The State of New Jersey
Department of Environmental Protection

Proposed Revisions to the Enhanced Inspection and Maintenance (I/M) Program for the State of New Jersey

Extension of the New Vehicle Inspection Exemption From 4 Years to 5 Years

I/M Program Modeling and USEPA Performance Standard Modeling

SIP Revision

July, 2010

Preface

This document is a revision to the State of New Jersey's Inspection and Maintenance (I/M) program State Implementation Plan (SIP). Specifically, this document provides the United States Environmental Protection Agency (USEPA) with documentation on the emission impacts that will result from proposed changes to New Jersey's enhanced I/M program. The proposed changes to New Jersey's I/M program are an extension of the new vehicle inspection exemption from 4 years to 5 years and an acknowledgement that New Jersey's decentralized I/M network (the private inspection facilities, or PIFs) is currently 96 percent as effective as New Jersey's centralized I/M network (the centralized inspection facilities, or CIFs). PIFs were previously assumed to be 80 percent as effective as CIFs.

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Acronyms and Abbreviations

ASM	Acceleration Simulation Mode
CAA	Clean Air Act
CIF	Centralized Inspection Facility
CO	Carbon Monoxide
EGR	Exhaust Gas Recirculation
Fed. Reg.	Federal Register
gpm	Grams Per Mile
HC	Hydrocarbons
HDGV	Heavy Duty Gasoline Vehicle
I/M	Inspection and Maintenance
LDGT	Light Duty Gasoline Truck
LDGV	Light Duty Gasoline Vehicle
LEV	Low Emission Vehicle
MY	Model Year
NAAQS	National Ambient Air Quality Standards
NHSDA	National Highway System Designation Act
NJDEP	New Jersey Department of Environmental Protection
NJMVC	New Jersey Motor Vehicle Commission
NJDOT	New Jersey Department of Transportation
NO_x	Oxides of Nitrogen
OBD	On-Board Diagnostics
OTR	Ozone Transport Region
PCTG	Parsons Commercial Technology Group Inc.
PCV	Positive Crankcase Ventilation
PIF	Private Inspection Facility
ppm	Parts Per Million
psi	Pounds Per Square Inch
ROP	Rate of Progress
RPM	Revolutions Per Minute
RVP	Reid Vapor Pressure
SIP	State Implementation Plan
TSI	Two-Speed Idle
USEPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
ZEV	Zero Emission Vehicle

Executive Summary

This document is a revision to the State of New Jersey's Inspection and Maintenance (I/M) program State Implementation Plan (SIP) reflecting recent statute changes to the program. The changes are an extension of the new vehicle inspection exemption from 4 years to 5 years and an acknowledgement that New Jersey's decentralized I/M network (the private inspection facilities, or PIFs) is currently 96 percent as effective as New Jersey's centralized I/M network (the centralized inspection facilities, or CIFs). PIFs were previously assumed to be 80 percent as effective as CIFs.

This SIP revision evaluates the emission impacts of the enhanced I/M program changes by comparing emission factors calculated using the USEPA MOBILE6 model for the existing and new programs. The emission factors were estimated for 2012 which is when the anticipated changes are expected to be in place. The model results indicate that there is no difference between emission factors for the existing and new enhanced I/M programs for ozone precursors (VOCs and NO_x). The new enhanced I/M program provides a small but insignificant increase in the predicted carbon monoxide emission factor relative to the existing program. This SIP demonstrates that the proposed changes to the I/M program do not compromise the State's efforts to meet and/or maintain National Ambient Air Quality Standards (NAAQSs) for ozone or carbon monoxide.

This SIP revision also revises the State's enhanced I/M performance standard modeling to account for the proposed I/M program changes. This revision shows that the State's new enhanced I/M program continues to meet the USEPA low enhanced performance standard.

I. Introduction:

A. Background

In accordance with the requirements of the Clean Air Act (CAA), the State of New Jersey implemented an enhanced Inspection and Maintenance (I/M) program on December 13, 1999. The implementation of this program continues to be an integral part of New Jersey's plan to attain and maintain compliance with the health-based National Ambient Air Quality Standards (NAAQS) for ozone and for carbon monoxide. Reducing the emissions of carbon monoxide, as well as emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) (precursors to ozone formation), will help the State in its efforts to improve its air quality and protect the health and welfare of its citizens.

New Jersey's enhanced I/M program design is a hybrid network system that consists of both centralized (test-only) and decentralized (test-and-repair) facilities. A private contractor to the State operates the centralized portion of the inspection network which consists of a network of Centralized Inspection Facilities (CIFs). The decentralized network is comprised of over 1,000 Private Inspection Facilities (PIFs) that are privately owned and operated, and licensed by the New Jersey Motor Vehicle Commission (NJMVC) to perform vehicle inspections on behalf of the State. This hybrid network design gives motorists a choice as to where to have their vehicles inspected.

B. Purpose

This document revises the State of New Jersey's enhanced Inspection and Maintenance (I/M) State Implementation Plan (SIP) due to recent statute changes to the I/M program. A draft of the New Jersey legislation for the I/M program changes is provided in Appendix I. A complete history of New Jersey's I/M SIP is provided in Appendix II. This SIP revision includes emission modeling that quantifies the impacts of the program changes including a comparison to the USEPA performance standard. The changes to New Jersey's I/M program are an extension of the new vehicle inspection exemption from 4 years to 5 years and an acknowledgement that New Jersey's decentralized I/M network is currently 96 percent as effective as New Jersey's centralized I/M network. PIFs were previously assumed to be 80 percent as effective as CIFs. The goal of this SIP revision is to demonstrate that the changes to the enhanced I/M program do not compromise the State's efforts to meet and/or maintain National Ambient Air Quality Standards (NAAQSs) for ozone or carbon monoxide. It will also demonstrate that New Jersey's I/M program continues to meet the USEPA I/M performance standard after the changes to the I/M program are implemented.

Although it does not affect the demonstrations in this SIP revision, the NJMVC intends to include provisions that discontinue smoke testing for certain pre-1997 diesel vehicles in future rule changes that implement the recent statute changes. Although the visible smoke test for pre-1997 light-duty diesel vehicles is being eliminated, on-board

diagnostics emissions testing will continue for 1997 and newer model years. The extension of the I/M program to light duty diesel vehicles was included in a recent SIP revision[1]; however, any benefits associated with a visible smoke test were not included as a control measure to meet attainment, rate of progress or other SIP commitments. There is no impact to the SIP from this action.

II. I/M Program Modeling and Revised Performance Standard Modeling

A. Background

As part of its final rule for Inspection and Maintenance (I/M) requirements, the USEPA established a "model" program for areas that were required to implement enhanced I/M programs. This model program is termed by the USEPA as the "I/M performance standard" and is defined by a specific set of program elements.[2] The purpose of the performance standard is to provide a gauge by which the USEPA can evaluate the adequacy and effectiveness of each state's enhanced I/M program. As such, states are required to demonstrate that their enhanced I/M programs achieve applicable area-wide emission levels for the pollutants of interest that are equal to, or lower than, those which would be realized by the implementation of the model program. The USEPA allows for a margin of error of +/- 0.02 gpm in determining compliance with the performance standard.[3]

Originally, the USEPA only designed one enhanced performance standard, as specified at 40 C.F.R. §51.351, and required all enhanced I/M program areas to meet or exceed that standard. However, on September 18, 1995, the USEPA promulgated the "low" enhanced performance standard.[4, 5] The low enhanced performance standard is a less

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[1] State of New Jersey, Department of Environmental Protection, SIP Revision, Proposed I/M Program Modeling and Revised Performance Standard Modeling, December, 2009.

[2] 40 C.F.R. §51.351.

[3] 40 C.F.R. §51.351(g)(13).

[4] 60 Fed. Reg. 48029 (September 18, 1995).

[5] On July 19, 1996, the USEPA established an additional enhanced I/M performance standard for qualified areas in the Northeast Ozone Transport Region (OTR), often referred to as the OTR low enhanced performance standard. The emission reduction targets for the OTR low enhanced performance standard are less than both the low enhanced performance standard and the basic performance standard. The USEPA established two criteria that areas have to meet in order to be eligible for the OTR low enhanced performance standard: 1) the standard applies only in attainment areas, marginal ozone non-attainment areas and certain moderate ozone non-attainment areas with populations under 200,000 in an OTR and 2) the standard program must be supplemented by other measures in order to achieve emission reductions equal to or greater than that which would have occurred had a regular low enhanced I/M

stringent enhanced I/M performance standard established for those areas that have an approved SIP for Rate of Progress (ROP) for 1996, and do not have a disapproved plan for ROP for the period after 1996 or a disapproved plan for attainment of the air quality standards for ozone or carbon monoxide.[6]

New Jersey is currently demonstrating compliance with the Clean Air Act requirements for ROP and does not have a disapproved attainment plan and therefore is only required to meet the low enhanced performance standard. The revised performance standard modeling included as part of this submittal is intended to show attainment of the low enhanced performance standard.

In accordance with the USEPA's final rule for I/M requirements, a state must design and implement its enhanced I/M program such that it meets or exceeds, within +/- 0.02 grams per mile (gpm)[7], a minimum performance standard. The performance standard is expressed as average gpm emission levels from area-wide highway mobile sources as a result of the enhanced I/M program.[8] Areas must meet the performance standard for the pollutants that cause them to be subject to the enhanced I/M requirements.[9] New Jersey was required to implement its enhanced I/M program because of its non-attainment status for two criteria air pollutants; ozone (of which volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) are precursors) and carbon monoxide.

The USEPA's final rule on I/M requirements also requires that the equivalency of the emission levels achieved by the State's enhanced I/M program design compared to those of the performance standard must be demonstrated using the most current version of USEPA's mobile source emission model.[10] At the beginning of the current analysis in early 2010, the latest mobile source emission model was MOBILE 6.2.03 (dated September 24, 2003), which was used for this analysis.

B. Modeling Parameters and Assumptions

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program been implemented. Although New Jersey is currently required to meet the low enhanced performance standard, New Jersey did not meet the criteria to qualify for use of the OTR low enhanced performance standard.

[6] 40 C.F.R. §51.351(g).

[7] 40 C.F.R. §51.351(g)(13) allows for a margin of error of +/-0.02 gpm for each pollutant result.

[8] 40 C.F.R. §51.351(a), 57 Fed. Reg. 52988 (November 5, 1992).

[9] Ibid.

[10] 40 C.F.R.§51.351(d), 57 Fed. Reg. 52988, (November 5, 1992).

Modeling parameters and assumptions used to calculate emission factors that represent New Jersey's existing I/M program, New Jersey's new I/M program, and the USEPA low enhanced performance standard model program are provided in Appendix III.

New Jersey's enhanced I/M program is comprised of a hybrid network of both centralized test-only facilities and decentralized test-and-repair facilities. The State has assumed a 70/30 CIF/PIF split for its enhanced I/M network (that is, 70 percent of the vehicle owners are expected to pass inspection at a centralized inspection facility and the remaining 30 percent are expected to pass inspection at a decentralized private inspection facility).

In 1996, in accordance with the flexibility afforded states by the National Highway Systems Designation Act (NHSDA), New Jersey claimed that the decentralized portion of its enhanced I/M program would be 80 percent as effective as the centralized portion of its program.[11] As part of its August 31, 2001 enhanced I/M SIP revision submittal, New Jersey demonstrated that its private inspection network is achieving this 80 percent effectiveness. In fact, this analysis showed that the State was conservative in its 80 percent estimate. Appendix II Sections C and F contain additional discussions concerning the basis for the original 80 percent effectiveness assumption.

New Jersey has recently suspected that the effectiveness of the private inspection network may have increased to a level significantly higher than 80 percent, especially now that the majority of inspections are being conducted with OBD testing which is considered to be equally effective whether it is conducted by a CIF or a PIF. Therefore, New Jersey conducted a study to assess the current effectiveness of its PIF network. Documentation of the study is attached as Appendix IV. The study concluded that the PIF network is currently 96 percent as effective as the CIF network.

C. Modeling Results:

The following table shows the emission factors (in grams per mile) obtained for the USEPA performance standard program, New Jersey's existing enhanced I/M program, and New Jersey's new enhanced I/M program for VOC, NO_x and carbon monoxide, respectively. Modeling files are provided in Appendix V and the modeling results are summarized in Appendix VI.

Table 1: Modeling Results

Program Type	VOC (gpm)	NO_x (gpm)	Carbon Monoxide (gpm)

[11] Revision to the State Implementation Plan (SIP) for the Control of Mobile Source Ozone Air Pollution--Enhanced Inspection and Maintenance (I/M) Program, March 27, 1996, Section 3, Network Type and Program Evaluation, pages 14-15.

USEPA Low Enhanced Performance Standard (2002)	0.903 - 0.943*	2.376 - 2.416*	21.834 - 21.874*
New Jersey Existing Enhanced I/M Program (2012)	0.379	0.800	10.347
New Jersey New Enhanced I/M Program (2012)	0.379	0.800	10.350

* The performance standard values are expressed as a range to account for the +/- 0.02 gpm margin for error allowed for by the USEPA. Therefore, the standards are met so long as they fall below the upper limit of the range.

III. Conclusion

As shown in Table 1, the model results indicate that there is no difference between emission factors for New Jersey's existing and new enhanced I/M programs for ozone precursors (VOCs and NO_x). For these pollutants the magnitude of the increase in emissions due to the increased new vehicle exemption period from 4 years to 5 years is completely offset by the reduction in emissions due to the increased effectiveness of New Jersey's PIFs.

The new enhanced I/M program results in an insignificantly small increase in the predicted carbon monoxide emission factor relative to the existing enhanced I/M program. The increase is well below the USEPA margin of error of +/- 0.02 gpm. Indeed, to 4 significant figures, the carbon monoxide emission factors are the same.

This demonstrates that the proposed changes to the enhanced I/M program do not compromise the State's efforts to meet and/or maintain National Ambient Air Quality Standards (NAAQSs) for ozone or carbon monoxide. Also, as shown in Table 1, the State's new enhanced I/M program meets the USEPA low enhanced performance standard.