

COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

## **2009 Annual Report**

### **Massachusetts Vehicle Check Inspection and Maintenance Program**

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March 7, 2011

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Attachment B: 2009 Detailed Emissions Test Data

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## **2009 Annual Report**

### **Massachusetts Enhanced Inspection and Maintenance Program**

#### **1 EXECUTIVE SUMMARY**

This Annual Report is required by EPA under 40 CFR 51.366. This regulation requires that annual reports cover four categories of information:<sup>1</sup>

- Station and inspector oversight,
- Quality control,
- Compliance and enforcement, and
- Emissions test data.

2009 was the first full year of operation for Massachusetts Vehicle Check, the Commonwealth's updated I&M program. This program was established in January 2008, when the Commonwealth of Massachusetts signed a contract with a new network contractor, Parsons Commercial Technology, Inc., to manage the day-to-day operation of the state's I&M program. This contract continued some important features of the I&M program that were implemented from October 1999 through September 30, 2008:

- Inspections continue to be provided by a decentralized network of inspection stations,
- Stations and inspectors continue to be licensed by the Commonwealth,
- All registered vehicles are still required to be inspected annually (for safety),
- Vehicles that fail their initial emissions test must be repaired and pass a re-test within 60 days,
- Diesel vehicles model year 1984 and newer greater than 10,000 lbs. GVWR that are not equipped with OBD continue to be required to undergo an opacity test for emissions,
- Vehicles that continue to fail their emissions test after being repaired by a state-registered repairer may be eligible for a one-year waiver of the emissions standards, and
- The inspection fee remains at \$29, unchanged since it was established in 1999.

At the same time, the new contract brought some important changes to program:

- Vehicles that are equipped with on-board diagnostic (OBD) systems are required to undergo annual OBD emissions tests (the old program required biennial emissions tests);
- The two-year emissions test exemption for new vehicles was discontinued;
- A rolling 15-year OBD emissions test exemption has been established;
- Tailpipe testing of vehicles that are model year 1995 or older has been discontinued;

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<sup>1</sup> See "Attachment A: Index of Report Pages Relevant to EPA Regulation Sections" for details about where specific required items appear in this report.

- A new “economic hardship” exemption has been established for vehicles that fail their emissions test and require replacement of a major (and expensive) component to pass, giving the vehicle owner one year to finance repairs or replace the vehicle;
- Twelve Motorist Assistance Centers (MACs) have been established across the state to provide advice to motorists, technical assistance to repair technicians, help with getting vehicles “ready” for testing after emissions repairs, vehicle evaluations for repair waivers and economic hardship extensions, and vehicle testing quality assurance; and
- Massachusetts safety inspections of commercial vehicles have been expanded to include U.S. Department of Transportation requirements, so these vehicles will need to undergo only one comprehensive check, instead of two at different times and locations. Fees for commercial vehicle inspections are market-based (and are separate from the annual Massachusetts I&M program fee).

The Agencies amended the program’s implementing regulations (MassDEP at 310 CMR 60.02, and RMV at 540 CMR 4.00-4.09) to incorporate these changes in September 2008, and the new program started operation on October 1, 2008. A revision to the Massachusetts State Implementation Plan, reflecting the changes to MassDEP and RMV regulations, was submitted to EPA in June 2009. This report covers the period between January 1, 2009 and December 31, 2009.

## **1.1 Major Findings**

### ***Emissions Tests Conducted***

As of October 1, 2008, an annual OBD emissions test is required for the majority of the fleet. The following gasoline fueled vehicles now require an OBD test:

- Vehicles in model years 1996-2007 weighing 8,500 lbs. GVWR or less
- 2008 and newer vehicles weighing 14,000 lbs. GVWR or less

The following diesel fueled vehicles require an OBD test:

- Vehicles in model years 1997-2006 weighing 8,500 lbs. GVWR or less
- 2007 and newer vehicles weighing 14,000 lbs. GVWR or less

Heavy duty diesel fueled vehicles (weighing over 10,000 lbs. GVWR) in model year 1984 and newer that are not equipped with OBD require an annual opacity test. This test, which was also administered in the former program, was discontinued in August 2008 to allow the program contractor to design, test, and install new test equipment and software. Opacity testing of these vehicles was reinstated on October 1, 2009.

An emissions test is also required when a vehicle meeting any of the above requirements changes ownership or has its registration transferred to Massachusetts from another state.

In 2009, there were approximately 4.62 million vehicles registered in Massachusetts. From January 1, 2009 through December 31, 2009, the I&M program conducted

3,739,104 emissions tests on 3,487,313 unique vehicles (76% of the Massachusetts fleet), including initial tests, retests, and off-cycle tests due to changes of ownership/registration. Of the vehicles that received an initial emissions test in this period, 3,457,598 were gasoline fueled and 29,715 were diesel fueled.

### ***Compliance and Enforcement***

Of the 3,457,598 gasoline-fueled vehicles receiving an initial OBD test in Massachusetts in 2009, 272,363 (7.9%) failed their initial test. Of the 8,479 diesel-fueled vehicles receiving an initial OBD test, 801 (9.4%) failed their initial test. Of the 21,105 diesel-fueled vehicles receiving an initial opacity test, 897 (4.3%) failed their initial test.

Of all gasoline-fueled vehicles tested, 40,668 (1.2%) did not pass a subsequent retest, or receive a waiver or hardship extension by March 31, 2010. Seven waivers from the requirement that failing vehicles pass an emissions re-test were granted in 2009 along with ninety-three hardship extensions (less than 0.01% of vehicles failing initial emissions tests). Of all diesel-fueled vehicles receiving an OBD test, 96 (1.1%) did not pass a subsequent retest by March 31, 2010.

While some of the vehicles that failed an initial test and did not pass a re-test were taken off the road with expired registrations, sold out of state, or junked, vehicles failing to receive safety inspections or emissions tests when required are subject to enforcement by the Registry of Motor Vehicles (RMV) as well as state and local law enforcement agencies.

### ***Station and Inspector Oversight***

In 2009, the Massachusetts Registry of Motor Vehicles (RMV) performed 7,602 site audits to determine if the inspectors were correctly performing all safety and emissions tests and if the station's physical conditions continued to meet program requirements. All stations operating throughout the year received at least one visit. Based on the results of the site audits and other data, the RMV held 273 hearings for stations and issued 254 adverse actions against stations (e.g. warning letters, license revoked or suspended).

In 2009, 6,306 licensed inspectors performed at least one test. Based on the results of the site audits and other data, the RMV held 172 hearings for inspectors, and issued 154 adverse actions against inspectors (e.g., warnings, license revoked or suspended).

### ***2009 Program Changes***

The only significant change in the I&M program in 2009 was the reinstatement of diesel opacity testing starting on October 1.

## **1.2 Contents of This Report**

Section 2 of this report describes the Massachusetts I&M Program and provides information on the number of vehicles covered, inspection stations and inspectors, and types of emissions tests administered. The remaining sections of the report describe specific aspects of the program:

- Motorist Compliance with Testing Requirements (Section 3)
- Performance of Emissions Test Equipment (Section 4)
- Station and Inspector Oversight (Section 5)

The attachments to this report contain detailed data on vehicles tested, results of emissions tests, and audit results:

- Attachment A: Index of Report Pages Relevant to EPA Regulation Sections
- Attachment B: 2009 Detailed Emissions Test Data (see data disk)
- Attachment C: 2009 Test Data by Station (see data disk)
- Attachment D: 2009 Quality Control Report

## THE MASSACHUSETTS I&M PROGRAM

### 1.3 Why Does Massachusetts Have an I&M Program?

Massachusetts continues to be in non-attainment with federal standards for ground-level ozone pollution. On “bad air” days, there are increases in asthma attacks and hospitalizations for people with severe respiratory ailments. To reduce the number of “bad air” days and to comply with the federal Clean Air Act and U.S. Environmental Protection Agency (EPA) regulations, Massachusetts must implement a variety of federally mandated programs.<sup>2</sup> To reduce pollution from motor vehicles, Massachusetts is required to operate an Enhanced Inspection and Maintenance (I&M) program. EPA sets minimum standards for I&M programs<sup>3</sup>.

The current Massachusetts I&M program was authorized by the Legislature by Chapter 210 of the Acts of 1997. The Department of Environmental Protection (MassDEP or the Department) and the Registry of Motor Vehicles (RMV) jointly administer the “Massachusetts Vehicle Check Program.” The program’s goals are to implement a comprehensive test that provides the emission reductions needed for the Massachusetts state implementation plan (SIP), is convenient to motorists, ensures vehicle safety, and works well in local inspection shops. To maximize customer convenience, the legislation combines emissions and safety testing, and requires that the combined test be delivered in local inspection stations, convenient to where people live and work.

In January 2008, the Commonwealth contracted with Parsons Commercial Technology Group, Inc., to supply inspection equipment and operate the Massachusetts I&M Program. The new program started operation on October 1, 2008. This report describes the program in effect in 2009.

### 1.4 Vehicles Subject to Inspection

40 CFR 51.366 (d) (1) (i): An estimate of the number of vehicles subject to the inspection program, including the results of an analysis of the registration data base;
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In 2009, there were approximately 4.62 million vehicles with active registrations in the Massachusetts fleet. Each vehicle registered in Massachusetts must be inspected annually. All vehicles must receive a safety inspection every year, and the vast majority must also receive an emissions test every year. In addition, vehicles are required to receive an emissions inspection within seven days of transfer of ownership, or within seven days of their initial Massachusetts registration when transferring registration from another state.

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<sup>2</sup> These programs are established in legally binding and federally enforceable “State Implementation Plans” or “SIPs”.

<sup>3</sup> 40 CFR Part 51, Subpart S (§51.350 et seq.).



Starting on October 1, 2008, gasoline vehicles were exempted from the emissions inspection if they were:

- Light duty vehicles older than model year 1996,
- Medium duty vehicles older than model year 2008,
- Heavy duty vehicles that are not equipped with an OBD system, and
- Any vehicle that is more than 15 model years old.

Diesel fueled vehicles were exempted from the emissions inspection if they were:

- Light duty vehicles older than model year 1997 or more than 15 years old,
- Medium duty vehicles with a GVWR of 10,000 lbs. or less and either older than model year 2007 or more than 15 years old, and
- Any vehicle with a GVWR over 10,000 lbs. and a model year earlier than 1984.

Also exempt were vehicles of any fuel type that are less than one year old and still registered to the original owner.

Opacity testing of heavy-duty diesel vehicles (with a GVWR over 10,000 lbs.) that are model year 1984 or newer was suspended on August 1, 2008 (under the old program) to allow the new program contractor to prepare, test, and install new diesel testing equipment and related software. Heavy duty diesel vehicles were still inspected for safety during the period covered by this report. Opacity testing resumed on October 1, 2009 for these vehicles that are not equipped with OBD systems.

## 1.5 Inspection Stations

40 CFR 51.366 (b) <sup>4</sup> (1): The number of inspection stations and lanes: (i) Operating throughout the year; and (ii) Operating for only part of the year;
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Most Massachusetts vehicles receive their inspections at local public stations. The program also allows owners of vehicle fleets to purchase their own testing equipment so they can test their own vehicles. The number of public and fleet stations fluctuates slightly from month to month, as businesses join or leave the program.

In 2009, 1,383 stations conducted emissions tests throughout the year, and another 362 conducted tests during part of the year. There were 1,418 “workstations” or sets of inspection equipment used for testing emissions throughout 2009, and 383 workstations used for testing during part of the year. A small number of inspection stations have more than one workstation. In Massachusetts, the number of workstations is equivalent to the

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<sup>4</sup>For all references to 40 CFR 51.366: 57 FR 52987, Nov. 5, 1992, as amended at 61 FR 40945, Aug. 6, 1996; 65 FR 45534, July 24, 2000; 66 FR 18178, Apr. 5, 2001.

number of lanes in a centralized testing program. Table 1 shows the numbers of workstations and stations testing emissions throughout the year and for part of the year.

At any given time, some of the workstations and stations are not operating, due to factors such as change of ownership or location. Table 1 also shows that the number of workstations and stations testing in any given month is fewer than the total number of workstations and stations, as seen by the number of stations and workstations testing in December.

**Table 1: Number of Stations and Workstations Testing Emissions in 2009**

	Workstations <sup>5</sup>	Stations
Testing All Year	1,418	1,383
Testing for Part of Year	383	362
Total During Year	1,801	1,745
Testing in December	1,720	1,668

Table 2 shows the breakdown of fleet and public stations.

**Table 2: Public and Fleet Stations in 2009**

	Public	Fleet	Total Stations
Testing All Year	1,361	22	1,383
Testing for Part of Year	263	99	362
Total During Year	1,624	121	1,745
Testing in December	1,559	109	1,668

In Tables 1 and 2, a station or workstation must have conducted emissions inspections in each month in 2009 to be counted as “testing all year.” Stations or workstations that were licensed for the entire year, but did not test in one or more months are considered “testing for part of the year,” as are stations that entered or left the program during the year.

## 1.6 Inspectors

40 CFR 51.366 (b) (5): The number of inspectors licensed or certified to conduct testing;

At the close of calendar year 2009, there were 7,236 trained and licensed inspectors certified to conduct emission tests (See Table 3). However, in 2009 only 6,193

<sup>5</sup> If a workstation was moved to a different station during 2009, it was counted as the same workstation, but as a different station. Relocated workstations may have tested for all or part of the year. These statistics reflect the circumstances of each workstation.

inspectors conducted emissions tests and 6,306 inspectors tested at least one vehicle for safety or safety plus emissions.

**Table 3: Number of Inspectors  
January 1, 2009 through December 31, 2009**

	# Of Inspectors
Inspectors Trained And Licensed on December 31, 2009	7,236
Inspectors Who Inspected at Least One Vehicle in 2009	6,306
Inspectors Who Tested Emissions in 2009	6,193

### **1.7 Emissions Tests Administered**

The Massachusetts I&M Program uses the vehicle’s On-Board Diagnostic (OBD) system for emissions testing of most vehicles. These systems include computers and sensors that assess the condition of the vehicle’s emissions control systems. The emissions test accesses the OBD system in these vehicles to find out whether the emission control system is working properly. The Massachusetts I&M program started passing or failing all gasoline-fueled vehicles equipped with modern OBD systems (i.e., OBD II) based on the data in those systems on June 14, 2004. The new program that started on October 1, 2008 continued using OBD tests for gasoline-fueled vehicles, and added OBD testing for diesel-fueled vehicles that are equipped with these systems.

Massachusetts has used a snap acceleration opacity test for heavy duty diesel vehicles since 2001. Testing was suspended on August 1, 2008 to allow the new program contractor to prepare, test, and install new diesel testing equipment and related software. Opacity testing resumed on October 1, 2009.

## 2 MOTORIST COMPLIANCE WITH TESTING REQUIREMENTS

### 2.1 Overall Motorist Compliance with Testing Requirements

40 CFR 51.366 (d) (1) (ii): The percentage of motorist compliance based upon a comparison of the number of valid final tests with the number of subject vehicles;

Table 4 summarizes the overall compliance rate for 2009, which compares the total number of unique vehicles receiving an I&M test (including safety-only tests) to the number of unique registered vehicles that were estimated to be due for an inspection during this period.

**Table 4: 2009 Overall Testing Compliance Rates**

	Vehicle Count	Compliance %
Average Number of Vehicles Registered in MA in 2009	4,615,687	
Unique Vehicles Tested in 2009 (Safety Only or Safety and Emissions Tests)	4,542,544	98.4%

Please note that Table 4 may overstate compliance with testing requirements: the *average number of vehicles registered in the Commonwealth* can fluctuate from month to month, as vehicles are removed from the fleet and possibly replaced with new or out of state vehicles. By contrast, the *unique vehicles tested in 2009* counts all Massachusetts-registered vehicles that were tested during the year, even though they may only have been part of the fleet for a portion of the year. A compliance rate specifically for emissions tests in this period is not available, since the program does not track the number of registered vehicles that are exempt from the emissions testing requirement (e.g., those that are less than one year old, or are gasoline fueled and are model year 1995 or older).

Of the 272,363 gasoline-fueled vehicles that failed their initial OBD test, 40,668 (14.9% of the failing vehicles, and 1.2% of all gasoline-fueled vehicles tested) did not pass a subsequent retest, or receive a waiver or hardship extension by March 31, 2010 (the retest would be considered a “final test” as per EPA’s requirement noted above). Of the 8,479 diesel-fueled vehicles receiving an OBD test, 96 (1.1%) did not pass a subsequent retest by March 31, 2010. Seven waivers from the requirement that failing vehicles pass an emissions re-test were granted in 2009 along with ninety-three hardship extensions (less than 0.1% of vehicles failing initial emissions tests).

While some of the vehicles that failed an initial test and did not pass a re-test were taken off the road with expired registrations, sold out of state, or junked, vehicles failing to receive safety inspections or emissions tests when required are subject to enforcement by the Registry of Motor Vehicles (RMV) as well as state and local law enforcement agencies.

## 2.2 Registration File Audits and Compliance with Deadlines

40 CFR 51.366 (d) (2) (ii): [Registration denial based enforcement programs shall provide. . . ] The number of registration file audits, number of registrations reviewed, and compliance rates found in such audits. . . .

40 CFR 51.366 (d) (3): Computer-matching based enforcement programs shall provide the following additional information:

(i) The number and percentage of subject vehicles that were tested by the initial deadline, and by other milestones in the cycle;

In 2009, the RMV completed one scan of the vehicle registration database each month. These registration reviews examine the testing status of each registered vehicle to determine compliance with testing requirements. The results of these reviews are summarized in Table 5, below.

These registration reviews are snapshots in time, and therefore tend to understate compliance. Registration reviews determine whether the most recent inspection for each vehicle was performed within the last 12 months and was a “pass.” The I&M regulations allow up to 60 days for emissions repairs and re-testing. The registration reviews count vehicles that failed their emissions test as “out of compliance” if they did not complete repairs and pass a re-inspection by the time of the registration review, even though the vehicle may still be within its 60-day period. Also, registration reviews only capture compliance status at a particular moment in time. A vehicle that was tested seven weeks late in 2009 would ultimately have been in compliance but would have been counted as out-of-compliance on two registration reviews.

**Table 5: 2009 RMV Registration Reviews**

Date	Active Registrations	Number Non Compliant	Percent In Compliance
01/15/09	4,600,052	428,773	90.7%
02/15/09	4,591,489	455,774	90.1%
03/15/09	4,592,330	448,592	90.2%
04/15/09	4,601,039	440,237	90.4%
05/15/09	4,615,477	438,048	90.5%
06/15/09	4,629,293	439,237	90.5%
07/15/09	4,634,610	440,670	90.5%
08/15/09	4,639,626	439,493	90.5%
09/15/09	4,632,533	440,873	90.5%
10/15/09	4,629,905	444,190	90.4%
11/15/09	4,613,719	442,319	90.4%
12/15/09	4,608,174	439,126	90.4%
<b>Average</b>	<b>4,615,687</b>	<b>441,444</b>	<b>90.4%</b>

2.2.1 PARKING LOT AUDITS

40 CFR 51.366 (d) (4) (iii): [Sticker-based enforcement systems shall provide . . . ] The number of parking lot sticker audits conducted, the number of vehicles surveyed in each, and the noncompliance rate found during those audits.

Between January 1 and September 30, 2009, the RMV conducted audits of vehicle stickers at 157 Massachusetts parking lots. Table 6 summarizes the results of these audits.

**Table 6: 2009 Parking Lot Audits**

Parking lot audits conducted	157
Vehicles surveyed	3,925
Vehicles with valid inspection stickers	3,762
Compliance rate	95.8%

2.2.2 OTHER COMPLIANCE SURVEYS

40 CFR 51.366 (d) (1) (vi): The number of compliance surveys conducted, number of vehicles surveyed in each, and the compliance rates found;

The RMV conducted registration file audits and vehicle sticker audits at Massachusetts parking lots, as described in Sections 3.2 and 3.2.1 respectively. No other compliance surveys were conducted in 2009.

RMV recognizes the need to have a registration enforcement program to enhance its efforts to ensure that motorists comply with the requirements of the Massachusetts I&M program. However, in today’s era of unprecedented state resource limitations, the Agency’s aging information technology infrastructure cannot support a registration enforcement program while also meeting the data requirements of the other federal programs that the Agency works under (which are increasing at unparalleled levels). The RMV is continually exploring more cost-effective ways to get this job done in a proficient manner, and is working to replace its primary database. The replacement is expected to provide significantly more efficient data processing, which would allow the Agency to move forward with the development and implementation of a successful registration enforcement program.

The RMV continues to be committed to the registration enforcement requirement and is anxious to see it implemented. At the same time, the Agency observes that Massachusetts enjoys a compliance rate that exceeds 90% in database surveys and 95% in actual parking lot surveys, which is similar to the rates found in many other states.

### 2.2.3 MOTORIST TIME EXTENSIONS

40 CFR 51.366 (d) (1) (v): The number of time extensions and other exemptions granted to motorists;
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Massachusetts offers an economic hardship repair extension for non-commercial vehicles that do not pass their initial emissions test and a re-test. Motorists are eligible for this extension if they meet all of the following criteria:

- the cost of repairing or replacing a single component to correct a diagnostic trouble code for the component is more than 1.5 times the repair expenditure limit applicable for the model year of the vehicle:
  - \$750 for vehicles five model years old or newer;
  - \$650 for vehicles over five but not exceeding 10 model years old; and
  - \$550 for vehicles over 10 model years old.
- the vehicle does not qualify for a waiver;
- the economic hardship repair extension is not for an emissions inspection or re-inspection associated with initial registration or transfer of ownership;
- MassDEP or its designee agrees with the findings of the registered repair technician regarding the cause of the failure, and the appropriateness and reasonableness of the repair estimate;
- the motorist has used all relevant warranty coverage including recalls to repair the vehicle;
- all safety inspection requirements are met;
- the vehicle is registered with the Registry as a private passenger motor vehicle or auto home; and
- the emission control system is present and there is no evidence of tampering;

An economic hardship repair extension is valid until the vehicle's next emissions inspection. This extension cannot be renewed or extended for an additional period of time: at the end of the extension period, the vehicle must pass its emissions test.

In 2009, 93 economic hardship extensions were issued.

### 2.2.4 WAIVERS OF EMISSION STANDARDS

A waiver is available for any non-commercial vehicle that does not pass a re-test is eligible for a waiver of the emissions standards if the following criteria are satisfied:

- At least the following amount has been spent for a Registered Emissions Repair Technician to repair the vehicle’s emissions system (including labor and materials)<sup>6</sup>:
  - \$750 for a vehicle five model years old or newer
  - \$650 for a vehicle more than five but less than ten model years old
  - \$550 for a vehicle more than ten model years old
- The vehicle’s emissions-control system must be intact with no evidence of tampering;
- The vehicle must have passed its safety inspection within the previous 60 days; and
- The vehicle’s OBD system must connect successfully with the inspection station’s computer, must be “ready” for its re-test, and cannot be showing diagnostic trouble codes for engine misfire, catalytic converter efficiency failure, or energy storage for a hybrid vehicle.

To obtain a waiver, the motorist must bring the vehicle to a Motorist Assistance Center for an evaluation of eligibility. If the Center determines that the vehicle meets all the requirements for a waiver, the Center provides a waiver authorization, which the motorist must bring to the inspection station that conducted the failed test, to obtain a valid sticker.

A waiver is valid until the vehicle’s next emissions inspection.

In 2009, the program granted seven waivers.

#### 2.2.5 PREVENTING FALSE REGISTRATION BY MOTORISTS

40 CFR 51.366 (d) (2) (i): [Registration denial based enforcement programs shall provide . . . ] A report of the program’s efforts and actions to prevent motorists from falsely registering vehicles out of the program area or falsely changing fuel type or weight class on the vehicle registration, and the results of special studies to investigate the frequency of such activity; and

40 CFR 51.366 (d) (3) (ii): [Computer-matching based enforcement programs shall provide . . . ] A report on the program’s efforts to detect and enforce against motorists falsely changing vehicle classifications to circumvent program requirements, and the frequency of this type of activity;

40 CFR 51.366 (d) (4) (ii): [Sticker-based enforcement systems shall provide . . . ] A report on the program’s efforts to detect and enforce against motorists falsely changing vehicle classifications to circumvent program requirements, and the frequency of this type of activity;

The reporting requirements for efforts to prevent false registration are not relevant to Massachusetts because:

- All of Massachusetts is covered by the program;

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<sup>6</sup> Only the cost of repairs performed by a Registered Emissions Repair Technician qualifies for a waiver. Expenditures for repairs made by non-registered technicians are not eligible.



- All vehicles are required to be inspected annually for either safety or safety and emissions;
- If a motorist falsely reports fuel type or weight in order to avoid an emissions inspection, the inspector enters corrected data based on his or her examination of the fuel cap and the vehicle information appearing on the vehicle's door label. In addition, the workstation uses a separate VIN decoder to pre-populate the program's Vehicle Identification Database (VID)'s critical fields (model year, fuel type, and GVWR) that determine whether a vehicle receives an emissions test. Changes to these fields by inspectors are flagged by the VID for investigation by the Registry of Motor Vehicles.

#### 2.2.6 ADDITIONAL STICKER-RELATED ACTIVITIES

40 CFR 51.366 (d) (4): Sticker-based enforcement systems shall provide the following additional information:

(i) A report on the program's efforts to prevent, detect, and enforce against sticker theft and counterfeiting, and the frequency of this type of activity;

To support the state and local police efforts to enforce inspection-sticker requirements, the RMV mailed a detailed memorandum to state and local police departments in the Commonwealth regarding sticker characteristics for 2009.

In 2009, state and local police issued 82,628 inspection sticker motor-vehicle violations.

### **3 PERFORMANCE OF EMISSIONS TEST EQUIPMENT**

#### **3.1 2009 Pilot Program for OBD Test Equipment Audits**

Between 1999-2008, emissions test equipment audits were conducted by MassDEP staff, with support from a contractor that was separate from the contractor charged with administering the program. When the new program started in October 2008, equipment audits were suspended, so that the new testing equipment could be deployed and problems with early implementation could be addressed, and plans were developed to shift responsibility for auditing the OBDII testing equipment to RMV field investigators (to be done in conjunction with their routine field visits to inspection stations).

The new "MASS08" workstations (which have been used in the field since the new program started operation on October 1, 2008) have been designed to run several daily "self checks", to ensure that they are operating properly. The self checks include:

- Every 24 hours, the workstation is programmed to require the inspector to perform equipment checks that ensure the functionality of the OBD scan tool, printer, barcode scanner, and, if equipped, diesel opacity meter.
- The OBD scan tool performs a daily "loopback" check that tests the continuity of the OBD scan tool cable and pins in the Diagnostic Link Connector (DLC). Broken cables and damaged DLC pins are the most common reasons for the OBD scan tool not to communicate with a vehicle. In addition, the inspector is required to perform the loopback check following any OBD test that results in a communication failure to determine if a problem with the OBD cable or DLC pins was the cause of the failure. Whenever a loopback test fails, the workstation is locked out from performing OBD tests until a loopback check can be passed.
- The printer/barcode scanner check begins by the workstation printing sample 1D and 2D barcodes and sample VIR text. The inspector can manually fail the check if the text is not legible. The inspector is then prompted to scan the 1D and 2D barcodes. If the workstation cannot read the barcodes, it fails the check and the workstation is locked out from all testing until it can pass the check. This failure can be caused by a faulty barcode scanner or poor print quality. If the printer/barcode scanner check fails, the workstation is locked out from performing ALL inspections.
- The diesel opacity meter, if equipped, requires the following daily self-checks. It checks the meter's ability to perform the electronic zero and span correctly. It checks the accuracy of the opacity meter readings at 37.5% opacity by extinguishing 3 of 8 light pulses. It checks the condition of the sample fan by measuring the current draw. All three checks have tolerances which must be met to pass. If any of the three checks fail, the workstation is locked out from performing diesel opacity tests until all three checks pass.

In 2009, audits of the OBD test equipment were conducted by RMV field investigators under a pilot program, which was designed to answer several questions:

- Is the Massachusetts OBD test equipment operating correctly?
- Is the auditing equipment adequate?
- Are the auditing software and the audit database performing as expected?
- Can the audit be incorporated into routine RMV investigations and site visits?
- Based on experience during the pilot, are modifications needed to the auditing procedures, equipment, software or database?

40 CFR 51.366 (c) Quality control report. ...Basic statistics on the quality control program for January through December of the previous year, including:

- (1) The number of emission testing sites and lanes in use in the program;
- (2) The number of equipment audits by station and lane;

In 2009, 1,383 stations and 1,418 workstations (lanes) conducted emissions inspections throughout the period. A total of 1,745 stations and 1,801 workstations conducted emissions tests at some time during the year.

During the 2009 pilot program, eighteen RMV field investigators performed a total of 536 audits, which covered 526 different workstations (lanes) and 509 different inspection stations. Eleven inspection stations were audited twice and 498 stations were audited one time. One of the stations audited twice in 2009 had four workstations; two of the four workstations at this inspection station were included in each audit. Thus, only 10 workstations were audited two times. 516 workstations were audited one time.

The results of these audits are described in detail in Attachment D, and are summarized here.

### **3.2 Audit Results for OBD Test Equipment**

40 CFR 51.366 (c) Quality control report. ...Basic statistics on the quality control program for January through December of the previous year, including: . . .

- (3) The number and percentage of stations that have failed equipment audits; and
- (4) Number and percentage of stations and lanes shut down as a result of equipment audits.

To pass an overall audit, the workstation cannot fail any of the audit's individual parts. Table 7 describes the results of the OBDII scan tool audits conducted in 2009. It summarizes results for each individual OBDII audit part and the overall results for these audits.

**Table 7: 2009 OBDII Test Equipment Audit Results**

<b>Audit Part</b>	<b>2009 Audit Results</b>			
	<b>Pass</b>	<b>Fail</b>	<b>2009 Tested</b>	<b>Failure Rate</b>
Visual Cable and Connector Check	535	1	536	0.2%
Communications Check	536	0	536	0.0%
RPM Pickup Check	534	2	536	0.4%
Scan Tool Accuracy Check	532	4	536	0.7%
<b>Number of audits that failed one or more audit parts</b>	531	5	536	0.9%

The workstation that failed its visual cable and connector check passed all other items. When an auditor identifies problems with a cable or connector, station personnel are consulted regarding the condition of the equipment and encouraged to open a service ticket, if appropriate.

The two workstations that failed the RPM pickup check also failed the OBDII scan tool accuracy check. This result is expected, since the OBDII scanner accuracy check includes an OBDII RPM reading. If a workstation fails the OBDII RPM pickup check, it will also fail the OBDII scanner accuracy check.

Five workstations at five stations failed the OBD scan tool audit. These five failures represent 1% of all audited workstations (526 were audited in 2009) and 1% of all audited inspection stations. (509 were audited in 2009) The five failures comprised 0.4% of all 1,383 stations that conducted emissions inspections throughout the year and 0.4% of all 1,378 workstations that conducted emissions inspections throughout the year.

During the 2009 emissions test equipment audit pilot, the audit was repeated for all four workstations that failed the scan tool accuracy check. Each workstation passed the second scan tool accuracy check, as well as their second RPM check. As a result, no service tickets were opened for these audits, even though the initial audits were recorded as “failed.” MassDEP and the Network Contractor are reviewing these audit results.

No stations or workstations were shut down as a result of the OBDII scan tool audits.

### **3.3 Assessment of the 2009 OBD Emissions Test Equipment Audit Pilot**

The pilot produced very useful information that will be used as equipment audits are deployed full scale during 2010. Overall, the pilot found that audits of OBD test equipment can be easily incorporated into the protocols used for RMV’s field visits of inspection stations (adding about five minutes to the protocol used to assess station

performance, on average), and that the auditing equipment generally worked well. The field investigators also found that the auditing software and data base used to record audit results met performance expectations and were straightforward to use.

At the same time, the pilot also uncovered some issues with the auditing equipment, software, and database that need to be resolved:

- One piece of auditing equipment failed to communicate in cold, damp conditions. The manufacturer has modified the testing procedure that was used, which is expected to resolve this issue.
- Another piece of auditing equipment required repair when its OBD connector broke, due to stress from frequently being attached and unattached to its box. This problem has been resolved by the use of an extension cable that remains connected between audits, reducing stress on the cable.
- The carrying case for the auditing equipment has been modified so that the equipment does not need to be removed from its case to conduct an audit, saving time for RMV field investigators and reducing wear and tear on the equipment.
- The original audit software did not allow a field inspector to abort an audit, and created multiple records in the data base when inspectors tried to stop an audit in midstream. The software was modified in July 2010 to allow audits to be aborted, which is expected to resolve this issue.
- The process for updating the database with workstation records occasionally created duplicate audit records with slightly different time stamps. The software that controls this process has also been modified, and will be evaluated during 2010 to ensure that all sources of duplicate records have been eliminated.
- The need for a consistent definition of “passing” and “failing” visual inspections of the condition of a workstation’s cables and connectors was identified. RMV plans to work with field investigators to develop definitions for these conditions, so they can be consistently applied in the field.

The pilot program identified other more minor needs for improvements in the auditing software and database, which are described in Attachment D.

From 2004 through 2009, the overall failure rate for the OBD scan tool has been 1.1% or less. The 0.9% percent failure rate in 2009 maintains the improvement seen over the 5% OBDII audit failure rate in 2003. The self-checks that have been incorporated into the MASS08 workstation have contributed to this very low failure rate, and have helped to ensure that Massachusetts vehicles receive an accurate emissions test. Full-scale OBD equipment auditing by RMV, which is expected to start in 2010, will provide an important tool for monitoring the OBD test equipment.

## 4 STATION AND INSPECTOR OVERSIGHT

The Massachusetts I&M Program uses both overt and covert audits to assess station and inspector performance. The results of each type of audit conducted in 2009 are described in this section.

### 4.1 Overt Performance Audits

40 CFR 51.366 (b) (2): The number of inspection stations and lanes operating throughout the year:

- (i) Receiving overt performance audits in the year;
- (ii) Not receiving overt performance audits in the year;

The RMV conducts regular site visits/performance audits to determine if the inspectors are correctly performing all tests and the station's physical conditions continue to meet program requirements. RMV typically visits inspection stations at least three times during the year, and performs additional visits to follow up on past problems or to investigate stations or inspectors that are suspected of violating regulations based on consumer complaints or data analysis.

The I&M contractor maintains records of all inspections in a database to which MassDEP and RMV had access. RMV conducts monthly "digital audits" before visiting stations, to identify areas and stations that may need investigation. A "digital audit" is a query of the database for information that may indicate issues warranting attention during the site visit. Digital audit items include the station's emissions testing and inspection failure rates and vehicle characteristics recorded during the inspection that do not match the vehicle information in the registration database.

The RMV site visits cover a wide range of items including:

- Observing inspectors performing an inspection;
- Examining station and inspector licenses;
- Collecting voided inspection stickers and checking to see that stickers are stored in a secure location;
- Examining the inspection equipment and bay;
- Supplementing the inspector's training; and
- Investigating consumer complaints and/or anomalous digital audit findings.

RMV staff prepares a written report summarizing the results of each inspection. Violations of policies or regulations identified at site visits are forwarded to RMV headquarters for possible enforcement action.

In 2009, RMV conducted 7,602 overt station visits/audits. All 1,745 stations and 1,801 workstations that conducted emissions inspections during this period received at least one audit.

In addition to RMV’s overt station visits/audits, in 2009 MassDEP continued an initiative that started in late 2008 to use digital audits of the inspection data base to identify suspected improper inspections, and in many cases, to determine that an improper inspection occurred. Where the data indicated that an improper inspection may have occurred, MassDEP staff visited the station to confirm the accuracy of digital audit findings and to gather more information about the particular situations that had been identified. RMV staff participated in many of these station visits.

These digital audits were an effective tool for identifying improper inspections, particularly cases in which stations were “clean scanning” by conducting OBD tests on different vehicles than the ones brought in for inspection, and using the results from the fraudulent tests to issue stickers. In 2009, digital audits were the initial basis for eight enforcement cases against specific inspectors and stations by MassDEP, RMV and the Massachusetts Attorney General’s Office, supplemented by findings from the overt station visits. The enforcement actions reported in Table 9 (Section 5.2.1 below) include the results of these cases. Financial penalties resulting from these cases are reported in Section 5.2.2.

## 4.2 Covert Audits

40 CFR 51.366 (b) (2): The number of inspection stations and lanes operating throughout the year: . . .  
 (iii) Receiving covert performance audits in the year;  
 (iv) Not receiving covert performance audits in the year;

40 CFR 51.366 (b) (3): The number of covert audits:  
 (i) Conducted with the vehicle set to fail per test type;  
 (ii) Conducted with the vehicle set to fail any combination of two or more test types;  
 (iii) Resulting in a false pass per test type;  
 (iv) Resulting in a false pass for any combination of two or more test types;

40 CFR 51.366 (b) (8): The total number of covert vehicles available for undercover audits over the year;  
 (b) (9): The number of covert auditors available for undercover audits.

Covert vehicle audits, or “covert performance audits”, which are under-cover inspections done with vehicles set to fail one or more parts of the emissions test, were not performed in 2009 pending completion of covert audit procedures, training, and software. The contractor started conducting covert vehicle audits in 2010.

### 4.2.1 STATION AND INSPECTOR ENFORCEMENT

40 CFR 51.366 (b) (6): The number of hearings:  
 (i) Held to consider adverse actions against inspectors and stations; and  
 (ii) Resulting in adverse actions against inspectors and stations;

40 CFR 51.366 (b) (4): The number of inspectors and stations:  
 (i) That were suspended, fired, or otherwise prohibited from testing as a result of covert audits;  
 (ii) That were suspended, fired, or otherwise prohibited from testing for other causes; and

40 CFR 51.366 (b) (2): The number of inspection stations and lanes operating throughout the year: . . .  
 (v) That have been shut down as a result of overt performance audits;

Tables 8 and 9 summarize the results of the RMV's hearings and enforcement actions for stations and inspectors, and describes the issues raised in written violations issued to stations and inspectors in 2009. These tables report cases that resulted in license suspensions, license revocations, and formal warnings as "adverse actions."

**Table 8: Number of Written Violations and Subsequent Actions Taken Against Stations and Inspectors in 2009**

Type of Action Following Written Violations	Inspection Stations	Inspectors
Actions Following Written Violations		
Warning Letters (no hearing)	108	81
Violations Filed (no action or hearing)	14	7
Hearings Held	273	172
Cases Unresolved as of 12/31/09	8	6
<b>Total Number of Written Violations</b>	<b>403</b>	<b>266</b>

**Table 9: Total Adverse Actions Against Stations and Inspectors in 2009**

Types of Adverse Actions (Enforcement)	Inspection Stations	Inspectors
Adverse Actions Resulting from Hearings <sup>7</sup>		
License Revocations	5	9
License Suspensions	121	109
Warnings	128	36
Other Action (e.g., abeyance, surveillance)	0	0
Warning Letters Issued without a Hearing	108	81
<b>Total Number of Adverse Actions in 2009</b>	<b>362</b>	<b>235</b>

<sup>7</sup> Hearings resulted in no action against 19 inspection stations and 18 inspectors.



#### 4.2.2 FINES COLLECTED

40 CFR 51.366 (b) (4): The number of inspectors and stations: . . . (iii) That received fines; 40 CFR 51.366 (b) (7): The total amount collected in fines from inspectors and stations by type of violation;
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In 2009, Massachusetts settled eight enforcement cases, carrying a total of \$310,000 in penalties assessed. Of the total penalty assessment, a total of \$165,800 was stayed as long as the station and/or inspector complies with all program requirements during the period covered by the settlement. The remaining \$144,200 in penalties will be collected according to the schedules provided in each settlement agreement.

#### 4.2.3 STATION COMPLIANCE DOCUMENTS - ISSUED AND MISSING DOCUMENTS

40 CFR 51.366 (d) (1) (iii): The total number of compliance documents issued to inspection stations; (iv) The number of missing compliance documents;
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For 2009, 6,274,400 compliance documents (stickers) were issued to inspection stations.

The MASS08 software has been designed to make sticker accounting and reporting more automated than it was in the old program, by recording information about sticker status (including damaged stickers and identifying stickers that have been picked up by RMV field investigators). However, these features were not fully functional in 2009. Manual accounting records (e.g., of stickers picked up by RMV inspectors or by Parsons) are also not complete for this period.

There were two issues with the software for sticker accounting that prevented a full sticker accounting for 2009:

- Prior to October 2009, if a computer was replaced as part of a workstation repair, the history of stickers voided on that workstation was lost. The RMV picked up these stickers, but the software did not allow the pickups to be recorded in the database.
- At the end of the year, the process that voided full books of 2009 stickers did not list those full books on the workstation for RMV pickup. The RMV picked up these stickers, but the software did not allow the pickups to be recorded in the database.

There were two significant issues with stickers in 2009 that further complicated a full accounting:

- Printing problems resulted in significant fading of the first batch of stickers that were delivered to stations for use in 2009. The contractor delivered new stickers to stations during the Spring of 2009. Documentation of the pickup of the remaining faulty stickers could not be recorded in the database.

- The sticker vendor did not adequately account for the disposition of the full range of stickers. It is not clear that the stickers that were missing from the sticker vendor's accounting were manufactured and that gaps in the numbered ranges of manufactured sticker numbers were not adequately reported by the sticker vendor.

## 5 EMISSIONS TEST RESULTS

### 5.1 Emissions Tests and the Massachusetts Fleet

In 2009, the Massachusetts I&M program administered OBD emissions tests during all of 2009 and diesel opacity test beginning on October 1, 2009.

In 2009, 272,363 (7.9%) of the 3,457,598 unique non-diesel (e.g. gasoline) fueled vehicles receiving initial OBD tests failed their initial tests. Of the 8,479 diesel-fueled vehicles receiving an initial OBD test, 801 (9.4%) failed their initial tests. Of the 21,105 diesel-fueled vehicles receiving an initial opacity test, 897 (4.3%) failed their initial opacity tests. The Massachusetts Program requires that failing vehicles be repaired and re-tested within 60 days of the failing test.

Table 10 summarizes the failure rates for initial OBD tests in Massachusetts in 2009:

**Table 10: 2009 Failure Rate for Initial OBD Tests**

<b>Vehicle Fuel Types</b>	<b>Failure Rate</b>
Non-Diesel	7.9%
Diesel	9.4%
All Initial OBD Tests	7.9%

Please note:

- Approximately 94% of retested vehicles passed the retest.
- Of the vehicles that failed their initial test, 40,764 (15.0%) had neither passed a retest nor obtained a waiver by March 31, 2010.
- Seven waivers and 93 hardship extensions were granted (less than 0.1% of the vehicles that failed their initial emissions test).

Details of all emissions test results from are included in Attachment B.

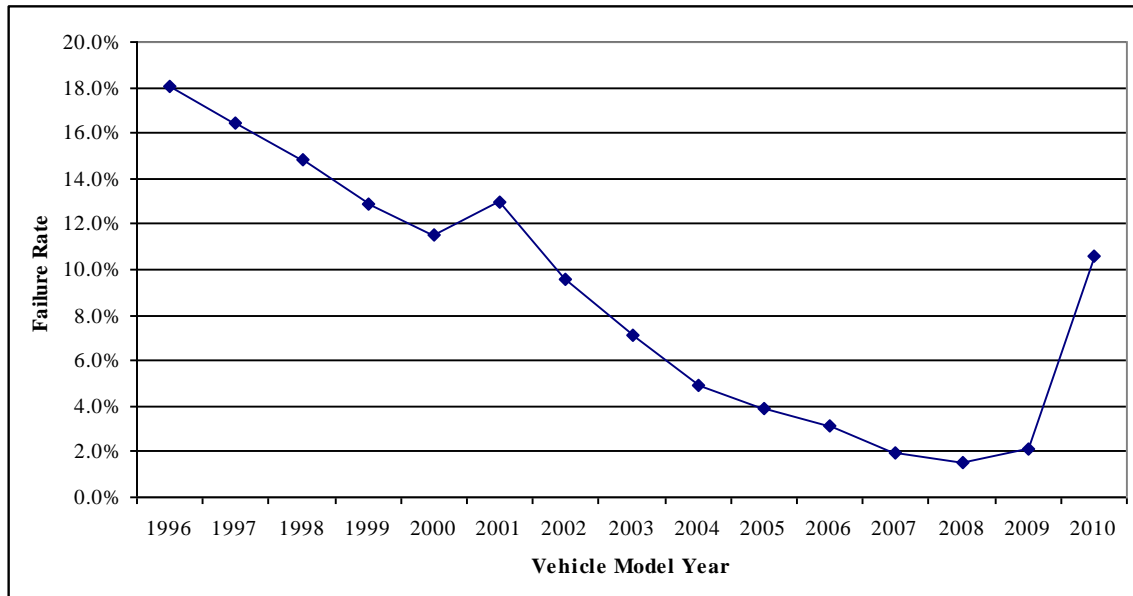
A number of vehicles failed their initial inspections because their OBD computer could not communicate with the OBD scan tool and workstation equipment. In these cases, the workstation allows an alternative test to be performed, which consists of performing a Key-On Engine-Off (KOEO) bulb check to see whether the MIL bulb is functioning and a Key-On Engine-Running (KOER) to see if the MIL is commanded on. Failing either check will result in an OBD test failure.

In total, 131,165 (3.6%) of the 3,676,135 OBD tests performed during 2009 were alternative tests. Attachment B describes the particular years, makes, models and counts of vehicles receiving these tests. Work is on-going to determine why the OBD scan tool has difficulty communicating with certain types of vehicles and several workstation and scan tool updates were performed in 2009 to address these problems. By the end of 2009,

software and hardware fixes had resolved the communications issues, and many of the vehicles listed in Attachment B were no longer receiving an alternative test.

Figure 1 below shows the OBD failure rates by model year for gasoline-fueled vehicles. As can be seen, the age of the vehicle has a significant impact on failure rate. Please note that the spike in the failure rate in for model year 2010 is based on a very small sample size (489). While this includes some new vehicles that have changed ownership within the first year, nearly all of these failures were for readiness for new vehicles that inadvertently received an emissions test either through a software deficiency or inspector error. The Massachusetts I&M program is not designed to achieve a specific overall failure rate or a specific failure rate for any particular test or type of vehicle.

**Figure 1: 2009 Failure Rate by Model Year – Non-Diesel Initial Emissions Tests**



**5.2 Overall Conclusions about Program Operation During 2009**

2009 was the first full year of operation for the new Massachusetts I&M Program. This year saw the resolution of many early implementation issues with new test equipment and software. In general, the program is meeting its goals of a comprehensive test that provides the emission reductions needed for the Massachusetts state implementation plan (SIP), is convenient to motorists, ensures vehicle safety, and works well in local inspection shops.

Most vehicles that failed their initial emissions test were repaired successfully and passed their re-test. The program continues to issue a very small number of waivers (seven during the period covered by this report), far below the commitment in Massachusetts’ I&M SIP of limiting waivers to no more than 1% of vehicles that fail an initial emissions test. In addition, only ninety-three hardship extensions were issued in 2009.

# **Attachment A: Index of Report Pages Relevant to EPA Regulation Sections**

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**Massachusetts Enhanced Emissions and Safety Test  
Inspection and Maintenance Program**

## Attachment A: Index of Report Pages Relevant to EPA Regulation Sections

### Rules

40 CFR 51.366 (a) (1), (2) & (5) .....	Attachment B
40 CFR 51.366 (a) (3) &(4) .....	Attachment C
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40 CFR 51.366 (b) (2) (i) & (ii).....	19
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40 CFR 51.366 (b) (2) (v).....	21
40 CFR 51.366 (b) (3) (i), (ii), (iii) (iv) .....	20
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40 CFR 51.366 (b) (4) (iii).....	22
40 CFR 51.366 (b) (5).....	7
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40 CFR 51.366 (b) (8).....	20
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## **Attachment B: Detailed 2009 Emissions Test Data**

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**Massachusetts Enhanced Emissions and Safety Test  
Inspection and Maintenance Program**

See data disk

## **Attachment C: 2009 Test Data by Station**

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**Massachusetts Enhanced Emissions and Safety Test  
Inspection and Maintenance Program**

See data disk