# The State of New Jersey
# Department of Environmental

# Proposed State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the One-Hour Ozone National Ambient Air Quality Standard

# Update to Meeting the Requirements of the Alternative Ozone Attainment Demonstration Policy-Additional Emission Reduction Commitment and Transportation Conformity Budgets

# Appendix I: Post-Processor Air Quality (PPAQ) Driver File and Output Files, Traffic Data Input Files, Spreadsheets for Emission Calculations and Tier 2 Motor Vehicle Standards / Low Sulfur Gasoline Emission Benefit

# February 4, 2000

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## 1. Highway Mobile Sources

The highway mobile source emissions for 2005 and 2007 are an estimate of VOC and $NO_x$ tailpipe emissions, and VOC evaporative emissions, from vehicles operating on public roadways. In general, the 2005 and 2007 emissions are calculated by multiplying an emission factor times an activity level. In the case of the highway mobile source portion of the emission inventory, the activity level is daily vehicle miles traveled (DVMT). The emission factors are calculated using a USEPA computer model, Mobile 5a_h.

The DVMT used to estimate the 2005 and 2007 highway emissions presented here is based on travel demand models (TDMs) in use by the three (3) Metropolitan Planning Organizations (MPOs) in the State. The three MPOs with jurisdiction in New Jersey are the North Jersey Transportation Planning Authority (NJTPA), the Delaware Valley Regional Planning Commission (DVRPC) and the South Jersey Transportation Planning Organization (SJTPO). Figure 1 presents a map showing the counties included in each of the three MPOs.

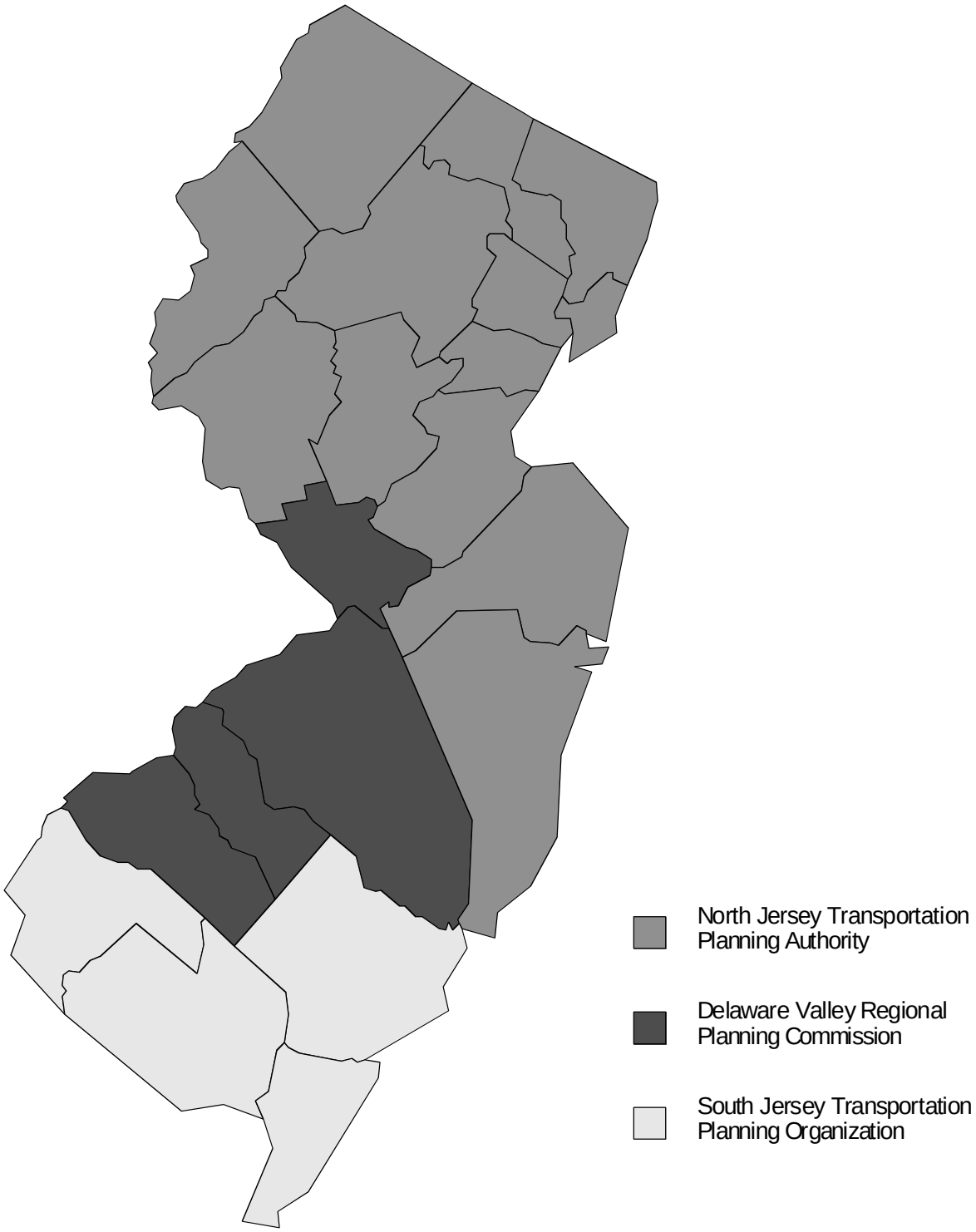
In general, the TDMs use demographic data, such as population, employment, housing densities, and shopping patterns to estimate the demand for travel in the modeled area. This travel demand is then distributed throughout the available roadways and transit routes, referred to as links. An algorithm which takes into account factors such as transit fares, tolls, traffic volume, and time of day is used to estimate how many people travel from one point to another on any given link. The number of vehicles traveling on each link is then used to estimate the speed of travel and the total number of vehicle miles traveled (VMT) in a day. After this process, any VMT which is not accounted for in the model, such as increases to account for local roadways, is added to the model output to yield the final DVMT values. The resulting spread sheets contain the DVMT used by county for the MPO regions.

The specific method used to convert this DVMT into emission varies by MPO. The NJTPA and the SJTPO both use the Post-Processor for Air Quality (PPAQ) computer model to estimate emissions. The DVRPC uses their own, specific computer model to generate emissions information. However, all three MPOs use Mobile 5a_h in the same manner.

### Mobile5a_h Model Input Parameters

The Mobile 5a_h model simulations for 2005 and 2007 included the effects of the following federal programs: Tier 1 program, the National Low Emission Vehicle program (NLEV) and the Reformulated Fuel program (RFG), and the New Jersey Motor Vehicle Inspection and Maintenance Program. The Mobile5a_h model can simulate the full effects of the RFG I program, and only part of the RFG II program. The effects of the Tier 2 Motor Vehicle Standards and the Low Sulfur Gasoline Emission Benefit are calculated off model, and the spreadsheets used are also provided in this appendix.

## Figure 1: Metropolitan Planning Organizations in New Jersey



*a. Modeling the New Jersey Inspection and Maintenance Program*

A two-step process is required to estimate the impact of the vehicle inspection program on emissions from highway mobile sources in New Jersey. The first step estimates the emissions from all vehicles in the State as if they were inspected at a centralized, test-only inspection facility. The second step estimates the emissions from all vehicles in the state as if they were inspected at a decentralized, test-and-repair facility. The composite emissions from these two steps are then combined together assuming that 70% of the vehicle fleet is inspected at a centralized facility and 30% are inspected at a decentralized facility. The New Jersey decentralized test was estimated to be 80% as effective as a centralized test, verses a 50% effectiveness accounted for in the Mobile 5a_h model. To account for this, 3/5 times the decentralized emissions minus the centralized emissions was subtracted from the decentralized emissions before multiplying by the 30% use factor for the decentralized portion. The general input parameters that represent the New Jersey inspection and maintenance program in 2005 and 2007 are as follows:

**General Input Parameters for New Jersey's Inspection & Maintenance Program in 2005 and 2007:**

- idle testing for pre-1981 vehicles
- acceleration simulation mode (ASM) exhaust testing with final emission cutpoints for HC, CO, and NOx, for model year 1981 and newer vehicles
- pressure testing (81 + newer vehicles including gas cap test)
- purge testing (81 + newer vehicles)
- anti-tampering program (ATP) testing, same as 1999:
  - catalytic converter check
  - fuel inlet restricter check
  - gas cap integrity check
- gas cap testing for pre 1981 vehicles
- technician training
- biennial testing cycle
- 98% compliance rate (effectiveness of the inspection and maintenance program in reducing HC, CO, and NOx emissions)

The individual input driver files used for each MPO are contained in this appendix.

*b. The Post-Processor for Air Quality*

Both the NJTPA and the SJTPO use a computer model call the Post-Processor for Air Quality (PPAQ) to estimate emissions from highway mobile sources. In general, this model uses a "traffic file," generated by the TDM to calculate emissions. The traffic file contains DVMT estimates for three (3) roadway types for four (4) time periods over 24 hours for each county in the MPO's jurisdiction. There is also a time period for the 24-hour average, but this is not used for SIP purposes. The three roadway types are freeways, arterials and locals. The four time periods used are overnight (7 p.m. to 6 a.m. the following day), morning rush hour (6 to 9 a.m.), mid-day (9 a.m. to 4 p.m.), and evening rush hour (4 p.m. to 7 p.m.). The traffic files used to generate the 2007 highway emissions for the NJTPA and the SJTPO are presented in this appendix and are available only in electronic copies.

The second type of input file used by the PPAQ model is referred to as a "driver" file. This driver file contains information about which traffic file to use, the temperature data that should be used, the output files to generate and the specific Mobile 5a_h model input files. The driver files used to develop the 2007 and 2005 highway emissions for the NJTPA and the SJTPO are contained in this appendix and are available only in electronic copies.

The PPAQ model first uses the driver file and the traffic file to generate a Mobile 5a_h input file. The program then runs Mobile 5a_h using the generated input file to create an output file. The model then uses the Mobile 5a_h input file, the Mobile 5a_h output file and the driver file to calculate the emissions. The calculated emissions are stored in a dBASE format file for future use. Copies of the driver files containing the Mobile 5a_h input files used the generate the 2007 and 2005 highway emissions for the NJTPA and the SJTPO are provided in this appendix. Also, the spreadsheets with the results of the modeling and the off-model calculations to account for New Jersey's inspection and maintenance program are provided.

*c. DVRPC Modeling Process*

The DVRPC uses a slightly different process to calculate emissions. First, the TDM is used to generate a file which contains the relevant DVMT and speed data, referred to as a card file. DVRPC's model uses this card file, along with several other files, to generate the DVMT file. The other file mentioned here account for seasonal adjustment, off-model DVMT, and growth for non-modeled years. Three Mobile 5a_h input files are then set up and run. The three input files are for each of the three roadway types used in the TDM: freeways, arterials, and locals. The DVRPC modeling procedure generates Mobile 5a_h emission factors for speeds between 3 and 55 miles per hour in one mile per hour increments for use by the model. The emission factors from the three Mobile 5a_h model runs are then merged into an emission factor lookup table file for use by the DVRPC model. The Mobile 5a_h input files used to generate the 2005 highway emissions, and the spreadsheets with the results are provided in this appendix.

# Appendix I
## Attachment A: NJTPA

# Appendix I
## Attachment B: SJTPO

# Appendix I
## Attachment C: DVRPC