

**Commonwealth of Pennsylvania
Department of Environmental Protection**



**Report to the Environmental Quality Board:
Feasibility of Modifying the
Pennsylvania Vehicle Emissions Inspection Programs
(Prepared Pursuant to 25 Pa. Code § 126.451(3))**

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EXECUTIVE SUMMARY

The 1990 Amendments of the federal Clean Air Act (CAA) mandate vehicle emission inspection/maintenance (I/M) programs as one of the control measures to attain and maintain the health based national ambient air quality standards. The I/M program is mandatory in certain areas in the United States based on certain criteria including the severity of air pollution, population, and/or geographic location.

A vehicle emission inspection/maintenance (I/M) program is required in 25 counties in Pennsylvania, because the entire Commonwealth is included in the Ozone Transport Region established by operation of law in 1990. CAA § 184; 42 U.S.C. § 7511c (relating to control of interstate ozone air pollution). The Department of Environmental Protection (DEP), in consultation with the Pennsylvania Department of Transportation (PennDOT), was required by 25 *Pa. Code* § 126.451(3) (relating to responsibilities of the Department) to study and evaluate the feasibility of modifying I/M program taking into account implementation of the Pennsylvania Clean Vehicles Program for new model year 2008 passenger cars and light-duty trucks.

Implementing of the Clean Vehicles Program does not necessarily pave the way to amending the I/M programs. For I/M programs, the CAA establishes unique effectiveness requirements that must be met regardless of the effectiveness of other air quality programs in the state. Furthermore, the statute would require equivalent and contemporaneous emission reductions to be achieved to replace those lost by modifications to the I/M Program, in addition to emission reductions from control measures (such as the Pennsylvania Clean Vehicles Program) currently being implemented.

Any future modifications to an I/M program would be limited by three factors:

- The Commonwealth's ability to demonstrate timely attainment and maintenance of the ozone and fine particulate standards and compliance with federal "anti-backsliding" requirements in nonattainment or maintenance areas, which require replacement of lost emission benefits;
- Compliance with the applicable federal performance standard; and
- Compliance with the federally prescribed elements of I/M programs.

For purposes of this Report to the Environmental Quality Board, the Departments analyzed the various elements of the I/M program separately for each of the Commonwealth's four I/M regions for 2010 and 2018. The analyses identified the following:

- Any modification to an I/M program must meet the applicable federal performance standard and include the requisite program elements.
- Modifying the I/M program in any I/M region of the Commonwealth in a way that would diminish emission benefits from those presently achieved is not feasible unless and until compensating equivalent emission benefits are found. This is due primarily to the "anti-

backsliding” provisions in the Clean Air Act. These anti-backsliding provisions would be applicable on a nonattainment area basis.

- Since federal control strategies or state regulation in place or in development by the Commonwealth to reduce emissions already span the utility, industrial, commercial, consumer product, highway and nonroad sources of emissions, cost-effective emission benefits to replace any lost through I/M modifications would be difficult to find.
- Pennsylvania’s I/M program will continue to make valuable contributions to the Commonwealth’s effort to attain and maintain the NAAQS. However as detailed in this report, the Commonwealth’s I/M program only just meets federal performance requirements, so the margin for any modification is minor at best. Moreover, in the future, EPA’s model estimates that emission reductions currently being achieved in the Northern I/M Region will diminish as the fleet contains more and more vehicles equipped with on-board diagnostics.
- EPA, under a Federal Advisory Committee Act process, is developing an assessment of how emission inspection programs may evolve in the future with the changing fleet. The Commonwealth should take into account that assessment once it is complete for any potential changes to its I/M program.

I. PURPOSE AND BACKGROUND

A vehicle emission inspection/maintenance (I/M) program is required in 25 counties in the Commonwealth of Pennsylvania irrespective of the air quality status of a particular area, because the Commonwealth is included in the Ozone Transport Region established by operation of law in 1990. The Department of Environmental Protection (DEP), in consultation with the Pennsylvania Department of Transportation (PennDOT), was required by 25 Pa. Code § 126.451(3) to study and evaluate the feasibility of modifying the I/M program taking into account implementation of the Pennsylvania Clean Vehicles Program for new model year 2008 passenger cars and light-duty trucks.

The purpose of this Report is to comply with 25 Pa. Code Subchapter D, Pennsylvania Clean Vehicles Program, 25 Pa. Code § 126.451(3), which states:

The Department [of Environmental Protection], in conjunction with the Department of Transportation, will study and evaluate the feasibility of modifying the Pennsylvania vehicle emission inspection program. In performing the study and evaluation, the Department, in conjunction with the Department of Transportation, will consider the additional reductions in NO_x [nitrogen oxides], VOCs [volatile organic compounds] and other pollutants to be achieved through implementation of the Title 13, CCR, Division 3, Chapter 1 and 2 requirements. The Department will submit the findings and recommendations to the EQB no later than September 10, 2007.

Pennsylvania's I/M program has been operated by the Pennsylvania Department of Transportation (PennDOT) since 1984, as required by the federal Clean Air Act. The CAA and subsequent vehicle I/M regulations of 1992 (40 CFR 51.350) identify areas that must implement "enhanced" I/M programs. Because the entire Commonwealth is a part of the northeast Ozone Transport Region established under Section 184 of the CAA, 42 U.S.C. § 7511c, the I/M requirement applies statewide, except in areas exempted by virtue of lower population and population density (42 U.S.C. § 7511c(b)(1)(A)). The statewide requirement is designed to assist in reducing a state's contribution to air quality violations in downwind states. While the EPA has in recent years promulgated regulations to provide additional "flexibility," the Clean Air Act requires I/M programs in an ozone transport region to remain in effect, regardless of local ozone attainment status of the area.

Because I/M programs were mandated by Congress as a control measure to address nonattainment, it is important to note that 24 of the 25 Pennsylvania counties required to have I/M have also been designated by EPA as not attaining the health-based 8-hour ozone nonattainment standard, as indicated in Appendix 1. On July 11, 2007, EPA proposed making the ozone 8-hour ozone nonattainment standard (NAAQS) more stringent after the Agency's scientific advisory body concluded that neither public health nor the environment (including agriculture) is being protected at the current level. 72 Fed. Reg. 37817. Many of the counties in this Commonwealth, in particular the I/M

counties, meeting the current standard would not meet the range of standards proposed by EPA for the more stringent standard (see maps at www.epa.gov/groundlevelozone/pdfs/20070621_maps.pdf). EPA is under a court order to promulgate the revised eight-hour ozone standard by March 2008. States will need to submit designation recommendations for nonattainment areas to EPA by June 2009, EPA will finalize nonattainment designation in 2010, and states will once again need to impose tighter VOC and NO_x emission limitations in order to attain and maintain the more protective 8-hour ozone standards.

Over the past two decades, air quality needs, federal requirements, vehicle and inspection technology have changed; Pennsylvania's I/M program has also evolved. In 2002, the Department and PennDOT were sued by environmental groups seeking enforcement of the I/M program in the U.S. Federal Court for the Eastern and Middle Districts of Pennsylvania. The Departments worked tirelessly with the plaintiffs, elected officials and EPA to develop elements of the I/M program required for each affected region of the Commonwealth that would satisfy all concerned. Resolution was finally achieved and documented in settlement agreements filed with the court in 2003. The I/M program requirements were codified in PennDOT regulations and systematically implemented in accordance with the terms of the settlements. The revised I/M program being implemented in Pennsylvania approved by EPA as a SIP revision on October 6, 2005 (70 *Fed. Reg.* 58313), is federally enforceable by EPA and citizens under Section 304 of the CAA, 42 U.S.C. § 7604 (relating to citizen suits).

This federally mandated program is an important part of Pennsylvania's strategy to attain and maintain the ozone standards and will be key in meeting the new ozone standards. The program will also be helpful in meeting the federal standards for fine particulates (PM_{2.5}), as some pollutants that contribute to ozone also contribute to the formation of fine particulates. In addition, Pennsylvania will also include the I/M program as a control strategy in its SIP revisions for the eight areas which have been designated as nonattainment areas for the annual PM_{2.5} standard; these SIP revisions are due April 2008. On September 21, 2006, EPA tightened the PM_{2.5} short-term (24-hour) standard; Pennsylvania will make recommendations for nonattainment area boundaries for that standard in December 2007.

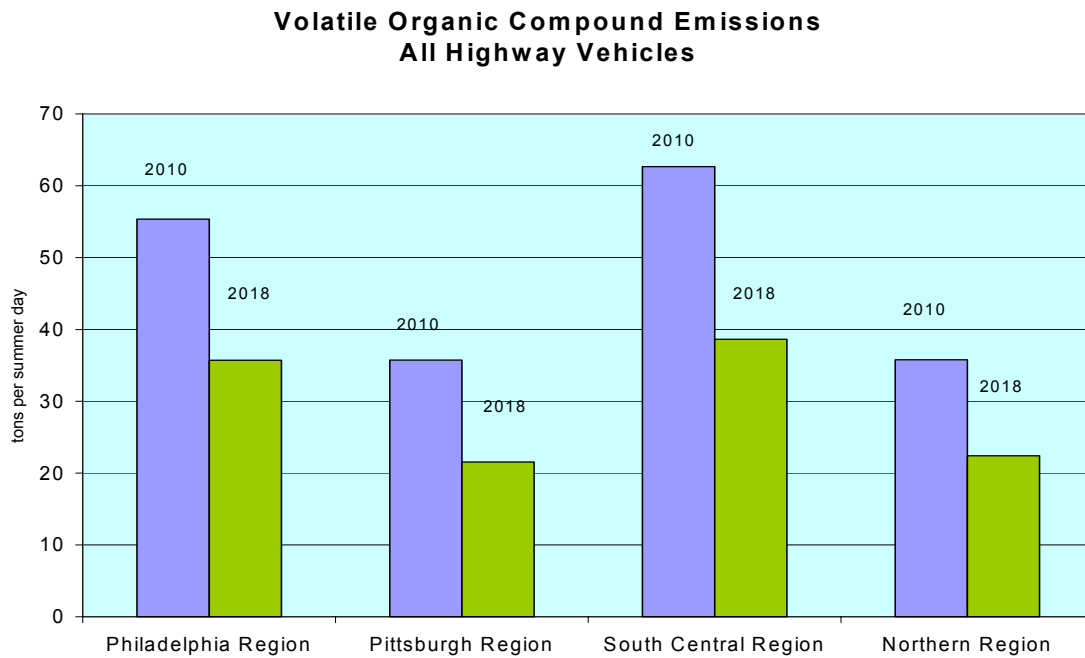
The emission benefits of the current I/M program have also been included in the 17 ozone-related SIP revisions the Department submitted to EPA for the eight-hour ozone NAAQS¹ between September 2006 and June 2007. EPA has already approved seven of those plans. As a result of the I/M program, Pennsylvania Clean Vehicles Program and control measures reducing emissions from power plants, industry, area sources such as consumer products and solvents, the SIP revisions for areas now attaining the current ozone standard demonstrate that the areas will maintain the eight-hour ozone standard

¹ EPA is required to review the NAAQS periodically to ensure it is adequately protective of public health and the environment. CAA § 109; 42 U.S.C. § 7409(d) (relating to national primary and secondary ambient air quality standards). The "one-hour" standard was adopted in 1989. In 1997, EPA adopted a new "eight-hour" standard, but its implementation was delayed until 2004 by litigation. The Commonwealth's SIP for the current program was originally submitted in 2004 to fulfill its obligation for an I/M program in all mandated counties and to meet the one-hour standard.

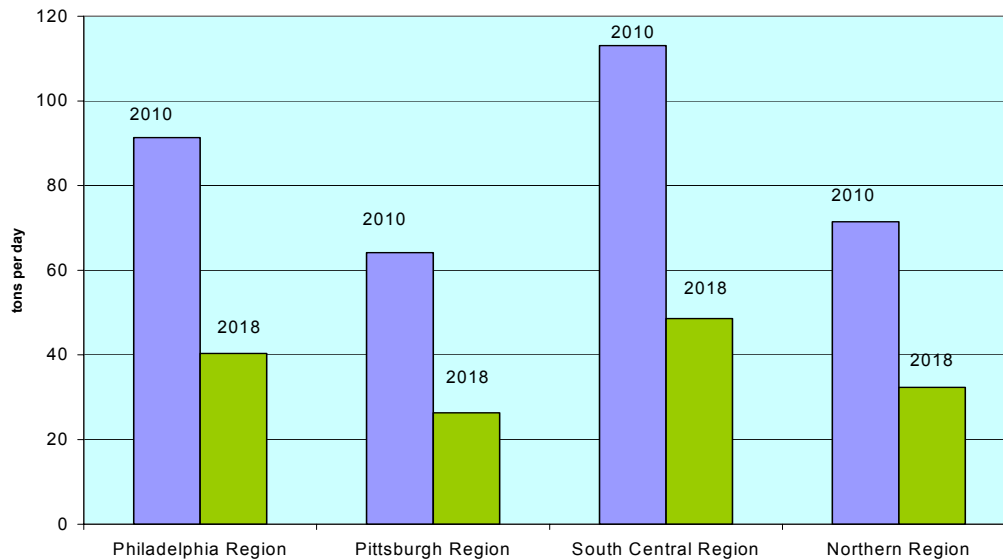
through 2018. The SIP revision prepared for the Philadelphia area demonstrates that the area will attain the ozone standard by June 2010. However, approval of the attainment demonstration as a SIP revision by EPA is required under Section 172 of the CAA, 42 U.S.C. § 7502 (relating to nonattainment plan provisions in general). Based on current data, the Department will need to assess the air quality impacts of the 2007 ozone season on certain eight-hour ozone nonattainment areas including the Pittsburgh-Beaver Valley Area. Although, EPA proposed to approve the redesignation request and maintenance plan for the area (72 *Fed. Reg.* 37683 (Jul. 11, 2007)), exceedances of the 8-hour ozone standard in August 2007 could jeopardize approval of the redesignation request.

Despite the continuing challenges to achieve and maintain the ozone and fine particulate NAAQS, Pennsylvania continues to make progress. Emissions contributing to ground-level ozone are expected to be reduced significantly in the 25 I/M counties between 2010 and 2018, as shown in Figure 1.

Figure 1: Expected Highway Vehicle Emissions of Ground-Level Ozone Precursors



Nitrogen Oxide Emissions All Highway Vehicles

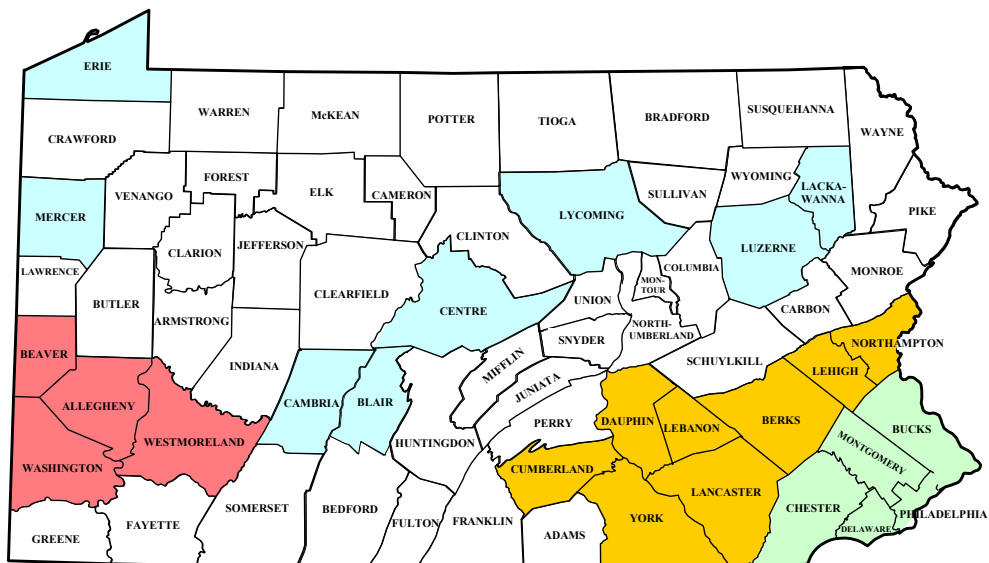


Improving air quality in this Commonwealth, however, does not automatically allow for relaxing the elements of the I/M program. The amendment in *25 Pa. Code* § 126.451(3) appears to arise from an assumption that if emissions are reduced by the Pennsylvania Clean Vehicles Program, maintaining emission reductions in the I/M program may no longer be necessary. This is not the case with I/M. The CAA treats the I/M program differently from other programs. Not only does the CAA mandate where I/M programs must be implemented, as discussed earlier, it also requires every I/M program to perform at a certain level of effectiveness and to contain certain program elements, regardless of air quality. While the DEP “consider[ed] the additional reductions... to be achieved through implementation of the Title 13, CCR, Division 3, Chapter 1 and 2 requirements,” as required by *25 Pa. Code* § 126.451(3), the usefulness of the results is limited by this federal statutory framework.

The analysis in this Report has taken into account the increasing percentages of newer, more durable vehicles in years to come as older vehicles are retired from the fleet, and the infusion of cleaner vehicles into the Commonwealth’s fleet over the next decade as a result of the Pennsylvania Clean Vehicles Program. It should also be noted that *67 Pa. Code* § 177.51(c)(1) and (2) (relating to program requirements) allows the Secretary of Transportation to make certain changes in the program based on vehicle age, but only if air quality and EPA requirements can still be met. This is a significant challenge at a time when even more emission reductions may be needed in the Commonwealth due to the tightening of standards as discussed above.

In light of all of the foregoing, this Report examines the feasibility of modifying the I/M program with analysis scenarios for a near-term year, 2010, and a longer term year, 2018, for each of the four I/M regions of the Commonwealth: Philadelphia, Pittsburgh, South Central and Northern Regions, shown below.

Figure 2: I/M program regions



As required by 25 Pa. Code § 126.451(3), DEP consulted with PennDOT during preparation of this Report. PennDOT has indicated its agreement with the conclusions of this evaluation.

II. Overview of Pennsylvania’s I/M program and criteria for EPA acceptability

A. Current I/M programs

EPA’s original implementing regulations were issued in November 1992; EPA has amended the I/M regulations several times since then. The amendments provided flexibility, latitude, new testing procedures, and compliance alternatives under which to design a program. Pennsylvania has taken full advantage of applicable alternatives. Air quality needs for attaining and maintaining the ozone standard also helped determine what kind of an I/M program would be practical, cost-effective and acceptable to EPA in various regions.

In 1997, the Commonwealth initiated an enhanced I/M program in nine counties in the Philadelphia (five counties) and Pittsburgh (four counties) regions. Inspections in these regions included tailpipe testing, a gas cap check and a visual anti-tampering inspection of pollution control devices.

From December 2003 through June 2004, in response to the litigation described above, I/M programs were expanded to the 16 counties of the South Central and Northern regions. On-board diagnostic (OBDII) testing was included in the programs in the

Philadelphia, Pittsburgh and South Central regions for vehicles model year 1996 and newer. OBDII was substituted (for most vehicles) for tailpipe testing in the Philadelphia and Pittsburgh regions. An anti-tampering check of several pollution control devices was added to the annual safety inspection in the 42 counties without an I/M program to generate sufficient emission reductions to meet EPA requirements. The elements of the I/M program were designed to meet both EPA's standards and specific air quality needs in each region under the ozone NAAQS in place at the time (the "one-hour" standard).

All areas have an annual testing frequency and test gasoline-powered vehicles up to 9,000 pounds that are model year 1975 and newer. PennDOT's regulation, *25 Pa. Code § 177.101* (relating to subject vehicles), contains a list of those vehicles not subject to testing and those eligible for exemptions. Most importantly, brand-new current model year vehicles and vehicles owned by the same owner for 12 months that have traveled less than 5,000 miles in the past year are exempt. More information on the inspections in each region is provided later in this Report and in the Appendices.

B. Criteria for evaluation

Potential modifications to any I/M program mandated under the CAA are limited by three factors:

- Need for emission benefits in order to demonstrate timely attainment or maintenance of the ozone standard and compliance with federal "anti-backsliding" requirements, the latter of which requires replacement of emission benefits lost through modification of a federally-approved program like I/M;
- Compliance with the applicable federal I/M performance standard; and
- The inclusion of federally-prescribed programmatic elements or a demonstration that an alternative program element is equally effective.

1. National Ambient Air Quality Standard Attainment and Maintenance Needs

An I/M program is required under the federal CAA in 25 counties in Pennsylvania as a result of Pennsylvania being in the northeast Ozone Transport Region. Having I/M programs in those counties is mandatory and the programs may not be removed.

If Pennsylvania modifies any of the elements of its I/M programs, the Department must demonstrate in a SIP revision that the modified program achieves an emission rate the same or lower than the emission rate of EPA's model program, provided it also meets certain other program design criteria, such as electronic data transmission and enforceability. EPA may also require a demonstration that a modified program would achieve relative emission reductions at a future date equal to or greater than those achieved by the current SIP-approved program.

Secondly, the Department would have to demonstrate in a SIP revision that the modified program does not "interfere with any applicable requirement concerning attainment and reasonable further progress ... or any other applicable requirement" of the CAA. CAA §110(l); 42 U.S.C. § 7410(l) (relating to state implementation plans for national primary and secondary

ambient air quality standards). EPA is unlikely to approve a SIP revision modifying a Pennsylvania I/M program unless the SIP revision provided for equivalent compensating emission reductions in order to avoid such "interference". An additional CAA provision for I/M programs applies to three areas in the Commonwealth, namely the Philadelphia and Pittsburgh regions, and Allentown, requiring equivalent or greater emission reductions for modifications because I/M programs were in effect in those areas prior to November 15, 1990. CAA § 193; 42 U.S.C. § 7515 (relating to general savings clause). As the Court stated in *South Coast Air Quality Management District v. EPA*, 472 F.3d 882 (D.C. Cir. 2006), as amended, 2007 U.S. App. LEXIS 13751, "Considered as a whole, the [Clean Air] Act reflects Congress' intent that air quality should be improved until safe and never allowed to retreat thereafter." 472 F.3d at 900.

Replacement of lost emission benefits would most likely be necessary individually within the Philadelphia Region and the Pittsburgh Region. EPA approved the existing program for the South Central and Northern I/M Regions together, incorporating benefits from the safety inspection in the 42 non-I/M counties.

DEP has submitted to EPA an attainment demonstration for the five-county Philadelphia area and maintenance plans for the other 16 areas (32 counties) that were designated as nonattainment in 2004 and are now meeting the 8-hour ozone standard. SIP revisions for nonattainment areas with an I/M program assume the current I/M program will be in effect in the future (through 2010 for the Philadelphia area and through 2018 for the other areas). For the Philadelphia area, the attainment demonstration also includes evidence that the area meets requirements for specific emission reductions of VOC and NO_x for 2008 and 2009 with the current I/M program in place.

2. Performance standard

The Clean Air Act established the framework by which EPA would evaluate the acceptable performance of a state I/M program. EPA's evaluation involves comparing what a state program would achieve if EPA's "model program" were in place with what the state's own program will achieve.

This evaluation must be made for the I/M program itself. State, regional and local factors, such as cleaner new car standards, cleaner fuel, temperature/humidity and fleet age, are used in both sides of this comparison in order to isolate only the effects of the I/M program design for purposes of the performance standard assessment. Emission reductions from other programs, such as emission limits on solvents or industrial processes, cannot be used to compensate for any deficit in an I/M program, itself.

EPA's performance standards are contained in 40 CFR 51.351 (relating to enhanced I/M performance standard). EPA's regulations require states to compare the fleet emission rate (grams per mile) that an EPA program design would achieve during a "typical summer weekday" to the fleet emission rate the state's program would achieve. The performance standard demonstration must use EPA's highway estimation model (currently MOBILE6.2) and state-specific parameters. The state-specific parameters include factors that would change vehicles'

basic emission rates, such as the Pennsylvania Clean Vehicles Program, and parameters such as fleet age, fuels required in the area, ambient temperatures/humidity and traffic data. If the state's program achieves an emission rate the same or lower than the emission rate of EPA's model program for a given performance standard, the program should be approvable, provided it also meets certain other program design criteria, such as electronic data transmission and enforceability. EPA may also require the program to achieve relative emission reductions equal to or greater than those achieved by the current SIP-approved program. (For purposes of this analysis, data will be shown in terms of the more familiar "tons per day," which is the emission rate multiplied by the vehicle-miles-traveled in the region.)

Therefore, a state's program design need not be identical to the EPA program designs but must achieve the same or better environmental results. To obtain EPA approval, states must demonstrate that the program meets the performance standard through the attainment deadline for the applicable NAAQS standard. For Pennsylvania counties and ground-level ozone, this date ranges from June 15, 2007 through June 15, 2010. Because ozone is a summertime problem, the relevant ozone season is the summer before these years (for example, 2009 for an attainment date of June 15, 2010).

Under the regulations in effect when Pennsylvania's program was approved, separate performance standards were applied to the Philadelphia, Pittsburgh and the South Central combined with the Northern Region. The performance standard in the EPA-approved SIP is discussed in each section.

In April 2006, EPA revised its performance standards, adding a less stringent performance standard for areas newly required to implement I/M based on eight-hour ozone designations, by recognizing that fleet turnover reduces the number of pre-1996 OBD-equipped vehicles for tailpipe programs (71 *Fed. Reg.* 17705 (Apr. 7, 2006)). Pennsylvania did not have any such areas. A revised performance standard, however, may reflect future options for existing programs.

If program changes are made and the changes are incorporated into a SIP revision, EPA expects that a performance standard analysis be submitted. The Appendices include the key requirements and a comparison of the four performance standards. EPA may also require a demonstration that a modified program would achieve relative emission reductions at a future date equal to or greater than those achieved by the current SIP-approved program.

While the analysis in this Report used the MOBILE6.2 model, it is possible that another model will need to be used by the time a SIP revision might be required. The most current highway emission estimation model must always be used. EPA is currently developing a new model called MOVES (MOtor Vehicle Emission Simulator) for release in the next two years that will be significantly different and use more robust data than MOBILE6.2. Issues of credit for I/M programs under the anticipated MOVES model have not yet been made available for public review. In addition, depending on timing, the most current vehicle age and traffic data would be used.

3. Required program elements.

Many required program items can be found in Section 182(c)(3) of the CAA, 42 U.S.C. § 7511a(c)(3) (relating to plan submissions and requirements), such as a requirement for computerized emission analyzers, waiver policy and vehicle registration denial unless a sticker program is shown to be as effective. Other required program elements are found in EPA’s regulations. The most significant program element for Pennsylvania was a demonstration that the existing sticker enforcement program was as effective as denying vehicle registration until an emission inspection is completed. The Commonwealth’s approved SIP highlights the provision in PennDOT’s regulations that indicates that a final safety inspection sticker cannot be issued until an emissions sticker (including an exemption or waiver sticker) is affixed, since law enforcement has historically been active in enforcing safety inspection requirements. Any changes affecting required programmatic elements would need to be reconfirmed in future SIPs.

III. Evaluation of Feasibility of Modifications in I/M Programs

For purposes of this evaluation, results have been presented in tons per day (grams per mile x vehicle miles traveled by subject vehicles converted to tons). Results for NOx and VOC, the major ground-level ozone precursors, are presented. While the Pennsylvania Clean Vehicles program achieves reductions in greenhouse gases, there are no EPA-approved methodologies for calculating the effects of I/M programs on greenhouse gases, and no traditional modeling techniques that indicate greenhouse gas (CO2) emission differences with and without the program. Therefore, CO2 is not modeled. The following sections present results for each I/M region.

A. Philadelphia Region (Bucks, Chester, Delaware, Montgomery and Philadelphia counties)

The analysis used the following test types, which are currently applicable to the Philadelphia Region.

Table 1: Program Design

MODEL YEAR	APPLICABLE TESTS
1996 and newer vehicles	OBDII Gas cap check
1995 vehicles and older but newer than 25 years old*	Accelerated Simulation Model (ASM) tailpipe test, or idle tailpipe test depending on vehicle type and age. Gas cap check Visual inspection of pollution control devices
Test for vehicles 25 years and older* , but 1975 and newer.	Visual inspection Gas cap check

* as per table in 25 Pa. Code §177.101

Highway emissions projections. In addition to the existing I/M program, the analysis assumed the Federal New Motor Vehicle Control program for vehicles up to model year 2008, the Pennsylvania Clean Vehicles program for vehicles 8,500 pounds and under for model year 2008 and beyond, the federal reformulated gasoline program and local fleet and weather parameters. Table 2 shows the decrease in total highway vehicle emissions between 2010 and 2018 for the Philadelphia Region, reflected earlier in Figure 1.

Table 2: Projected Highway Vehicle Emissions in the Philadelphia Region (tons per day)

VOC		NOx	
2010	2018	2010	2018
55.34	35.69	91.31	40.31

Emission benefits of I/M. Table 3 presents the emission benefits of the current I/M program. The emissions projected are the result of modeling emissions with and without the I/M program, while including all other programs in place. Results are presented in tons per day emission benefit as well as the percent reduction from the “no I/M” scenario. That is, in 2010, the current I/M program will reduce VOC emissions from highway vehicles by 15 percent. Additional emission benefits develop by 2018 due to the preponderance of OBDII-equipped vehicles and the additional credit EPA provides for OBDII over other inspection technology.

Table 3: Benefits of the I/M Program in the Philadelphia Region (tons per day and percent)

VOC		NOx	
2010	2018	2010	2018
9.43 (15%)	10.80 (23%)	11.20 (11%)	14.24 (26%)

Evaluation. The performance standard applied to the Philadelphia Area in the EPA-approved SIP is the “high enhanced” performance standard of 40 CFR 51.351(f), which includes the OBD requirement of 40 CFR 51.351(c) for areas required to have I/M prior to the effective date of the eight-hour ozone standard designation.

Table 4 provides the differences between modeling that performance standard and the existing program in the Philadelphia Region in tons per day. This means modifications that would decrease emissions benefits by those amounts could be made before the program would fail the I/M performance standard. The difference between the performance standard and the program is less in 2018 than in 2010 because EPA’s model program includes OBD, and the credit for tailpipe and anti-tampering test diminishes as 1996 and newer vehicles replace pre-1996 vehicles in the fleet.

Although the Philadelphia Region will exceed the performance standard by a small amount in both future years, any modifications that would diminish emission benefits would have to be replaced with other control measures in order to continue to demonstrate attainment and/or

maintenance of the ozone standard and to meet anti-backsliding requirements. The Commonwealth would have to ensure that the benefits were replaced at the same time or before the effective date of the loss of benefits from I/M.

Table 4: Emissions Latitude Based Only on Performance Standard (tons per day)

VOC	
2010	2018
0.89	1.6
NOx	
1.15	1.44

B. Pittsburgh Region (Allegheny, Beaver, Washington and Westmoreland counties)

The analysis used the following test types, which are applicable to the Pittsburgh Region.

Table 5: Program Design

MODEL YEAR	APPLICABLE TESTS
Test(s) for 1996 and newer vehicles	OBDII Gas cap check
Test(s) for 1995 vehicles and older, but newer than 25 years old*	Two-speed idle tailpipe test Gas cap check Visual inspection of pollution control devices
Test for vehicles 25 years and older* (1975 and newer).	Visual inspection of pollution control devices Gas cap check

* as per table in 25 Pa Code Section 177.101.

Highway emissions projections. In addition to the existing I/M program, the analysis assumed the Federal New Motor Vehicle Control program for vehicles up to model year 2008, the Pennsylvania Clean Vehicles program for vehicles 8,500 pounds and under for model year 2008 and beyond, the gasoline volatility requirements applicable to the Pittsburgh area under 25 Pa. Code § 126.301 (relating to compliant fuel requirement) and local fleet and weather parameters. Table 6 shows the decrease in total highway vehicle emissions between 2010 and 2018 for the Pittsburgh Region, reflected earlier in Figure 1.

Table 6: Projected Highway Vehicle Emissions in the Pittsburgh Region (tons per day)

VOC		NOx	
2010	2018	2010	2018
35.72	21.54	64.16	26.30

Emission benefits of I/M. Table 7 presents the emission benefits of the current I/M program. The emissions projected are the result of modeling emissions with and without the I/M program, while including all other programs in place. Results are presented in tons per day emission benefit as well as the percent reduction from the “no I/M” scenario. That is, in 2010, the current I/M program will reduce VOC emissions by 15 percent. Additional emission benefits develop by 2018 due to the preponderance of OBDII-equipped vehicles and the additional credit EPA provides for OBDII over other inspection technology.

**Table 7: Benefits of the I/M Program in the Pittsburgh Region
(tons per day and percent)**

VOC		NO _x	
2010	2018	2010	2018
6.31 (15%)	6.86 (24%)	6.08 (9%)	7.83 (23%)

Evaluation. The performance standard applied to the Pittsburgh Area in the EPA-approved SIP is the “low enhanced” performance standard of 40 CFR 51.351(g), which includes the OBD requirement of 40 CFR 51.351(c) for areas required to have I/M prior to the effective date of the eight-hour ozone standard designation.

Table 8 provides the differences between modeling that performance standard and the existing program in the Pittsburgh region in tons per day. This means modifications that would decrease emissions benefits by those amounts could be made before the program would fail the I/M performance standard.

Although the Pittsburgh Region will exceed the performance standard by a small amount in both future years, any modifications that would diminish emission benefits would have to be replaced with other control measures in order to continue to demonstrate attainment and/or maintenance of the ozone standard and to meet anti-backsliding requirements. The Commonwealth would have to ensure that the benefits were replaced at the same time or before the effective date of the loss of benefits from I/M.

**Table 8: Emissions Latitude Based Only on Performance Standard
(tons per day)**

VOC	
2010	2018
1.52	1.02
NO _x	
1.18	0.85

C. South Central Region (Berks, Cumberland, Dauphin, Lancaster, Lebanon, Lehigh, Northampton and York counties)

The analysis used the following test types, which are applicable to the South Central Region.

Table 9: Program Design

MODEL YEAR	APPLICABLE TESTS
Test(s) for 1996 and newer vehicles	OBDII Gas cap check
Test(s) for 1995 vehicles and older* newer than 25 years old	Visual inspection of pollution control devices Gas cap check
Test for vehicles 25 years and older* , (but 1975 and newer).	Visual inspection of pollution control devices Gas cap check

* as per table in 25 Pa Code Section 177.101.

Highway emissions projections. In addition to the existing I/M program, the analysis assumed the Federal New Motor Vehicle Control program for vehicles up to model year 2008, the Pennsylvania Clean Vehicles program for vehicles 8,500 pounds and under for model year 2008 and beyond, federal gasoline volatility requirements and local fleet and weather parameters. Table 10 shows the decrease in total highway vehicle emissions between 2010 and 2018 for the South Central Region, reflected earlier in Figure 1.

Table 10: Projected Highway Vehicle Emissions in the South Central Region (tons per day)

VOC		NOx	
2010	2018	2010	2018
62.66	38.62	113.05	48.56

Emission benefits of I/M. Table 11 presents the emission benefits of the current I/M program. The emissions projected are the result of modeling emissions with and without the I/M program, while including all other programs in place. Results are presented in tons per day emission benefit as well as the percent reduction from the “no I/M” scenario. That is, in 2010, the current I/M program will reduce VOC emissions by 13 percent. Additional emission benefits develop by 2018 due to the preponderance of OBDII-equipped vehicles and the additional credit EPA provides for OBDII over other inspection technology.

Table 11: Benefits of the I/M Program in the South Central Region (tons per day)

VOC		NOx	
2010	2018	2010	2018
9.00 (13%)	12.61 (25%)	9.22 (8%)	13.60 (22%)

Evaluation. The performance standard applied to the South Central Area in the EPA-approved SIP is the Ozone Transport Region “low enhanced” performance standard of 40 CFR 51.351(h), which includes the OBD requirement of 40 CFR 51.351(c) for areas required to have I/M prior to the effective date of the eight-hour ozone standard designation. In the SIP, emission benefits from the South Central, Northern Region and the pollution control device component of the safety inspection program in non-I/M counties were considered together to meet the performance standard. However, information on the South Central Program is presented alone in this section.

Table 12 provides the differences between modeling that performance standard and the existing program in the South Central region in tons per day. If the South Central Region was considered by itself, modifications that would decrease emissions benefits by those amounts could be made before the program fails the performance standard.

Although the South Central Region will exceed the performance standard by a small amount in both future years, any modifications that would diminish emission benefits would have to be replaced with other control measures in order to continue to demonstrate attainment and/or maintenance of the ozone standard and to meet anti-backsliding requirements. The Commonwealth would have to ensure that the benefits were replaced at the same time or before the effective date of the loss of benefits from I/M.

Table 12: South Central Emissions Latitude Based Only on Performance Standard (tons per day)

VOC	
2010	2018
2.25	1.74
NOx	
1.22	1.41

D. Northern Region (Erie, Mercer, Cambria, Blair, Centre, Lycoming, Luzerne and Lackawanna counties)

The analysis used the following test types, which are applicable to the Northern Region.

Table 13: Program Design

MODEL YEAR	APPLICABLE TESTS
All vehicles 1975 and newer	Visual inspection of pollution control devices Gas cap check

Highway emissions projections. In addition to the existing I/M program, the analysis assumed the Federal New Motor Vehicle Control program for vehicles up to model year 2008, the Pennsylvania Clean Vehicles program for vehicles 8,500 pounds and under for model year 2008 and beyond, federal gasoline volatility requirements and local fleet and weather parameters.

Table 14 shows the decrease in total highway vehicle emissions between 2010 and 2018 for the Northern Region, reflected earlier in Figure 1.

**Table 14: Projected Emissions
(tons per day)**

VOC		NO _x	
2010	2018	2010	2018
35.76	22.42	71.40	32.34

Emission benefits of I/M. Table 15 presents the emission benefits of the current I/M program. Credit for anti-tampering inspections decreases because EPA’s approved highway vehicle emissions model (MOBILE6.2) only provides anti-tampering credits for pre-1996 vehicles. Furthermore, gas cap check credit diminishes for vehicles 1999 and newer. Therefore, while emission benefits for the I/M programs in Philadelphia, Pittsburgh and South-Central regions increase over time, the emission benefits for the Northern Region program diminish over time.

**Table 15: Benefits of the I/M Program in the Northern Region
(tons per day)**

VOC		NO _x	
2010	2018	2010	2018
0.83 (2%)	0.31 (1%)	0.41 (1%)	0.01 (0%)

Evaluation. The performance standard applied to the Northern Area in the EPA-approved SIP is the Ozone Transport Region “low enhanced” performance standard of 40 CFR 51.351(h), which includes the OBD requirement of 40 CFR 51.351(c) for areas required to have I/M prior to the effective date of the eight-hour ozone standard designation. In the SIP, emission benefits from the South Central and Northern Region were considered together to meet the performance standard. However, information on the Northern Program is presented alone here for purposes of this evaluation.

Table 16 provides the differences between modeling that performance standard and the existing program in the Northern region in tons per day. If a program is predicted to fail the performance standard, a negative number is shown. As noted previously, the EPA model provides no credit for a visual inspection for 1996 and newer vehicles. Therefore, the credit for the anti-tampering test diminishes as 1996 and newer vehicles replace pre-1996 vehicles in the fleet. The Northern Region program will not meet the performance standard on its own in either 2010 or 2018. As shown in Table 16, there would therefore be no latitude to make program modifications that would even further diminish emission benefits.

Table 16: Northern Region Emissions Latitude Based Only on Performance Standard (tons per day)

VOC	
2010	2018
-2.83	-4.39
NOx	
-4.01	-5.80

Combining emission credits from the Northern and South Central I/M programs along with the visual inspection component of the safety inspection (as was done in the federally-approved demonstration of compliance with the performance standard) nonetheless may not meet the performance standard in future years. As shown in Table 17, there is no latitude to make program modifications that would even further diminish emission benefits.

Table 17: Combination Northern Region and South Central Region and Non I/M program Visual Inspection Latitude

VOC	
2010	2018
0.26	-2.63
NOx	
-1.75	-4.37

V. Conclusions

- Any modification to an I/M program must meet the applicable federal performance standard and include the requisite program elements.
- Modifying the I/M program in any I/M region of the Commonwealth in a way that would diminish emission benefits from those presently achieved is not feasible unless and until compensating equivalent emission benefits are found. This is due primarily to the “anti-backsliding” provisions in the Clean Air Act. These anti-backsliding provisions would be applicable on a nonattainment area basis.
- Since federal control strategies or state regulation in place or in development by the Commonwealth to reduce emissions already span the utility, industrial, commercial, consumer product, highway and nonroad sources of emissions, cost-effective emission benefits to replace any lost through I/M modifications would be difficult to find.
- Pennsylvania’s I/M program will continue to make valuable contributions to the Commonwealth’s effort to attain and maintain the NAAQS. However, in the future, EPA’s model estimates that emission reductions currently being achieved in the Northern I/M Region will diminish as the fleet contains more and more vehicles equipped with on-board diagnostics.
- EPA, under a Federal Advisory Committee Act process, is developing an assessment of how emission inspection programs may evolve in the future with the changing fleet. The Commonwealth should take into account that assessment once it is complete for any potential changes to its I/M program.