring

Illinois commits to continue monitoring ozone levels according to a USEPA-approved monitoring plan, as required to ensure maintenance of the ozone NAAQS. Should changes in the location of an ozone monitor become necessary, Illinois EPA will work with USEPA to ensure the adequacy of the monitoring network. Illinois EPA will continue to quality assure the monitoring data to meet the requirements of 40 CFR 58. Illinois EPA will continue to enter all data into AQS on a timely basis in accordance with federal guidelines.

3.5 Impact of Permanent and Enforceable Measures on Future Air Quality

Two organizations, USEPA and LADCO, have performed national-scale ozone photochemical modeling that used a 2023 projected inventory to assess air quality in support of the Interstate Transport "Good Neighbor" Provision for the 2015 8-hour ozone NAAQS. Both sets of 2023 modeling results are relevant to maintenance of the 2008 ozone NAAQS because they demonstrate the impact of the permanent and enforceable measures on 2023 ozone air quality.

USEPA's most recently completed national-scale photochemical modeling (released in 2018) was in support of addressing the Interstate Transport "Good Neighbor" Provision of the State Implementation Plan for the 2015 8-hour ozone standard required under the Clean Air Act Section 110(a)(2)(D)(i)(I). The modeling results that have been released are from emissions from the 2011 base case, grown to 2023. Both USEPA and LADCO are updating this analysis with a 2016 base for emissions and meteorology, but this work is not completed, and therefore will not be included in this document. In brief, the modeling referenced here started with the development of a 2011 base case for emissions, meteorology, boundary conditions, and so forth. The base case was evaluated for its ability to replicate monitored values, and was found to be performing acceptably. Emissions were then projected to 2023 using two different models. USEPA used the Integrated Planning Model ("IPM"), platform version 5.16 and other growth-and-control tools to account for changes in emissions in all sectors between 2011 and 2023. The difference in the LADCO modeling was the use of the Eastern Regional Technical Advisory Committee ("ERTAC") power sector emissions model rather that the IPM for

EGU emissions projections. Finally, the 2023 control case was reviewed to ensure that all "on-the-books" controls and announced shutdowns were accounted for.

The differences in ozone concentrations, as indicated by average design value, between the USEPA and LADCO 2023 control case are minor for the monitors in the multi-state Chicago NAA, as shown in Table 3.1. The highest 2023 projected average design value for any nonattainment monitor using USEPA modeling data is 66.8 ppb, while the LADCO modeling shows a highest average design value of 66.2 ppb. Both maximums are well under the 2008 ozone standard of 75.0 ppb. Compared to the 2009-2013 "design value" first used in USEPA's "Supplemental Information on the Interstate Transport State Implementation Plan Submissions for the 2008 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I)" (October 2017), both sets of 2023 modeling results show large decreases in ozone concentrations, especially in the heart of the urban area and at the critical monitors along the north shore of Lake Michigan. These results are strong evidence that ozone concentrations will continue to decrease across the entire nonattainment area.

Table 3.1. Base year versus USEPA and LADCO future year design values

Monitor ID	State	County	Monitored 2009-2013 Average Design Value	2023 Projected Average Design Value	
				U.S. EPA modeling	LADCO modeling
170310001	Illinois	Cook	72.0	63.2	62.8
170310032	Illinois	Cook	77.7	66.6	66.2
170310076	Illinois	Cook	71.7	62.7	61.5
170311003	Illinois	Cook	69.7	62.4	61.7
170311601	Illinois	Cook	71.3	61.5	61.3
170314002	Illinois	Cook	71.7	62.3	62.0
170314007	Illinois	Cook	65.7	58.0	57.4
170314201	Illinois	Cook	75.7	66.8	66.2
170317002	Illinois	Cook	76.0	66.8	66.1
170436001	Illinois	DuPage	66.3	57.9	57.6
170890005	Illinois	Kane	69.7	62.8	62.2
170971007	Illinois	Lake	79.3	63.4	62.7
171110001	Illinois	McHenry	69.7	61.8	61.4
171971011	Illinois	Will	64.0	55.6	55.3
180890022	Indiana	Lake	66.7	58.3	57.9
180890030	Indiana	Lake	69.7	60.4	61.7
181270024	Indiana	Porter	70.3	61.8	61.4
181270026	Indiana	Porter	63.0	54.4	54.1
550590019	Wisconsin	Kenosha	81.0	64.8	64.1

4.0 EMISSIONS INVENTORY

A redesignation request must contain a demonstration that the improvement in air quality between the year that violations occurred and the year that attainment was achieved is based on permanent and enforceable emission reductions. As described previously in Section 3.0, a three-year monitoring period is used to evaluate whether attainment has been achieved. An attainment year inventory can be developed for any of the three years in which an attaining design value is computed. In this Section, the "attainment year inventory" refers to the first year (2017) of the three-year period (2017-2019) used to demonstrate attainment. The request should also include a projection of the emissions inventory to a year at least 10 years following redesignation, a demonstration that the projected level of emissions is sufficient to maintain the ozone NAAQS, and a commitment to provide future updates of the inventory to enable tracking of emission levels during the 10-year maintenance period.

4.1 Attainment Year Inventory, 2017

Illinois EPA has prepared a comprehensive emissions inventory for the Illinois portion of the Chicago ozone NAA, including point, area, and on-road and off-road mobile sources for ozone precursors (NOx and VOM) for the attainment year, 2017.

Point source information was compiled from 2017 annual emissions reports submitted to the Illinois EPA by emission sources. Area source emissions were calculated primarily using an emission factor multiplied by an activity rate (e.g., population, employment, amount of fuel burned, etc.). The 2017 inventory included additional categories not calculated in the 2011 inventory. These categories include oil and gas production, oil exploration, and agricultural field burning. While emissions from these categories may be significant statewide, they have very minor emissions for the Chicago ozone NAA.

On-road mobile source emissions were calculated using USEPA's MOVES2014a emissions model with vehicle miles traveled ("VMT") data provided by the Illinois Department of Transportation ("IDOT"). Off-road mobile source emissions were also calculated using USEPA's MOVES2014a emissions model. Aircraft emissions were calculated using the Emissions and Dispersion Modeling System ("EDMS") model. While EDMS may not be the most recent model to calculate aircraft emissions, practically all emission factors have not changed. For new engines, EDMS allows input of emission factors. Emissions from locomotives and commercial marine vessels continue to be included in the off-road portion of the inventory. Biogenic emissions are not included in these summaries.

The following tables summarize the 2017 emissions estimates for the entire Chicago ozone nonattainment area.

Table 4.1 2017 Chicago Ozone Nonattainment Area NOx Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	28.00	18.29	96.86	76.23	219.38
DuPage	5.81	5.41	24.11	15.29	50.62
Grundy Twps	3.92	0.05	0.65	1.55	6.17
Kane	3.95	2.45	11.97	10.11	28.48
Kendall Twps	0.38	0.19	1.10	0.70	2.37
Lake	11.25	4.02	17.14	14.94	47.35
McHenry	1.63	1.31	7.58	7.04	17.56
Will	21.88	1.88	18.25	16.78	58.79
Total	76.82	33.60	177.66	142.64	430.72
Indiana					
Lake	30.65	4.91	8.91	4.92	49.39
Porter	28.50	3.15	3.94	1.81	37.40
Total	59.15	8.06	12.85	6.73	86.79
Wisconsin					
Kenosha	8.68	1.02	2.81	1.67	14.19
ERCs					0.00
Total	8.68	1.02	2.81	1.67	14.19
Total NAA	144.65	42.68	193.32	151.04	531.70

Table 4.2 2017 Chicago Ozone Nonattainment Area VOM Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	25.00	131.90	44.80	37.33	239.03
DuPage	3.73	29.16	10.75	12.32	55.96
Grundy Twps	1.46	0.54	0.24	0.45	2.69
Kane	3.00	15.52	5.78	6.30	30.60
Kendall Twps	0.26	1.41	0.57	0.66	2.90
Lake	1.87	20.08	7.82	12.66	42.43
McHenry	0.99	8.88	3.76	3.98	17.61
Will	9.10	19.20	7.77	6.86	42.83
Total	45.31	226.69	81.49	80.56	434.05
Indiana					
Lake	8.27	13.99	4.37	2.53	29.16
Porter	2.09	5.57	1.70	1.53	10.89
Total	10.36	19.56	6.07	4.06	40.05
Wisconsin					
Kenosha	0.39	3.49	1.42	0.74	6.05
ERCs					0.00
Total	0.39	3.49	1.42	0.74	6.05
Total NAA	56.06	249.74	88.98	85.36	480.15

4.2 Air Quality Improvements and Emission Controls

The Chicago area was designated nonattainment in 2012, based on ozone air quality monitoring data collected between 2009 and 2011. Since that time, permanent and enforceable reductions of ozone precursor emissions have contributed to improvements in ozone air quality and to the attainment of the ozone NAAQS. Some of these emission reductions were due to the application of tighter federal emission standards on motor vehicles and fuels, and some due to the requirements of regional transport rules such as the Clean Air Interstate Rule ("CAIR"), CSAPR, and additional permanent and enforceable measures. Section 5.0 of this report describes these reductions in more detail, along with an explanation of their regulatory status. In this subsection, the emission levels from 2017 are compared to emission levels estimated in 2011.

The 2011 inventory in the Attainment Demonstration submitted January 10, 2019, after the Chicago NAA was reclassified moderate for the 2008 ozone standard did not include locomotive emissions from Metra and AMTRAK. These emissions were first calculated for the 2017 inventory. To provide for a consistent approach between the 2011 and 2017 inventories, these emissions were added to the 2011 inventory being used here. Those emissions were back-casted using fuel consumption rates. No other changes to the 2011 inventory were made.

Tables 4.3 and 4.4 summarize 2011 emissions by major source category and by pollutant for the Illinois portion of the Chicago NAA.

Table 4.3 2011 Chicago Ozone Nonattainment Area NOx Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	42.52	14.60	167.98	96.78	321.88
DuPage	5.49	4.53	41.99	20.00	72.01
Grundy Twps	5.39	0.06	1.21	0.85	7.51
Kane	3.79	1.77	17.67	13.93	37.16
Kendall Twps	0.77	0.19	1.48	1.01	3.45
Lake	13.74	3.52	26.28	28.88	72.42
McHenry	0.86	1.17	9.74	8.85	20.62
Will	47.42	1.30	30.03	18.04	96.79
Total	119.98	27.14	296.38	188.34	631.84
Indiana					
Lake	67.72	5.80	17.85	8.07	99.44
Porter	28.89	3.89	6.85	4.62	44.25
Total	96.61	9.69	24.70	12.69	143.69
Wisconsin					
Kenosha	8.82	1.09	5.35	2.08	17.35
ERCs					0.00
Total	8.82	1.09	5.35	2.08	17.35
Total NAA	225.41	37.92	326.43	203.11	1,062.88

Table 4.4 2011 Chicago Ozone Nonattainment Area VOM Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	27.00	123.60	50.52	82.23	283.35
DuPage	4.12	25.77	12.82	16.24	58.95
Grundy Twps	1.87	0.51	0.35	0.63	3.36
Kane	3.25	13.45	5.77	8.30	30.77
Kendall Twps	0.50	1.33	0.54	1.04	3.41
Lake	2.14	19.35	8.59	45.82	75.90
McHenry	1.21	8.46	3.42	5.62	18.71
Will	8.16	17.57	9.03	9.70	44.46
Total	48.25	210.04	91.04	169.58	518.91
Indiana					
Lake	15.83	12.54	6.92	7.55	42.84
Porter	1.87	5.53	2.66	6.64	16.70
Total	17.70	18.07	9.58	14.19	59.54
Wisconsin					
Kenosha	0.56	3.76	2.53	1.13	7.97
ERCs					0.00
Total	0.56	3.76	2.53	1.13	7.97
Total NAA	66.51	231.87	103.15	184.90	586.42

Comparing the Illinois portion of the 2011 inventory to that for 2017 indicates that total NOx emissions for Illinois decreased by about 201.12 tons/day while VOM emissions decreased by about 84.86 tons/day during the same time period. These reductions in ozone precursor emissions, plus reductions in upwind areas in Illinois and other nearby states, resulted in a substantial improvement in ozone air quality in the Chicago area, ultimately resulting in attainment of the 2008 ozone NAAQS.

4.3 Emission Projections

A maintenance plan must contain a demonstration that the level of emissions projected for the ten-year period following redesignation are sufficient to maintain the ozone NAAQS. Accordingly, Illinois EPA has projected NOx and VOM emissions for the Illinois portion of the Chicago NAA for 2030. Illinois EPA has also projected 2025 emissions to represent a midpoint during the maintenance period. Emissions for these two projection years are compared to emission levels in 2017 to determine whether the maintenance plan is adequate to maintain the NAAQS during this period.

Point and area source categories, along with off-road categories not calculated by the MOVES model, were calculated using Version 6.2 of the "Notice of Data Availability of the Environmental Protection Agency's Updated Ozone Transport Modeling Data for the 2008 Ozone National Ambient Air Quality Standard (NAAQS)" – also known as the

NODA. This data set projects 2011 emissions to 2017 and 2025. To account for a base year of 2017 and projected years of 2025 and 2030, additional manipulation had to be performed to obtain appropriate growth factors. In this case, the Excel TREND function was used to extrapolate data from the individual years of 2018 to 2025 in order to obtain 2030 emissions.

Emissions presented in the NODA are expressed in tons/year. Growth factors for the applicable year (2025 or 2030) were calculated by taking the ratio of the future year to the base year. Illinois EPA had already calculated daily emissions for the 2017 inventory, so calculating emissions for the future years was a simple multiplication of the applicable growth factor to obtain the future year emissions.

Illinois EPA's 2017 inventory included some point sources that began operation after the 2011 NODA base year. These emissions were grown using growth factors already calculated using the NODA for the same SCC. Illinois EPA notes that the projections in the NODA calculated by the IPM model do not agree in certain cases with what Illinois EPA believes will actually happen with fuel switching and/or shutdowns. Therefore, appropriate modifications to address the incorrect NODA projections were made in the point source portion of the inventory.

Also included in the 2025 and 2030 point source inventories were two large combustion sources that have obtained a construction permit but have not yet been constructed. Daily emissions for these sources were calculated by dividing the allowable emissions by 365.

On-road and off-road emissions for 2025 and 2030 were calculated using the MOVES2014a model. The inputs assume the continued phase-in of the Tier 2 motor vehicle standards, the phase-in of the Tier 3 standards beginning in 2017, and continued operation of Illinois EPA's vehicle inspection and maintenance program. Total VMT for 2025 and 2030 were assumed to increase at a rate of 1.5 percent per year from 2017.

As part of common practice when projecting off-road emissions, emissions from a proposed third airport for the Chicago area have been included in this inventory.

The following tables identify the NOx and VOM emissions estimates for the year 2025 and 2030 for the entire Chicago NAA.

Table 4.5 2025 Chicago Ozone Nonattainment Area NOx Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	33.80	18.39	44.87	64.37	161.43
DuPage	6.99	5.46	11.64	11.95	36.04
Grundy Twps	5.23	0.05	1.05	1.06	1.06
Kane	3.97	2.47	5.72	7.24	19.40
Kendall Twps	0.67	0.19	1.19	0.45	2.20
Lake	13.71	4.07	8.25	11.99	38.02
McHenry	2.09	1.32	3.64	5.15	12.20
Will	31.08	1.88	8.68	12.62	54.26
Total	97.24	33.83	85.04	114.83	330.94
Indiana					
Lake	34.41	4.37	5.88	3.10	47.76
Porter	24.42	2.76	2.65	1.18	31.01
Total	58.83	7.13	8.53	4.28	78.77
Wisconsin					
Kenosha	0.16	1.00	1.47	1.24	3.86
ERCs					7.22
Total	0.16	1.00	1.47	1.25	11.10
Total NAA	156.23	41.96	95.04	120.36	420.81

Table 4.6 2025 Chicago Ozone Nonattainment Area VOM Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	24.66	130.02	28.09	36.67	219.44
DuPage	3.81	28.73	6.99	12.77	52.30
Grundy Twps	1.80	0.53	0.54	0.31	3.18
Kane	2.97	14.08	3.75	6.39	27.19
Kendall Twps	0.26	1.39	0.85	0.56	3.06
Lake	2.05	19.81	5.09	12.06	39.01
McHenry	1.03	8.76	2.51	3.77	16.07
Will	9.21	18.87	5.03	6.54	39.65
Total	45.79	222.19	52.85	79.07	399.90
Indiana					
Lake	9.62	13.93	3.51	2.25	29.31
Porter	2.15	5.83	1.40	1.33	10.71
Total	11.70	19.76	4.91	3.58	40.02
Wisconsin					
Kenosha	0.15	3.48	0.95	0.64	5.21
ERCs					0.37
Total	0.15	3.48	0.95	0.61	5.56
Total NAA	57.64	245.43	58.71	83.26	445.48

Table 4.7 2030 Chicago Ozone Nonattainment Area NOx Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	37.74	18.45	34.70	61.28	152.17
DuPage	7.70	5.49	9.03	11.13	33.35
Grundy Twps	5.41	0.05	0.80	0.80	7.06
Kane	3.98	2.49	4.40	6.53	17.40
Kendall Twps	0.36	0.19	0.91	0.40	1.86
Lake	15.24	4.10	6.36	11.06	36.76
McHenry	2.67	1.32	2.78	4.70	11.47
Will	36.19	1.88	6.68	11.02	55.77
Total	109.29	33.97	65.66	106.92	315.84
Indiana					
Lake	35.13	4.10	4.52	2.31	46.06
Porter	24.51	2.58	2.10	0.91	30.10
Total	59.64	6.68	6.62	3.22	76.16
Wisconsin					
Kenosha	0.16	0.99	1.14	1.15	3.44
ERCs					7.22
Total	0.16	0.99	1.14	1.16	10.67
Total NAA	169.09	41.64	73.42	111.30	402.67

Table 4.8 2030 Chicago Ozone Nonattainment Area VOM Emissions (tons/day)

County	Point	Area	On-road	Off-road	Total
Illinois					
Cook	24.82	129.56	22.80	38.26	215.44
DuPage	3.88	28.63	5.63	13.47	51.61
Grundy Twps	1.88	0.53	0.43	0.28	3.12
Kane	2.97	14.04	3.02	6.70	26.73
Kendall Twps	0.26	1.39	0.67	0.56	2.88
Lake	2.10	19.74	4.07	12.43	38.34
McHenry	1.07	8.73	1.98	3.89	15.67
Will	9.23	18.78	4.04	6.68	38.73
Total	46.21	221.40	42.64	82.27	392.52
Indiana					
Lake	9.47	13.90	2.68	2.14	28.19
Porter	2.16	5.96	1.09	1.24	10.45
Total	11.63	19.86	3.77	3.38	38.64
Wisconsin					
Kenosha	0.15	3.50	0.73	0.62	5.00
ERCs					0.37
Total	0.15	3.50	0.73	0.60	5.35
Total NAA	57.99	244.76	47.14	86.25	436.51

4.4 Demonstration of Maintenance

Table 4.9 demonstrates that the level of emissions projected for the ten-year period following redesignation is sufficient to maintain the ozone NAAQS. As shown in the table, both NOx and VOM emissions within the Illinois portion of the nonattainment area are expected to decrease significantly between 2017 and 2030. Projected NOx and VOM emissions for the mid-point year of 2025 are also less than emission levels in 2017. Based on these emission trends it is expected that air quality will continue to meet the ozone NAAQS throughout the maintenance period.

In addition to the overall emission reductions projected to occur within the nonattainment area, significant reductions of statewide NOx emissions resulting from implementation of Illinois' multi-pollutant standards affecting electric utilities will also help to ensure continued attainment of the ozone NAAQS.

Table 4.9 Comparison of 2017, 2025, and 2030 Emission Estimates for the Illinois Portion of the Chicago Nonattainment Area (tons/day)

	2017	2025	2030	Difference (2017-2025)	Difference (2017-2030)
NOx	430.72	330.94	315.84	-99.78	-114.88
VOM	434.05	399.90	392.52	-34.15	-41.53

4.5 Provisions for Future Updates

As required by Section 175A(b) of the CAA, Illinois commits to submit to USEPA, eight years after redesignation, a revised version of this Maintenance Plan. The revision will contain Illinois' plan for maintaining the ozone NAAQS for ten years beyond the first ten-year period after redesignation.

5.0 CONTROL MEASURES AND REGULATIONS

This section provides specific information on the control measures implemented in the Chicago NAA, including CAA requirements and other state and federal measures. The control measures required in past ozone SIP revisions have been fully implemented, and other, more recent, control programs will continue to provide emission reductions in future years. Illinois EPA commits to keep these measures in effect after redesignation, or to provide equivalent emissions levels using alternate measures. Illinois' SIP contains acceptable provisions to provide for preconstruction review of new emission sources. After redesignation to attainment, Prevention of Significant Deterioration ("PSD") requirements will apply to the construction of new major sources and to significant modifications of existing sources. Illinois has accepted delegation from USEPA of this program. Illinois further commits to continue to require that all future transportation plans in the Chicago area conform with the SIP.

5.1 Redesignation Control Measures

This redesignation request for the Chicago NAA identifies control measures that have been promulgated at either the state or federal level that are sufficient to allow the Chicago NAA to meet the 2008 ozone NAAQS. The primary emission reduction measures for demonstrating attainment of the ozone standard are as follows, with compliance dates and approximate emission reductions given for state measures.

- VOM Reductions in Categories including:
    - RACT for Consumer and Commercial Products Group II
        - Industrial cleaning solvents – January 1, 2012; indeterminate reduction
        - Flat wood paneling coatings – May 1, 2012; 60% reduction
        - Flexible packaging printing lines – August 1, 2020; negligible reduction
        - Lithographic printing lines – August 1, 2020; 25% reduction
        - Letterpress printing lines - August 1, 2020; 30% reduction
    - RACT for Consumer and Commercial Products Group III
        - Paper, film, and foil coatings – May 1, 2011; 20% reduction
        - Large appliance coatings – May 1, 2011; negligible reduction
        - Metal furniture coatings – May 1, 2011; negligible reduction
    - RACT for Consumer and Commercial Products Group IV
        - Miscellaneous metal and plastic parts coatings – May 1, 2012; 35% reduction
        - Automobile and light-duty truck assembly coatings – May 1, 2012; negligible reduction
        - Miscellaneous industrial adhesives – May 1, 2012; 40% reduction
        - Fiberglass boat manufacturing – May 1, 2012; no applicable sources

- CAIR (2009 – 2014) / CSAPR (2015 – present) – 42% reduction

- Illinois' Multi Pollutant Standards ("MPS") and Combined Pollutant Standards ("CPS"), including revisions that mandate fuel-switching at specific plants – January 1, 2012; 59% reduction

- Standards and Limitations for Organic Material Emissions for Area Sources (Consumer and Commercial Products and Architectural and Industrial Maintenance Coatings rule) – July 1, 2009, Additional categories July 1, 2012; 18% reduction

- State Regulations for Stationary Reciprocating Internal Combustion Engines and Turbines – May 1, 20120 ; 55-65% reduction

- State Regulations for NOx Control – May 1, 2015; 46% reduction

- Mercury and Air Toxics Standard ("MATS") – Adopted January 2012

- New Source Performance Standards ("NSPS") including:

    - Reciprocating Internal Combustion Engine Standards 40 CFR 60 Subparts IIII and JJJJ – Adopted June 2011

    - Industrial/Commercial/Institutional Steam Generating Units 40 CFR 60 Subpart Db – Adopted May 2011

    - Crude Oil and Natural Gas Production, Transmission and Distribution 40 CFR 60 Subpart OOOO – Adopted August 2012

- National Emission Standards for Hazardous Air Pollutants (NESHAP)/Maximum Achievable Control Technology ("MACT") Standards including:

    - Reciprocating Internal Combustion Engine Standards 40 CFR 63 Subpart ZZZZ – Adopted January 2013

    - Industrial/Commercial/Institutional Boilers and Process Heaters 40 CFR 63 Subpart DDDDD and JJJJJJ – Adopted March 2011

- Ongoing reductions from the Enhanced Vehicle Inspection & Maintenance Program – Adopted April 2006

- Ongoing reductions from Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements – Adopted February 2000, Full Phase-in by 2009, emission reductions estimated through 2030

- Ongoing reductions from On-Highway Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements – Adopted January 2001, Full Phase-in by 2009, emission reductions estimated through 2030

- Federal Control Programs Incorporated into NONROAD Model (e.g., Nonroad Diesel Rule), plus Evaporative Large Spark Ignition and Recreational Vehicle Standards – Adopted March 2016

- Ongoing reductions from Tier 4 Nonroad Diesel Engine Standards and Diesel Fuel Sulfur Content Restrictions – Adopted June 2004

- Ongoing reductions from Category 3 Marine Diesel Engine Standards – Adopted March 16

- Ongoing reductions from Marine Compression-Ignition Engine Standards and Locomotive Engine Standards – Adopted March 2016

- Consent Decrees – Dynegy Midwest Generation (March 2005), ConocoPhillips (January 2005), CITGO (October 2004), Exxon-Mobil (October 2005), Marathon Ashland (May 2001), Archer Daniels Midland (April 2003)

It should be noted that other regulatory requirements also affect VOM emission sources within the Chicago ozone NAA. These include Maximum Achievable Control Technology ("MACT"), federal New Source Performance Standards ("NSPS"), and National Emission Standards for Hazardous Air Pollutants ("NESHAPS"). These programs satisfy the RACT requirements for specific source categories because these rules are more stringent than RACT. USEPA is also in the process of determining that Illinois is meeting VOC RACT requirements.

5.2 Controls to Remain in Effect

Illinois will maintain all of the control measures listed in this Section to ensure maintenance of the 2008 ozone NAAQS. Any revisions to the control measures included as part of the Maintenance Plan will be submitted as a SIP revision to USEPA for approval, and will be accompanied by a showing that such changes will not interfere with maintenance of the NAAQS.

Illinois EPA has the necessary resources to enforce any violations of its rules or permit provisions. After redesignation, it intends to continue enforcing all rules that relate to the emission of ozone precursors in the Chicago NAA.

5.3 Provisions for Permitting New or Modified Emission Sources

Illinois has longstanding and fully implemented programs for the review of new major sources and significant modifications of existing sources. The PSD program, which includes requirements for Best Available Control Technology on major new sources or significant modifications of existing sources, will be applicable in the Chicago area once the area has been redesignated to attainment. Illinois has been delegated full authority to implement the PSD program by USEPA.

5.4 Transportation Conformity

The purpose of this section is to describe and establish the Chicago NAA motor vehicle emissions budgets associated with the ozone Maintenance Plan SIP. Average summer weekday motor vehicle emissions budgets are being proposed for the midpoint of the Maintenance Plan, 2025, and the final year of the Maintenance Plan, 2030, for precursor pollutants NOx and VOM. The 2025 and 2030 budgets were developed consistent with the motor vehicle activity assumptions and emissions control strategies incorporated into the ozone attainment demonstration analysis. The budgets reflect an emissions level determined using data provided by Illinois EPA and consultation with the Chicago Metropolitan Agency for Planning ("CMAP"), and are consistent with the emissions levels used in the attainment demonstration.

A motor vehicle emissions budget is that portion of the total allowable emissions allocated to highway and transit vehicle use that are defined in the SIP for a certain year. The rules governing transportation conformity require certain transportation activities to be consistent with motor vehicle emissions budgets contained in control strategy implementation plans (40 CFR § 93.118). Section 93.101 of the rule defines a "control strategy [State] implementation plan revision" as a "plan which contains specific strategies for controlling the emissions and reducing ambient levels of pollutants in order to satisfy CAA requirements of reasonable further progress and attainment." In order to demonstrate conformity to the motor vehicle emissions budget, emissions from the implementation of a transportation plan or a transportation improvement program must be less than or equal to the budget level (40 CFR § 93.118(a)).

The effects of motor vehicle control measures are incorporated into the emissions factors produced by USEPA's MOVES model. These control measures include motor vehicle emissions standards, the operation of a vehicle inspection and maintenance ("I/M") program, and the required use of reformulated gasoline and low sulfur gasoline and diesel fuel.

The Maintenance Plan emissions analysis summarized in Table 4.9 estimates that NOx and VOM emissions will be respectively 99.78 and 34.15 tons/day less in 2025 than the 2017 attainment year emissions levels. Furthermore, NOx and VOM emissions will be respectively 114.88 and 41.53 tons/day less in 2030 than the 2017 attainment year emissions levels. The transportation conformity regulations (40 CFR § 93.118(a)) allow the addition of a portion of this "safety margin" to the motor vehicle emissions estimates. As future year emissions levels are projected to be substantially less than the attainment year 2017 emissions, a safety margin is being proposed to be added to the 2025 and 2030 estimated motor vehicle emissions to establish the motor vehicle emissions budget. For 2025, 15% of the safety margin will be used for NOx and 50% will be used for VOM. For 2030, 30% of the safety margin will be used for NOx and 66% will be used for VOM. This equates to an increase of 14.96 tons/day of NOx and 17.09 tons/day of VOM for 2025 and an increase of 34.55 tons/day for NOx and 27.43 tons/day of VOM for 2030. Since only a fraction of the safety margin is being used, maintenance requirements are still easily met.

The motor vehicle emissions budgets, which reflect the VMT, control program

assumptions, and safety margin are listed in Table 5.1.

Table 5.1 Proposed Chicago Ozone Maintenance Plan Motor Vehicle Emissions Budgets (tons/day)

	Estimated Emissions		Safety Margin		Motor Vehicle Emissions Budgets	
Year	**NOx**	**VOM**	**NOx**	**VOM**	**NOx**	**VOM**
2017	177.66	81.49	-----	-----	N/A	N/A
2025	85.04	52.85	14.96	17.09	100.00	69.94
2030	65.66	42.64	34.55	27.43	100.21	70.07

Complete details on the derivation of the motor vehicle emissions budgets, including discussion of the MOVES model inputs and assumptions are included in Appendix C of this report.

6.0 CONTINGENCY MEASURES

6.1 Contingency Measures

Section 175(A) of the CAA specifies the requirements for maintenance plans, including provisions for contingency measures that could be triggered if violations of the ozone NAAQS are measured after redesignation to attainment. A list of potential contingency measures that would be implemented in such an event should also be included in the maintenance plan.

Contingency measures are intended to provide further emission reductions in the event that violations of the ozone NAAQS occur after redesignation to attainment. While these measures do not need to be fully adopted by the State prior to the occurrence of NAAQS violations, the contingency plan should ensure that the measures are adopted expeditiously if they are triggered. The maintenance plan must identify the triggers that determine which measures that the State will consider and when such measures will be adopted.

Illinois EPA's contingency plan for the Chicago NAA is described in Table 6.1. Consistent with this plan, Illinois agrees to adopt and implement, as expeditiously as is practicable, the necessary corrective actions in the event that violations of the ozone NAAQS occur within the Chicago maintenance area after redesignation to attainment. As described in Section 5.0 of this report, Illinois has adopted and is continuing to implement a range of control measures that will greatly reduce precursor emissions, both locally and statewide. The contingency plan anticipates that these reductions will be sufficient to mitigate exceedances or violations of the NAAQS that may occur in the coming years without further regulatory action.

The contingency plan provides for different levels of corrective responses should ambient ozone levels exceed the NAAQS in any year, if emissions in the NAA increase significantly above current attainment levels, or if the NAAQS is violated. A Level I response would occur in the event that: 1) the fourth highest ozone concentration at any monitoring site in the Chicago NAA exceeds 75 ppb in any year, or 2) area-wide VOM or NOx emissions increase more than 5% above the levels contained in the attainment year (2017) emissions inventory. It should be noted that USEPA does not require a state to implement contingency measures when occasional exceedances are recorded. Illinois EPA's voluntary commitment to initiate a Level I response is intended to prevent future violations of the NAAQS from ever occurring.

Illinois commits to compiling VOM and NOx emissions inventories every three years for the duration of the Maintenance Plan to facilitate the emissions trends analysis included

Table 6.1 Contingency Plan for the Chicago Ozone Nonattainment Area

Contingency Measure Trigger	Action to be Taken	List of Potential Contingency Measures
Level I Trigger Fourth highest monitored 8-hour average ozone concentration exceeding 75 ppb in any year at any monitoring station in the Chicago maintenance area. The Chicago maintenance area's NOx or VOM emissions inventories increase more than 5% above the levels included in the 2017 emissions inventories.	Illinois will evaluate air quality or determine if adverse emissions trends are likely to continue. If deemed appropriate, Illinois will determine what and where controls may be required, as well as level of emissions reductions needed, to avoid a violation of the NAAQS. The study shall be completed within nine months of the certification of the ozone data showing an exceedance. If necessary, control measures shall be adopted within 18 months of determination and implemented as expeditiously as practicable, taking into consideration the ease of implementation and the technical and economic feasibility of the selected measures.	**Point Source Measures** • Continued phasing in of: Mercury and Air Toxics Standards (MATS), Reciprocating Internal Combustion Engines (RICE) NESHAP, and Industrial/Commercial/ Institutional Boilers and Process Heaters NESHAP; Cross-State Air Pollution Rule Update; • NESHAP – Risk and Technology Review including: Mineral Wool Production 40 CFR 63 Subpart DDD; Ferroalloys Production 40 CFR 63 Subpart XXX; Petroleum Refineries 40 CFR 63 Subparts CC and UUU; • NSPS – Petroleum Refineries 40 CFR 60 Subpart Ja; • Broader geographic applicability of existing measures, if determined to be an issue; • Oil and Gas Sector Emission Guidelines, once finalized by USEPA; • MPS revisions requiring the retirement of 2000 MW of coal-fired EGUs.

Level II Trigger A violation of the 2008 NAAQS at any monitoring station in the Chicago maintenance area.	Illinois will conduct a thorough analysis to determine appropriate measures to address the cause of the violation. Analysis shall be completed within six months of the certification of the ozone data showing a violation. If necessary, the appropriate selected measures shall be implemented within 18 months of a violation.	• Revisions to Illinois NOx state rules for boilers and engines. • Implementation of OTC model rules for above ground storage tanks; **Mobile Source Measures** Continued implementation of: • 2017 Light-Duty Vehicle GHG and Corporate Average Fuel Economy (CAFE) Standards; • Mobile Source Air Toxics Rule; • Tier 3 Vehicle Emissions and Fuel Standards; • Heavy-Duty Vehicle Greenhouse Gas Rules; • Regulations on the Sale of Aftermarket Catalytic Converters. **Area Source Measures** • Current California Commercial and Consumer Products – Aerosol Adhesive Coatings, Dual Purpose Air Freshener/Disinfectant, etc.

in the contingency plan under Level I. Illinois will coordinate with LADCO and other Lake Michigan states to evaluate the causes of high ozone levels or the emissions trends and to determine if control measures are needed to assure continued attainment of ozone NAAQS. Under Level I, measures that could be implemented in a short time would be selected, if any are deemed necessary, so as to be in place quickly after the Illinois EPA becomes aware that corrective measures have been triggered. Control measures selected under Level I will be adopted in most cases within 18 months after a determination is made, and implemented, generally, within 24 months of adoption.

A Level II response would be implemented in the event that a violation of the ozone NAAQS were to occur at a monitoring site within the Chicago maintenance area. In order to select appropriate corrective measures, Illinois will work with LADCO and other Lake Michigan States to conduct a comprehensive study to determine the causes of the violation and the control measures necessary to mitigate the problem. The analysis will examine the following factors:

- the number, location, and severity of the ambient ozone concentrations;
- the weather patterns contributing to ozone levels;
- potential contributing emissions sources;
- the geographic applicability of possible contingency measures;
- emissions trends, including timeliness of implementation of scheduled control measures;
- current and recently identified control technologies; and

- air quality contributions from outside the maintenance area.

Contingency measures will be selected from those listed in Table 6.1 or Illinois will implement other measures deemed appropriate and effective at the time the selection is made. This list of contingency measures is comprehensive, and it is expected that only a few of these measures would be required. The selection of measures will be based upon cost-effectiveness, emission reduction potential, economic and social considerations, ease and timing of implementation, and other appropriate factors. Implementation of necessary controls in response to a Level II trigger will take place as expeditiously as possible, but no later than 18 months after Illinois makes a determination, based on quality-assured ambient data, that a violation of the NAAQS has occurred.

Adoption of additional control measures is subject to necessary administrative and legal processes. No contingency measure will be implemented without providing the opportunity for full public participation. This process will include publication of notices, an opportunity for public hearing, and other measures required by Illinois law for rulemakings.

6.2 Commitment to Revise Plan

As noted in Section 4.5 above, Illinois commits to review its Maintenance Plan eight years after redesignation, as required by Section 175(A) of the CAA. The Maintenance Plan revision is intended to ensure continued attainment of the ozone NAAQS for an additional ten-year period.

6.3 Public Participation

In accordance with Section 110(a)(2) of the CAA, Illinois is required to have a public comment period and provide the opportunity for a public hearing on the Maintenance Plan prior to adoption. Public participation in the SIP process is provided for as follows:

- Notice of availability of the Maintenance Plan document and the time and date of the public hearing was published in the Chicago Sun Times on TBA.

- If requested, the public hearing to receive comments on the Chicago Maintenance Plan was scheduled for TBA in the Sangamo Room at the Illinois EPA's Headquarters at 1021 N. Grand Ave. East, Springfield, Illinois.

- A 30-day public comment period was also available to receive comments on the Maintenance Plan. A summary of the comments received, and Illinois EPA's responses thereto, is included as part of the submittal to USEPA.

6.4 Legal Authority to Implement and Enforce

The Maintenance Plan must contain a demonstration that the State of Illinois has the necessary legal authority to implement and enforce the measures relied upon to attain and maintain the NAAQS. Illinois has the legal authority to implement and enforce the requirements of this SIP submittal pursuant to the Illinois Environmental Protection Act.

7.0 CONCLUSIONS

The Chicago NAA has attained the ozone NAAQS established in 2008 and is in compliance with the applicable provisions of the Clean Air Act required of moderate ozone nonattainment areas. While the area has recently been reclassified as a serious NAA, requirements for a serious NAA do not apply until August 3, 2020. Clean Air Act Section 182(c) contains the requirements for areas classified as serious. On August 23, 2019 (84 FR 44238), EPA reclassified the Chicago area from moderate to serious and established August 3, 2020, and March 23, 2021, as the due dates for serious area SIP revisions. No requirements under section 182(c) became due prior to Illinois EPA's submission of the complete redesignation request for the Illinois portion of the Chicago area, and, therefore, none are applicable to the area for purposes of redesignation. Illinois has performed an analysis showing that the air quality improvements in the Chicago NAA are due to permanent and enforceable control measures, and supporting documentation is contained herein.

Illinois has prepared a Maintenance Plan that meets the applicable requirements of the Clean Air Act. This Maintenance Plan provides for the continued attainment of the 2008 ozone NAAQS for a period of ten years after USEPA has formally redesignated the area to attainment. This Maintenance Plan provides adequate contingency measures for potential, additional emission reductions in the event that future violations of the ozone NAAQS are observed in the area.

Illinois has prepared a comprehensive emission inventory of ozone precursors completed for the "attainment" year 2017, and has prepared a projection of the emission inventory to a year at least 10 years following redesignation. These projections indicate that emissions levels in the Chicago NAA will continue to remain much lower than emissions from the attainment year 2017 levels, thereby maintaining the ozone NAAQS in future years. Illinois commits to continue to operate an appropriate monitoring network to verify the maintenance of the attainment status once the area has been redesignated. Illinois EPA has the legal authority to implement and enforce all control measures.

Finally, the Maintenance Plan includes on-road motor vehicle emissions budgets for use in transportation conformity determinations to ensure that any increases in emissions from this sector do not jeopardize continued attainment of the ozone standard during the ten-year maintenance period. This Maintenance Plan has been prepared in accordance with the requirements specified in USEPA's guidance document, and additional guidance received from USEPA staff.

APPENDIX A: Summary of Ambient Air Monitoring Data (2017-2019)

Table A.1 2017-2019 Ozone Design Values for Monitors in the Chicago Nonattainment Area

State of Illinois

County	AQS Code	Site Name	Design Value	4th High 2017	4th High 2018	4th High 2019
Cook	170310001	Alsip	75	78	79	70
Cook	170310032	Chicago (SWFP)	73	74	76	71
Cook	170310076	Chicago (ComED)	72	78	74	65
Cook	170311003	Chicago (Taft)	67	60	73	69
Cook	170311601	Lemont	68	70	68	68
Cook	170313103	Schiller Park	63	61	65	64
Cook	170314002	Cicero	68	68	72	64
Cook	170314007	Des Plaines	70	71	75	66
Cook	170314201	Northbrook	74	70	83	69
Cook	170317002	Evanston	75	73	84	69
DuPage	170436001	Lisle	70	69	71	70
Kane	170890005	Elgin	70	69	72	71
Lake	170971007	Zion	71	74	74	66
McHenry	171110001	Cary	71	70	74	70
Will	171971011	Braidwood	66	68	71	60

State of Indiana

County	AQS Code	Site Name	Design Value	4th High 2017	4th High 2018	4th High 2019
Lake	180890022	Gary	68	70	71	65
Lake	180892008	Hammond	65	69	62	65
Porter	181270024	Ogden Dunes	70	72	71	68
Porter	181270026	Valparaiso	73	77	71	71

State of Wisconsin

County	AQS Code	Site Name	Design Value	4th High 2017	4th High 2018	4th High 2019
Kenosha	550590019	Chiwaukee	75	79	79	67
Kenosha	550590025	Kenosha	73	76	80	63

APPENDIX B: Classification and Regression Tree (CART) Analysis for Chicago-Naperville, IL-IN-WI, Nonattainment Area

CART Analysis for Chicago-Naperville, IL-IN-WI, Nonattainment Area

A classification and regression tree ("CART") analysis was conducted by LADCO using ozone monitoring data for two regions of Chicago-area ozone sites. The first analysis area is comprised of two northern monitors: Chiwaukee (ID number 55-059-0019) and Zion (17-097-1007). The second analysis area is represented by a combination of multiple southern monitoring sites including: Alsip (ID number 17-031-0001), Cheltenham (17-031-0032), Hurlbut St. (17-031-1003), Lemont (17-031-1601), Cicero (17-031-4002), Northbrook (17-031-4201), and Evanston (17-031-7002). The analysis years measured from 2000-2015. The goal of the analysis was to determine the meteorological conditions associated with high ozone episodes in the Chicago air-shed and to construct trends for the days identified as sharing similar meteorological characteristics.

The CART analyses for the Chicago-area ozone study processed multiple meteorological variables for each day to determine which are the most effective at predicting ozone. Meteorological data collected for the Chiwaukee/Zion monitors were taken from Mitchell Field (Milwaukee) NWS station and processed by LADCO. Upper air observations were taken from the Green Bay, Wisconsin, NWS site. Meteorological data collected for the analysis of southern monitors was taken from the Chicago O'Hare Airport National Weather Service ("NWS") station and processed by LADCO. Upper air observations, taken from Lincoln, Illinois, NWS site, were downloaded from the National Climatic Data's Center ("NCDC") Integrated Global Radiosonde Archive. Meteorological variables for both analyses included maximum and average daily temperatures, dew points, relative humidity and air pressure at the surface and different levels of the atmosphere, wind directions and wind speeds, change in temperatures and air pressure from the previous day, average wind speeds and temperatures over a two- or three-day period, day of the week, cloud cover, daily precipitation and many other parameters.

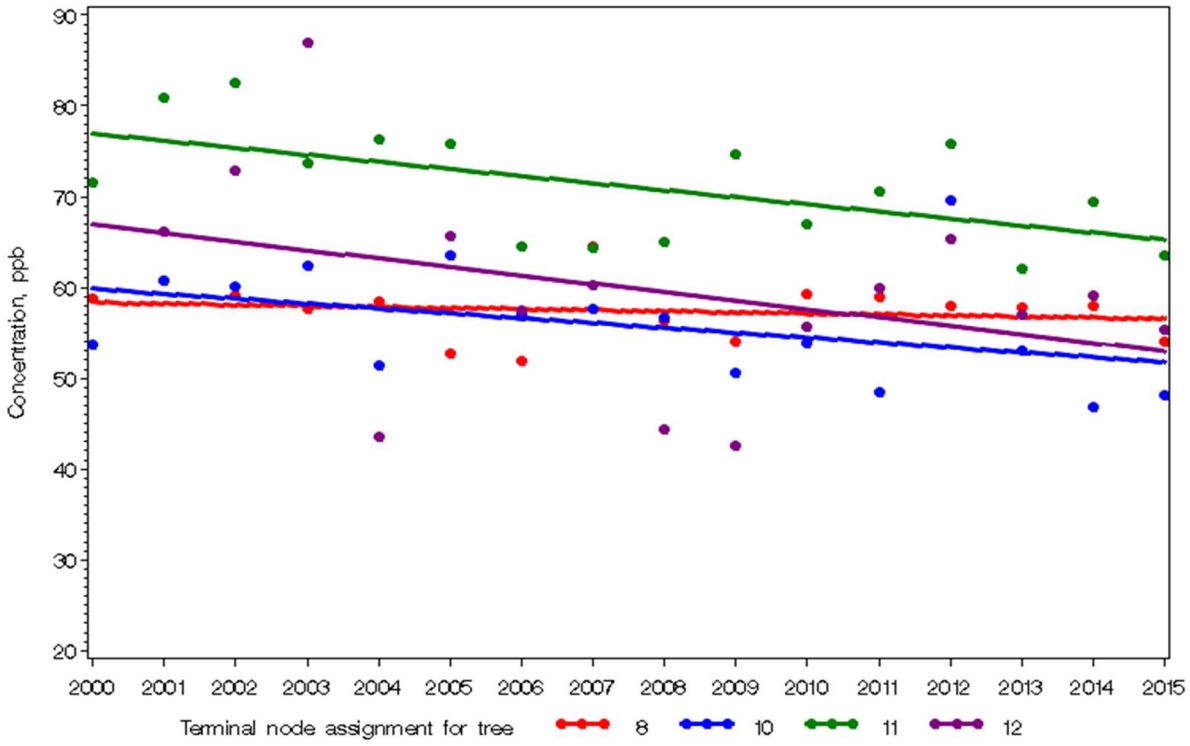
Regression trees, where each branch describes the meteorological conditions associated with different ozone concentrations, were developed to classify each summer day (May – September). Although the exact selection of predictive variables changes from site to site, the universally common predictors are 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 7-10 am, afternoon 1-4 pm, etc.). Similar days were assigned to nodes, which are equivalent to branches of the regression tree. By grouping days with similar meteorology, the influence of meteorological variability on the underlying trend in ozone concentrations is partially removed; the remaining trend is presumed to be due to trends in precursor emissions or other non-meteorological influences. Ozone trends in these nodes were then plotted.

This analysis focused on the Chiwaukee/Zion analysis because the Chiwaukee monitor is the controlling ozone monitor for the Chicago area. The CART analysis determined that four sets of meteorological conditions had the strongest correlation with high ozone episodes (values over 50 ppb for ozone) for the Chiwaukee/Zion sites: Node 8, morning height values measured at 700 millibars altitude; Node 10, representing maximum surface

temperature above 85° F; Node 11, representing morning temperatures below 77° F (7-10 am local time), average afternoon "v" wind vector greater than 2.41 meters per second (m/s) (i.e. from the south) as well as average afternoon "u" vector less than or equal to -1.88 m/s (i.e. from the east); Node 12, representing morning temperatures below 77° F (7-10 am local time), average afternoon "v" wind vector greater than 2.41 meters per second (m/s) (i.e. from the south) as well as average afternoon "u" vector equal to or greater than -1.88 m/s (i.e. from the east); Node 11 contains 358 days of data and an average of 72.366 ppb in the data set under these conditions. Node 12 contains 154 days of data and an average of 61.097 ppb for ozone.

Figure B.1, presented below, shows that for the four Nodes identified by the CART analysis, ozone values are trending lower for the most recent 16 years. This is to say, when wind directions are from the south-southeast and morning temperatures are below 77 degrees F (parameters associated with the highest ozone values in the past), ozone values are trending lower. While maximum temperatures play a role in the formation of ozone, the CART analysis reveals that other meteorological parameters play a more significant role in the conditions that are favorable for ozone formation.

Figure B.1 Concentration Trends in CART Nodes – Lake County, IL, and Chiwaukee, WI (Only Nodes with O_3 > 50ppb)



By using a CART analysis to analyze ozone data in the Chicago 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 Chicago-area have declined. Furthermore, under meteorological conditions when monitored ozone has historically been at its highest, ozone concentrations are lower under similar meteorological conditions. This analysis demonstrates that lower ozone values are not caused by favorable meteorological conditions and that progress in reducing ozone precursor emissions is the primary reason for lower 8-hour ozone concentrations in the Chicago metropolitan area as well as areas to the north and east.

APPENDIX C: Chicago Ozone Maintenance Plan Transportation Conformity Motor Vehicle Emissions Budget Documentation

TRANSPORTATION CONFORMITY

This section describes the development of the Chicago NAA motor vehicle emissions budgets associated with the revised Maintenance Plan for the 2008 ozone NAAQS. Average summer weekday motor vehicle emissions budgets are being proposed for the attainment year, 2017, and for the Maintenance Plan end year 2030 for the ozone precursor pollutants NOx and VOM. The budgets were developed using the inventory method of MOVES2014a model. The MOVES model incorporates local inputs such as annual vehicle miles of travel, vehicle fleet characteristics, meteorological conditions, and vehicle and fuel emission control programs.

Background

Section 176(c)(4) of the Clean Air Act Amendments of 1990 requires that transportation plans, programs, and projects which are funded or approved under Title 23 of the United States Code must be determined to conform with State or Federal air implementation plans. A motor vehicle emissions budget is that portion of the total allowable emissions allocated to highway and transit vehicle use that are defined in the implementation plan for a certain year. Section 93.101 of the rule defines a "control strategy [State] implementation plan revision" as a "plan which contains specific strategies for controlling the emissions and reducing ambient levels of pollutants in order to satisfy CAA requirements of reasonable further progress and attainment." In order to demonstrate conformity to the motor vehicle emissions budget, emissions from the implementation of a transportation plan or a transportation improvement program must be less than or equal to the budget level (40 CFR § 93.118(a)).

Transportation conformity is determined based on these proposed on-road motor vehicle emissions budgets after USEPA determines that the budgets meet the adequacy criteria of the transportation conformity rule under §93.118(e). The motor vehicle emissions budgets in this submittal are adequate as each of the six criteria under §93.118(e) is satisfied. These six criteria include:

1. The submitted control strategy implementation plan revision or maintenance plan was endorsed by the Governor (or his or her designee) and was subject to a State public hearing.

2. Before the control strategy implementation plan or maintenance plan was submitted to USEPA, consultation among federal, State, and local agencies occurred; full implementation plan documentation was provided to USEPA; and USEPA's stated concerns, if any, were addressed;

3. The motor vehicle emissions budgets(s) is clearly identified and precisely quantified;

4. The motor vehicle emissions budget(s), when considered together with all other emissions sources, is consistent with all applicable requirements for reasonable

further progress, attainment, or maintenance (whichever is relevant to the given implementation plan submission);

5. The motor vehicle emissions budget(s) is consistent with and clearly related to the emissions inventory and the control measures in the submitted control strategy implementation plan revision or maintenance plan; and

6. Revisions to previously-submitted control strategy implementation plans explain and document any changes to previously submitted budgets and control measures, impacts on point and area source emissions; any changes to established safety margins; and reasons for the changes (including the basis for any changes related to emissions factors or estimates of vehicle miles traveled).

This SIP and the associated motor vehicle emissions budgets have been developed by Illinois EPA, the designated air quality agency for the State of Illinois. The required notice to accept public comment (and to allow for a public hearing) on the proposed Maintenance Plan and associated motor vehicle emissions budget was posted on the Illinois EPA's website on TBA. Comments on the proposed attainment demonstration and motor vehicle emissions budgets were accepted for 30 days after the notice.

In compliance with criterion #2 above, a Tier 2 Conformity Consultation Team meeting was held on January 21, 2020 to discuss the proposed Maintenance Plan and associated motor vehicle emissions budgets. The Consultation Team includes representatives from the Federal Highway Administration, Federal Transit Authority, USEPA, CMAP, IDOT, Regional Transportation Authority, and the Illinois EPA. A draft Maintenance Plan was also forwarded to the Region V representative for his review and comment.

The motor vehicle emissions budgets proposed and described herein satisfy adequacy criterion #5. The effects of these controls are incorporated into the emissions estimates produced by the MOVES model. In response to adequacy criteria #4 and #6, the narrative of the Chicago ozone Maintenance Plan discusses the emissions estimates from other sectors and any changes in regulations. Following, in response to adequacy criteria #3, is a discussion of the inputs and assumptions incorporated into the development of the proposed Maintenance Plan motor vehicle emissions budgets.

Vehicle Miles Traveled: The attainment year 2017 motor vehicle emissions estimates contained in the Chicago ozone Maintenance Plan incorporate county- and township-level 2017 annual VMT levels from IDOT. The 2017 annual VMT total for the six-county-three-township Chicago NAA was approximately 57.9 billion miles. For future year emission estimates, VMT was grown to the target year at a compound growth rate of 1.5% per year. Applying this growth factor to the 2017 VMT level yields future year annual VMT projections of 65.2 billion for 2025 and 70.2 billion for 2030.

Meteorological Data: USEPA guidance for the use of the MOVES model requires the use of representative local temperature and absolute humidity data. Appropriate hourly temperature and humidity values were used to calculate emissions.

Motor Vehicle Emissions Controls: Beyond USEPA's federal motor vehicle control program emissions standards, the primary local motor vehicle emissions control programs that were in place in the Chicago NAA in 2017, and are projected to still be required in 2030 are an I/M program and the required use of reformulated gasoline ("RFG").

Inspection and Maintenance: The current Illinois I/M program, in effect since February 1, 2012, requires biennial On-Board Diagnostics II ("OBD") testing on all model year ("MY") 1996 and newer ("MY96+") light-duty gasoline vehicles (cars and light-duty trucks)**,** and 2007 and newer (MY07+) heavy duty gasoline vehicles with a gross vehicle weight rating ("GVWR") between 8,501 and 14,000 pounds, registered in the I/M testable area. Motorcycles and diesel vehicles are not subject to I/M. The program includes a four-year grace period for new vehicles. The post-2012 I/M program was established when the Illinois legislature amended the Illinois Vehicle Inspection law in 2005 and 2011 as follows.

- End dynamometer testing of vehicles.
- Require an OBD-based program beginning in February 2007.
- Remove the requirement for testing compliant pre-MY96 vehicles.
- End the steady-state idle exhaust and evaporative system integrity (gas cap pressure) tests.
- Exempt pre-2007 model year heavy duty vehicles with GVWR between 8,501 and 14,000 pounds.
- Exempt all heavy-duty vehicles with GVWR greater than 14,000.
- Add a visual inspection test for vehicles that are equipped with OBD technology, but for which OBD testing is not possible due to the vehicle's design.

The Chicago I/M program vehicle testing domain includes the urbanized areas in the Chicago NAA. An "I/M Coverage" percentage was developed based on the amount of VMT from vehicles subject to the inspection program compared to total area VMT. The I/M Coverage percentage for the Chicago ozone NAA is 91.5%.

Fuels: The use of federal RFG has been required in the Chicago NAA since 1995. The ozone Attainment Demonstration assumed the use of northern grade RFG in 2008 and beyond. RFG was and is assumed to contain 15% ethanol. The MOVES model can account for other fuels, such as E85, natural gas, methanol, etc., but for all practical purposes the gallons of such alternative fuels and hence the number of vehicles using them is very small compared to the number of gasoline and diesel vehicles, therefore, the use of such fuels was not considered.

> **Gasoline Sulfur:** The federal Tier 2 regulations require gasoline sulfur levels to average no greater than 30 parts per million ("ppm") with a maximum of 80 ppm beginning in 2007. There are no Illinois gasoline sulfur requirements, therefore, the MOVES default gasoline sulfur levels were used in the emissions modeling.

Diesel Sulfur: The federal Tier 2 regulations limit the level of sulfur in diesel fuel requiring on-highway diesel fuel to 15 ppm beginning in 2006. Illinois diesel sulfur requirements will mimic these requirements beginning in 2017; therefore, the MOVES default diesel sulfur levels were used in the emissions modeling.

Fuel Volatility: The volatility of summer RFG, measured as Reid vapor pressure ("RVP"), is not specifically regulated. However, a fuel's RVP is one of the primary characteristics controlled by refiners in order to meet the RFG performance standards. The MOVES model contains default RVP levels for different seasons of the year based on fuel compliance testing. Therefore, the MOVES default RVP levels were used in the emissions modeling.

Vehicle Registration Distribution: A Chicago area-specific vehicle registration distribution ("RD") profile based upon 2014 data was developed by Illinois EPA's Division of Mobile Source Programs from vehicle age data for 2013 provided by the Illinois Secretary of State's Department of Motor Vehicles. The RD is the fraction of vehicles of a given vehicle type and age in the fleet of vehicles of that type as a whole. Different vehicle types have different RDs. Chicago-area RDs generally show fewer older vehicles than the nationwide average or default, because vehicles in the Chicago area tend to wear out faster than they do in the rest of the country due to rust from road salt and heavy city driving.

Source Type Population represents the number of vehicles of each MOVES vehicle type in the fleet as a whole within the area under consideration. Accurate local source-type populations were not available; therefore, the MOVES default fractions modified by VMTs by vehicle type were used.

VMT Temporal Fractions are the VMT fractions of annual VMT by month of the year, of weekly VMT by day of the week, and daily VMT by hour of the day. The Illinois EPA used default values from MOVES. Temporal fractions vary by road type.

Speed distributions are the fractions of VMT on a given road type by given vehicle types in various speed ranges (bins). Thus, on a typical Urban Arterial, a small fraction of the vehicles are traveling at less than 10 mph (plus or minus 5 mph), more at 20 mph, more at 30mph, most at 40 mph, less at 50 mph, and so on. These fractions differ by hour of the day – in more congested conditions during rush hours, the maximum fraction might be in the 30 mph range rather than the 40 mph range. MOVES uses speed distributions when aggregating emissions (or emission rates) for vehicles at different speeds. The Illinois EPA used the default speed distributions from MOVES.

Ramp fraction is the fraction of total VMT on limited-access highways such as Interstates that is from on- and off-ramps to or from those highways. Driving on limited-access highways is more or less at uniform speed, but driving on ramps involves considerable acceleration and deceleration; and these speed changes affect emissions. The default MOVES Ramp Fractions are 15% on Rural Interstates, 10% on Urban Interstates, and 2% on Other Freeways and Expressways. Illinois does not have actual or

observed Ramp Fraction data so data from CMAP was used.

Road Type Distribution is the (fraction of) VMT on different road categories within an area under consideration. The Illinois EPA uses VMT data by HPMS functional class ("FC") published by IDOT as the basis of its emission calculations. The Road Type Distributions came from default MOVES values.

Safety Margin

USEPA's transportation conformity regulations allow for the use of a safety margin in the development of motor vehicle emissions budgets for maintenance plans. A Safety Margin is defined as "the amount by which the total projected emissions from all sources of a given pollutant are less than the total emissions that would satisfy the applicable requirement for reasonable further progress, attainment, or maintenance."

The Maintenance Plan emissions analysis summarized in Table 4.9 estimates that NOx and VOM emissions will be respectively 99.78 and 34.15 tons/day less in 2025 than the 2017 attainment year emissions levels, and 114.88 and 41.53 tons/day less in 2030 than the 2017 attainment year emissions levels. The transportation conformity regulations (40 CFR § 93.118(a)) allow the addition of a portion of this "safety margin" to the motor vehicle emissions estimates. As future year emissions levels are projected to be substantially less than the attainment year 2017 emissions, a safety margin is being proposed to be added to the 2025 and 2030 estimated motor vehicle emissions to establish the motor vehicle emissions budget. For 2025, 15% of the safety margin will be used for NOx and 50% will be used for VOM. For 2030, 30% of the safety margin will be used for NOx and 66% will be used for VOM. This equates to an increase of 14.96 tons/day of NOx and 17.09 tons/day of VOM for 2025. An increase of 34.55 tons/day for NOx and 27.43 tons/day of VOM will occur for 2030.

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Motor Vehicle Emissions Budgets

Using the emissions generated by the MOVES model inventory methodology and incorporating the additional emissions from the Maintenance Plan safety margin, following are the proposed attainment year 2017 and Maintenance Plan end year 2030 Chicago ozone motor vehicle emissions budgets for use in determining transportation conformity.

Table C.1 Proposed Chicago Ozone Maintenance Plan Motor Vehicle Emissions Budgets (tons/day)

	Estimated Emissions		Safety Margin		Motor Vehicle Emissions Budgets	
Year	**NOx**	**VOM**	**NOx**	**VOM**	**NOx**	**VOM**
2017	177.66	81.49	-----	-----	N/A	N/A
2025	85.04	52.85	14.96	17.09	100.00	69.94
2030	65.66	42.64	34.55	27.43	100.21	70.07