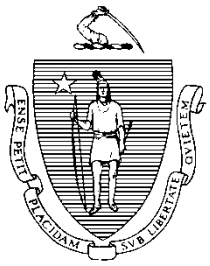

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

2010 Annual Report

Massachusetts Vehicle Check Inspection and Maintenance Program

December 30, 2011

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2010 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:[1]

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

2010 was the second full year of operation for Massachusetts Vehicle Check, the Commonwealth's updated Inspection and Maintenance (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. The current program continues important features of the I&M program that were implemented from October 1999 through September 30, 2008, as well as adding new features. The Massachusetts Vehicle Check is a comprehensive vehicle emissions and safety testing program including:

- Inspections provided by a decentralized network of inspection stations;
- Stations and inspectors licensed by the Commonwealth;
- Annual safety tests;
- Commercial vehicle safety inspections that meet U.S. Department of Transportation requirements, so these vehicles only needed one comprehensive check;
- An annual OBD emissions test for vehicles that are equipped with on-board diagnostic (OBD) systems (vehicles more than 15 years old were exempt);
- An annual opacity test for emissions for diesel vehicles model year 1984 and newer greater than 10,000 lbs. GVWR that are not equipped with OBD;
- A safety test and any applicable emissions test upon transfer of ownership;
- Vehicles that fail their initial emissions test be repaired and pass a re-test within 60 days;
- Waiver eligibility for certain vehicles that fail their emissions test after being repaired by a state-registered repairer were eligible for a one-year waiver of the emissions standards;
- An "economic hardship" extension for vehicles that failed 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;

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

- Twelve Motorist Assistance Centers (MACs) located across the state to provide information 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;
- An inspection fee of $29, unchanged since 1999; and
- Market-based fees for commercial vehicle inspections.

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 updated program started operation on October 1, 2008. A revision to the Massachusetts State Implementation Plan (SIP), reflecting the changes to MassDEP and RMV regulations, was submitted to EPA in June 2009. This report covers the period between January 1, 2010 and December 31, 2010. EPA has not approved the proposed SIP Revision.

1.1 Major Findings

Emissions Tests Conducted

In 2010, an annual emissions test was required for the majority of the fleet. The following gasoline fueled[2] vehicles required an OBD test:

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

The following diesel fueled vehicles required an OBD test:

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

Heavy duty diesel fueled vehicles (weighing over 10,000 lbs. GVWR) with model year 1984 or newer that were not equipped with OBD required an opacity test.

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

In 2010, there were approximately 4.63 million vehicles registered in Massachusetts. From January 1, 2010 through December 31, 2010, the I&M program conducted 3,858,638 emissions tests on 3,628,686 unique vehicles (78% 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 2010, 3,520,698 were non-diesel fueled (e.g. gasoline, natural gas, etc.) and 107,948 were diesel fueled.

[2] Throughout this report, "gasoline fueled vehicles" refers to non-diesel vehicles and includes alternative fuels such as natural gas.

Compliance and Enforcement
Of the 3,520,698 gasoline-fueled vehicles receiving an initial OBD test in 2010, 253,416 (7.2%) failed their initial test. Of the 11,786 diesel-fueled vehicles receiving an initial OBD test, 672 (5.7%) failed their initial test. Of the 96,162 diesel-fueled vehicles receiving an initial opacity test, 2,745 (2.9%) failed their initial test.

Of all gasoline-fueled vehicles tested, 39,755 (1.1%) did not pass a subsequent retest, or receive a waiver or hardship extension by March 31, 2011. Five waivers from the requirement that failing vehicles pass an emissions re-test were granted in 2010 along with 70 economic hardship extensions (less than 0.01% of vehicles failing initial emissions tests). Of all diesel-fueled vehicles receiving an OBD test, 69 (0.6%) did not pass a subsequent retest by March 31, 2011.

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 2010, the Massachusetts Registry of Motor Vehicles (RMV) performed 8,409 site audits to determine if program 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, RMV held 302 hearings for stations and issued 464 adverse actions against stations (e.g., warning letters, license revocations or license suspensions).

In 2010, 6,649 licensed inspectors performed at least one test. Based on the results of the site audits and other data, RMV held 300 hearings for inspectors, and issued 410 adverse actions against inspectors (e.g., warnings, license revocations or license suspensions).

2010 Program Changes
There were no significant program changes in 2010.

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: 2010 Detailed Emissions Test Data (see data disk)
- Attachment C: 2010 Test Data by Station (see data disk)
- Attachment D: 2010 Quality Control Report

2 THE MASSACHUSETTS I&M PROGRAM

2.1 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.[3] 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[4].

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 Department of Transportation's Registry of Motor Vehicles Division ("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 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 current program started operation on October 1, 2008. This report describes the program in 2010.

2.2 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;

In 2010, there were approximately 4.63 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 a safety and 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.

[3] These programs are established in legally binding and federally enforceable "State Implementation Plans" or "SIPs."
[4] 40 CFR Part 51, Subpart S (§51.350 et seq.).

In 2010, gasoline-fueled 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, and
- Heavy duty vehicles not equipped with an OBD system.

Diesel fueled vehicles were exempted from the emissions inspection in 2010 if they were:

- Light duty vehicles older than model year 1997,
- Medium duty vehicles with a GVWR of 10,000 lbs. or less and older than model year 2007, and
- Heavy duty vehicles with a GVWR of more than 10,000 lbs with a model year earlier than 1984.

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

2.3 Inspection Stations

40 CFR 51.366 (b)[5] (1): The number of inspection stations and lanes: (i) Operating throughout the year; and (ii) Operating for only part of the year;

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 2010, 1,586 stations conducted emissions tests throughout the year, and another 184 conducted tests during part of the year. There were 1,646 "workstations" or sets of inspection equipment used for testing emissions throughout 2010, and 208 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 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.

[5]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.

Table 1: Number of Stations and Workstations Testing Emissions in 2010

	Workstations[6]	Stations
Testing All Year	1,646	1,586
Testing for Part of Year	208	184
Total During Year	1,854	1,770
Testing in December	1,767	1,703

Table 2 shows the breakdown of fleet and public stations.

Table 2: Public and Fleet Stations in 2010

	Public	Fleet	Total Stations
Testing All Year	1,505	81	1,586
Testing for Part of Year	133	51	184
Total During Year	1,638	132	1770
Testing in December	1,593	110	1,703

In Tables 1 and 2, a station or workstation must have conducted emissions inspections in each month in 2010 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.

2.4 Inspectors

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

At the close of calendar year 2010, there were 7,223 trained and licensed inspectors certified to conduct emission tests (See Table 3). However, in 2010 only 6,583 inspectors conducted emissions tests and 6,649 inspectors tested at least one vehicle for safety or safety plus emissions.

[6] If a workstation was moved to a different station during 2010, 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.

Table 3: Number of Inspectors
January 1, 2010 through December 31, 2010

	#Inspectors
Inspectors Trained And Licensed on December 31, 2010	7,223
Inspectors Who Inspected at Least One Vehicle in 2010	6,649
Inspectors Who Tested Emissions in 2010	6,583

2.5 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 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 (except between August 2008 and October 2009, when a new program contractor was preparing, testing, and installing new diesel testing equipment and related software).

3 MOTORIST COMPLIANCE WITH TESTING REQUIREMENTS

3.1 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 2010, 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: 2010 Overall Testing Compliance Rates

	Vehicle Count	Compliance %
Average Number of Vehicles Registered in MA in 2010	4,626,387	
Unique Vehicles Tested in 2010 (Safety Only or Safety and Emissions Tests)	4,492,134	97.1%

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 2010* 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 253,416 gasoline-fueled vehicles that failed their initial OBD test, 39,755 (15.7% of the failing vehicles, and 1.1% of all gasoline-fueled vehicles tested) did not pass a subsequent retest, or receive a waiver or economic hardship extension by March 31, 2011 (the re-test would be considered a "final test" as per EPA's requirement noted above). Of the 11,786 diesel-fueled vehicles receiving an OBD test, 69 (0.6%) did not pass a subsequent retest by March 31, 2011. Five waivers from the requirement that failing vehicles pass an emissions re-test were granted in 2010 along with 70 economic 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.

3.2 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 2010, 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 2010 would ultimately have been in compliance but would have been counted as out-of-compliance on two registration reviews.

Table 5: 2010 RMV Registration Reviews

Date	Active Registrations	Number Non Compliant	Percent In Compliance
1/15/2010	4,595,541	439,060	90.4%
2/15/2010	4,593,548	448,522	90.2%
3/15/2010	4,593,680	447,780	90.3%
4/15/2010	4,604,472	439,260	90.5%
5/15/2010	4,620,846	439,302	90.5%
6/15/2010	4,637,593	444,878	90.4%
7/15/2010	4,645,976	453,882	90.2%
8/15/2010	4,652,247	451,025	90.3%
9/15/2010	4,653,759	454,703	90.2%
10/15/2010	4,650,942	459,260	90.1%
11/15/2010	4,634,769	457,001	90.1%
12/15/2010	4,633,270	448,055	90.3%
Average	**4,626,387**	**448,561**	**90.3%**

3.3 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.

In 2010, RMV conducted audits of vehicle stickers at 160 Massachusetts parking lots. Table 6 summarizes the results of these audits.

Table 6: 2010 Parking Lot Audits

Parking lot audits conducted	160
Vehicles surveyed	3,999
Vehicles with valid inspection stickers	3,766
Compliance rate	94.2%

3.4 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;

RMV conducted registration file audits and vehicle sticker audits at Massachusetts parking lots, as described in Sections 3.2 and 3.3 respectively. No other compliance surveys were conducted in 2010.

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). 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.

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 94% in actual parking lot surveys, which is similar to the rates found in many other states.

3.5 Motorist Time Extensions

40 CFR 51.366 (d) (1) (v): The number of time extensions and other exemptions granted to motorists;

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:
    - $1,085 for vehicles five model years old or newer;
    - $1,035 for vehicles over five but not exceeding 10 model years old; and
    - $885 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 2010, 70 economic hardship extensions were issued.

3.6 Waivers of Emission Standards

A 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)[7]:
    - $790 for a vehicle five model years old or newer
    - $690 for a vehicle more than five but less than ten model years old
    - $590 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 2010, the program granted five waivers.

3.7 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;

[7] 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.

3.8 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, RMV mailed a detailed memorandum to state and local police departments in the Commonwealth regarding sticker characteristics for 2010.

In 2010, state and local police issued 63,898 inspection sticker motor-vehicle violations.

4 PERFORMANCE OF EMISSIONS TEST EQUIPMENT

The Massachusetts Vehicle Check program uses two methods to ensure that the emissions test equipment is operating properly:

1. The workstations have been designed to run daily "self-checks", so that equipment with significant issues is identified (and repaired) as quickly as possible, and
2. RMV field inspectors audit equipment performance in the field.

4.1 OBD Test Equipment Self Checks

The "MASS08" workstations, which have been used in the field since 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 to fail 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 Vehicle Inspection Report (VIR) text. The inspector examines the quality of the printed sample and records a failure for the printer/barcode scanner check if the text is not legible. If the print quality is good, the inspector is then prompted to scan the 1D and 2D barcodes. If the workstation cannot read the barcodes, it fails the check. This failure to read the barcodes 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 until it can pass the check.
- For workstations equipped with diesel opacity meters, the opacity meters perform three daily self-checks: electronic zero and span; accuracy at 37.5% opacity by extinguishing 3 of 8 light pulses; and current draw of the sample fan. 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.

4.2 OBD Test Equipment Audits

> 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;
> (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.

In 2010, Massachusetts Registry of Motor Vehicles' field investigators conducted 2,131 audits of the OBD emissions test equipment used to conduct vehicle inspections in the Commonwealth.

In 2010, 1,586 stations and 1,646 workstations (lanes) conducted emissions inspections throughout the period[8]. A total of 1,770 stations and 1,854 workstations conducted at least one emissions test at some time during the year.

Thirty-one RMV field investigators performed a total of 2,131 OBD test equipment audits in 2010, which covered 1,156 different workstations (lanes) and 1,128 different inspection stations. Multiple workstation audits were completed for 639 workstations.

The results of these audits are described in detail in Attachment D, and are summarized here[9].

4.3 Audit Results for OBD Test Equipment

To pass an overall audit, the workstation cannot fail any of the audit's individual parts.

Table 7 describes the results of the workstation OBD test equipment audits conducted in 2010. It summarizes the workstation audit results for each individual OBD audit part and the overall workstation audit results.

[8] A station or workstation must have conducted at least one emissions inspection in each month in 2010 to be counted as "testing throughout the period."
[9] The OBD test equipment audits focus on workstation performance. In this report, the data for 40 CFR 51.366(c)(3) is provided for workstations, rather than for stations. A summary of failures for stations can be found in Attachment D, 2010 Quality Control Report.

Table 7: 2010 OBD Test Equipment Audit Results

Audit Part	2010 Audit Results			
	Pass	**Fail**	**Tested**	**Failure Rate**
Functional Checks				
Communications Check	2,127	4	2,131	0.2%
Accuracy Check, (Including RPM)	2,125	2	2,127[10]	0.1%
Number of Audits Failing One or More Functional Checks	2,125	6	2,131	0.3%
Visual Cable and Connector Check	2,100	27	2,127[11]	1.3%
Overall Audit Results (Audits that Failed One or More Audit Parts)	2,098	33	2,131	1.5%

A total of six workstations failed a functional check of the workstation's performance. Four workstations failed the communications check and two workstations failed the accuracy check. The two workstations that failed the accuracy check failed to report the OBD VIN and returned responses (PID $1C) that indicated that the workstations did not recognize the signal from the OBD vehicle simulator as an OBD compliant vehicle. Please note that these two accuracy items are not required by the EPA audit guidance. The audit was repeated for each of these workstations. Both workstations passed their second accuracy check, indicating that, during the initial audits, there was a communication problem between the OBD simulator and workstations that could not be reproduced. As a result, no service tickets were opened for these two workstations. MassDEP and the Network Contractor continue to review accuracy check audit results.

Service tickets were opened, and service provided, for all four workstations with communication failures.

Twenty-seven workstation audits failed the visual cable and connector check. All twenty-seven of these workstation audits passed for both communication and accuracy, indicating that, while the visual condition of the equipment was questionable, it still performed adequately. Service tickets were opened for about half (14) of the twenty-seven failures of the visual cable and connector check. For the majority of the visual failures without a service ticket, the audit comment in the data base indicated that the problem may not have been severe enough to merit service at the time of the audit or that service was not necessary. Examples of audit comments include: "station has a new connector [to replace the worn one]," "lock clip on blue OBD connector broke but still holds" and "OBD cable wire starting to wear." These types of comments are helpful to the auditors for subsequent visits. In the meantime, daily loopback checks of the OBD interface and cable should identify when the components wear to the point of becoming unreliable.

[10] The accuracy check could not be done for the four workstation audits that had failed for communication.
[11] Due to the functionality of the current audit software, the visual cable and connector check results were not recorded in the database for the four workstation audits that failed for communication.

No stations or workstations were shut down as a result of the workstation OBD test equipment audits.

5 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 2010 are described in this section.

5.1 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;

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 based on consumer complaints or data analysis.

The I&M contractor maintains records of all inspections in a database to which MassDEP and RMV have 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.

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 2010, RMV conducted 8,409 overt station visits/audits. All 1,770 stations and 1,854 workstations that conducted emissions inspections during this period received at least one audit.

5.2 Digital Audits

In addition to RMV's overt station visits/audits, in 2010 MassDEP continued an initiative that started in late 2008 to use digital audits of the inspection data base to identify suspected improper emissions 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 unusual 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 2010, digital audits were the initial basis for seven enforcement cases settled against specific inspectors and stations by the Massachusetts Attorney General's Office or by MassDEP and RMV. The digital audits were supplemented by findings from the overt station visits. The enforcement actions reported in Section 5.4 include the results of these cases. Financial penalties resulting from these cases are reported in Section 5.4.1.

5.3 Covert Audits

Covert audits, or "covert performance audits," are under-cover inspections done with vehicles set to fail one or more parts of the emissions test. This section summarizes covert audits performed by the Network Contractor. While RMV staff also conducts covert audits as part of their enforcement activities, the results of their covert audits are not included in the following tables.

Covert auditing started in April, 2010. In 2010, the Network Contractor performed 2,115 covert vehicle audits. The unusually high number of covert vehicle audits in 2010 was due to the Network Contractor successfully catching up on the 2,000 (677 + 1,333) vehicle audits Massachusetts was committed to perform between October 1 2008 and September 30, 2010.

Of the 2,115 performed in 2010, six were scheduled in response to Agency requests. The remaining audits were selected randomly or targeted based on data analysis.

Some stations received more than one covert audit, as summarized in Table 8.

Table 8: 2010 Covert Audits per Station

Number of Audits Per Station	Count of Stations
1	678
2	504
3	143
Total Number of Stations Audited	1,325
Total Number of 2010 Audits	2,115

5.3.1 Covert Auditors and Covert Vehicles

> 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 audit vehicles are selected to represent the range of OBD communication protocols. Seven vehicles were used for covert audits in 2010, representing five communication protocols:

- CAN,
- KWP (ISO 14230-4),
- ISO (ISO9141),
- VPW and
- PWM.

In 2010, six covert auditors conducted covert vehicle audits.

5.3.2 Number of Covert Audits Conducted in 2010

> 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;

Table 9 summarizes the number of covert audits conducted during 2010 for each type of inspection station. In order to be considered "operating throughout the year" a station must have conducted at least one emissions test during each month of the year. Only public stations can receive covert vehicle audits because fleet stations only test vehicles that are part of the company's fleet, making it impossible for The Network Contractor to present a covert (or "undercover") vehicle for testing. Also, covert vehicle audits are not conducted at stations that inspect only heavy duty vehicles.

Table 9: Number of Inspection Stations and Covert Audits in 2010

			2010 Covert Audits		
		2010 # of Stations	Audited Stations	# Of Audits	Stations NOT Receiving Covert Audits
Operating Throughout the Year	Fleet stations	81	0	0	81
	Public stations	1,505	1,265	2,036	240
	All stations	**1,586**	**1,265**	**2,036**	**321**
Operating Part of the Year	Fleet stations	51	0	0	51
	Public Stations	133	60	79	73
	All stations	**184**	**60**	**79**	**124**
TOTAL		**1,770**	**1,325**	**2,115**	**445**

Table 10 shows the total number of workstations in the inspection network and the number of workstations that received covert audits. A workstation is counted as "operating throughout the year" if it conducted at least one emissions inspection each month of the year.

Since the inspector is required to drive the vehicle into the inspection bay during a covert audit, the covert auditor has no control over which workstation is used at stations with multiple workstations.

Table 10: Number of Workstations and Covert Audits in 2010

	# of Workstations	Audited Workstations	# Of Audits	Workstations Not Audited
Operating Throughout the Year	1,646	1,272	2,034	374
Operating Part of the Year	208	62	81	146
TOTAL	**1,854**	**1,334**	**2,115**	**520**

5.3.3 Covert Audit Overview

A "false pass" on a covert audit is an inspection that passes a vehicle that was set to fail its OBD test.

Covert vehicles are set to fail the OBD test in a variety of ways including:

- diagnostic trouble codes being set,
- failing to communicate, and
- failing because the readiness monitors are not set.

In addition to these three types of OBD failures, the Malfunction Indicator Lamp (MIL) was made inoperable for some of the vehicles that were set to fail with diagnostic trouble codes set.

During 2010, Massachusetts also piloted setting an audit vehicle to fail the OBD test due to apparent tampering of the data link connector (DLC).

For some covert audits, the vehicles were also set to fail the safety test.

5.3.4 Covert Audit Results by Type of OBD Failure

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;

Table 11 summarizes the results of the covert audits with vehicles set to fail the OBD test. Since OBD tests are the only type of emissions test covered by the covert audit program, there were no audits set to fail two or more test types. For the 2,076 regular, non-pilot, covert audits with OBD set to fail, there were no false passes.

In addition to the 2,076 audits, Massachusetts conducted thirty-nine pilot audits where the OBD failure implanted in the vehicle was a DLC that appeared to have had an emissions-defeating device installed, which constitutes "tampering" in the Massachusetts I&M program. This pilot caused a stir within the inspection community, generating calls to the program's Technical Support Hotline and word-of-mouth descriptions of the defect spreading among stations. It quickly became evident that the defect was not a viable defect to set in covert vehicles because it made the vehicles and auditors too easy to recognize. Because of these concerns, the pilot was discontinued.

The thirty-nine audits with DLC tampering failures resulted in twenty false passes. Possible reasons for the high rate of false passes include:

- The tamper was difficult to see when the inspection bay was poorly lit;
- The tampered "box" looked like a commercially manufactured box and the inspector may have believed it was original equipment;

- The wording on the box label could be interpreted to mean that the emissions tests would be circumvented, but an inspector with less automotive experience might have been interpreted the label to mean that the emissions from the vehicle were minimized.
- A language barrier may have prevented the inspector from interpreting the box as a tamper; based on the box's labeling
- The inspector may have believed the box represented tampering, but chose not to report it.

No enforcement action was taken against the stations and inspectors that falsely passed the vehicles with "tampered" DLCs, due to concerns about compromising the identity of the covert auditors and vehicles.

Table 11: 2010 Covert Audit Results
False Passes for Vehicles Set to Fail OBD Inspections

	Total Audits	Falsely Passed OBD When Set to Fail	Percent Falsely Passed When Set to Fail
Regular Covert Audits with OBD Set to Fail	2,076	0	0.0%
Pilot Covert Audits: OBD Failure Due to Data Link Connector (DLC) Tampering	39	20	51.3%
Total	2,115	20	0.9%

5.4 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;

In 2010, RMV issued 535 written violations to stations resulting in 352 hearings. Of the hearings held, 162 resulted in the station's license being suspended or revoked. Of the 50 suspensions and revocations that were appealed, 25 were upheld, resulting in 137 station license suspensions or revocations.

RMV issued 462 written violations to inspectors resulting in 321 hearings. Of the hearings held, 128 resulted in the inspector's license being suspended or revoked. Of the 21 suspensions and revocations that were appealed, six were upheld, resulting in 113 inspector license suspensions or revocations.

Tables 12 and 13 summarize the results of RMV's hearings and enforcement actions for stations and inspectors in 2010. Some stations and inspectors appealed hearing results that were suspensions or revocations of their licenses. The results of the appeals are summarized in Table 14. Table 15 summarizes all adverse actions, including license suspensions, license revocations, and formal warnings.

Table 12: Number of Written Violations and Subsequent Actions Taken Against Stations and Inspectors in 2010

Type of Action Following Written Violations	Inspection Stations	Inspectors
Actions Following Written Violations		
Warning Letters (no hearing)	163	130
Violations Filed (no action or hearing)	16	8
Hearings Held (no appeal)	302	300
Hearing Held and Results Appealed	50	21
Cases Unresolved as of 12/31/10	4	3
Total Number of Written Violations	535	462

Table 13: Types of Enforcement Resulting from 2010 Hearings for Stations and Inspectors

Types of Enforcement Resulting from Hearings (Excluding hearings where the results were appealed)	Inspection Stations	Inspectors
Total Number of Hearings Held	302	300
License Revocations	1	3
License Suspensions	111	104
Warnings	164	167
Total Number of Adverse Actions	276	274
Other Action (e.g., abeyance, surveillance)	1	0
No Action	25	26

Table 14: Results of Appeals of Hearing Results

Results from the Board of Appeals	Inspection Stations	Inspectors
Total Number of Appeals	50	21
Adverse Actions		
Affirmed RMV Decision (suspended or revoked)	14	3
Modified RMV Decision (reduced suspension)	11	3
Total Number of Adverse Actions	25	6
Decisions Pending at RMV's Board of Appeals	0	2
Board of Appeals Vacated RMV Decision	22	8
Other	3	5

Table 15: Total Adverse Actions Against Stations and Inspectors in 2010

Adverse Actions	Inspection Stations	Inspectors
Warning Letters (no hearing)	163	130
Total Number of Adverse Actions as a Result of Hearings (Hearing results that were not appealed)	276	274
Total Number of Adverse Actions - Board of Appeals[12]	25	6
Total Adverse Actions for 2010	464	410

5.4.2 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;

In 2010, Massachusetts settled seven enforcement cases against a total of three inspectors and four stations, carrying a total of $433,000 in penalties assessed. Of the total penalty assessment, a total of $57,500 was stayed as long as the station and/or inspector comply with all program requirements during the period covered by the settlement. Each settlement agreement provides a schedule for the collection of the penalties.

[12] Some of the Board of Appeals cases that were resolved during 2011 originated from written violations that were issued in 2010.

All seven settled cases included violations due to OBD "clean scans." (A clean scan is a fraudulent OBD test conducted in whole or part on a motor vehicle other than the vehicle reportedly tested, or using an electronic device designed to simulate a vehicle's OBD system.)

5.4.3 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;

For 2010, 5,446,800 compliance documents (stickers) were issued to inspection stations. 5,008,016 stickers were used.

Using the workstations software, twelve stations reported a total of 850 stickers stolen RMV field investigators subsequently collected 450 of the stickers identified as stolen in the database, indicating that the stickers had either been mis-reported as stolen or subsequently recovered.

RMV field investigators attempted to collect all of the remaining stickers. There were two types of collection activities:

- During station site visits, RMV field investigators collected stickers that had been voided since the prior site visit (99,112 stickers were in this category); and
- In early 2011, in addition to picking up the usual voided stickers, the field investigators collected unused full sticker books and partial books that were voided as "Year-End Overstock." (338,822 stickers were in these categories).

RMV destroyed the collected stickers.

RMV field investigators were able to use the workstation software to identify all stickers that had been voided and therefore should have been available for collection, [13] and to determine if any stickers were missing. However, the collected stickers were typically not recorded in the database. If a voided sticker was missing, RMV always addressed the issue with the station and usually required the station to go through the full violation and hearing process. The missing sticker(s) were noted in the comments field for the site visit in RMV's VISITS database. The current format of the data for missing stickers makes it impossible to count the missing stickers.

[13] Due to software issues, the field investigators could not use the workstation software to identify full books of stickers that were in a station's inventory but had not been loaded into the workstation's printer tray. For each station, field investigators were provided with a list of the full books of un-loaded stickers requiring collection. The unloaded stickers needing collection were identified, through analysis of sticker data in the database.

6 EMISSIONS TEST RESULTS

6.1 Emissions Tests and the Massachusetts Fleet

The Massachusetts I&M program administered OBD and opacity emissions tests during all of 2010.

In 2010, 253,416 (7.2%) of the 3,520,698 unique non-diesel (gasoline, natural gas, etc.) fueled vehicles receiving initial OBD tests failed their initial tests. Of the 11,786 diesel-fueled vehicles receiving an initial OBD test, 672 (5.7%) failed their initial tests. Of the 96,162 diesel-fueled vehicles receiving an initial opacity test, 2,745 (2.9%) 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 16 summarizes the failure rates for initial OBD tests in Massachusetts in 2010:

Table 16: 2010 Failure Rate for Initial Emissions Tests by Test Type and Fuel

Test Type	Fuel	Failure Rate
Opacity	Diesel	2.9%
OBD	Non-Diesel	7.2%
OBD	Diesel	5.7%
All Initial OBD Tests		7.2%
All Initial Emissions Tests		7.1%

Of the initial emissions test failures, please note:

- Approximately 94.7% of retested vehicles passed the retest.
- 39,824 (15.7%) of vehicles that failed an initial OBD test and were still registered[14] in Massachusetts had not passed a retest, obtained a waiver or been granted a hardship extension by March 31, 2011.
- Five waivers and 70 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

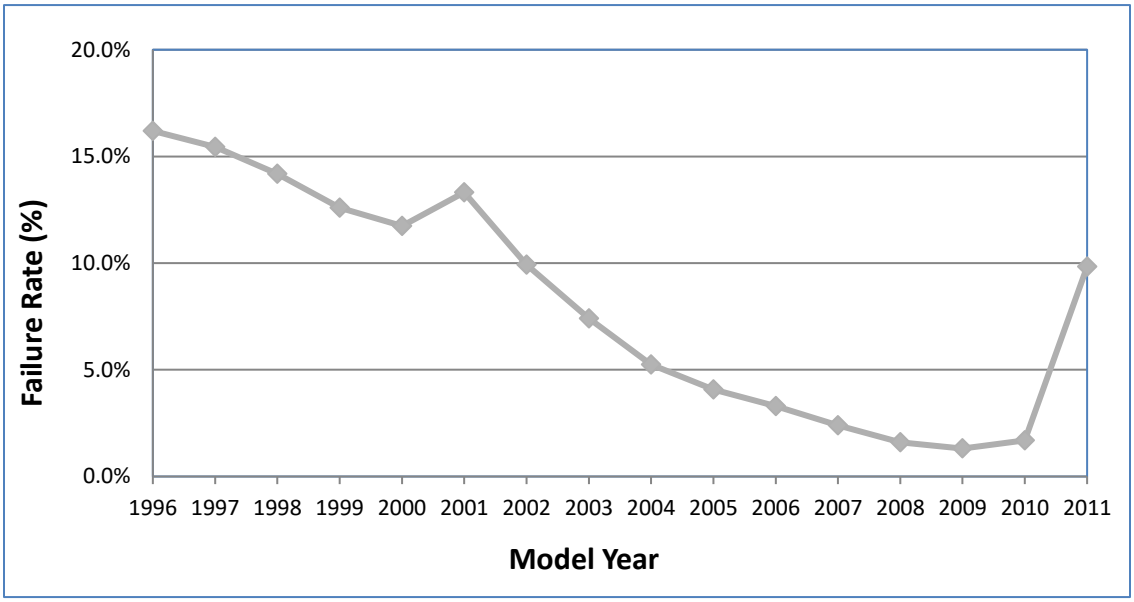
[14] Any vehicle that had a registration expire 3/31/11 or earlier was assumed to have been taken of the road.

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, 23,489 (0.6%) of the 3,722,694 OBD tests performed during 2010 were alternative tests. Attachment B describes the particular years, makes, models and counts of vehicles receiving these tests. The Network Contractor and the Agencies continue to work 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 and 2010 to address these problems. By the end of 2010, software and hardware fixes had resolved most of the communications issues, and nearly all of the vehicles listed in Attachment B are no longer receiving an alternative test.

Figure 1 below shows the initial OBD failure rates by model year. 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 2011 is based on a very small sample size (468). While this includes some new vehicles that have changed ownership within the first year, most 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: 2010 Failure Rates by Model Year – Initial OBD Tests Only



6.2 Overall Conclusions about Program Operation During 2010

2010 was the second full year of operation for the updated Massachusetts I&M Program. The program is meeting its goals of a comprehensive test that provides the emission reductions needed for the Massachusetts 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 (five 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 seventy hardship extensions were issued in 2010.

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

Massachusetts Enhanced Emissions and Safety Test
Inspection and Maintenance Program

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

Rules

Attachment B: Detailed 2010 Emissions Test Data

Massachusetts Enhanced Emissions and Safety Test
Inspection and Maintenance Program

See data disk

Attachment C: 2010 Test Data by Station

Massachusetts Enhanced Emissions and Safety Test
Inspection and Maintenance Program

See data disk