DRAFT

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

AQPSTR 10-05

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EXECUTIVE SUMMARY

This document describes Illinois' Draft 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. Illinois intends to submit a final version of the Maintenance Plan to the U.S. Environmental Protection Agency (U.S. EPA) after consideration of public comments. The Indiana Department of Environmental Management (IDEM), has prepared a similar plan for the Indiana portion of the Chicago nonattainment area.

$PM_{2.5}$ 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 of the $PM_{2.5}$ standard in 2004. These air quality improvements are due to permanent and enforceable emissions control measures. The entire Chicago nonattainment area 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 nonattainment area 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 with 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.

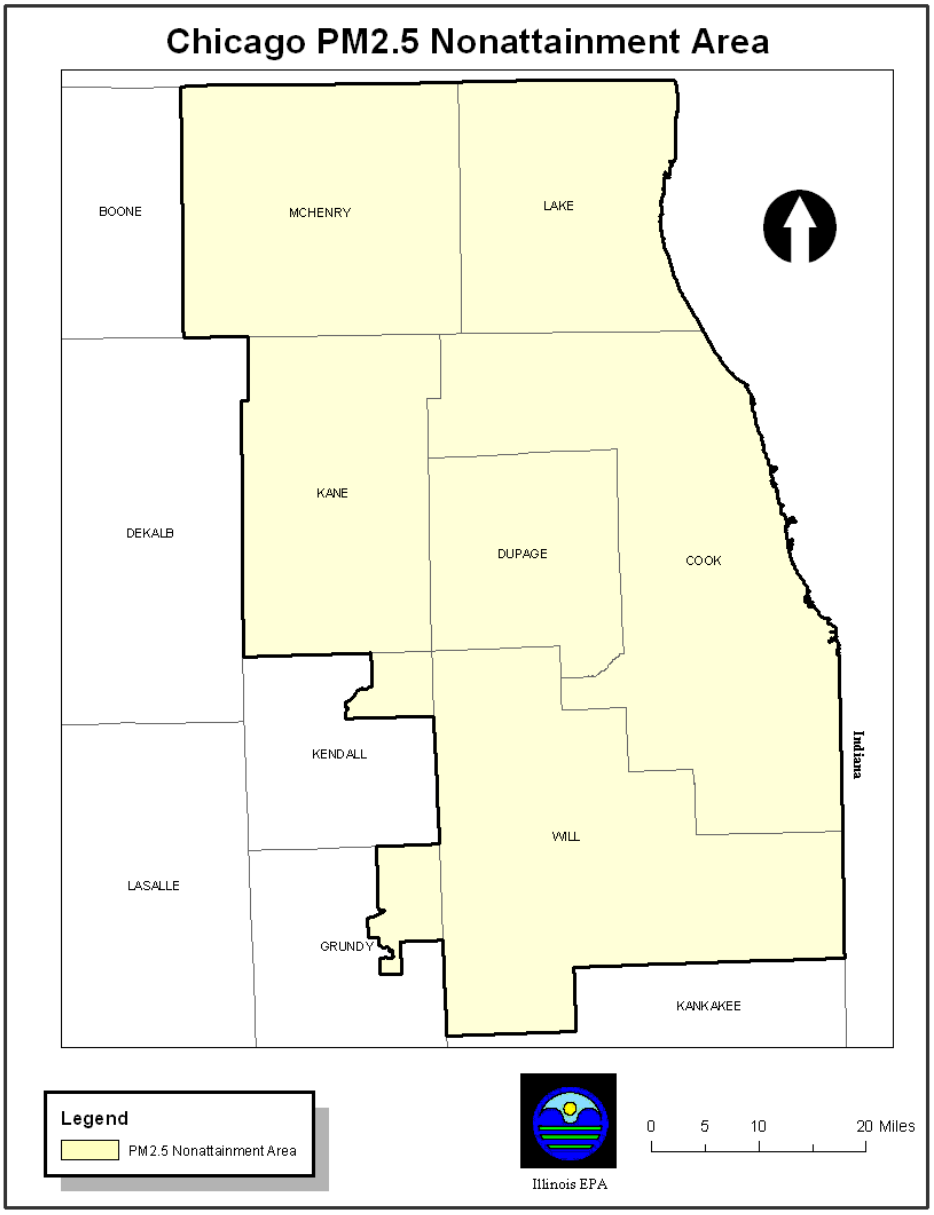
This document addresses the Maintenance Plan requirements established by the CAA and U.S. EPA, and includes additional information to support continued compliance with the $PM_{2.5}$ NAAQS.

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 current Chicago NAA.

Figure 1.1- Chicago PM2.5 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, these areas were 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. Both State and Federal emissions control measures have reduced primary and secondary $PM_{2.5}$ emissions both locally and regionally and have allowed 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 followed 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 nonattainment areas 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 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 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.

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

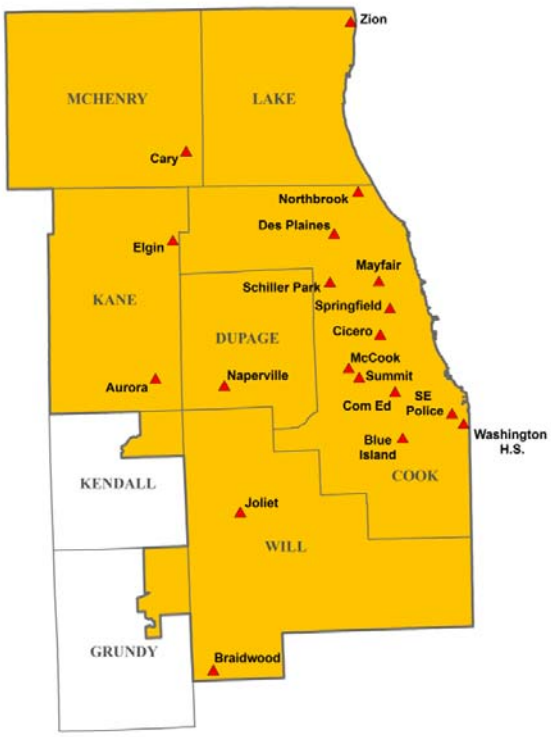
U.S. EPA's published guidance document, "Procedures for Processing Requests to Redesignate Areas to Attainment" (September 4, 1992), details specific requirements regarding the collection and use of ambient air monitoring data needed to support a redesignation request. Before the Chicago NAA can be redesignated, 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 the appropriate 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 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, so the area now attains the annual $PM_{2.5}$ air quality standard.

3.2 Quality Assurance

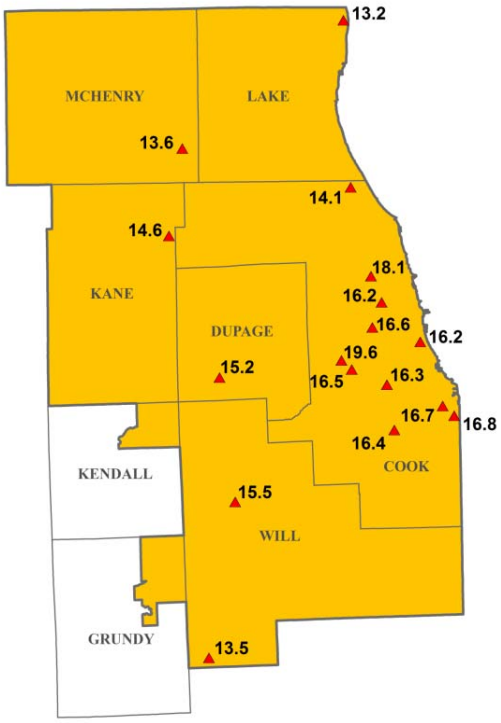
The Illinois EPA has quality assured all monitoring data shown in Appendix A for all sites located in Illinois in accordance with 40 CFR 58.10 and the Illinois EPA's Quality Assurance Plan, which describes Illinois EPA's standard operating procedures for operating the ambient monitoring network and validating 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

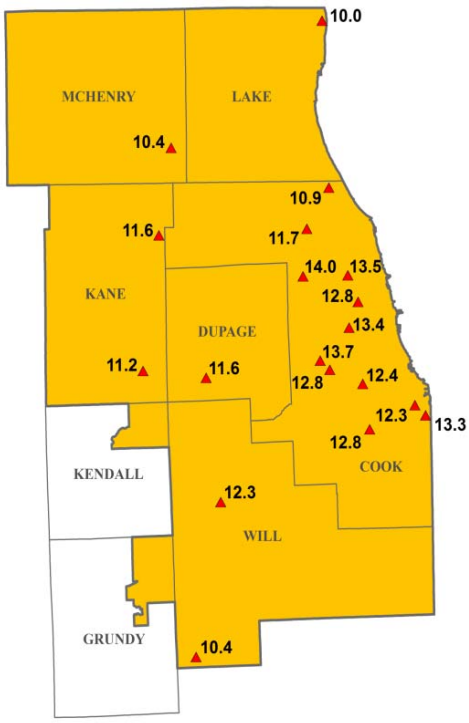
Illinois commits to continue monitoring $PM_{2.5}$ levels according to a U.S. EPA approved monitoring plan, as required to ensure maintenance of the $PM_{2.5}$ NAAQS. Should changes in the location of a $PM_{2.5}$ monitor become necessary, the Illinois EPA will work with U.S. EPA to ensure the adequacy 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 MOBILE6.2 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 are not included in the NONROAD model and are calculated separately. Biogenic emissions are 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	SO2
Point Sources	3,859	35,939	90,706
Area Sources*	9,189	32,318	4,109
On-Road Mobile Sources	1,816	99,627	575
Off-Road Mobile Sources	3,653	51,184	779
Total	18,517	219,068	96,169

*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.

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	8,441	32,325	3,290
On-Road Mobile Sources	3,071	167,620	3,850
Off-Road Mobile Sources	4,834	87,426	3,743
Total	19,103	341,421	132,481

An updated methodology was used to calculate residential wood combustion emissions in 2008. In order to be able to compare 2002 emissions to 2008 emissions, the original 2002 estimates were revised using the updated methodology.

Comparing the 2002 inventory to that for 2008 indicates that the total direct $PM_{2.5}$ emissions in the Chicago area were reduced by approximately 580 tons per year. NOx emissions in the Chicago area decreased significantly, about 122,300 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 about 36,300 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. The effect of Illinois' recently adopted NOx RACT requirement on NOx emissions in future years was estimated and applied, as appropriate, to the point source inventory. 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 MOBILE6.2 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 SO2 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	1,231	49,746	651
Off-Road Mobile Sources	2,995	35,927	866
Total	18,071	145,752	63,875

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	28,499	53,452
Area Sources	10,009	33,277	4,332
On-Road Mobile Sources	1,043	29,102	681
Off-Road Mobile Sources	2,398	28,271	919
Total	17,841	119,149	59,384

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	1,064	23,687	734
Off-Road Mobile Sources	2,267	27,173	1,215
Total	18,312	114,185	62,666

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)
$PM_{2.5}$	18,517	18,071	17,841	18,312	446	676	205
NOx	219,068	145,752	119,149	114,185	73,315	99,919	104,883
SO_2	96,169	63,875	59,384	62,666	32,294	36,785	33,503

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 nonattainment area. 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 provide 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 transportation plans in the Chicago area conform with 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 and Clean Air Interstate Rule (CAIR)
- 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 for so long as the areas continue 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 (incomplete)

VOC RACT is incomplete at this time, since three CTG's have been submitted to the Illinois Pollution Control Board, but have not been submitted to the U.S. EPA. 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 mandate any public works contractor must use Ultra Low Sulfur Diesel fuel in diesel vehicles, nonroad vehicles, and stationary generators used in the performance of contract duties. 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 reduction 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 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 proposed 2008 and 2025 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 used in the $PM_{2.5}$ attainment demonstration. The effects of motor vehicle control measures are incorporated into the emissions factors produced by the U.S. EPA's MOBILE6.2 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.
Since the Chicago $PM_{2.5}$ Maintenance Plan has been under development for several months, the MOBILE6.2 model is being used rather than the recently-released MOVES2010 model. The motor vehicle emissions budgets proposed herein will be updated using the MOVES2010 model within the allotted two-year grace period. Following is a discussion of the inputs and assumptions used in the development of the motor vehicle emissions budgets.

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

Year	$PM_{2.5}$	NOx
2008	1,816	99,627
2025	1,064	23,687

Complete details on the derivation of the motor vehicle emissions budgets, including discussion of the MOBILE6 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 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 $PM_{2.5}$, 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 • Phase II of the Clean Air Interstate Rule, after promulgation by U.S.EPA • Best Available Retrofit Technology (BART) **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 • Portable fuel containers **Area Source Measures** • Architectural/Industrial Maintenance (AIM) Coatings • Commercial and Consumer Products • Aerosol coatings • Broader geographic applicability of existing measures
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, the Illinois EPA is required to hold a public hearing prior to adoption of this Maintenance Plan and submittal to U.S. EPA. 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 will be published in the Chicago Sun-Times no later than June 14, 2010.

- The public hearing to receive comments on the Chicago Maintenance Plan will be held at 1:00 p.m. on July 14, 2010 at the James R. Thompson Center, 100 West Randolph Street, in Chicago.

- A 30-day public comment period will also be available after the public hearing to receive comments on the Maintenance Plan. A summary of the comments received and Illinois EPA's responses thereto will be 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 decrease from the levels occurring in the attainment year, 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 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	13.2	10.3	10.0	**11.2**
Kane	Elgin	14.5	10.8	9.6	**11.6**
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 nonattainment area (NAA) motor vehicle emissions budgets associated with the $PM_{2.5}$ Maintenance Plan State Implementation Plans (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 oxides of nitrogen (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. The budgets reflect an emissions level determined using motor vehicle VMT and fleet mix provided by the Chicago Metropolitan Agency for Planning (CMAP).

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 will be 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 will be printed in a local newspaper of broad circulation. Comments on the proposed attainment demonstration and motor vehicle emissions budgets will be accepted for 30 days after the public hearing. A "Responsiveness Summary" which addresses the written comments received will be prepared and included in the final submission.

In compliance with adequacy criterion #2, an interagency consultation meeting will be held with members of the CMAP Tier 2 Consultation Team prior to submittal of the plan. At this meeting, the Illinois EPA representative will discuss the requirements for the maintenance plan as they relate to transportation conformity and explain the derivation of the proposed motor vehicle emissions budgets. Compliance with the remaining adequacy criteria is contained within the narrative of the attainment demonstration document and this transportation conformity section.

The Chicago $PM_{2.5}$ Maintenance Plan Motor Vehicle Emissions Budgets

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 factors produced by the U.S.EPA's MOBILE6.2 model. Since the Chicago $PM_{2.5}$ Maintenance Plan has been under development for several months, the MOBILE6.2 model is being used rather than the recently-released MOVES2010 model. The motor vehicle emissions budgets proposed herein will be updated using the MOVES2010 model within the allotted two-year grace period. Following is a discussion of the inputs and assumptions used in the development of the motor vehicle emissions budgets.

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 million miles. For future year emission estimates, VMT was grown to the target year at a compound growth rate (CGR) of 1.5% per year. Applying this growth factor to the 2008 VMT level yields future year annual VMT projections of 65.2 million for 2015, 70.3 million for 2020, and 75.7 for 2025.

Following is a summary of the information and MOBILE6.2 model assumptions used included in the development of the draft motor vehicle emissions budgets.

Year: VMT estimates and motor vehicle emissions factors were developed representative of 2008, 2015, 2020, and 2025 for the modeled $PM_{2.5}$ attainment demonstration.

Annual Emissions as Sum of Monthly Emissions: The 2008 Chicago $PM_{2.5}$ Maintenance Plan emissions inventory is based on annual activity. Estimates of motor vehicle emissions were made for each month of the year, using average monthly information, and summed to get annual emissions. The primary parameters affected by the choice to calculate monthly emissions and sum then are the representative temperatures, fuel volatilities, and the estimation of VMT for the various months to account for month-to-month changes in travel.

Temperatures: U.S. EPA guidance for the use of the MOBILE6.2 model calls for the use of representative temperatures. For the Chicago area, the representative monthly summer temperatures are the National Weather Service's (NWS) monthly average minimum and maximum temperatures at Chicago's O'Hare Airport in 2008.

2008 Maximum and Minimum Temperatures for Chicago, from O'Hare NWS Data												
Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max, °F	32	30	43	60	66	81	84	82	75	62	46	32
Min, °F	15	16	27	39	45	61	64	64	57	44	32	14
2008 Absolute Humidity Corresponding to the Temperatures Above												
AH, grains/lb	17	14	21	34	41	73	83	74	71	39	25	15

For forecast emissions for later years than 2008, the appropriate temperatures inputs are the climatological averages. The climatological data are based on observed temperature and humidity observations in the period 1970-2000, as published by the NWS and are as follows:

Climatological Average Maximum and Minimum Temperatures for Chicago												
Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Max, °F	30	35	46	58	70	79	84	81	74	62	47	34
Min, °F	14	19	29	38	48	57	63	62	54	42	32	20
Climatological Absolute Humidities Corresponding to the Temperatures Above												
AH, grains/lb	21	22	25	45	48	92	98	101	75	43	28	21

Absolute Humidity: U.S. EPA guidance calls for the use of the lowest absolute humidity (AH) corresponding to the actual (or climatological) temperatures in the region as calculated from local actual (or climatological) humidity data published by the NWS. The AHs corresponding to the actual 2008 and climatological monthly temperatures are shown in the tables above. AHs are calculated from NWS temperature, humidity, and pressure data using a U.S.EPA-supplied utility. MOBILE6 requires that AH inputs be 20 or greater, so the AH inputs for the months of January, February, and December 2008 were set to 20 rather than the actual AHs of 17, 14, and 15.

Motor Vehicle Emission Controls: The primary motor vehicle emission control programs that were in place in the Chicago NAA in 2008 are (1) an OBD-II-based vehicle inspection and maintenance (I/M) program, and (2) the requirement that gasoline sold in the area be "reformulated gasoline", fuel that is specially formulated to reduce emissions.

Inspection and Maintenance (I/M): The I/M program in effect since February 2007 requires biennial On-Board Diagnostics (OBD) testing on all model year (MY) 1996 and newer (MY96+) light-duty gasoline vehicles, and biennial exhaust idle and gas cap testing on MY96+ heavy-duty gasoline vehicles including gasoline-powered buses, registered in the I/M testing area. The program includes a 4-year grace period for new vehicles such that a MY 2004 car would not be tested until 2008. The 2007 I/M program, established after the Illinois legislature amended the Illinois Vehicle Inspection law in 2005, also removed the requirement to conduct dynamometer testing (IM240 test) of vehicles and dropped the requirement for testing compliant pre-MY1996 vehicles. See Attachment A for additional information about the post-'07 I/M program and the inputs to the MOBILE6 model. (In 2008, but not in later years, there were still residual benefits from the pre-2007 I/M program; they were accounted for in the emission calculations. The pre-'07 program will be discussed in Attachment A.)

The Chicago vehicle testing domain is based upon urbanized areas and includes all of Cook, DuPage, and Lake Counties, and parts of Kane, McHenry, Will, and Kendall Counties. Some of the VMT in the Chicago area is generated by vehicles that come from outside the testable area and are therefore not required to undergo I/M testing; therefore VMT estimates used when calculating I/M emissions reduction benefits for a county or township are adjusted to reflect VMT from vehicles subject to I/M only. This is done using I/M coverage factors derived ultimately from transportation modeling outputs from CMAP. The coverage factors are 98% for Cook and DuPage Counties (that is, 98% of the gasoline-vehicle VMT in the county is from vehicles

subject to I/M) , 95% for Lake County, 81% for Kendall County's NAA township, 65% for Will County, 60% for Kane County, 50% for McHenry County, and 25% for Grundy County's NAA townships.

Fuels: Reformulated gasoline (RFG) has been required in the Chicago NAA since 1995. The attainment demonstration and RFP plan both assume all gasoline sold in the Chicago NAA since 1995 is "Northern" grade RFG.

Gasoline Sulfur: Gasoline sulfur levels were assumed to be 30 parts per million (ppm) in 2008 and in future years in accordance with the federal Tier 2 gasoline regulations which required the 30 ppm level beginning in 2006. An input for gasoline sulfur is not required, since the MOBILE6.2 model assumes 30 ppm gasoline sulfur for RFG after 2006.

Diesel Sulfur: Diesel sulfur levels were assumed to be 15 parts per million in2008 in accordance with the U.S. EPA's Highway Diesel Rule which was finalized in January 2001. This regulation required the sale of on-road diesel fuel with no greater than 15 ppm of sulfur beginning in June 2006. Diesel fuel sulfur concentrations are a required input to the MOBILE6.2 model when particulate emission factors are to be evaluated.

Fuel Volatility: Fuel volatility is a required input to the MOBILE6.2 model, although this input is ignored when the use of RFG is being modeled. Fuel RVP varies from month to month during the year. The following table shows the monthly fuel RVP inputs for the Chicago area in 2008 as well as the expected values for future years.

Monthly Fuel Volatility (Reid Vapor Pressure or RVP) of Reformulated Gasoline (RFG) in the Chicago Area by Month

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Actual RVP, psi	13.4		10.9		7.2					10.9		13.1
Expected RVP for future years	14.0		10.9		6.7					10.9		14.0

The 2008 monthly RVP inputs are from actual measured winter and summer RVP data for northern Illinois as reported in *Motor Gasolines Summer 2008* (NGMS-258 PPS (2009/1) (the "NIPER" reports). Future year expected monthly RVPs were taken from U.S.EPA's National Emissions Inventory inputs.

Speeds: The MOBILE6.2 model contains a default speed distribution file (SVMT.D); however, the Illinois EPA assumed area-specific vehicle speed distributions. This distribution below is based on 2007 CMAP transportation model output, deemed representative for 2008.

VMT Fraction by Road Type by Hour by Speed

1 1 0.0001 0.0000 0.0050 0.0075 0.0043 0.0103 0.0253 0.0254 0.0452 0.0638 0.1040 0.3767 0.1943
0.1383
1 2 0.0001 0.0080 0.0148 0.0466 0.0625 0.0859 0.0908 0.1456 0.1013 0.1130 0.1416 0.1285 0.0299
0.0316
1 3 0.0001 0.0080 0.0148 0.0466 0.0625 0.0859 0.0908 0.1456 0.1013 0.1130 0.1416 0.1285 0.0299
0.0316
1 4 0.0001 0.0048 0.0307 0.0799 0.0662 0.0918 0.1283 0.1232 0.0962 0.1322 0.1209 0.0715 0.0286
0.0256
1 5 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
0.0529
1 6 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
0.0529
1 7 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
0.0529
1 8 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
0.0529
1 9 0.0000 0.0002 0.0044 0.0256 0.0476 0.0554 0.0941 0.1110 0.1631 0.1493 0.1555 0.1277 0.0264
0.0395
1 10 0.0000 0.0002 0.0044 0.0256 0.0476 0.0554 0.0941 0.1110 0.1631 0.1493 0.1555 0.1277 0.0264
0.0395
1 11 0.0000 0.0083 0.0147 0.0337 0.0587 0.0474 0.0728 0.1249 0.1122 0.1205 0.1318 0.1771 0.0449
0.0530
1 12 0.0000 0.0083 0.0147 0.0337 0.0587 0.0474 0.0728 0.1249 0.1122 0.1205 0.1318 0.1771 0.0449
0.0530
1 13 0.0000 0.0001 0.0044 0.0012 0.0133 0.0118 0.0238 0.0312 0.0561 0.0519 0.1358 0.3491 0.1903
0.1310
1 14 0.0000 0.0001 0.0044 0.0012 0.0133 0.0118 0.0238 0.0312 0.0561 0.0519 0.1358 0.3491 0.1903
0.1310
1 15 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 16 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 17 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 18 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 19 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 20 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 21 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 22 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 23 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
1 24 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
0.1414
2 1 0.0000 0.0008 0.0034 0.0102 0.0177 0.0367 0.1027 0.1775 0.1839 0.2465 0.0867 0.1338 0.0000
0.0000
2 2 0.0017 0.0254 0.0689 0.0968 0.1127 0.1207 0.1452 0.1356 0.1088 0.0924 0.0445 0.0474 0.0000
0.0000
2 3 0.0017 0.0254 0.0689 0.0968 0.1127 0.1207 0.1452 0.1356 0.1088 0.0924 0.0445 0.0474 0.0000
0.0000
2 4 0.0050 0.0531 0.1042 0.1302 0.1335 0.1256 0.1265 0.1096 0.0819 0.0645 0.0314 0.0345 0.0000
0.0000
2 5 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
0.0000
2 6 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
0.0000
2 7 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
0.0000
2 8 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
0.0000
2 9 0.0008 0.0120 0.0470 0.0938 0.1316 0.1388 0.1523 0.1449 0.1091 0.0837 0.0382 0.0476 0.0000
0.0000
2 10 0.0008 0.0120 0.0470 0.0938 0.1316 0.1388 0.1523 0.1449 0.1091 0.0837 0.0382 0.0476 0.0000
0.0000
2 11 0.0032 0.0375 0.0866 0.1239 0.1277 0.1268 0.1365 0.1206 0.0909 0.0680 0.0356 0.0428 0.0000
0.0000
2 12 0.0032 0.0375 0.0866 0.1239 0.1277 0.1268 0.1365 0.1206 0.0909 0.0680 0.0356 0.0428 0.0000
0.0000
2 13 0.0000 0.0015 0.0097 0.0286 0.0596 0.0997 0.1556 0.1827 0.1639 0.1548 0.0635 0.0805 0.0000
0.0000
2 14 0.0000 0.0015 0.0097 0.0286 0.0596 0.0997 0.1556 0.1827 0.1639 0.1548 0.0635 0.0805 0.0000
0.0000

```
  2 15 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 16 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 17 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 18 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 19 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 20 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 21 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 22 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 23 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000
  2 24 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
     0.0000


* Fraction of vehicle miles traveled within an hour within an average speed bins by hour of the day.
    The first hour is 6 a.m.

* Speed Bins:
* Hr   2.5    5.0   10.0   15.0   20.0   25.0   30.0   35.0   40.0   45.0   50.0   55.0   60.0   65.0+

Speed bins extend 2.5 mph on either side of the bin name (i.e., the 30-mph speed bin encompasses
speeds from 27.5 to 32.5 mph), except for the first (2.5 mph) bin (0 to 2.5 mph) and the last (65+
mph) bin (62.5 mph and above).

The above data are for the Chicago NAA and for Freeways and Arterials only.  Locals and Ramps have a
fixed speed in built into the M6 model, and therefore are not affected by this file.

The first number in each line is roadway type: 1 = Freeways; 2 = Arterials.  The second number is the
hour of the day, hour 1 being hour beginning at 6 AM, and hour 24 being hour beginning at 5 AM the
next day.  The third and subsequent numbers are the fractions of VMT in that hour that occurs within
the specified speed bins.  Note that, for Freeways, most VMT is in the 45-50-55-60-mph speed bins,
with lower speeds more common during Peak hours.  Much the same holds for Arterials, where most VMT is
in the 30-35-40-45 mph speed bins.
```

VMT Mix: The regional VMT mix inputs used for 2008 were based on Chicago-area-specific VMT-by-vehicle-type data supplied by CMAP from transportation model output which were adapted to represent fractions of the vehicle types in MOBILE's descriptive output for different road types. The VMT Mix used in Annual emission calculations is an aggregated mix for all road types. This information is used in the MOBILE model to compute the average emission factors for certain combined vehicle classes, and the all-vehicle emission rate.

Registration Distribution (RD): A Chicago-area-specific vehicle registration distribution profile based upon 2008 information data developed by Illinois EPA's Division of Mobile Source Programs from data provided by the Illinois Secretary of State's Department of Motor Vehicles. The file was generated using U.S.EPA's recommended method from its MOBILE6.2 training material.

Emissions Computation: Illinois EPA calculated annual motor vehicle emissions budgets using the basic formula: Emissions of a given pollutant = VMT * Emission Factor (EF) for that pollutant. The VMT in that formula is further broken down into VMT by vehicle type, which, for a specific vehicle type, equals Total VMT * VMT Mix for that vehicle type, such that Emissions of a given pollutant for a specific vehicle type = Total VMT * VMT Mix for that vehicle type * EF for that pollutant and vehicle type. For each county or county subdivision in the Chicago NAA, emissions for each pollutant are calculated by month and vehicle type, and summed to give emissions by month for all

vehicle types. Those monthly totals are further summed to give annual emissions by county for each pollutant. In those counties or sub-county areas where there is I/M, I/M benefits were calculated using the same formula except that EF was replaced by "I/M Benefit EF" (IMBEF), where IMBEF = EF assuming no I/M – EF assuming I/M program), and the I/M coverage factor was included. For I/M counties, No-I/M Emissions were calculated, then I/M Benefits; and Net Emissions were simply No-IM Emissions minus I/M Benefits. .

Attachment A of this section provides additional details on the MOBILE6 model inputs used in the development of the 2008 and 2025 Chicago NAA motor vehicle emissions budgets. Following is a discussion of how the data for the spreadsheet are generated and used:

Annual VMT by county and by month.

1. Aggregate each county's average daily (ADVMT) by Highway Performance Monitoring System (HPMS) functional class (FC) into ADVMT by the four road types (Rural Interstate, Rural Other Functional Classes, Urban Interstate, and Urban Other Functional Classes).

2. Estimate monthly county VMT for January by multiplying the ADVMT for each of four road types by the number of days in the month (31) and the appropriate month-long count division factors (e.g., 0.8572 for Rural Interstates in the Chicago area) from Table below (i.e., by the Monthly Factors in the columns on the right side of that Table—25.57 for January Chicago Rural Interstates), and summing the resulting Monthly VMTs by road type to get total Monthly VMT for that month and that county.

3. Do the same for each of the other months, and sum the 12 Monthly results to get total Annual VMT for the county. As a check, multiply the actual or forecast ADVMT by 365 and compare to the total from Step 2. The two Annual estimates should be very close—usually within 0.05%. The difference is due to rounding.

Factors for Estimating Monthly VMT from ADVMT

Based on IDOT 2002-2005 Count Data and representative of 2005 and future years

(Source: IDOT Office of Planning & Programming, Sept 2006)

	Normalized Month-long Count Division Factors (MCDFs)					**Monthly VMT Factors** (MVFs) = MCDF × days in month			
	Rural		**Urban**		Days in Month	**Rural**		**Urban**	
Month	**Inter-states**	**Other FCs**	**Inter-states**	**Other FCs**		**Inter-states**	**Other FCs**	**Inter-states**	**Other FCs**
CHICAGO AREA (IDOT District 1)									
January	0.8572	0.9643	0.9192	0.9267	31	26.57	29.89	28.50	28.73
February	0.8789	0.8560	0.9291	0.9379	28	24.61	23.97	26.01	26.26
March	0.9585	0.9461	0.9519	0.9736	31	29.71	29.33	29.51	30.18
April	0.9861	1.0107	0.9981	1.0177	30	29.58	30.32	29.94	30.53

May	1.0323	1.0114	1.0047	1.0280	31	32.00	31.35	31.15	31.87
June	1.1064	1.0688	1.0395	1.0417	30	33.19	32.06	31.19	31.25
July	1.1177	1.0619	1.0538	1.0114	31	34.65	32.92	32.67	31.35
August	1.1050	1.0509	1.0669	1.0183	31	34.26	32.58	33.07	31.57
September	1.0210	1.0192	1.0396	1.0143	30	30.63	30.58	31.19	30.43
October	0.9931	1.0124	1.0203	0.9923	31	30.79	31.38	31.63	30.76
November	0.9844	0.9899	1.0207	1.0195	30	29.53	29.70	30.62	30.59
December	0.9594	1.0084	0.9562	1.0186	31	29.74	31.26	29.64	31.58
Jun-Jul-Aug Sum	3.3291	3.1816	3.1602	3.0714	92	102.10	97.56	96.93	94.17

Emission factors by vehicle type representative of each month were obtained by running the MOBILE6.2 model twelve times, once for each month using average monthly temperature and fuel inputs as noted above. All twelve monthly runs for an area can be on a single input file.

All-Facility-Type EFs were calculated assuming the default distribution of VMT among facility types; this is a reasonable because the Statewide M6 Facility Type fractions (Freeway 31%, Arterial 58%, Local 8%, Ramp 3%) are reasonably close to MOBILE6's default fractions (Freeway 34%; Arterial 50%, Local 13%, Ramp 3%).

For future-year estimates, one would use monthly climatological temperature and absolute humidity averages available from the National Weather Service's National Climatic Data Center (NCDC) in the form of Local Climatological Data publications, as described above. Most of the other MOBILE inputs are "fixed", that is, they don't change from month to month. Examples are: Activity Inputs such as VMT by Hour, VMT by Speed Bin, and VMT by Facility Type, and VMT Fractions. One would use the same ones here as in the Summer Weekday EF calculations.

The MOBILE monthly inputs for Year and Month of Output EFs in a given year should be for evaluation months of January [Year], July [Year], or January [Year + 1]. See the table below for 2008. U.S.EPA's MOBILE6.2 Technical Guidance Document (August 2004), recommends that the resulting emission factor outputs be used as is (i.e., without interpolation) for the monthly EFs.

Year and Month Input Settings for MOBILE6.2 for Monthly 2008 Emission Factors

Months for Which M6.2 EFs Are Desired	MOBILE Input Values for Evaluation Month & Calendar Year
January, February, or March 2008	1 (January) and 2008
April through September 2008	7 (July) and 2008
October, November, or December 2008	1 (January) and 2009

Emission factor results from the MOBILE runs are extracted from the MOBILE output

files (*.OUT or *,TXT for VOC, CO, and NOx; *,PM for SO_2, ammonia, and the particulate species) and placed in a page of an Excel spreadsheet. The "pivot table" commands in Excel allow the user to take those emission factors and put them into the tabular form used in the emission calculation spreadsheet, to which they are copied.

At this point, the emission calculation spreadsheet has VMT by county and month on one page, and emission factors by vehicle type and month (and I/M status) on another. A third page contains All-Facility-Type Vehicle Mix by month and vehicle type. The same mix is used for all months. Subsequent pages contain the results of emission calculations by county, which are evaluated as follows.

1. No-I/M County Emissions by vehicle type (VT) and month = (County ADVMT by month * (VMT Mix by VT and month) * No-I/M EF by pollutant, VT, and month) * 1.102×10^{-6} (grams-to-ton conversion factor). For areas without I/M, this is the only calculation.

2. I/M Credits by VT and month for counties with I/M = County VMT by month * VMT mix as above * I/M Credit EF by month (i.e., No-I/M EF – I/M EF by month, by pollutant and vehicle type) * I/M Coverage factor * 1.102×10^{-6}). I/M Credits will exist for VOC, CO, and NOx, but not for any SO_2, NH_3, or any PM species.

3. Net County Emissions by VT and month for counties with I/M = (No-I/M County Emissions by VT and month) – (I/M Credits by VT and month).

4. For Grundy and Kendall Counties, which are only partly in the NAA, No-I/M emissions were calculated for the NAA townships and Attainment townships separately using NAA-township VMT data and Attainment Township VMT data; then the I/M benefits for the NAA townships, then the Net Emissions for the NAA townships as in 3 above, and finally All-County emissions, which are the sum of the emissions for the Attainment townships and the Net Emissions for the NAA townships

Once each county's or county subdivision's emissions for all pollutants have been calculated, the spreadsheet can be commanded to aggregate them into NAA totals by pollutant.

Motor Vehicle Emissions Budgets

Using the above VMT and control program assumptions and methodology, following are 2008 and 2025 the proposed Chicago $PM_{2.5}$ Maintenance Plan motor vehicle emissions budgets (rounded to the nearest ton/year) for use in determining transportation conformity.

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

Year	$PM_{2.5}$	NOx
2008	1,816	99,627
2025	1,064	23,687

External MOBILE6.2 Inputs:

In the examples of external files shown below, the actual command lines are **boldfaced**; the unbolded lines represent comments. The actual text files have no such distinction in typefaces. The unbolded lines have been "commented out" and have no effect on the MOBILE model. They may therefore be omitted, but it is suggested that they remain in the files for documentation, and to make the files easier for the user to read and understand.

The comments and other text in the External Files have been shown in the `Courier New` typeface. Actual command lines—the inputs that MOBILE actually uses—are shown in **`Courier New Bold`**

Vehicle Inspection and Maintenance (I/M) Program

The external I/M files giving the inputs used by the MOBILE6 model to generate year 2008 emissions factors is described below. The first is the post-2007 I/M program that went into effect in early 2007. Since it is a biennial program, about ¾ of vehicles subject to I/M had been tested under this program by mid 2008; but ¼ of them had been tested under the pre-2007 program and were still generating benefits from the old program. Thus the actual I/M benefits in 2008 are the weighted average of the benefits of the two programs, the weighting factors being 75% for the post-'07 program and 25% for the pre-'07 program.

Below is the post-'07 I/M program description, represented by the external input file IM07ON.D. This program is expected to continue into the foreseeable future. It represents an I/M program with four components, chief of which is an OBD (on-board diagnostics) test for vehicles of model year (MY) 1996 and newer. The order in which the components appear in the external file is not significant, but they must be numbered consecutively. Illinois EPA begins the external file with identifying comments and adds other comment lines or blank lines to make the file easier to read and understand.

```
* ILLINOIS ENHANCED I/M DESCRIPTION

*  Filename: IM07ON.D

* External input file for Illinois' OBD-only I/M program
*  from 2007 on.
*  OBD-only applies to light-duty vehicles only; HDVs still get
*   an Idle Test & Gas Cap Check.
*  All program start years set to 1986 per U.S. EPA guidance in
*   "Frequently Asked Questions on MOBILE6" from U.S. EPA/OTAQ.

*  This represents the NEW I/M program in which only 1996 &
*   newer vehicles are tested with an OBD test; and the OBD test
*   applies only to LDVs.
*  This program came into effect in February 2007.
```

```
*-----------------------------------------------
*  Program description for post MY'96 LDV OBD I/M
*===============================================
* FIRST I/M program--"Evaporative]" OBD for MY 1996+ LDVs
*-----------------------------------------------------------
I/M PROGRAM         : 1 1986 2050 2 T/O EVAP OBD
I/M MODEL YEARS     : 1 1996 2050
I/M VEHICLES        : 1 22222 11111111 1
I/M STRINGENCY      : 1 20.0
I/M COMPLIANCE      : 1 95.0
I/M WAIVER RATES    : 1 0.5 2.2     '01 data
I/M EXEMPTION AGE   : 1 25
I/M GRACE PERIOD    : 1 4
```

In each case, the first number after the colon refers to the I/M program's component number.

I/M PROGRAM : 1 1986 2050 2 T/O EVAP OBD

Testing began in 1986 and runs into the indefinite future (2050). The program is a biennial test-only (2 T/O, here and in other program components) program, in this case an Evaporative OBD test. The vehicle engine computer records information from sensors in the engine and fuel system. Indications of malfunctions or out-of-specification operations of the engine or fuel and evaporative emission control systems are stored in the engine computer as "fault codes". An OBD test consists of plugging a special scanner into an output jack from vehicle's engine computer. The scanner queries the computer and records any fault codes that the computer's OBD system has saved. OBD tests are quick, dependable, and clean, and, if a vehicle fails an OBD test, the fault codes that the scanner displays help mechanics diagnose the problem.

I/M MODEL YEARS : 1 1996 2050

This program component covers only vehicles manufactured between model year (MY) 1996 (start year) and the indefinite future (MY 2050, the end year). An increasing percentage of vehicles are becoming subject to this test as new vehicles are purchased and older (pre-MY-1996) vehicles are retired.

I/M VEHICLES : 1 22222 11111111 1

Only the five light-duty vehicle types only light-duty gasoline vehicles (LDGVs) and light-duty gasoline trucks (LDGTs 1, 2, 3, and 4) are covered by this program component (22222). Heavy-duty gasoline trucks (eight types) and gasoline buses are not covered by this program component (11111111 1), but rather by Programs 3 and 4, described below.

I/M STRINGENCY : 1 20.0

Stringency (exhaust inspection failure rate) is 20%. A Stringency entry is necessary for an exhaust test, but not an evaporative test, so this entry can be omitted or "commented

out". In this Evap test case, it will be ignored by the model, but is included for reference.

I/M COMPLIANCE : 1 95.0

Compliance rate (tested vehicles as percent of all vehicles subject to I/M) is 95%

I/M WAIVER RATES : 1 0.5 2.2 '01 data

The Waiver Rate is the fraction of tested vehicles that get a waiver—i.e., do not pass the I/M test but, because repairs cost more than a specified amount, get a certificate of compliance. Waiver rate is 0.5% for MY 1980 and earlier vehicles (irrelevant now that pre-MY-96 vehicles are not tested), and 2.2% for MY 1981 and later vehicles. These figures are from VIM's actual 2001 waiver statistics, and have been representative of the last few years, so are deemed representative of 2009. In this case the comment stating that fact is allowed in the same line as the data.

I/M EXEMPTION AGE : 1 25

Vehicles older than 25 years are not subject to this program. This will not happen until at least 2021. The default is 25, and the model does not calculate benefits for vehicles older than 25 years, so in essence this command has no effect. It could be omitted, but is included for completeness.

I/M GRACE PERIOD : 1 4

Vehicles less than 4 model years old—in this case MY2006, '07, '08, and '09—are exempt from I/M testing.

Most of the inputs to the second and subsequent program components are the same as those for the first program, so the description of the components will be abbreviated and summarized as below, rather than after each command line as above.

```
* Second I/M program--"Exhaust" OBD for MY 1996+ LDVs
*-------------------------------------------------
I/M PROGRAM        : 2 1986 2050 2 T/O OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 20.0
I/M COMPLIANCE     : 2 95.0
I/M WAIVER RATES   : 2 0.5 2.2     '01 data
I/M EXEMPTION AGE  : 2 25
I/M GRACE PERIOD   : 2 4
*
```

The second program component is a biennial, test-only Exhaust OBD test for MY 1996 and later LDGVs and LDGTs. In this OBD test, the scanner queries the vehicle's computer for fault codes concerning exhaust emissions. Stringency, Compliance, Waiver Rates, Exemption Age, and Grace Period are

the same as in the first program. An entry for I/M STRINGENCY (20%) is required for an Exhaust I/M program.

```
*-----------------------------------------------------
*  Program description for post MY'96 HDV Idle & GC I/M
*=====================================================
* Third I/M program--HDV IDLE for MY 1996+ HDVs
*-----------------------------------------------
I/M PROGRAM        : 3 1986 2050 2 T/O IDLE
I/M MODEL YEARS    : 3 1996 2050
I/M VEHICLES       : 3 11111 22222222 2
I/M STRINGENCY     : 3 20.0
I/M COMPLIANCE     : 3 95.0
I/M WAIVER RATES   : 3 1.2 1.5     '01 data
I/M EXEMPTION AGE  : 3 25
I/M GRACE PERIOD   : 3 4
```

The third program component is a biennial, test-only Idle test for MY 1996 and later HDGVs and Gas Buses (22222222 2). Light-duty vehicles are not subject to this component (11111), but rather to components 1 and 2. Stringency, Compliance, Exemption Age, and Grace Period are the same as in component 1, but the pre- and post-MY 1981 Waiver Rates (1.2% and 1.5%, respectively), are slightly different from those in components 1 and 2. HDGVs are few in number, and most of them are commercial vehicles.

```
* Fourth I/M program--Gas Cap Check for MY 1996+ HDVs
*-------------------------------------------------
I/M PROGRAM        : 4 1986 2050 2 T/O GC
I/M MODEL YEARS    : 4 1996 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M COMPLIANCE     : 4 95.0
I/M WAIVER RATES   : 4 1.2 1.5     '01 data
I/M EXEMPTION AGE  : 4 25
I/M GRACE PERIOD   : 4 4
```

The fourth program component is a biennial, test-only Gas Cap Check for MY 1996 and later HDVs. Compliance, Waiver Rates, Exemption Age, and Grace Period are the same as in the third program. Since a Gas Cap Check is an evaporative I/M test, the I/M STRINGENCY command is not necessary and is not included here.

Below is the pre-'07 I/M program ILLOBDIM.D

```
* ILLINOIS ENHANCED I/M DESCRIPTION Filename: ILLOBDIM.D
*  OBD EXH AND GAS CAP 1996+ BEGINNING IN 2002

* The Illinois I/M is Biennial Test Only (2 T/O) program
*  that applies to LDGVs, LDGTs, and, in slightly different
```

```
*  fashion, to HDGVs.  Exhaust & Evaporative OBD is for
*  MY '96+ vehicles; IM240 and simple Idle tests remain for
*  pre-'96 LDVs pre-'81 LDVs respectively.

* Ref to MYCUTS in 2nd program changed to
F:\ONROAD\AREASPEC\MYCUTS.D
*  by SL on 31.j.05 from F:\ONROAD\MOBILE62\RUN\EXAMPLES\MYCUTS.D


* ------------------------------------------------
* Program Description for older LDVs' I/M programs
* ------------------------------------------------

* First I/M program--IDLE test for MY 1968+ LDVs
I/M PROGRAM        : 1 1986 2050 2 T/O IDLE
I/M MODEL YEARS    : 1 1968 1980
I/M VEHICLES       : 1 22222 11111111 1
I/M STRINGENCY     : 1 20.0
I/M COMPLIANCE     : 1 95.0
I/M WAIVER RATES   : 1 0.5 2.2     '01 data
I/M GRACE PERIOD   : 1 4
*
```

Program 1 is for vehicle of MY1968 to MY 1980. It consists of a biennial test-only Idle Test for light-duty cars and trucks (22222), with stringency of 20%, Compliance of 90%, and a 4-year grace period (which is irrelevant, since 1980 is long in the past. Waiver rates are 0.5% and 2.2% for pre-MY1981 and MY1981-and-after The IM240 cutpoints are given by the MYCUTS.D file. See the MOBILE6 User's Guide, Section 2.8.9.4.g..

```
* Second I/M program--IM240 for MY 1981 to 1995 LDVs
I/M PROGRAM        : 2 1999 2050 2 T/O IM240
I/M MODEL YEARS    : 2 1981 1995
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 20.0
I/M CUTPOINTS      : 2 F:\ONROAD\AREASPEC\MYCUTS.D
I/M COMPLIANCE     : 2 95.0
I/M WAIVER RATES   : 2 0.5 2.2     '01 data
I/M GRACE PERIOD   : 2 4
*
* Third I/M program Gas Cap Check for MY 1968 to 1995 LDVs
I/M PROGRAM        : 3 1992 2050 2 T/O GC
I/M MODEL YEARS    : 3 1968 1995
I/M VEHICLES       : 3 22222 11111111 1
* I/M STRINGENCY not required in evaporative I/M program input
I/M COMPLIANCE     : 3 95.0
I/M WAIVER RATES   : 3 0.5 2.2     '01 data
I/M GRACE PERIOD   : 3 4
```

The second and third I/M programs also apply to light-cars and trucks and consists of a biennial IM240 test and a Gas Cap Check for vehicles of MY1981 through MY 1995. Stringency, Compliance, Waiver Rates, and Grace Period are as above,

The fourth and fifth I/M programs apply to light-duty vehicles (22222) of MY1996 on. Program 4 is a biennial Test-Only Evaporative OBD Test + Gas Cap Check; and Program 5 is a biennial Test-Only "Exhaust" OBD test, as described below. There is a 4-year grace period; thus in 2008 the OBD tests have been applied only to light-duty vehicles from MY1996 to MY2004,

```
* ------------------------------------------------------
* Program description for LDV Evaporative and Exhaust OBD
* ------------------------------------------------------

* Fourth I/M program--EVAP OBD & Gas Cap Check for 1996+ LDV
I/M PROGRAM        : 4 2002 2050 2 T/O EVAP OBD & GC
I/M MODEL YEARS    : 4 1996 2050
I/M VEHICLES       : 4 22222 11111111 1
* I/M STRINGENCY not required in evaporative I/M program input
I/M COMPLIANCE     : 4 95.0
I/M WAIVER RATES   : 4 0.5 2.2     '01 data
I/M GRACE PERIOD   : 4 4

* Fifth I/M program--"Exhaust" OBD for MY 1996+ LDVs
I/M PROGRAM        : 5 2002 2050 2 T/O OBD I/M
I/M MODEL YEARS    : 5 1996 2050
I/M VEHICLES       : 5 22222 11111111 1
I/M STRINGENCY     : 5 20.0
I/M COMPLIANCE     : 5 95.0
I/M WAIVER RATES   : 5 0.5 2.2     '01 data
I/M GRACE PERIOD   : 5 4
```

The final two programs in the ILLOBDIM file apply to heavy-duty vehicles (HDVs) only (22222222 2), and consist of an Idle Test and a Gas Cap check for all HDVs of MY1968 and later, with a 4-year grace period

```
* ------------------------------------------------
* Program description for Heavy-Duty Vehicle I/M
* ------------------------------------------------

* Sixth I/M program--HDV IDLE for MY 1968+ HDVs
I/M PROGRAM        : 6 1986 2050 2 T/O IDLE
I/M MODEL YEARS    : 6 1968 2050
I/M VEHICLES       : 6 11111 22222222 2
I/M STRINGENCY     : 6 20.0
I/M COMPLIANCE     : 6 95.0
I/M WAIVER RATES   : 6 1.2 1.5     '01 data
I/M GRACE PERIOD   : 6 4
*
* Seventh I/M program--Gas Cap Check for MY 1968+ HDVs
I/M PROGRAM        : 7 1992 2050 2 T/O GC
I/M MODEL YEARS    : 7 1968 2050
I/M VEHICLES       : 7 11111 22222222 2
* I/M STRINGENCY not required in evaporative I/M program input
I/M COMPLIANCE     : 7 95.0
I/M WAIVER RATES   : 7 1.2 1.5     '01 data
I/M GRACE PERIOD   : 7 4
*
* ----------------
```

```
*
* NOTES:
* This is the standard Illinois I/M input, describing
*  the I/M program with OBD as it exists after early
*  March 2002.
```

The MYCUTS file mentioned above is as follows:

```
* This file was created automatically by a Mobile6 conversion utility.
* The same cutpoints are used for each model year and vehicle type.
I/M CUTPOINTS      : CUTP015.D
*
*
* Block 1 (LDGV, LDGT1)
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000
*
* Block 2 (LDGT2, LDGT3)
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000
*
* Block 3 (LDGT4)
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000
*
* Block 4 (HDGV)
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800   0.800
  0.800   0.800   0.800   0.800   0.800
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000  15.000
 15.000  15.000  15.000  15.000  15.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000 999.000
999.000 999.000 999.000 999.000 999.000
```

The Registration Distribution

The Registration Distribution (RD) for a vehicle type is an indication of the fraction of the vehicle fleet of that type that is made up of vehicles of a given age. The following is based on 2008 registration data from the Illinois Secretary of State's office (ISOS). It and its contents are described below. The file is named CHRD08AA.D.

REGISTRATION DISTRIBUTION

```
* CNAA M6 LDV RD = SOSLDV (Light-duty Vehicles--passenger cars) RD from
*  08VADbyCounty.xls for Chicago omitting '09 counts & '08 = 75% of '07
 1 0.0550  0.0733  0.0675  0.0656  0.0649  0.0666  0.0698  0.0665  0.0680
0.0598
   0.0524  0.0500  0.0415  0.0421  0.0325  0.0263  0.0218  0.0166  0.0134
0.0103
   0.0074  0.0057  0.0043  0.0033  0.0154


* CNAA M6 LDT1 RD = SOSLDT1 (ISOS "light" or type 1 LD trucks) RD from
*  08VADbyCounty.xls for Chicago omitting '09 counts & '08 = 75% of '07
 2 0.0526  0.0702  0.0769  0.0872  0.0796  0.0729  0.0835  0.0670  0.0669
0.0586
   0.0583  0.0478  0.0385  0.0342  0.0294  0.0219  0.0148  0.0118  0.0076
0.0065
   0.0051  0.0031  0.0020  0.0012  0.0024


* CNAA M6 LDT2 RD = Same as M6 LDT1 RD; see above.
 3 0.0526  0.0702  0.0769  0.0872  0.0796  0.0729  0.0835  0.0670  0.0669
0.0586
   0.0583  0.0478  0.0385  0.0342  0.0294  0.0219  0.0148  0.0118  0.0076
0.0065
   0.0051  0.0031  0.0020  0.0012  0.0024


* CNAA M6 LDT3 = SOSLDT21 (ISOS "heavy" or type 2 LD trucks) RD from
*  08VADbyCounty.xls for Chicago omitting '09 counts & '08 = 75% of '07
 4 0.0457  0.0609  0.0635  0.0720  0.0854  0.0843  0.0729  0.0689  0.0705
0.0800
   0.0517  0.0472  0.0349  0.0375  0.0294  0.0203  0.0162  0.0095  0.0104
0.0099
   0.0075  0.0049  0.0041  0.003  0.0094


* CNAA M6 LDT4 = same as LDT3 RDs; see above.
 5 0.0457  0.0609  0.0635  0.0720  0.0854  0.0843  0.0729  0.0689  0.0705
0.0800
   0.0517  0.0472  0.0349  0.0375  0.0294  0.0203  0.0162  0.0095  0.0104
0.0099
   0.0075  0.0049  0.0041  0.003  0.0094


*  Heavy-Duty & MC RDs below are all assumed same as M6 default RD.

* HDV2B (Heavy-duty vehicles 2B--M6 Default RDs)
 6 0.0503 0.0916 0.0833 0.0758 0.0690 0.0627 0.0571 0.0519 0.0472 0.0430
   0.0391 0.0356 0.0324 0.0294 0.0268 0.0244 0.0222 0.0202 0.0184 0.0167
   0.0152 0.0138 0.0126 0.0114 0.0499
* HDV3 (Heavy-duty vehicles3, same RD as HDV2B, M6 Default RDs)
 7 0.0503 0.0916 0.0833 0.0758 0.0690 0.0627 0.0571 0.0519 0.0472 0.0430
   0.0391 0.0356 0.0324 0.0294 0.0268 0.0244 0.0222 0.0202 0.0184 0.0167
   0.0152 0.0138 0.0126 0.0114 0.0499
```

```
* HDV4 (Heavy-duty vehicles 4, M6 default RDs)
 8 0.0388 0.0726 0.0679 0.0635 0.0594 0.0556 0.0520 0.0486 0.0455 0.0425
   0.0398 0.0372 0.0348 0.0326 0.0304 0.0285 0.0266 0.0249 0.0233 0.0218
   0.0204 0.0191 0.0178 0.0167 0.0797
* HDV5 (Heavy-duty vehicles 5, same RD as HDV4, M6 Default)
 9 0.0388 0.0726 0.0679 0.0635 0.0594 0.0556 0.0520 0.0486 0.0455 0.0425
   0.0398 0.0372 0.0348 0.0326 0.0304 0.0285 0.0266 0.0249 0.0233 0.0218
   0.0204 0.0191 0.0178 0.0167 0.0797
* HDV6 (Heavy-duty vehicles 6, same RD as HDV4, M6 Default)
10 0.0388 0.0726 0.0679 0.0635 0.0594 0.0556 0.0520 0.0486 0.0455 0.0425
   0.0398 0.0372 0.0348 0.0326 0.0304 0.0285 0.0266 0.0249 0.0233 0.0218
   0.0204 0.0191 0.0178 0.0167 0.0797
* HDV7 (Heavy-duty vehicles 7, same RD as HDV4, M6 Default)
11 0.0388 0.0726 0.0679 0.0635 0.0594 0.0556 0.0520 0.0486 0.0455 0.0425
   0.0398 0.0372 0.0348 0.0326 0.0304 0.0285 0.0266 0.0249 0.0233 0.0218
   0.0204 0.0191 0.0178 0.0167 0.0797
* HDV8A (Heavy-duty vehicles 8A same RD as HDV4, M6 Default)
12 0.0388 0.0726 0.0679 0.0635 0.0594 0.0556 0.0520 0.0486 0.0455 0.0425
   0.0398 0.0372 0.0348 0.0326 0.0304 0.0285 0.0266 0.0249 0.0233 0.0218
   0.0204 0.0191 0.0178 0.0167 0.0797
* HDV8B (Heavy-duty vehicles 8B,same RD as HDV4, M6 Default)
13 0.0388 0.0726 0.0679 0.0635 0.0594 0.0556 0.0520 0.0486 0.0455 0.0425
   0.0398 0.0372 0.0348 0.0326 0.0304 0.0285 0.0266 0.0249 0.0233 0.0218
   0.0204 0.0191 0.0178 0.0167 0.0797
* HDBS (HDV School buses; this M6 RD default is assumed)
14 0.0393 0.0734 0.0686 0.0641 0.0599 0.0559 0.0522 0.0488 0.0456 0.0426
   0.0398 0.0372 0.0347 0.0324 0.0303 0.0283 0.0264 0.0247 0.0231 0.0216
   0.0201 0.0188 0.0176 0.0165 0.0781
* HDBT (HDV Transit buses; this M6 RD default is assumed)
15 0.0307 0.0614 0.0614 0.0614 0.0614 0.0614 0.0614 0.0614 0.0614 0.0613
   0.0611 0.0607 0.0595 0.0568 0.0511 0.0406 0.0254 0.0121 0.0099 0.0081
   0.0066 0.0054 0.0044 0.0037 0.0114
* MC (Motorcycles; this M6 default RD is assumed)
16 0.1440 0.1680 0.1350 0.1090 0.0880 0.0700 0.0560 0.0450 0.0360 0.0290
   0.0230 0.0970 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
   0.0000 0.0000 0.0000 0.0000 0.0000
```

This Chicago area-specific data is derived from ISOS registration data for LDVs subject to I/M in the Chicago-area counties. Since more than 90% of the light-duty gasoline vehicles in the Chicago NAA are subject to I/M, we assume the RD for Chicago-area LDVs subject to I/M is representative of that for all Chicago-area LDVs.

The ISOS data were counts for what ISOS calls "LDVs", LDT1s", and "LDT2s" by model year (MY). Those appear below as SLDV, SLDT1, and SLDT2 to distinguish them from M6 vehicle types.

- SLDVs correspond to passenger cars, so SLDVs = M6 LDVs.
- SLDT1s correspond to M6 LDT1s and LDT2s. ISOS data do not distinguish between the two M6 categories. For this reason, the RDs for M6 LDT1 and LDT2 are assumed to be the same.
- Similarly, SLDT2s correspond to M6 LDT3s and LDT4s, and ISOS data don't distinguish between those two M6 categories either. Therefore, the RDs for M6 LDT3 and LDT4 are also assumed to be the same.

The age distribution fractions have been rounded to 4 decimal places, and where the rounded fractions do not add up to 1.0000 exactly, RD fractions for old (age 22 to 24

years) have at times been modified by +/- 0.0001 so as to make the RDs add up to 1.0000, a requirement of the MOBILE6.2 model.

In this RD file, the first number in each distribution is an integer that indicates which of the 16 M6 vehicle classes are represented by the RD in question. That number is followed by 25 age fractions arranged in two rows of 10 values followed by a third row with the last 5 values.

It is assumed that the RDs for diesel vehicles are the same as the RDs for the corresponding gasoline vehicles; in particular, LDDV and LDDT RDs are assumed the same as LDGV and LDGT RDs. Since the (default) HDV RDs are based more on diesel vehicles to start with, and HDGVs are many fewer than HDDVs, especially in the higher weight classes, we feel the default HDV RDs represent both HDGV and HDDV reasonably well.

Default RDs are assumed for the various HDV classes. Good area-specific HDV age distribution data are lacking—the ISOS data covered only light-duty vehicles subject to I/M—and besides, much Chicago-area HDV VMT is from vehicles registered outside the Chicago area and just passing through. The best choice, then, was to go with the HDV defaults. Similarly, accurate local-area registration data for motorcycles are lacking, so the default MC RD is used.

External MOBILE6.2 Activity File Inputs: VMT by Facility Type, VMT by Hour, VMT by Speed Bin.

The following files were used in the 2002 base year and the 2009 future year estimates.

VMT by Facility Type

The M6.2 default file is FVMT.D, provided with the MOBILE6 model. The Chicago-area-specific VMT-by-facility-type file is FVMTCH07.D, shown below. It based on the most recent complete data from CMAP on VMT by hour by vehicle class. This is a very long file —about 750 lines—so for the purposes of this Attachment, only the data for vehicle types 1, 6, 11, 13, 24 (LDGV, HDGV2b, HDGV7, HDGV13, and MC) are shown; the others are omitted. See the second paragraph of the introduction to the file.

```
VMT BY FACILITY
*
*
* VMT fractions are listed for 28 vehicle classes for each hour of
```

```
*  the day starting at 6AM, as follows
*   Classes 1-5 (LDGV, LDGT1, LDGT2, LDGT3, and LDGT4), and
*     Classes 14, 15, and 28 (LDDV, LDDT12, LDDT34) were all assumed
*     to have the "Light-duty Vehicle" distribution on page "SL VMT
*     by vtype reedited" of the MF13 file.
*   Classes 6-10 and 16-20 (HDGV2b-HDGV6 and HDDV2b-HDDV6) were assumed
*    to have the "LTRK" (light HDV) distribution on that page.
*   Classes 11 & 12 and 21 & 22 (HDGV7 & HDGV8a, and HDDV7 & HDDV8a) were
*    assumed to have the "MTRK" (medium HDV) distribution on that page.
*   Classes 13 and 23 (HDGV8b and HDDV8b) were assumed to have the
*    "HTRK" (heavy HDV) distribution on that page
*   Classes 24 and 25-27 (Motorcycles and the three bus classes [HDGB,
*    HDDBT and HDDBS]) were assumed to have the default distribution
*    for those types in FVMT.DEF.
*
* The four values in each line represent the VMT distribution on
* freeway, arterial, local and ramps--in that order--as shown.
*
* See M6UG 2.8.5.1.f., p. 49, or CLASLIST.TXT for further info.
* (The CLASLIST file describes the vehicle classes.)
*
* Veh   Int&   Arts&   Local
*Class  Fwys   Colls   Rd/St   Ramps
*-----  ----   -----   -----   -----
*
    1  0.3341  0.5393  0.1105  0.0161
       0.2604  0.6106  0.1160  0.0130
       0.2604  0.6106  0.1160  0.0130
       0.2669  0.5831  0.1365  0.0135
       0.2576  0.5823  0.1468  0.0133
       0.2576  0.5823  0.1468  0.0133
       0.2576  0.5823  0.1468  0.0133
       0.2576  0.5823  0.1468  0.0133
       0.2683  0.5830  0.1354  0.0133
       0.2683  0.5830  0.1354  0.0133
       0.2646  0.5911  0.1315  0.0128
       0.2646  0.5911  0.1315  0.0128
       0.2825  0.5568  0.1468  0.0139
       0.2825  0.5568  0.1468  0.0139
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
       0.3363  0.5122  0.1358  0.0157
.
```

[Data for Vehicle Types 2 through 5 omitted]

```
.
    6  0.3836  0.5157  0.0827  0.0180
       0.3045  0.5985  0.0822  0.0148
       0.3045  0.5985  0.0822  0.0148
       0.3589  0.5412  0.0829  0.0170
       0.3791  0.5203  0.0826  0.0180
       0.3791  0.5203  0.0826  0.0180
       0.3791  0.5203  0.0826  0.0180
       0.3791  0.5203  0.0826  0.0180
       0.3606  0.5397  0.0827  0.0170
       0.3606  0.5397  0.0827  0.0170
       0.3581  0.5432  0.0816  0.0171
```

```
        0.3581  0.5432  0.0816  0.0171
        0.4101  0.4884  0.0815  0.0200
        0.4101  0.4884  0.0815  0.0200
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
        0.4312  0.4663  0.0818  0.0207
.
```

[Data for Vehicle Types 7 through 11 omitted]

.

```
   11   0.4158  0.4904  0.0752  0.0186
        0.3337  0.5763  0.0749  0.0151
        0.3337  0.5763  0.0749  0.0151
        0.3905  0.5165  0.0755  0.0175
        0.4111  0.4952  0.0752  0.0185
        0.4111  0.4952  0.0752  0.0185
        0.4111  0.4952  0.0752  0.0185
        0.4111  0.4952  0.0752  0.0185
        0.3928  0.5144  0.0753  0.0175
        0.3928  0.5144  0.0753  0.0175
        0.3896  0.5185  0.0742  0.0177
        0.3896  0.5185  0.0742  0.0177
        0.4423  0.4630  0.0743  0.0204
        0.4423  0.4630  0.0743  0.0204
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
        0.4619  0.4425  0.0745  0.0211
.
```

[Data for Vehicle Types 7 through 12 omitted]

.

```
   13   0.6106  0.3299  0.0430  0.0165
        0.5563  0.3937  0.0367  0.0133
        0.5563  0.3937  0.0367  0.0133
        0.6241  0.3235  0.0376  0.0148
        0.6260  0.3178  0.0403  0.0159
        0.6260  0.3178  0.0403  0.0159
        0.6260  0.3178  0.0403  0.0159
        0.6260  0.3178  0.0403  0.0159
        0.6561  0.2957  0.0340  0.0142
        0.6561  0.2957  0.0340  0.0142
        0.6029  0.3414  0.0401  0.0156
        0.6029  0.3414  0.0401  0.0156
        0.5776  0.3523  0.0508  0.0193
        0.5776  0.3523  0.0508  0.0193
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
```

```
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
        0.5737  0.3512  0.0547  0.0204
.
```

[Data for Vehicle Types 14 through 23 omitted]

.

```
   24   0.392   0.457   0.117   0.034
        0.344   0.497   0.129   0.030
        0.338   0.497   0.135   0.029
        0.349   0.492   0.129   0.030
        0.346   0.497   0.127   0.030
        0.333   0.509   0.129   0.029
        0.324   0.516   0.132   0.028
        0.334   0.506   0.131   0.029
        0.334   0.506   0.131   0.029
        0.320   0.519   0.134   0.028
        0.330   0.506   0.135   0.029
        0.312   0.521   0.140   0.027
        0.295   0.538   0.141   0.026
        0.310   0.527   0.137   0.027
        0.329   0.510   0.133   0.029
        0.343   0.497   0.131   0.030
        0.381   0.460   0.126   0.033
        0.405   0.437   0.123   0.035
        0.426   0.418   0.118   0.037
        0.443   0.403   0.115   0.039
        0.457   0.394   0.110   0.040
        0.461   0.391   0.107   0.040
        0.453   0.400   0.108   0.039
        0.418   0.434   0.112   0.036
```

[Data for Vehicle Types 25 through 28 omitted; the file ends after Vehicle Type 28.]

VMT by Hour of the Day

The MOBILE6.2 default file is HVMT.D. The most current Chicago-area-specific file, derived from 2007 modeling output from CMAP, is shown below. Again, this file contains "commented-out" data from previous files for comparison purposes.

```
VMT BY HOUR
*  Fraction of all vehicle miles traveled by hour of the day.
*  First hour is 6 a.m.  These data are for the Chicago NAA for
*   2007, derived from CMAP VbyHr07.def file based
*   upon his run iepa07 300_20070830, VMT for 2007.
*
*   IEPA estimates are based on CMAP data, but assume VMT in multi-hour
*   modeling periods is distributed as the default is distributed across
*   the hours in question.  Calculations made from VbyHr07.def
*   in accordance with ~~USEPA~~U.S.EPA guidance on the subject.  See M6 Technical
   Guidance
*   Document (Jan '02) Section 4.3.3 for details.
```

```
0.03358  0.07039  0.06240  0.07658  0.05870  0.06327
0.06609  0.06207  0.06693  0.07118  0.07991  0.07507
0.05924  0.04599  0.02160  0.01851  0.01360  0.01010
0.00757  0.00603  0.00568  0.00561  0.00687  0.01304

*  Here are RP's original fractions from VbyHr07.def
*  0.033579 0.066392 0.066392 0.076578 0.062532 0.062532
*  0.062532 0.062532 0.069056 0.069056 0.077490 0.077490
*  0.052616 0.052616 0.010861 0.010861 0.010861 0.010861
*  0.010861 0.010861 0.010861 0.010861 0.010861 0.010861

*  These following are the default values from HVMT.DEF
*   supplied for comparison.
*      0.0569  0.0740  0.0655  0.0555  0.0540  0.0582
*      0.0608  0.0571  0.0598  0.0636  0.0777  0.0730
*      0.0501  0.0389  0.0308  0.0264  0.0194  0.0144
*      0.0108  0.0086  0.0081  0.0080  0.0098  0.0186
*
*  Following are SL's original HVMTCH07 fractions based upon DE's '07 model
*   runs made in 2002 (for information).
*      0.0443  0.0851  0.0755  0.0577  0.0541  0.0583
*      0.0609  0.0572  0.0659  0.0701  0.0818  0.0769
*      0.0576  0.0447  0.0219  0.0188  0.0138  0.0102
*      0.0077  0.0061  0.0058  0.0057  0.0070  0.0132
```

All these Hourly-VMT files show similar profiles, with morning and afternoon peaks, a noontime dip, and a minimum about 3AM - 4AM.

VMT by Speed Bin

The MOBILE6.2 default file is SVMT.D. The Chicago-area-specific Speed-bin file is VbySpd07.DEF, shown below. It represents 2007 CMAP transportation model output, deemed representative for 2008 and 2009 as well. Since it is a “wide” file (at least 90 columns), it is shown here in a smaller-than-usual typeface to make it easier to read

```
SPEED VMT
  1  1 0.0001 0.0000 0.0050 0.0075 0.0043 0.0103 0.0253 0.0254 0.0452 0.0638 0.1040 0.3767 0.1943
    0.1383
  1  2 0.0001 0.0080 0.0148 0.0466 0.0625 0.0859 0.0908 0.1456 0.1013 0.1130 0.1416 0.1285 0.0299
    0.0316
  1  3 0.0001 0.0080 0.0148 0.0466 0.0625 0.0859 0.0908 0.1456 0.1013 0.1130 0.1416 0.1285 0.0299
    0.0316
  1  4 0.0001 0.0048 0.0307 0.0799 0.0662 0.0918 0.1283 0.1232 0.0962 0.1322 0.1209 0.0715 0.0286
    0.0256
  1  5 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
    0.0529
  1  6 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
    0.0529
  1  7 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
    0.0529
  1  8 0.0000 0.0002 0.0012 0.0103 0.0282 0.0531 0.0824 0.0971 0.1819 0.1460 0.1768 0.1341 0.0358
    0.0529
  1  9 0.0000 0.0002 0.0044 0.0256 0.0476 0.0554 0.0941 0.1110 0.1631 0.1493 0.1555 0.1277 0.0264
    0.0395
  1 10 0.0000 0.0002 0.0044 0.0256 0.0476 0.0554 0.0941 0.1110 0.1631 0.1493 0.1555 0.1277 0.0264
    0.0395
  1 11 0.0000 0.0083 0.0147 0.0337 0.0587 0.0474 0.0728 0.1249 0.1122 0.1205 0.1318 0.1771 0.0449
    0.0530
  1 12 0.0000 0.0083 0.0147 0.0337 0.0587 0.0474 0.0728 0.1249 0.1122 0.1205 0.1318 0.1771 0.0449
    0.0530
```

```
  1 13 0.0000 0.0001 0.0044 0.0012 0.0133 0.0118 0.0238 0.0312 0.0561 0.0519 0.1358 0.3491 0.1903
    0.1310
  1 14 0.0000 0.0001 0.0044 0.0012 0.0133 0.0118 0.0238 0.0312 0.0561 0.0519 0.1358 0.3491 0.1903
    0.1310
  1 15 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 16 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 17 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 18 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 19 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 20 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 21 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 22 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 23 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  1 24 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0023 0.0201 0.0151 0.0416 0.0454 0.0992 0.6347
    0.1414
  2  1 0.0000 0.0008 0.0034 0.0102 0.0177 0.0367 0.1027 0.1775 0.1839 0.2465 0.0867 0.1338 0.0000
    0.0000
  2  2 0.0017 0.0254 0.0689 0.0968 0.1127 0.1207 0.1452 0.1356 0.1088 0.0924 0.0445 0.0474 0.0000
    0.0000
  2  3 0.0017 0.0254 0.0689 0.0968 0.1127 0.1207 0.1452 0.1356 0.1088 0.0924 0.0445 0.0474 0.0000
    0.0000
  2  4 0.0050 0.0531 0.1042 0.1302 0.1335 0.1256 0.1265 0.1096 0.0819 0.0645 0.0314 0.0345 0.0000
    0.0000
  2  5 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
    0.0000
  2  6 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
    0.0000
  2  7 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
    0.0000
  2  8 0.0003 0.0070 0.0329 0.0740 0.1233 0.1356 0.1577 0.1579 0.1184 0.0963 0.0417 0.0547 0.0000
    0.0000
  2  9 0.0008 0.0120 0.0470 0.0938 0.1316 0.1388 0.1523 0.1449 0.1091 0.0837 0.0382 0.0476 0.0000
    0.0000
  2 10 0.0008 0.0120 0.0470 0.0938 0.1316 0.1388 0.1523 0.1449 0.1091 0.0837 0.0382 0.0476 0.0000
    0.0000
  2 11 0.0032 0.0375 0.0866 0.1239 0.1277 0.1268 0.1365 0.1206 0.0909 0.0680 0.0356 0.0428 0.0000
    0.0000
  2 12 0.0032 0.0375 0.0866 0.1239 0.1277 0.1268 0.1365 0.1206 0.0909 0.0680 0.0356 0.0428 0.0000
    0.0000
  2 13 0.0000 0.0015 0.0097 0.0286 0.0596 0.0997 0.1556 0.1827 0.1639 0.1548 0.0635 0.0805 0.0000
    0.0000
  2 14 0.0000 0.0015 0.0097 0.0286 0.0596 0.0997 0.1556 0.1827 0.1639 0.1548 0.0635 0.0805 0.0000
    0.0000
  2 15 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 16 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 17 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 18 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 19 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 20 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 21 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 22 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 23 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000
  2 24 0.0000 0.0000 0.0000 0.0000 0.0000 0.0003 0.0615 0.1295 0.1536 0.3574 0.0745 0.2231 0.0000
    0.0000

*
* Comments are not allowed before the end of the data!
*
* Fraction of vehicle miles traveled within an hour within an average speed bins by hour of the day.
* The first hour is 6 a.m.
*
* Speed Bins:
* Hr   2.5    5.0   10.0   15.0   20.0   25.0   30.0   35.0   40.0   45.0   50.0   55.0   60.0   65.0+
```

```
*
*  These values developed from run iepa07 300_20070830 by CMAP, and were calculated in December 2007.
```

Speed bins extend 2.5 mph on either side of the bin name (i.e., the 30-mph speed bin encompasses speeds from 27.5 to 32.5 mph), except for the first (2.5 mph) bin (0 to 2.5 mph) and the last (65+ mph) bin (62.5 mph and above).

The information in this file strictly speaking represents a speed distribution for 2007, but is assumed (after discussion with CMAP) to be reasonably valid throughout the 2000-2010+ period.

The above data are for the Chicago NAA and for Freeways and Arterials only. See M6 User's Guide Sec. 2.8.8.2.c and Appendix B, Table 5: "Average Speed Ranges for Speed Bins (SPEED VMT Command)" for further information about this file and its use. See also the default VMT-by-speed file SVMT.DEF for more information and comments.

The first number in each line is roadway type: 1 = Freeways; 2 = Arterials. Locals and Ramps have a fixed speed in built into the M6 model, and therefore are not affected by this file. The second number is the hour of the day, hour 1 being [hour beginning at] 6 AM, and hour 24 being [hour beginning at] 5 AM the next day. The third and subsequent numbers are the fractions of VMT in that hour that occur within the specified speed bins.

Note that, for Freeways, most VMT is in the 45-50-55-60-mph speed bins, with lower speeds more common during Peak hours. Much the same holds for Arterials, where most VMT is in the 30-35-40-45 mph speed bins.