MASSACHUSETTS 2005 PERIODIC EMISSIONS INVENTORY OF:

VOLATILE ORGANIC COMPOUNDS
NITROGEN OXIDES
CARBON MONOXIDE
SULFUR DIOXIDE
PARTICULATE MATTER
AMMONIA

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1.1 OVERVIEW

The federal Clean Air Act (CAA) and associated regulations require that states compile and submit to the U.S. Environmental Protection Agency (EPA) estimates of certain air pollutants emitted from sources within their borders. Areas that fail to attain one of more of the National Ambient Air Quality Standards (NAAQS) must develop emission inventories as part of the State Implementation Plan (SIP) they submit to EPA demonstrating how they will attain the NAAQS. Inventories provide estimates of the contribution of various source categories to pollution levels and are important components of state plans to attain the NAAQS.

Under EPA's Consolidated Emissions Reporting Rule (CERR), 40 CFR Part 51,), irrespective of a state's NAAQS attainment status, it must develop and update every three years a single, statewide annual inventory of all pollutants that contribute to regional haze. Regional haze is caused by particulates and gases that diminish visibility in Class 1 federal areas (certain parks and wilderness areas). The pollutants that contribute to regional haze are: volatile organic compounds (VOCs), nitrogen oxides (NOx), carbon monoxide (CO), particulate matter (PM), ammonia (NH3), and sulfur dioxide (SO2).

The Massachusetts Department of Environmental Protection (MassDEP) developed a 2002 Base Year Emissions Inventory that was submitted to EPA in January 2008 as part of the Massachusetts *State Implementation Plan (SIP) to Demonstrate Attainment of the National Ambient Air Quality Standard for Ozone* (Ozone SIP). The 2002 Base Year Inventory will be used to measure progress toward attainment of the ozone standard by 2009. (The 2002 Base Year Inventory is available at: http://www.mass.gov/dep/air/priorities/aqdata.htm). It will also be used to measure progress towards long-range visibility goals under the Massachusetts Regional Haze SIP, which will be submitted to EPA in late 2008. MassDEP expects to develop a 2008 Base Year Emissions Inventory as part of the attainment SIP that will be required in connection with the revised ozone NAAQS adopted by EPA in March 2008.

1.2 2005 UPDATES

This 2005 Inventory is an interim inventory between the 2002 and 2008 base year inventories and fulfills the triennial reporting requirements of the CERR. It is based on the 2002 SIP Base Year Inventory methodologies and quality assurance checks for the Point, Area and Mobile source categories. The methodologies and quality assurance checks are fully described in the 2002 Base Year Inventory.

The Stationary Point Source category was updated using the MassDEP 2005 emissions database that is based on annual emissions reports submitted by facilities with actual emissions over 10 tons per year (TPY) of VOC and NOx and over 100 TPY of CO, SO2, PM10, PM2.5 or NH3. Pollutant emissions are presented in Appendix A for the years 2002 and 2005

The On-Road Mobile section is based on 2005 daily vehicle miles traveled from MassHighway and EPA's MOBILE6.2 model was run using 2005 transportation inputs and defaults. The methodologies are the same as the 2002 Base Year Inventory. The 2005 emissions and data files are presented in Appendix B.

The NONROAD model emissions are based on 2005 data and inputs. The model was run for all seasons in order to estimate annual emissions for 2005. The NONROAD input and output files are in Appendix C. The other Off-road mobile categories: Aircraft, Locomotives, and Commercial Vessels were grown from 2002 to 2005 similar to the Area source categories in Tables 1.2 and 1.3.

The 2005 emissions for the numerous Area Source categories were estimated by growing the 2002 Base Year emissions to 2005 using growth factors extrapolated from the annual growth factors MassDEP used to project future year emissions in the Ozone Attainment SIP. The 2005 Area source emissions are estimated in Tables 1.2 and 1.3.

1.3 EMISSIONS DATA SUMMARIES AND TRENDS

Table 1.1 and Figures 1.1 to 1.9 present summaries of the inventoried pollutants broken out into the five source categories of point, area, on-road mobile, off-road mobile, and biogenics. VOC, NOx and CO are ozone precursors are reported in tons per summer day (TPSD) as well as in tons per year (TPY). CO is also reported in tons per winter day (TPWD). The other pollutants are reported in TPY.

Since 1990, MassDEP has periodically estimated emissions of four pollutants: VOC, NOx, CO, and SO2. Emissions trends from 1990-2005 are shown in Table 1.4 and Figures 1.10 to 1.13 but not for PM10, PM2.5 and NH3 because only two years of data are available.

In order to compare emissions trends as accurately as possible over time as shown in Table 1.4 and Figures 1.10 to 1.13, MassDEP ran the latest MOBILE6.2 and NONROAD2005a models for previous inventory years from 1990 through 2005.

VOC
Total VOC emissions were reduced by 406 TPSD or 38% from 1990 to 2005, with 245 tons of those reductions attributable to on-road mobile sources. The on-road mobile source emission reductions for this period, in spite of increased Vehicle Miles Traveled, are due to the ongoing numerous programs to reduce emissions from motor vehicles, including: the Federal Motor Vehicle Control Program (FMVCP), Massachusetts Low Emission Vehicle program (LEV), Massachusetts Enhanced Inspection and Maintenance (MA I/M) program, Stage II Vapor Recovery for Gasoline Stations, and Reformulated Gasoline (RFG).

NOx
Total NOx emissions decreased by 262 TPSD or 29% from 1990 to 2005. Point source reductions of 213 TPSD are attributable to the Reasonably Available Control Technology (RACT) program and reductions in power plant emissions. Although overall NOx emissions increased slightly by 2 TPSD from on-road mobile sources from 1990 to 2002, the reduction from 1999 to 2005 was 20%, reversing the trend of increasing emissions for this category from 1990-1999. This reduction is attributable to the MA I/M and LEV programs and more reductions are expected as older, higher emitting cars are replaced with cleaner vehicles. Although Off-road NOx emissions increased by approximately 28% during this period, newly adopted diesel control programs are expected to reduce NOx emissions from this category subsequent to 2005.

CO
Total CO emissions decreased by 2,624 TPSD or 41% from 1990 to 2005. Despite slight increases in emissions from point, area and off-road categories, the overall reduction is attributable to an estimated 3,093 TPSD (66%) reduction in on-road mobile emissions for this period. Future reductions from off-road engines are expected as programs to control emissions from these sources are implemented.

SO2
Total SO2 emissions decreased by 241,388 TPY or 66% from 1990 to 2005. Point sources, mainly power plants, account for a reduction 180,270 TPY. The Massachusetts State Acid Rain Program regulation, 310 CMR 7.21, requires that MassDEP report statewide SO2 emissions annually to determine whether a statutory cap and trigger level of SO2 emissions are exceeded. Table 1.5 is a comparison of the annual emission levels and the state statutory cap and trigger levels since 1979. Emissions for 2005 are less than half of the 310 CMR 7.21 statutory cap and trigger levels.

Other Pollutants
Annual emissions data (2002 and 2005) for PM10, PM2.5 and NH3 are insufficient to present a trend.