DRAFT

Maintenance Plan for the Chicago Nonattainment Area for the 1997 $PM_{2.5}$ National Ambient Air Quality Standards (Revised)

AQPSTR 11-05

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Illinois Environmental Protection Agency
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EXECUTIVE SUMMARY

This document describes Illinois' Maintenance Plan for the Illinois portion of the Chicago fine particulate matter ($PM_{2.5}$) nonattainment area (NAA), hereafter referred to as the Chicago NAA. An approved Maintenance Plan is required before an area can be redesignated from nonattainment to attainment of a National Ambient Air Quality Standard (NAAQS). This document provides technical information required to support a request to redesignate the Chicago NAA to attainment of the 1997 annual $PM_{2.5}$ NAAQS. This revision incorporates motor vehicle emissions estimates developed using the U.S. EPA's MOVES model. The Indiana Department of Environmental Management (IDEM), has prepared a similar plan for the Indiana portion of the Chicago NAA.

$PM_{2.5}$ air quality has improved in the Chicago area as a result of the implementation of State and Federal emissions control measures since the designation of the area as nonattainment in 2004. The air quality improvement is due to permanent and enforceable emissions control measures. The entire Chicago NAA has at least three years of complete, quality assured ambient air quality monitoring data for 2007-2009 that demonstrates compliance with the 1997 NAAQS. The U.S. EPA has made a determination that the Chicago NAA has attained the 1997 fine particle standard (40 CFR 52.74, p. 62243-62249).

This Maintenance Plan provides for continued attainment of the 1997 $PM_{2.5}$ air quality standards for the Chicago nonattainment area for a period of at least ten years after U.S. EPA 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, contingency measures listed in the Plan will be triggered to prevent any future occurrences. Finally, the Plan includes on-road motor vehicle emissions budgets for the years 2008 and 2025 for use in transportation conformity determinations to assure that any increases in emissions from this sector do not jeopardize continued attainment of the $PM_{2.5}$ standards during the maintenance period.

1.0 INTRODUCTION

The Illinois Environmental Protection Agency (Illinois EPA) has prepared this document to describe Illinois' $PM_{2.5}$ Maintenance Plan for the Chicago NAA. This Maintenance Plan is required before the area can be redesignated from nonattainment to attainment of the annual National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$ promulgated by the U.S. Environmental Protection Agency (U.S. EPA) in 1997. The Illinois EPA intends to submit such a request to the U.S. EPA in conjunction with this Maintenance Plan. The entire Chicago nonattainment area, including Lake and Porter counties in Indiana, has at least three years of complete, quality assured ambient air quality monitoring data for the most recent 3-year period, 2007-2009, demonstrating attainment of the annual $PM_{2.5}$ NAAQS promulgated in 1997. U.S. EPA finalized its determination that the entire Chicago NAA attains the 1997 $PM_{2.5}$ NAAQS in November 2009.

This document provides the technical information needed to support a request to redesignate the Chicago area to attainment of the 1997 annual $PM_{2.5}$ 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. Before an area can be reclassified to attainment:

- U.S. EPA must make a determination that the area has attained the NAAQS based on at least three complete years of ambient monitoring data.
- U.S. EPA 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.
- The state must submit, and U.S. EPA 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 NAAQS are measured.

This Maintenance Plan provides for the continued attainment of the annual $PM_{2.5}$ NAAQS for the Chicago NAA for a period of at least ten years after U.S. EPA has formally redesignated the area to attainment. The Plan also provides assurances that even if a subsequent violation of the annual $PM_{2.5}$ NAAQS occurs, provisions in the Plan will prevent any future occurrences through the enactment of contingency measures that would be triggered upon such occurrence.

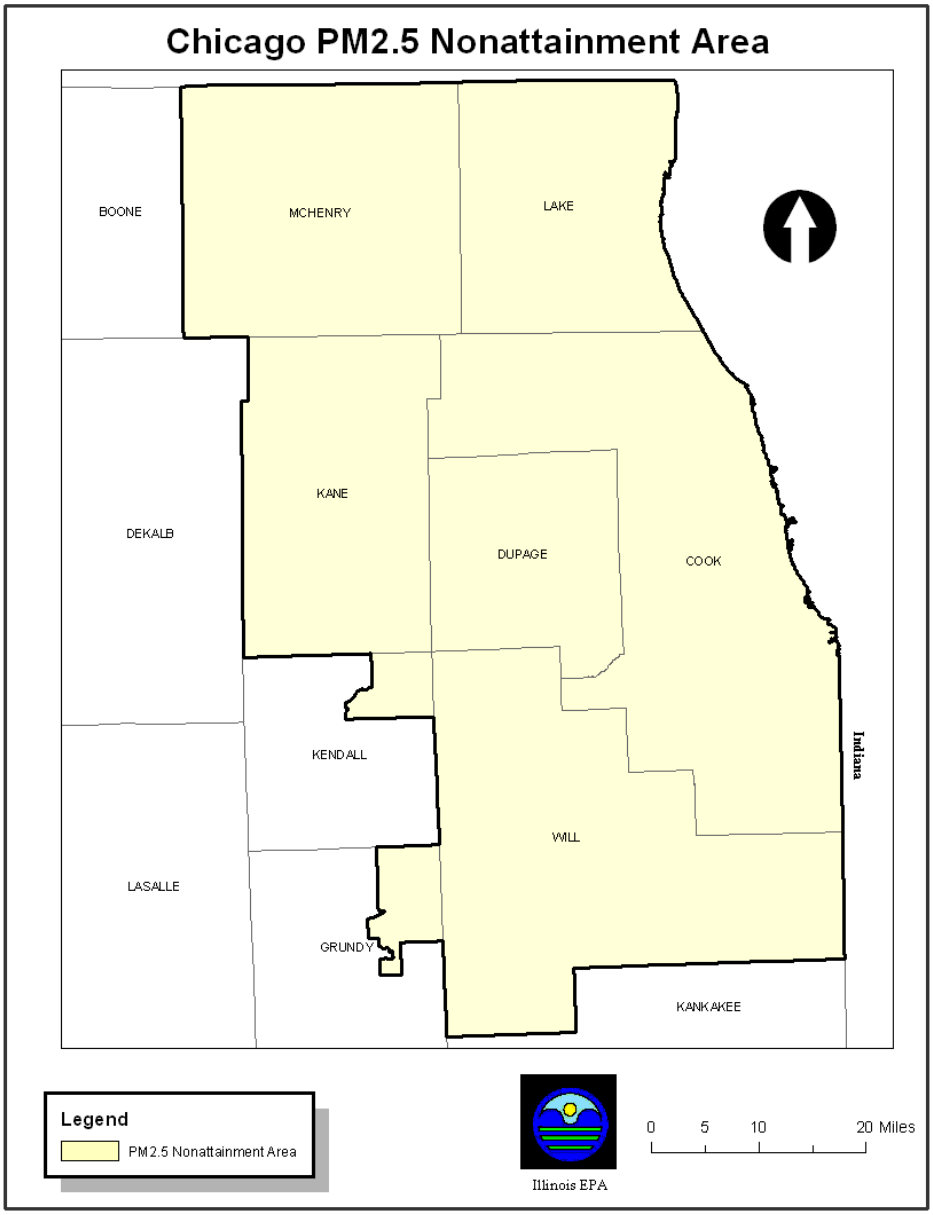
This document addresses the Maintenance Plan requirements established by the CAA and U.S. EPA, and includes additional information to support continued compliance with the $PM_{2.5}$ NAAQS.

1.1 Regulatory Background

The CAA requires areas that fail to meet the NAAQS for $PM_{2.5}$ to develop SIPs to expeditiously attain and maintain the NAAQS. Historically, one-year exceedances of the annual $PM_{2.5}$ NAAQS have been monitored as recently as 2007 at one monitor in Cook County, but all monitors in the NAA are now in attainment of the $PM_{2.5}$ NAAQS.

The Chicago NAA, which includes all of Cook, DuPage, Kane, Lake, McHenry and Will counties, as well as portions of Grundy and Kendall counties, was originally designated as nonattainment of the 1997 annual $PM_{2.5}$ in 2004. The Chicago area was designated unclassifiable/attainment for the 24-hour $PM_{2.5}$ standard that was also promulgated in 1997, and revised in 2006. Since the Chicago area is not a nonattainment area for the 24-hour $PM_{2.5}$ NAAQS, any reference to the $PM_{2.5}$ NAAQS in the remainder of this document refers only to the annual $PM_{2.5}$ standard promulgated in 1997. Figure 1.1 depicts the boundaries of the Chicago $PM_{2.5}$ NAA in Illinois.

Figure 1.1- Chicago $PM_{2.5}$ Nonattainment Area



The following is a list of the counties contained in the Chicago $PM_{2.5}$ nonattainment area:

- Cook County, IL
- DuPage County, IL
- Kane County, IL
- Lake County, IL
- McHenry County, IL
- Will County, IL
- Aux Sable and Goose Lake Townships in Grundy County, IL, and
- Oswego Township in Kendall County, IL

As a result of the nonattainment designation, this area was subject to new requirements, including development of an attainment strategy that would allow the area to meet the federal $PM_{2.5}$ NAAQS by June 15, 2010. The attainment strategy recognizes the importance of reducing both locally-generated as well as incoming (transported) $PM_{2.5}$ and precursor emissions. State and Federal emissions control measures have reduced primary and secondary $PM_{2.5}$ emissions both locally and regionally and have enabled the Chicago NAA to attain the $PM_{2.5}$ NAAQS by the attainment deadline established by the U.S. EPA.

1.2 Status of Air Quality

$PM_{2.5}$ monitoring data for the most recent three-year period, 2007 through 2009, demonstrates that air quality has met the 1997 $PM_{2.5}$ NAAQS in the Chicago NAA. Information regarding the air monitoring network and air quality monitoring data is included in Section 3.0 and Appendix A.

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 development of a Maintenance Plan, which describes a state's plan for maintaining the NAAQS for a minimum ten-year period after redesignation. The Illinois EPA developed this Maintenance Plan according to the guidance published by the U.S.EPA entitled "Procedures for Processing Requests to Redesignate Areas to Attainment" (September 4, 1992).

Before a redesignation to attainment can be promulgated, U.S. EPA must:

- Determine that the NAAQS for $PM_{2.5}$, as published in 40 CFR 50.4, has been attained. $PM_{2.5}$ 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 U.S. EPA's Air Quality System (AQS) data base, and made available to the public. U.S. EPA has already finalized and published a finding that the area has, in fact, attained the NAAQS. This finding was published in the Federal Register in November 2009.

- Approve the state's plan for demonstrating attainment. The attainment plan, which is based on air quality modeling, must contain enforceable control measures and must be submitted as a revision to the state's SIP after a public hearing.

- 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 emissions reductions.

- Approve the state's Maintenance Plan. The requirements for the Maintenance Plan are discussed below.

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

A $PM_{2.5}$ Maintenance Plan provides for the continued attainment of the $PM_{2.5}$ NAAQS for a nonattainment area for a period of at least ten years after U.S. EPA has formally redesignated the area to attainment. 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 "attainment year" emissions inventory of primary $PM_{2.5}$ and the precursors of secondary $PM_{2.5}$: oxides of nitrogen (NO_x) and sulfur dioxide (SO_2);

- 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 attainment of the $PM_{2.5}$ 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 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.

This Maintenance Plan has been prepared in accordance with the requirements specified in U.S. EPA's guidance document and additional guidance received from U.S. EPA staff. The following sections of this document describe how U.S. EPA's requirements have been met.

3.0 $PM_{2.5}$ MONITORING

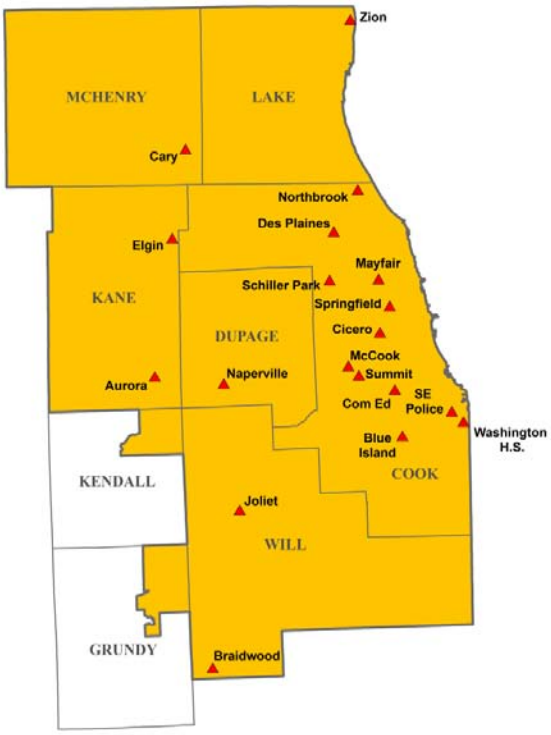
U.S. EPA's published guidance document, "Procedures for Processing Requests to Redesignate Areas to Attainment" (September 4, 1992), details specific requirements regarding the collection and use of ambient air monitoring data needed to support a redesignation request. Before the Chicago NAA can be redesignated, Illinois must demonstrate that the $PM_{2.5}$ NAAQS has been attained. $PM_{2.5}$ monitoring data must show that violations of the NAAQS are no longer occurring within the nonattainment area. This showing must rely on three complete, consecutive calendar years of quality assured data. Further, the air monitoring data must be quality assured in accordance with 40 CFR 58.10, recorded in U.S. EPA's AQS data base, and made available to the public. As previously mentioned, U.S.EPA has made a finding that the Chicago NAA has met these requirements and is attaining the 1997 $PM_{2.5}$ NAAQS. Finally, Illinois must commit to continue to operate an appropriate monitoring network to verify the maintenance of the attainment status, once the area has been redesignated.

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

3.1 Monitored Design Values

Currently there are 19 $PM_{2.5}$ monitors located in the nonattainment counties in the Illinois portion of the Chicago nonattainment area. Figure 3.1 shows the locations of these monitors.

Figure 3.1 - $PM_{2.5}$ Monitors in the Chicago Nonattainment Area



To determine whether the NAAQS has been met, the annual $PM_{2.5}$ design value has been calculated for the 3-year period, 2007-2009. The current U.S. EPA method for calculating the annual $PM_{2.5}$ design value is to average each monitor's annual average values over a 3-year period and compare the calculated design values to the 15.0 microgram per cubic meter level of the NAAQS. The calculated annual $PM_{2.5}$ design values for the monitors in the Chicago NAA for 2007-2009 are included as Appendix A of this report. Figure 3.2 compares the design values for 2000-2002, when the area was initially recommended for designation as a nonattainment area, and the 2007-2009 period for monitoring stations in the Chicago region. The comparison shows that $PM_{2.5}$ air quality has improved considerably since 2000-2002 throughout the Chicago NAA. The 2007-2009 data shows that the design values at all monitoring sites are less than the level of the annual $PM_{2.5}$ NAAQS, demonstrating that the area attains the annual $PM_{2.5}$ air quality standard.

3.2 Quality Assurance

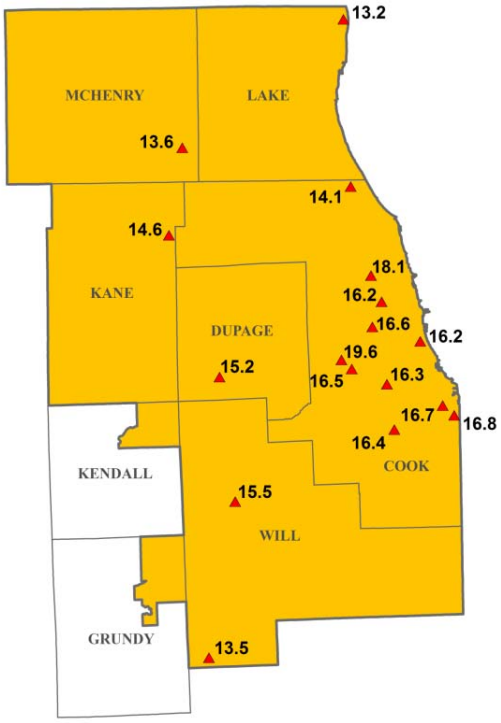
The Illinois EPA has quality assured all monitoring data shown in Appendix A for all sites located in Illinois in accordance with 40 CFR 58.10 and the Illinois EPA's Quality Assurance Plan, which describes Illinois EPA's standard operating procedures for operating the ambient monitoring network and validating the data. The Illinois EPA has recorded the monitoring data in the U.S. EPA's AQS database, which is available to the public.

3.3 Continued Monitoring

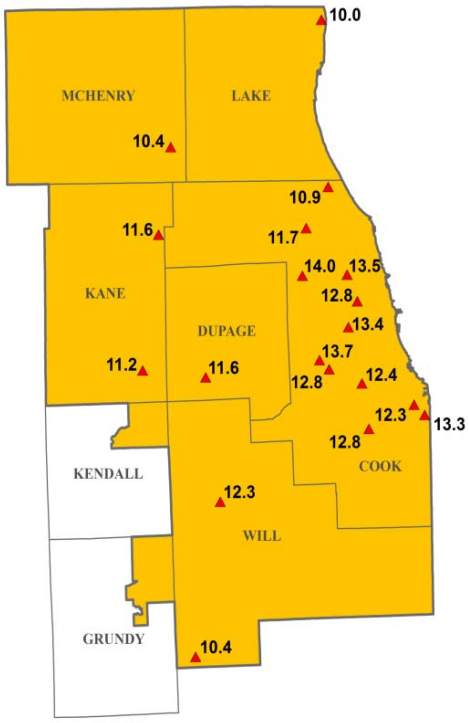
Illinois commits to continue monitoring $PM_{2.5}$ levels according to a U.S. EPA approved monitoring plan, as required to ensure maintenance of the $PM_{2.5}$ NAAQS. Should changes in the location of a $PM_{2.5}$ monitor become necessary, the Illinois EPA will work with U.S. EPA to ensure the adequacy of the monitoring network. The Illinois EPA will continue to quality assure the monitoring data to meet the requirements of 40 CFR 58. The Illinois EPA will continue to enter all data into AQS on a timely basis in accordance with federal guidelines.

Figure 3.2 - $PM_{2.5}$ Design Values for the Chicago Nonattainment Area Between 2000-2002 and 2007-2009

2000-2002 Design Values



2007-2009 Design Values



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 emissions reductions. As described previously in Section 3.0, a three-year monitoring period is used to evaluate whether actual air quality attainment has been achieved. In this Section, the "attainment year" refers to the mid-point year (2008) of the three-year period (2007-2009) used to demonstrate attainment. As required by U.S.EPA redesignation guidance, this request also includes 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 $PM_{2.5}$ NAAQS, and a commitment to provide future updates of the inventory to enable tracking of emissions levels during the 10-year maintenance period.

4.1 Attainment Year Inventory

The Illinois EPA has prepared a comprehensive emissions inventory for the Chicago $PM_{2.5}$ nonattainment area, including point, area, and on-road and off-road mobile sources for primary $PM_{2.5}$ as well as precursors of $PM_{2.5}$ (NOx and SO_2) for the year 2008. The Illinois EPA selected 2008 emissions data to represent the "attainment year" since it is the middle year of the 3-year period (2007-2009) which demonstrates monitored attainment. This inventory is based on actual activity levels. Point source information was compiled from 2008 Annual Emissions Reports (AERs) submitted to the Illinois EPA by emissions sources. Area source emissions were calculated using the most recently available methodologies and emissions factors from U.S. EPA along with activity data (typically population, employment, fuel use, etc.) specific to 2008. On-road mobile source emissions were calculated using U.S. EPA's MOVES emissions model with 2008 vehicle miles traveled (VMT) data provided by the Illinois Department of Transportation (IDOT). Off-road mobile source exhaust emissions, such as those from lawn and garden equipment, agricultural equipment, and construction equipment were calculated for summer 2008 using U.S. EPA's NONROAD emissions model. Emissions sources such as commercial marine vessels, locomotives and aircraft were not included in the NONROAD model and were calculated separately. Biogenic emissions were not included in these summaries.

Table 4.1 summarizes the 2008 emissions estimates for the Chicago $PM_{2.5}$ nonattainment area.

Table 4.1
2008 $PM_{2.5}$, NOx, and SO_2 Emissions (tons per year)

Source Category	$PM_{2.5}$	NOx	SO_2
Point Sources	3,859	35,939	90,706
Area Sources*	9,189	32,318	4,109
On-Road Mobile Sources	5,100	127,951	537
Off-Road Mobile Sources	3,653	51,184	779
Total	21,800	247,391	96,130

*does not include fugitive dust emissions from construction (residential, road and other) and agricultural tilling

4.2 Air Quality Improvements and Emissions Controls

The Chicago area was designated as nonattainment of the 1997 $PM_{2.5}$ NAAQS in 2004. Since that time, permanent and enforceable reductions of primary $PM_{2.5}$ and secondary $PM_{2.5}$ precursor emissions have contributed to improvements in $PM_{2.5}$ air quality and to the attainment of the $PM_{2.5}$ NAAQS. Some of these emissions reductions were due to the application of tighter federal emissions standards on motor vehicles and fuels, and some due to the requirements of the federal NOx SIP Call. Section 5.0 of this report describes these reductions in more detail, along with an explanation of their regulatory status. In this subsection, the 2008 attainment year emissions levels are compared to the base year 2002 emissions levels.

The U.S. EPA's $PM_{2.5}$ Emissions Inventory Guidance requires that states with $PM_{2.5}$ nonattainment areas prepare and submit a 2002 base year inventory of anthropogenic sources of direct $PM_{2.5}$ and precursors of secondary $PM_{2.5}$ emissions, namely NO_x and SO_2. This base year inventory included emissions from point, area, on-road mobile and off-road mobile emissions. The Illinois EPA prepared and submitted this inventory in May 2006. Table 4.2 summarizes 2002 emissions by major source category and by pollutant for the Chicago NAA. This summary has been revised to incorporate emissions estimates for on-road mobile sources using U.S. EPA's MOVES model.

Table 4.2
2002 $PM_{2.5}$ NOx, and SO_2 Emissions (tons per year)

Source Category	$PM_{2.5}$	NOx	SO_2
Point Sources	2,757	54,050	121,598
Area Sources	22,356	32,325	3,290
On-Road Mobile Sources	6,573	187,632	4,472
Off-Road Mobile Sources	4,834	87,426	3,743
Total	36,520	361,433	133,103

Comparing the 2002 inventory to that for 2008 indicates that the total direct $PM_{2.5}$ emissions in the Chicago area were reduced by 14,720 tons per year. NOx emissions in the Chicago area decreased significantly, by 114,042 tons per year, during the same time period. These reductions were primarily from on-road and off-road mobile sources. SO_2 emissions in the Chicago area decreased by 36,973 tons per year, due largely to reductions from point sources. These sizeable emissions reductions in direct $PM_{2.5}$ emissions and secondary $PM_{2.5}$ precursor emissions, as well as corresponding reductions in upwind areas in Illinois and other nearby states resulted in a substantial improvement in $PM_{2.5}$ air quality in the Chicago area, ultimately resulting in attainment of the 1997 $PM_{2.5}$ NAAQS.

4.3 Emissions 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 NAAQS. Accordingly, Illinois EPA has projected $PM_{2.5}$, NOx, and SO_2 emissions for the Chicago NAA for 2025. Illinois EPA has also projected emissions to 2015 and 2020 to represent midpoint years during the maintenance period. Emissions for these projection years are compared to emissions levels in 2008 to determine if emissions are sufficient to maintain the NAAQS during this period.

Chicago area point and area source emissions for 2015, 2020, and 2025 were estimated using the 2008 base year inventory and growth factors appropriate for each source category. Off-road emissions projections were developed using the growth factors contained in U.S. EPA's NONROAD model. On-road motor vehicle emissions were estimated using U.S. EPA's MOVES motor vehicle emissions model. The figures assume the continued use of reformulated gasoline, the continued phase-in of the Tier 2 motor vehicle emissions standards, and operation of an enhanced vehicle inspection and maintenance program. Total vehicle miles of travel (VMT) for 2015, 2020 and 2025 were assumed to increase at a rate of 1.5 percent per year from 2008.

Tables 4.3, 4.4 and 4.5 include the direct NOx, $PM_{2.5}$ and SO_2 emissions estimates for the years 2015, 2020 and 2025 respectively, for the Chicago nonattainment area.

Table 4.3
2015 $PM_{2.5}$, NOx, and SO_2 Emissions (tons per year)

Source Category	$PM_{2.5}$	NOx	SO_2
Point Sources	4,169	27,082	58,092
Area Sources	9,676	32,997	4,266
On-Road Mobile Sources	3,071	68,491	504
Off-Road Mobile Sources	2,995	35,927	866
Total	19,911	164,497	63,727

4.4 Demonstration of Maintenance

Table 4.6 provides a comparison of emissions for the years 2008, 2015, 2020, and 2025. The table demonstrates that the level of emissions projected through the maintenance period are less than emissions estimated for the attainment year and are, therefore, sufficient to maintain the $PM_{2.5}$ NAAQS. As shown in the table, both SO_2 and NOx emissions within the nonattainment area are expected to decrease significantly between 2008 and 2025 with $PM_{2.5}$ decreasing slightly. Projected emissions of those pollutants for the mid-point years of 2015 and 2020, are also less than their respective emissions levels in 2008. Based on these emissions trends it is expected that air quality will continue to meet the $PM_{2.5}$ NAAQS throughout the maintenance period.

Table 4.4
2020 $PM_{2.5}$, NOx, and SO_2 Emissions (tons per year)

Source Category	$PM_{2.5}$	NOx	SO_2
Point Sources	4,391	28,500	53,452
Area Sources	10,009	33,277	4,332
On-Road Mobile Sources	2,119	40,599	477
Off-Road Mobile Sources	2,398	28,271	919
Total	18,918	130,648	59,180

Table 4.5
2025 $PM_{2.5}$, NOx, and SO_2 Emissions (tons per year)

Source Category	$PM_{2.5}$	NOx	SO_2
Point Sources	4,604	29,638	56,310
Area Sources	10,377	33,687	4,407
On-Road Mobile Sources	2,067	38,456	488
Off-Road Mobile Sources	2,267	27,173	1,215
Total	19,316	128,954	62,420

Table 4.6
Comparison of 2008, 2015, 2020 and 2025 Emissions
(Emissions stated in tons per year)

	2008	2015	2020	2025	Decrease (2008-2015)	Decrease (2008-2020)	Decrease (2008-2025)
$PM_{2.5}$	21,800	19,911	18,918	19,316	1,889	2,882	2,484
NOx	247,391	164,497	130,648	128,954	82,894	116,743	118,437
SO_2	96,130	63,727	59,180	62,420	32,403	36,950	33,710

In addition to the overall emissions reductions projected to occur within the nonattainment area, significant reductions of statewide NOx and SO_2 emissions resulting from implementation of Illinois' multi-pollutant standards affecting electric utilities during the maintenance period, will also help to ensure continued attainment of the $PM_{2.5}$ NAAQS.

It should also be noted that the emissions projections included here do not reflect the reductions expected from a range of measures being implemented to reduce diesel emissions in the Chicago NAA. These measures have been funded through sources such as the:

- U.S. EPA's Midwest Clean Diesel Initiative
- Congestion Mitigation and Air Quality Improvement (CMAQ) Program
- Diesel Emissions Reduction Act (DERA)

- American Recovery and Reinvestment Act of 2009
- Various Supplemental Environmental Projects

These projects include the installation of particulate filters, diesel oxidation catalysts, closed-crankcase ventilation systems, and direct-fired heaters on school and transit buses, and municipally-owned utility vehicles, repowering diesel locomotive engines with generator sets, upgrading diesel construction engines with engines meeting more stringent emissions standards, and installing auxiliary power units on over-the-road trucks to reduce idling. We anticipate DERA and CMAQ funding to continue to support additional diesel emissions reduction projects in the near future.

4.5 Provisions for Future Updates

As required by Section 175A(b) of the CAA, Illinois commits to submit to U.S. EPA, eight years after redesignation, a revised version of this Maintenance Plan. The revision will contain Illinois' plan for maintaining the $PM_{2.5}$ NAAQS for ten years beyond the initial maintenance period.

5.0 CONTROL MEASURES AND REGULATIONS

This section provides specific information on the control measures implemented in the Chicago NAA. These include CAA requirements, and other state and federal measures. These control measures have been fully promulgated, and will provide emissions reductions in future years. Illinois EPA commits to keep these measures in effect after redesignation, or to maintain equivalent emissions levels using alternate measures. Illinois' SIP contains acceptable provisions to provide for preconstruction review of new emissions 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 U.S. EPA of this program. Illinois further commits to continue to require that all future regional transportation plans for the Chicago area conform to the SIP.

5.1 Control Measures

A variety of control measures are in place that reduce emissions of direct $PM_{2.5}$, NO_x and SO_2, and have contributed to the attainment of the annual fine particle standard. The emissions reduction measures for demonstrating attainment of the $PM_{2.5}$ standard are as follows:

- NOx SIP Call
- New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAPS)/Maximum Achievable Control Technology (MACT) Standards
- VOM Solvent Categories: Aerosol Coatings, Architectural and Industrial Maintenance (AIM) Coatings, Consumer Solvents
- Vehicle Inspection & Maintenance Program
- Reformulated Gasoline
- Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements
- On-Highway Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements
- Federal Emissions Standards for Off-Road Equipment (e.g., Nonroad Diesel Engine Rule, Evaporative Large Spark Ignition and Recreational Vehicle Standards) incorporated into NONROAD Model
- Tier 4 Nonroad Diesel Engine Standards and Diesel Fuel Sulfur Content Restrictions
- Marine Compression-Ignition Engine Standards and Locomotive Engine Standards
- Consent Decrees (CITGO and ExxonMobil)

5.2 Reasonable Further Progress (RFP) and Reasonably Available Control Technology (RACT)

Since U.S. EPA has published an attainment finding for the Chicago area for the 1997 $PM_{2.5}$ standard, the requirements for Illinois to submit an attainment demonstration, RACM, RFP, contingency measures, and any other planning SIP's related to attainment are suspended as long as the area continues to attain the 1997 $PM_{2.5}$ NAAQS.

5.3 Controls to Remain in Effect

Illinois will maintain all of the control measures listed in this Section to ensure maintenance of the annual $PM_{2.5}$ NAAQS. Any revisions to the control measures included as part of the Maintenance Plan will be submitted as a SIP revision to U.S. EPA for approval, and will be accompanied by a showing that such changes will not interfere with maintenance of the NAAQS.

In addition to the control measures identified in subsection 5.1, additional control measures that will remain in effect are:

- NO_x RACT, as a requirement for the 1997 ozone NAAQS attainment demonstration.
- Multi-Pollutant Standard/Combined Pollutant Standards---Ameren, Midwest Generation, and Dynegy (35 Ill. Adm. Code Part 225)
- VOC RACT

Though Illinois believes that control of organic compounds may help improve PM air quality, we have not relied on the control of organics, consistent with the $PM_{2.5}$ Implementation Rule.

In addition, clean construction standards are in place as part of Cook County Ordinance No. 09-O-36, 5-19-2009 (Article IX, Section 30-952) that mandates that contractors must use Ultra Low Sulfur Diesel fuel in diesel vehicles, nonroad vehicles, and stationary generators for Cook County government projects exceeding $2 million. Furthermore, by the start of 2014, any primary contractor working on a construction project in Cook County shall be required to meet a PM emission reduction of at least 85% from uncontrolled for any heavy duty diesel vehicle or diesel nonroad vehicle. This level of control of diesel vehicles must be met by subcontractors by the start of 2016. This is not included as a contingency measure, but is further evidence of current and future PM emissions reductions in the heart of the urban area.

The O'Hare Airport Modernization Program already has in place an Ultra Low Sulfur Diesel fuel requirement for all off-road diesel powered vehicles and equipment (both mobile and stationary) that are utilized on-site. (O'Hare Modernization Project Site

Preparation, Project No. OH6126.200.50.023, specification no. 35491) This requirement is in place for the remainder of the project.

The 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 emissions of primary $PM_{2.5}$ and precursors to secondary $PM_{2.5}$ in the Chicago nonattainment area.

5.4 Provisions for Permitting New or Modified Emissions 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 (BACT) 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 U.S. EPA.

5.5 Transportation Conformity

The purpose of this section is to describe and establish the Chicago nonattainment area motor vehicle emissions budgets associated with the $PM_{2.5}$ Maintenance Plan SIP. Annual motor vehicle emissions budgets are being proposed for the attainment year, 2008, and for the final year of the Maintenance Plan, 2025, for primary $PM_{2.5}$ and the precursor pollutant NOx. The Maintenance Plan also includes motor vehicle emissions estimates for the interim years 2015 and 2020 in order to demonstrate that total emissions from all sectors remain below the 2008 attainment year total; however, these interim year motor vehicle emissions estimates are not being proposed as formal motor vehicle emissions budgets. The Maintenance Plan also includes estimates of emissions of SO_2, however, as motor vehicles have not been identified as a significant source of SO_2, motor vehicle emissions budgets are not being proposed for this pollutant. The proposed 2008 and 2025 annual NOx and direct PM2.5 motor vehicle emissions budgets were developed consistent with the motor vehicle activity assumptions and emissions control strategies incorporated into the 8-hour ozone Attainment Demonstration and Maintenance Plan SIPs. The budgets reflect an emissions level determined using actual motor vehicle VMT for 2008 and VMT growth at an annual rate of 1.5% from year 2008 levels to 2025.

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 motor vehicle emissions budgets established and described herein were developed consistent with the methodology and control strategy assumptions in place in the region. The effects of motor vehicle control measures are incorporated into the emissions produced by the U.S. EPA's MOVES model. These control measures include the implementation of national 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 U.S. EPA'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." According to table 4.6, $PM_{2.5}$ and NOx emissions for the end of the maintenance plan year 2025 are 2,484 and 118,437 tons per year, respectively, less than the year 2008 attainment year levels. As year 2025 emissions levels are projected to be substantially less than the attainment year 2008 emissions, a 15% safety margin is being proposed to be added to the 2025 estimated motor vehicle emissions to make up the motor vehicle emissions budget. The 15% increase would equate to an increase of 310 tpy of $PM_{2.5}$ and 5,768 tpd of NOx.

The motor vehicle emissions budgets, which reflect the VMT and control program assumptions and methodology described here, are listed in Table 5.1.

Table 5.1
Proposed Chicago $PM_{2.5}$ Maintenance Plan
2008 and 2025
Motor Vehicle Emissions Budgets
(tons per year)

	Estimated Emissions		**Safety Margin**		**Motor Vehicle Emissions Budgets**	
Year	**$PM_{2.5}$**	**NOx**	**$PM_{2.5}$**	**NOx**	**$PM_{2.5}$**	**NOx**
2008	5,100	127,951	- -	- -	5,100	127,951
2025	2,067	38,456	310	5,768	2,377	44,224

Complete details on the derivation of the motor vehicle emissions budgets, including discussion of the MOVES model inputs and assumptions are included in Appendix B 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 will be implemented if violations of the annual $PM_{2.5}$ 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. Finally, the plan should provide a commitment to submit a revised Maintenance Plan eight years after redesignation to ensure continued maintenance for the next ten-year maintenance period.

Contingency measures are intended to provide further emissions reductions in the event that violations of the annual $PM_{2.5}$ NAAQS occur after redesignation to attainment. While these measures do not need to be fully adopted by the Illinois Pollution Control Board (IPCB) prior to the occurrence of NAAQS violations, the contingency plan should ensure that the contingency measures are adopted expeditiously once they are triggered. The Maintenance Plan must identify the triggers that determine when contingency measures will be adopted, and the measures that the state will consider.

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 practicable, the necessary corrective actions in the event that violations of the annual $PM_{2.5}$ 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. Illinois commits to continue to implement the identified control measures, although the Illinois EPA anticipates that these emissions 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 annual $PM_{2.5}$ 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 average of the annual $PM_{2.5}$ concentration for the three most recent years at any monitoring site in the Illinois portion of the Chicago NAA exceeds 15 micrograms per cubic meter, or 2) if total $PM_{2.5}$, SO_2 or NOx emissions increase more than 5% above the levels contained in the attainment year (2008) emissions inventory. If exceedances of the annual $PM_{2.5}$ NAAQS are observed in Lake and Porter counties in Indiana, Illinois commits to work with the Indiana Department of Environmental Management (IDEM) to develop appropriate corrective measures. It should be noted that U.S. EPA does not require a state to implement contingency measures when occasional exceedances are recorded. The Illinois EPA's voluntary commitment to initiate a Level I response is intended to prevent future violations of the NAAQS from ever occurring.

Table 6.1
Contingency Plan for the Chicago $PM_{2.5}$ Nonattainment Area

Contingency Measure Trigger	Action to be Taken	List of Potential Contingency Measures
Level I Trigger • Highest monitored $PM_{2.5}$ concentration exceeding 15.0 ug/m**3 in any year at any monitoring station in the Chicago maintenance area. • The Chicago maintenance area's total $PM_{2.5}$, NOx or SO_2 emissions increase more than 5% above the levels included in the 2008 emissions inventories.	IL will evaluate air quality, or determine if adverse emissions trends are likely to continue. If so, IL 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 9 months. 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** • IL Multi-Pollutant Program for electric generating units • NOx RACT • Clean Air Transport Rule, after promulgation by U.S.EPA • Best Available Retrofit Technology (BART) • Broader geographic applicability of existing measures **Mobile Source Measures** • Tier 2 Vehicle Standards and Low Sulfur Fuel • Heavy Duty Diesel Standards and Low Sulfur Diesel Fuel • High-enhanced I/M (OBDII) • Federal railroad/locomotive standards • Federal commercial marine vessel engine standards **Area Source Measures** • Architectural/Industrial Maintenance (AIM) Coatings • Commercial and Consumer Products • Aerosol coatings • Portable fuel containers
Level II Trigger • A violation of the NAAQS at any monitoring station in the Chicago maintenance area.	IL will conduct a thorough analysis to determine appropriate measures to address the cause of the violation. Analysis shall be completed within 6 months. Selected measures shall be implemented within 18 months of a violation.	

Illinois commits to compiling $PM_{2.5}$, SO_2, and NOx emissions inventories for the Chicago area every three years for the duration of the Maintenance Plan to facilitate the emissions trends analysis included in the contingency plan under Level I. The Illinois EPA will evaluate the causes of high $PM_{2.5}$ levels or the emissions trends and to determine appropriate control measures needed to assure continued attainment of the annual $PM_{2.5}$ NAAQS. Under Level I, measures that could be implemented in a short time would be selected so as to be in place quickly after the Illinois EPA is 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 by the IPCB.

A Level II response would be implemented in the event that a violation of the annual $PM_{2.5}$ NAAQS were to be measured at a monitoring site within the Chicago maintenance

area (including sites in Indiana and Illinois). In order to select appropriate corrective measures, the Illinois EPA will work with IDEM 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 location and severity of the ambient $PM_{2.5}$ exceedances;
- the weather patterns contributing to the elevated $PM_{2.5}$ 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 from any other measure deemed appropriate and effective at the time the selection is made. It is expected that implementation of only a few of these measures would be necessary. The selection between measures will be based upon cost-effectiveness, emissions reduction potential, 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 in no event later than 18 months after the Illinois EPA 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. The Illinois EPA will solicit input from all interested and affected persons in the area prior to selecting appropriate control measures. 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.

6.2 Commitment to Revise Plan

As noted in Section 4.5 above, the Illinois EPA 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 annual $PM_{2.5}$ 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 Chicago $PM_{2.5}$ Maintenance Plan document and the time and date of the public hearing was published in the Chicago Sun-Times on July 8, 2011.

- If requested, the public hearing to receive comments on the Chicago Maintenance Plan was scheduled for August 18, 2011, at 1:00 p.m. 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 open after the public hearing 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 U.S. EPA.

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 nonattainment area has attained the 1997 annual $PM_{2.5}$ NAAQS and has complied with the applicable provisions of the CAA required of $PM_{2.5}$ NAAs. Illinois has performed an analysis that demonstrates that the Chicago NAA has attained the 1997 annual $PM_{2.5}$ NAAQS and believes the air quality improvements are due to permanent and enforceable control measures. Supporting documentation is contained herein.

The Illinois EPA has prepared a Maintenance Plan that meets the requirement of the Clean Air Act. This Maintenance Plan provides for the continued attainment of the 1997 annual $PM_{2.5}$ NAAQS for a period of at least ten years after U.S. EPA has formally redesignated the area to attainment. This Maintenance Plan provides adequate contingency measures for potential, additional emissions reductions in the event that future violations of the 1997 annual $PM_{2.5}$ NAAQS are observed in the area.

The Illinois EPA has prepared a comprehensive emissions inventory of $PM_{2.5}$ and its precursors for the "attainment" year, 2008, and has prepared projections of the emissions inventory to 2015, 2020 and 2025. These emissions projections indicate that emissions levels in the Chicago nonattainment area will continue to remain much lower than emissions from the attainment year 2008 levels, thereby maintaining the $PM_{2.5}$ NAAQS in future years. The Illinois EPA commits to continue to operate an appropriate air quality monitoring network to verify the maintenance of the attainment status once the area has been redesignated. The Illinois EPA has the legal authority to implement and enforce all control measures.

Finally, the Chicago $PM_{2.5}$ Maintenance Plan includes year 2008 and 2025 on-road motor vehicle emissions budgets for $PM_{2.5}$ and NOx for use in transportation conformity determinations to assure that any increases in emissions from this sector do not jeopardize continued attainment of the annual $PM_{2.5}$ standard during the ten-year maintenance period. The Chicago Maintenance Plan has been prepared in accordance with the requirements specified in U.S. EPA's guidance document, and additional guidance received from U.S. EPA staff.

APPENDIX A

Summary of Ambient Air Monitoring Data (2007-2009)

Table A.1
2007-2009 Annual $PM_{2.5}$ Design Values for Monitors in the Chicago Nonattainment Area

County	Monitoring Site	2007	2008	2009	Design Value
Cook	Blue Island	14.3	12.5	11.7	**12.8**
Cook	Chicago-Com Ed	14.3	11.9	11.1	**12.4**
Cook	Chicago-Springfield	15.2	12.0	11.3	**12.8**
Cook	Chicago-Mayfair	15.5	12.2	12.7	**13.5**
Cook	Chicago-SE Police	14.1	11.8	11.0	**12.3**
Cook	Chicago-Washington	15.7	12.5	11.6	**13.3**
Cook	Cicero	14.8	*13.3*	*12.0*	**13.4**
Cook	Des Plaines	12.7	11.4	11.0	**11.7**
Cook	McCook*	15.6	12.9	12.6	**13.7**
Cook	Northbrook	13.2	10.1	9.3	**10.9**
Cook	Schiller Park*	15.4	*13.6*	12.9	**14.0**
Cook	Summit	14.8	12.0	11.6	**12.8**
Du Page	Naperville	13.8	11.3	9.8	**11.6**
Kane	Aurora	14.5	10.3	10.0	**11.6**
Kane	Elgin	13.2	10.8	9.6	**11.2**
Lake	Zion	11.9	9.3	8.8	**10.0**
McHenry	Cary	11.6	10.1	9.6	**10.4**
Will	Braidwood	*12.1*	10.3	8.7	**10.4**
Will	Joliet	14.6	11.7	10.5	**12.3**
Lake IN	Franklin School	14.4	12.0	11.3	**12.6**
Lake IN	Griffith	13.2	11.7	11.0	**12.0**
Lake IN	Madison St.	14.6	12.3	12.1	**13.0**
Lake IN	Hammond-Purdue	13.8	11.7	15.9	**13.8**
Lake IN	Clark HS	13.7	12.4	10.8	**12.3**
Porter IN	Ogden Dunes	13.8	10.9	11.3	**12.0**

*- Annual Standard does not apply at these monitoring sites
Annual averages listed in *underlined italics* based on incomplete data.

APPENDIX B

Transportation Conformity

TRANSPORTATION CONFORMITY

This section describes the development of the Chicago NAA motor vehicle emissions budgets associated with the $PM_{2.5}$ Maintenance Plan SIP. Annual motor vehicle emissions budgets are being proposed for the attainment year, 2008, and 2025, the final year of the initial maintenance period for direct motor vehicle $PM_{2.5}$ emissions and for the precursor pollutant NOx. These budgets were developed consistent with the motor vehicle activity assumptions and emissions control strategies incorporated into the $PM_{2.5}$ maintenance plan analysis.

Background

Section 176(c)(4) of the Clean Air Act (CAA) Amendments of 1990 requires that transportation plans, programs, and projects which are funded or approved under Title 23 USC 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 SIP 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 (TIP) must be less than or equal to the budget level (40 CFR § 93.118(a)).

Transportation conformity will be based on these submitted on road motor vehicle emissions budgets after the U.S. Environmental Protection Agency ("U.S.EPA") 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 EPA, consultation among federal, State, and local agencies occurred: full implementation plan documentation was provided to [US]EPA; and [US]EPA'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 emission 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 emission factors or estimates of vehicle miles traveled).

The $PM_{2.5}$ attainment demonstration SIP and the associated motor vehicle emissions budgets have been developed by the Illinois Environmental Protection Agency (Illinois EPA), the designated air quality agency for the State of Illinois. The required public hearing to accept public comment on the proposed motor vehicle emissions inventory was held at 1:00 PM, on July 14, 2010 in Room 9-040 of the James R. Thompson Center in downtown Chicago. Notification of this hearing was printed in the Chicago Sun Times on June 11, 2010. Comments on the proposed attainment demonstration and motor vehicle emissions budgets were accepted for 30 days after the public hearing. A "Responsiveness Summary" which addresses the comments received was included in the final submission.

Regarding this revision to the Chicago $PM_{2.5}$Maintenance Plan, notice of a comment 30-day comment period will be posted on the Illinois EPA's website and printed in the State newspaper, the XXXXX XXXXXXX on July XX, 2011. A public hearing to discuss the revised Maintenance Plan and associated motor vehicle emissions budgets will be held on August 18, 2011, if it is requested. If the public hearing is held, comments will be accepted for an additional 30 days. All comments and responses will be included in a Responsiveness Summary which will be submitted to the U.S. EPA with the Final Maintenance Plan document.

In compliance with adequacy criterion #2, an interagency consultation meeting was held with members of the Chicago Metropolitan Agency for Planning (CMAP) Tier 2 Consultation Team on June 25, 2010 in Chicago. At this meeting, the Illinois EPA representative discussed the requirements for the maintenance plan as they relate to transportation conformity and explained the derivation of the proposed motor vehicle emissions budgets. A follow-up meeting of the Tier 2 Conformity Consultation Team to discuss the revised MOVES-based motor vehicle emissions budgets was held at the CMAP offices on June 28, 2011.

Compliance with the remaining adequacy criteria is contained within the narrative of the attainment demonstration document and this transportation conformity section.

The motor vehicle emissions budgets proposed and described herein were developed

consistent with the methodology and control strategy assumptions used in the development of the emissions estimates contained in the Chicago $PM_{2.5}$ Maintenance Plan. The effects of these controls are incorporated into the emissions inventory estimates generated by the U.S.EPA's MOVES2010 (MOVES) model. Following is a discussion of the inputs and assumptions used in the development of the motor vehicle emissions budgets.

Vehicle Miles Travelled: The attainment year 2008 motor vehicle emissions estimates contained Chicago $PM_{2.5}$ Maintenance Plan incorporate county-and township-level 2008 annual vehicle miles traveled (VMT) levels from the Illinois Department of Transportation (IDOT). The 2008 annual VMT total for the 6-county-3-township Chicago NAA was approximately 58.8 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 2008 VMT level yields future year annual VMT projections of 65.2 billion for 2015, 70.3 billion for 2020, and 75.7 billion for 2025.

Meteorological Data: U.S. EPA guidance for the use of the MOVES model requires the use of representative local temperature and absolute humidity data. Average 2008 maximum and minimum monthly temperatures for the region were obtained from the National Weather Service local climatological data (LCD) for O'Hare International Airport. Absolute humidities corresponding to the average temperatures were calculated from LCD information as well. These 2008 temperatures and absolute humidity values, shown below, were used in the year 2025 emissions modeling.

2008 Minimum and Maximum Temperatures for Chicago, from O'Hare NWS Data												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Min, (^{o}F)	15	16	27	39	45	61	64	64	57	47	32	14
Max, (^{o}F)	32	30	43	60	66	81	84	82	75	62	46	32

2008 Absolute Humidity Corresponding to the Temperatures Above												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
AH, grains/lb	17	14	21	34	41	73	83	74	71	39	25	15

Motor Vehicle Emissions Controls: Beyond the U.S. EPA'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 2008, and are projected to still be required in 2025 are a vehicle inspection and maintenance (I/M) program and the required use of reformulated gasoline (RFG).

Inspection and Maintenance (I/M): The Illinois I/M program in effect since 2007 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 biennial exhaust idle and gas cap testing on MY96+ heavy duty gasoline vehicles including gasoline-powered buses, registered in the I/M testable area. Motorcycles and

diesel vehicles are not subject to I/M. The program includes a 4-year grace period for new vehicles. This post-2007 I/M program was established when the Illinois legislature amended the Illinois Vehicle Inspection law in 2005 to (a) end dynamometer testing of vehicles, (b) require an OBD-based program beginning in February 2007, and (c) remove the requirement for testing compliant pre-MY96 vehicles.

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 8-hour ozone NAA is 91.5%.

Fuels: The use of federal RFG has been required in the Chicago NAA since 1995. The 8-hour ozone Attainment Demonstration and original Maintenance Plan assumed the use of northern grade RFG in 2008 and beyond. RFG was and is assumed to contain 10% 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. There are no Illinois diesel sulfur requirements, 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 fuels' 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 2008 information data was developed by Illinois EPA's Division of Mobile Source Programs from vehicle age data for 2008 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 uses temporal fractions derived from data collected from continuous count stations and presented by IDOT. 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 speed distributions derived from the CMAP transportation demand model.

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; therefore the MOVES default values were 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 Distribution for Rural Interstates in a county is the county's Rural Interstate VMT divided by the county's total all-road-type VMT. Similar calculations can be made for MOVES road types and vehicle types.

Safety Margin: The U.S. EPA'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." According to table 4.6, $PM_{2.5}$ and NOx emissions for the end of the maintenance plan year 2025 are 2,484 and 118,437 tons per year, respectively, less than the year 2008 attainment year levels. As year 2025 emissions levels are projected to be substantially less than the attainment year 2008 emissions, a 15% safety margin is being proposed to be added to the 2025 estimated motor vehicle emissions to make up the motor vehicle emissions budget. The 15% increase would equate to an increase of 310

tpy of $PM_{2.5}$ and 5,768 tpd of NOx.

The motor vehicle emissions budgets, which reflect the VMT, motor vehicle fleet characteristics, emissions and control program assumptions, and safety margin described herein, are identified below.

Proposed Chicago $PM_{2.5}$ Maintenance Plan
2008 and 2025
Motor Vehicle Emissions Budgets
(tons per year)

	Estimated Emissions		**Safety Margin**		**Motor Vehicle Emissions Budgets**	
Year	**$PM_{2.5}$**	**NOx**	**$PM_{2.5}$**	**NOx**	**$PM_{2.5}$**	**NOx**
2008	5,100	127,951	- -	- -	5,100	127,951
2025	2,067	38,456	310	5,768	2,377	44,224