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

2008 Annual Report

Massachusetts Enhanced Emissions and Safety Test Inspection and Maintenance Program

September 3, 2009

Part 1: Program Activities and Results
January 1, 2008 – September 30, 2008

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

2008 Annual Report
Massachusetts Enhanced Inspection and Maintenance Program
Part 1 – January 1, 2008 through September 30, 2008

1 EXECUTIVE SUMMARY

This document is Part 1 of the 2008 Annual Report to the United States Environmental Protection Agency (EPA) on the Massachusetts Enhanced Inspection and Maintenance program (I&M program). This report covers the period between January 1 and September 30, 2008. On October 1, 2008, the Commonwealth of Massachusetts started operation of a new Inspection and Maintenance Program, under a contract with a new vendor that was executed on January 16, 2008. Because the new program is significantly different from the one implemented between October 1, 1999 and September 30, 2008, the report on the new program's first quarter of operation (October 1, 2008-December 31, 2008) can be found in Part 2 of the Commonwealth's 2008 Annual Report to EPA.

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.

1.1 Major Findings

Emissions Tests Conducted

A biennial emissions test is required for the majority of the fleet (Exemptions include vehicles less than two years old and pre-1984 vehicles). An emissions test is also required when a vehicle changes ownership, and when a vehicle is relocated to Massachusetts. An annual safety test is also required of all vehicles.

In 2008, there were approximately 4.63 million vehicles registered in Massachusetts. Between January 1, 2008 and September 30, 2008, the Massachusetts I&M program conducted initial emissions tests on 1,591,000 unique vehicles (34% of the Massachusetts fleet). Of the vehicles that received an initial emissions test in this period, 1,564,000 were gasoline fueled and 26,200 were diesel fueled Please note that testing of opacity testing of heavy duty diesel vehicles was halted on August 1, 2008 to allow for transition to the new I&M program (see Part 2 of the 2008 Annual Report)

In total, the I&M program conducted 1,706,000 emissions tests from January 1, 2008 through September 30, 2008, including initial tests, retests, and off-cycle tests due to changes of ownership/registration.

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

Compliance and Enforcement

Of the 4.63 million vehicles registered in Massachusetts in 2008, 3,475,390 (75.1%) were tested for safety or for safety and emissions between January 1, 2008 through September 30, 2008. Of the 1,564,484 gasoline-fueled vehicles receiving initial emissions tests, 144,371 (9.2%) failed their initial emissions tests. Of the 26,199 diesel-fueled vehicles receiving initial emissions tests 197 (0.8%) failed their initial emissions tests

Between January 1, 2008 and September 30, 2008, Massachusetts granted 123 waivers from the requirement that failing vehicles pass an emissions re-test (less than 0.01% of vehicles receiving initial emissions tests and 0.09% of vehicles failing initial emissions tests).

Of all gasoline-fueled vehicles tested, 12,955 (0.8%) did not pass a subsequent retest or obtain a waiver by March 31, 2009. These vehicles are considered to have "No Known Outcome." 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 inspections or emissions tests when required are subject to enforcement by the Registry of Motor Vehicles (RMV) as well as by state and local law enforcement agencies.

Emissions Reductions From Transient Tested Vehicles

EPA requires states to calculate emission reductions from vehicles that are repaired after failing a "transient" emissions test (This is one of the four types of emissions tests used in Massachusetts during the period covered by this report. It measures specific pollutants in tailpipe exhaust from gasoline-fueled vehicles). 12,373 transient-tested vehicles that had failed their emissions test in 2008 were successfully repaired and passed a subsequent transient test. Based on the emissions data for these vehicles' initial failing transient tests and their subsequent passing retests, these repairs reduced the emissions of those vehicles by an average of 73% for hydrocarbons, 79% for carbon monoxide and 61% for oxides of nitrogen.

Station and Inspector Oversight

Between January 1, 2008 and September 30, 2008, the Massachusetts Registry of Motor Vehicles (RMV) performed 4,098 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 1,397 stations operating throughout this period received at least one visit. Based on the results of these audits and other data, the RMV held 210 hearings for stations and issued 199 adverse actions against stations (e.g. license revoked or suspended).

Between January 1, 2008 and September 30, 2008, 5,561 licensed inspectors performed at least one test. Based on the results of the site audits and other data, the RMV held 235 hearings for inspectors, and issued 227 adverse actions (e.g., license revoked or suspended).

2008 Program Improvements

From January 1, 2008 through the end of the program contract on September 30, 2008, the program continued to implement contract provisions designed to improve the accuracy and reliability of emission testing equipment, an effort that was established by contract amendments (Nos. 4 and 6) signed in June 2004 and May 2006, respectively, that:

- established specific reliability standards for testing equipment,
- required all testing equipment to be upgraded or replaced,
- required the contractor to significantly increase its maintenance and monitoring of workstations, to provide early identification of needed adjustments and repairs and
- required the contractor to make additional improvements to improve program reliability (these were described in more detail in the 2007 Annual Report).

Massachusetts Department of Environmental Protection (MassDEP) continued its program of auditing inspection equipment performance through September 2008 to ensure that the contract amendment was achieving its goals. 2008 was the third year in which MassDEP used its audits to evaluate whether workstations were functioning within the contractually-required equipment reliability standards. However, to support the transition to the new Massachusetts I&M Program, the Department stopped auditing gas bench and VMAS equipment performance at the beginning of September 2008, and continued to audit only OBD testing equipment through the end of the month.

In January 2008, the Agencies started to implement a new contract for operation of the Massachusetts I&M program from October 1, 2008 through September 30, 2013. While the new program was framed in the Request for Responses (the document soliciting bids from contractors) that was issued in 2007, detailed implementation plans were developed between January and September 2008, and the new program started to administer inspections as scheduled on October 1, 2008. The new program is significantly different from the program operated between October 1, 1999 and September 30, 2008, and is described in detail in Part 2 of the 2008 Annual Report.

1.2 Contents of This Report

Section 2 of this report describes the Massachusetts I&M Program that was in effect between January 1, 2008 and September 30, 2008. It provides information on the number of vehicles covered, inspection stations and inspectors, and types of emissions tests administered during this period. 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)
- Emissions Test Results (Section 6)

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: Detailed 2008 Emissions Test Data
- Attachment C: 2008 Test Data by Station
- Attachment D: 2008 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.[2] 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[3].

The Massachusetts I&M program covered by this report 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 administered the Enhanced Emission and Safety Test Program. The program's goals were to implement a comprehensive test that provided the emission reductions needed for the Massachusetts state implementation plan (SIP), was convenient to motorists, ensures vehicle safety, and worked well in local inspection shops. To maximize customer convenience, the legislation combined emissions and safety testing, and required that the combined test be delivered in local inspection stations, convenient to where people live and work. In January 1999, the Commonwealth contracted with Keating Technologies, Inc. (which changed its name to Applus Technologies, Inc. in February 2005[4]), to supply the inspection equipment and operate the Massachusetts I&M program. This contract expired on September 30, 2008.

On October 1, 2008, Massachusetts started operation of a new Inspection and Maintenance Program, under a contract with a new vendor that was executed on January 16, 2008. Because the new program is significantly different from the one implemented between October 1, 1999 and September 30, 2008, the report on the new program's first quarter of operation (October 1, 2008-December 31, 2008) can be found in Part 2 of the Commonwealth's 2008 Report to EPA. This report (Part 1) describes the last nine months of the program operated by Applus Technologies, Inc.

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;

[2] These programs are established in legally binding and federally enforceable "State Implementation Plans" or "SIPs".
[3] 40 CFR Part 51, Subpart S (§51.350 et seq.).
[4] In July 2001, the Contractor changed its name to "Agbar Technologies, Inc.", and in February 2005, changed its name again to "Applus Technologies, Inc". In this report, the Contractor is referred to as "Applus", since the firm did business under this name during the period covered by this report.

In 2008, there were approximately 4.63 million vehicles with active registrations in the Massachusetts fleet. Under the I&M Program implemented from October 1, 1999 through September 30, 2008, all vehicles were required to receive a safety inspection every year, and the vast majority received an emissions test every other year. This program exempted vehicles from the emissions inspection if they were:

- Model year 1984 or older, or
- Less than 2 years old and still registered to the original owner.

Vehicles were required to receive an emissions inspection within seven days of transfer of ownership, or within seven days of their initial Massachusetts registration when moving registration from another state. In addition, vehicles that were more than 60 days late for a scheduled safety-only test were also given an emissions test.

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 received their inspections at local public stations. The program also allowed owners of vehicle fleets to purchase their own testing equipment so they could test their own vehicles. The number of public and fleet stations fluctuated slightly from month to month as businesses joined or left the program.

From January 1, 2008 through September 30, 2008, 1,397 stations conducted emissions tests throughout this period, and another 245 conducted tests during part of this period. There were 1,442 "workstations" or sets of inspection equipment used for testing emissions throughout this period, and 191 workstations used for testing during part of this period (See Table 1 below). A small number of inspection stations had more than one workstation. At any given time, some of the workstations and stations were not operating, due to factors such as change of ownership or location. The number of workstations and stations testing in any given month was therefore fewer than the total number of workstations and stations, as seen in Table 1. In Massachusetts, the number of workstations was equivalent to the number of lanes in a centralized testing program.

[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
January 1, 2008 through September 30, 2008

	Workstations[6]	Stations
Testing Whole period	1,442	1,397
Testing for Part of period	191	245
Total During Period	1,633	1,642
Testing in September	1,506	1,476

Table 2 shows the breakdown of fleet and public stations in the program between January 1, 2008 and September 30, 2008. Of the 1,397 stations that conducted emissions tests throughout this period, 1,371 were public stations and 26 were fleet stations. An additional 161 public stations and 184 fleet stations conducted emissions tests during part of this period.

Table 2: Public and Fleet Stations from
January 1, 2008 through September 30, 2008

	Public	Fleet	Total Stations
Testing Whole Period	1,371	26	1,397
Testing for Part of Period	161	84	245
Total During Period	1,532	110	1,642
Testing in September	1,439	37	1,476

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

2.4 Inspectors

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

At the beginning of 2008, there were 6,470 trained and licensed inspectors certified to conduct emission tests (See Table 3). However, only 5,561 inspectors tested at least one vehicle between January 1 and September 30, 2008.

[6] If a workstation was moved to a different station during 2008, it was counted as the same workstation, but as a different station. Relocated workstations may have tested for all or part of the period covered by this report. These statistics reflect the circumstances of each relocated workstation.

Table 3: Number of Inspectors from January 1, 2008 through September 30, 2008

	# Of Inspectors
Inspectors Trained and Licensed on January 1, 2008	6,470
Inspectors who Inspected At Least One Vehicle between January 1 – September 30, 2008	5,561

2.5 Emissions Tests Administered

In the Massachusetts I&M Program operated between January 1, 2008 and September 30, 2008, four different emissions tests were used. The workstation software determined what test a vehicle received. Gasoline-fueled vehicles received either an On-Board Diagnostic, transient (tailpipe), or two-speed idle (tailpipe) test. Diesel-fueled vehicles (heavy-duty only) received a snap acceleration (opacity) test. Each test is described below.

1. On-Board Diagnostic: All model year 1996-and-newer gasoline-fueled cars and light trucks have "On Board Diagnostic" (OBD) 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. Starting on June 15, 2004, all vehicles equipped with modern OBD systems (i.e., OBD II) passed or failed their emissions tests based on the data in those systems From January 1, 2008 through September 30, 2008, 86.5% of vehicles receiving initial emissions tests were tested using the OBD test.

2. Transient tailpipe tests were used for most gasoline-powered vehicles that are not equipped with modern OBD systems. In this test, vehicles were placed on a dynamometer, a treadmill-like device that puts resistance against the tires to simulate on-road driving. The vehicles were accelerated and decelerated according to a prescribed pattern ("drive trace"), and tailpipe emissions were measured and recorded. Readings for hydrocarbons (HC), Carbon Monoxide (CO) and Oxides of Nitrogen (NOx) were compared to each pollutant's pass/fail points, which are expressed in grams/mile. The pass/fail points varied by vehicle type [car vs. truck], model year, and, for trucks, by weight category. From January 1, 2008 through July 31, 2008, 10.0% of vehicles receiving initial emissions tests were tested using the transient test.

Transient tailpipe tests were not administered after July 31, 2008, to allow failing vehicles to obtain their retest within the 60 days allotted from initial test failure before the start of the new program contract on October 1, 2008. If vehicles were not retested, motorists might have paid for repairs without knowing whether the repairs were effective. The program also wanted to deter unnecessary repairs by unscrupulous

repairers who would have known that vehicles would not be retested. MassDEP estimates that approximately 78,000 vehicles were excused from their final emissions test before the transition to the new program, which uses only OBD emissions testing. This represents about 4% of the total number of emissions tests that were conducted annually in the old program.

3. Two-speed idle (TSI) tests were used for gasoline-fueled vehicles that cannot receive an OBD or transient test. This test measured emissions while the engine was operating at 2500 revolutions per minute with the transmission in neutral, and while the vehicle was idling. The pollutant levels and pass/fail points for TSI tests were measured in concentrations (parts per million for HC, and percent-per-standard volume for CO). This test did not measure emissions of oxides of nitrogen. All vehicles receiving a TSI tailpipe emission inspection were also visually inspected to confirm that various emissions components, such as the catalytic converter, are present with no apparent tampering. If a vehicle failed the visual inspection, it failed the overall emissions test, even if the vehicle passed the tailpipe portion of the test. Examples of vehicles that received a TSI test are those with all-wheel drive (where the vehicle could not be shifted back to two wheel drive) and gasoline-fueled vehicles over 10,000 pounds Gross Vehicle Weight Rating (GVWR). From January 1, 2008 through July 31, 2008, 1.9% of all vehicles receiving initial emissions tests were tested using the TSI test. TSI testing was also halted on August 1, 2008, for the same reasons described above for transient testing.

4. The snap acceleration test uses an opacity meter to identify excess emissions from heavy-duty diesel trucks and buses (e.g., vehicles weighing more than 10,000 pounds GVWR). While not required by EPA, Massachusetts devoted resources to diesel testing because diesel exhaust is linked to significant health problems. Every diesel vehicle that was repaired through this program results in an improvement in air quality for children riding school buses, for people living next to busy urban streets, and for the thousands of Commonwealth residents who suffer from asthma. Diesel testing started in February 2001. From January 1, 2008 through July 31, 2008, heavy-duty diesel vehicles comprised 1.6% of all vehicles receiving an initial emissions test.

Opacity testing of heavy-duty diesel vehicles was stopped after July 31, 2008, 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 between August 1 and September 30, 2008, but will not get an opacity test until their 2009 inspection. MassDEP estimated that opacity testing was deferred for about 8,500 diesel vehicles.

Please note that gas caps were tested for most gasoline-fueled vehicles. If a vehicle failed the gas cap test, it failed the overall emissions test, even if the vehicle passed the tailpipe or OBD portion of the test.

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 the period January 1-September 30, 2008, which compares the total number of unique vehicles receiving an I&M test (including safety-only tests) to the average number of unique registered vehicles during this period.

Table 4: Overall Testing Compliance Rates
January-September 2008

	Vehicle Count	Percent of Total
Average Number of Vehicles Registered in MA, January-September 2008	4,628,000	
Estimate of Vehicles Due for Inspection Between January 1-September 30, 2008[7] (Safety or Safety and Emissions)	3,610,000	78% of vehicles registered in MA in 2008
Unique Vehicles Tested between January 1-September 30 2008 (Safety Only or Safety and Emissions Tests)	3,475,390	96.3% of vehicles expected to be inspected in this period

Please note that a compliance rate specifically for emissions tests cannot be calculated due to insufficient data. In the period covered by this report, 12,965 (0.8%) of the 144,371 gasoline-fueled vehicles that failed their initial emissions tests did not pass a re-test by March 31, 2009 (the re-test would be considered a "final test" as per EPA's requirement noted above). However, data indicating the number of vehicles that should have obtained an initial emissions test is not available because the Commonwealth does not track the number of registered vehicles that are exempt from the emissions testing requirement (those that are less than two model years old, or were made in model year 1984 or earlier).

[7]This estimate is based on the percentage of tested vehicles that had an initial inspection between January 1 and December 30, 2007. The estimate does not include new vehicles purchased in Massachusetts in this period or vehicles that changed ownership then and were therefore required to be inspected outside of their annual schedule.

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;

The RMV typically completes two scans of the vehicle registration database each month. These registration reviews examine the testing status of each registered vehicle to determine compliance with testing requirements.

Table 5 (below) summarizes the results of these registration reviews for January-September, 2008. Please note that the compliance rate is typically higher in the middle of the month than at the start of the month, indicating that a significant number of vehicles were inspected between one day and two weeks after the inspection was due.

Please note that the proportion of the vehicle fleet found to be "in compliance" with inspection requirements by the bi-monthly registration reviews is lower than the proportion determined to be in compliance based on data from the full period covered by this report (89.5% vs. 96.3% respectively).

Registration reviews (as described in Table 5 below) 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." Massachusetts' I&M regulations allow up to 60 days for emissions repairs. The registration reviews count vehicles that failed their emissions test as "out of compliance" if they have not completed repairs and passed 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 2008 would ultimately have been in compliance but would have been counted as out-of-compliance on four registration reviews.

Alternatively, the compliance rate in Table 4, which is based on the number of unique vehicles tested during the period covered by this report, may overstate compliance. The number of vehicles subject to the test (the denominator, from Table 5) is the average of the number of vehicles found to be registered in each of RMV's registration reviews. In contrast, the numerator is the number of unique vehicles that were tested during the period covered by this report, even though some of these vehicles may not have been registered for the whole period.

Table 5: 2008 RMV Registration Reviews

Date	Active Registrations	Number Non Compliant	Percent In Compliance
01/02/2008	4,624,217	523,625	88.7%
01/15/2008	4,606,557	448,949	90.3%
02/01/2008	4,613,666	529,822	88.5%
02/15/2008	4,599,508	462,618	89.9%
03/01/2008	4,608,697	529,242	88.5%
03/15/2008	4,599,430	452,029	90.2%
04/01/2008	4,613,585	532,222	88.5%
04/15/2008	4,608,498	448,867	90.3%
05/01/2008	4,627,890	515,907	88.9%
05/15/2008	4,626,182	443,068	90.4%
06/01/2008	4,619,131	512,986	88.9%
06/15/2008	4,640,727	445,383	90.4%
07/01/2008	4,658,392	533,417	88.5%
07/15/2008	4,648,695	452,515	90.3%
08/01/2008	4,664,164	524,780	88.7%
08/15/2008	4,653,497	444,601	90.4%
09/01/2008	4,637,832	520,146	88.8%
09/15/2008	4,651,303	448,604	90.4%
Average Jan-Sept	**4,627,887**	**487,155**	**89.5%**

3.2.1 PARKING LOT SURVEYS

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.

Table 6 summarizes the results of parking lot surveys conducted by the RMV between January 1 and September 30, 2009.

Table 6: 2008 Parking Lot Surveys
(all surveys conducted between February and July 2008

Parking lot audits conducted	146
Vehicles surveyed	3,650
Vehicles with valid inspection stickers	3,439
Compliance rate	94.2%

3.2.2 RMV 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 parking lot surveys, as described in Sections 3.2 and 3.2.1 respectively. No other compliance surveys were conducted in 2008.

The RMV's registration enforcement program, originally scheduled to begin in late 2004, had not been implemented by the end of the period covered by this report. RMV suspended the mailing of letters to owners of all vehicles that had not passed a retest 30 days after they failed an initial inspection (see description in 2007 Annual Report) and instead directed its efforts toward working with the new program contractor on data integrity and test record issues to support the effective implementation of a full registration enforcement program in the new program.

3.2.3 MOTORIST TIME EXTENSIONS

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

No time extensions and other exemptions were granted to motorists, beyond the program's standard exemptions for certain classes of old or new vehicles.

3.2.4 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;
- 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.

3.2.5 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 with inspection-sticker motor-vehicle violations, the RMV mailed a detailed memorandum to state and local police departments in the Commonwealth regarding sticker characteristics for 2008.

Between January 1 and September 30, 2008, state and local police issued 68,258 inspection-sticker motor-vehicle violations.

4 PERFORMANCE OF EMISSIONS TEST EQUIPMENT

This section summarizes the findings of more than 6,600 audits of emissions testing equipment conducted by MassDEP and Applus Technologies, Inc. in from January 1, 2008 through September 30, 2008. The complete Quality Control Report, with detailed information about the equipment audits and results, can be found in Attachment D. In addition to the results of MassDEP equipment audits, this section summarizes the equipment performance standards covered by Contract Amendments Nos. 4 and 6, and reports whether these performance standards were met. This section also describes the results of equipment audits performed by Applus.

MassDEP's equipment auditing program was designed to determine whether emissions testing equipment meets stringent performance standards ("audit criteria") established by the Massachusetts I&M program. Equipment audits were on-site inspections of emissions testing equipment performed throughout the year at working inspection stations. Equipment audits were performed overtly and were either randomly selected or targeted. MassDEP's audits were performed by agency staff and SGS Testcom (a firm that held a separate contract with MassDEP, and had no business ties to Applus).

As per EPA requirements [40 CFR 363 (c)] and guidance, each state establishes equipment audit criteria and performance standards for its I&M program, based on its own program objectives. States can choose to include additional audit criteria not required by EPA, and some states select performance standards for the equipment audit criteria that differ from EPA guidance. MassDEP's audit criteria are listed in Attachment D.

Massachusetts's criteria were more rigorous and significantly stricter than what EPA requires: while EPA's criteria include 64 checks, Massachusetts' audits covered 88 checks (including everything required by EPA). If a workstation failed to meet one or more of the 88 audit criteria, then that workstation failed the audit, regardless of whether the failure might have affected the results of an emissions test. Follow-up audits occurred at stations failing items deemed critical during initial or follow-up audits.

As the following sections show, between January 1, 2008 and September 30, 2008, Applus maintained the equipment performance improvements that were achieved through the implementation of Contract Amendments 4 and 6[8].

4.1 MassDEP Audit Coverage of the Inspection Station Network

> 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;

[8] The requirements of these Amendments were described in detail in the 2005 and 2007 Annual Reports.

(2) The number of equipment audits by station and lane;

1,397 stations and 1,442 workstations (lanes) conducted emissions inspections throughout the period between January 1 and September 30, 2008. 1,642 stations and 1,633 workstations conducted emissions tests at some time during this period. These numbers include workstations and stations that were configured for "diesel only" emissions tests and were therefore not subject to equipment audits. In September 2008, 1,506 workstations and 1,476 stations conducted emissions tests for gasoline fueled vehicles and, therefore, were subject to equipment audits.

MassDEP performed a total of 1,604 audits from January 1, 2008 through September 30, 2008 of 1,212 different workstations (lanes) and 1,187 different inspection stations. 875 workstations were audited 1 time, 292 workstations were audited two times, 37 workstations were audited three times, six workstations were audited four times and two workstations were audited five times. These audits include re-audits at stations with critical failures during initial or follow-up audits. Except for targeted audits, MassDEP randomly selected workstations to receive audits. Therefore, some workstations were not scheduled for audits in the period covered by this report.

4.2 MassDEP Audit Results

4.2.1 NUMBER OF STATIONS THAT FAILED AN AUDIT, JANUARY 1, 2008 – SEPTEMBER 30, 2008

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

Of the 1,604 equipment audits conducted, 323 failed one or more audit parts, which was a 20% failure rate overall. In total, 302 different inspection stations failed at least one MassDEP audit criteria on at least one audit. This constituted 25.4% of the 1,187 stations audited between January 1, 2008 and September 30, 2008 and 18.4% of the 1,642 stations that tested at some time during the year. Please note that failing any one of the 88 parts of a Massachusetts audit results in an "audit failure." Most failures were associated with minor audit criteria that did not directly affect the outcome of emissions tests (e.g., a clock that was not within five minutes of the correct time).

4.2.2 NUMBER OF STATIONS SHUT DOWN DUE TO AN EQUIPMENT AUDIT BETWEEN JANUARY 1 AND SEPTEMBER 30, 2008

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

(4) Number and percentage of stations and lanes shut down as a result of equipment audits.

Of the 1,604 equipment audits performed between January 1, 2008 and September 30, 2008, only eight (0.5%) of the audits resulted in workstations being immediately shut down and suspended from performing inspections until repairs could be made. These eight audits occurred at eight different workstations located at eight different stations. They constituted 0.5% of all 1,642 stations and 0.5% of all 1,633 workstations.

Of the eight workstations that were immediately shut down as the result of an audit:

- One failed the leak check
- One was shut down because zero air was not detected; and
- Six were shut down due to serious issues that prevented calibration of the gas bench.

4.2.3 AUDIT FAILURE SUMMARY

Table 7 summarizes the results of equipment audits from 2003 through September 30, 2008. Of particular interest is the continued significant improvement from the 13% failure rate for "combined critical gas bench/VMAS audit" items in 2004 to a 2% failure rate in the period covered by this report.

Table 7 also demonstrates that the dramatic improvement in the overall audit failure rate, following the implementation of Contract Amendment No. 4 in June 2004, continued in 2008. In 2008, 20%, (323 of 1,604) of equipment audits failed one or more of the 88 audit criteria, compared with the 30% failure rate in 2007, the 31% failure rate in 2006, the 39% failure rate in 2005, the 55% failure rate in 2004 and the 83% failure rate in 2003. As noted in Section 4.2.1 above, most of these audit failures concerned minor audit criteria that did not directly affect the results of emissions tests.

As Table 7 shows, the failure rates for each audit part in the period covered by this report were either lower than or equal to 2007 failure rates for those parts, with the exception of slight increases in failure rates for the weather station and the leak check audits. Though the weather station audit failure rate increased from 20% to 21% in this period, these failures were generally due to issues with inspection station maintenance; the failure rate for this item continued to maintain the substantial improvement over the 47% failure rate in 2003. Similarly, while the leak check failure rates increased from less than 1% in 2007 to 2% between January 1, 2008 and September 30, 2008, these failures also generally stemmed from inspection station maintenance issues. The failure rate for leak check audits continued to maintain the substantial improvement over the 44% failure rate in 2003.

Though the failures of the second bench audits appear to be high, and increased from 76% in 2003 to 86% in 2008, there are several considerations for an evaluation of this statistic:

- In 2008, MassDEP conducted 1,079 first gas bench audits, of which only 25 failed. Of the first gas bench failures, three had such significant problems that they could not be recalibrated for a second audit, and calls for service were initiated. Of the remaining 22 gas benches that could be recalibrated and audited a second time, 19 (or 86%) failed the second audit.

- Since the number of gas benches that failed their first bench audit decreased significantly since 2003, the small number of failed second gas bench audits was a large percentage of the number of first gas bench audit failures.

- The high percentage of second gas bench audit failures indicates two qualitative improvements since 2003: 1) these audits successfully identified gas benches that experienced a substantive failure after their last audit, and 2) better maintenance conducted by the program contractor generally took care of small problems, so that these audits no longer identified gas benches with minor problems that could be resolved by a calibration.

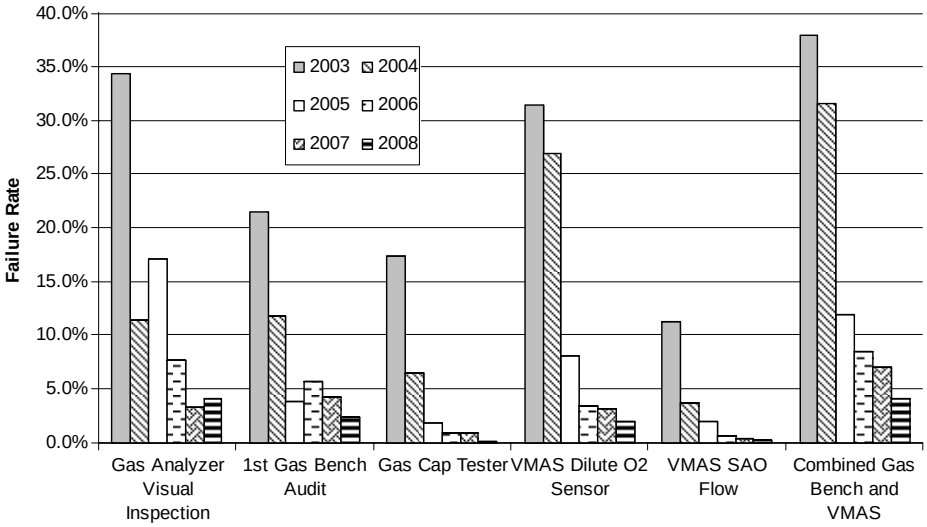
Table 7: Equipment Audit Data Summary
January 1, 2003through September 30, 2008

Audit Part	2003 Failure Rate	2004 Failure Rate	2005 Failure Rate	2006 Failure Rate	2007 Failure Rate	2008 Failure Rate
Visual Inspection	7%	6%	4%	4%	3%	1%
Gas Analyzer Visual Inspection	34%	11%	17%	8%	4%	4%
Weather Station	47%	27%	21%	17%	20%	21%
Leak Check	44%	7%	1%	1%	<1%	2%
1st Gas Bench Audit	22%	12%	4%	6%	4%	2%
2nd Gas Bench Audit	76%	73%	80%	83%	87%	86%
Gas Cap Tester	17%	7%	2%	<1%	<1%	<1%
Inductive RPM Pickup	2%	3%	1%	<1%	1%	<1%
OBDII RPM Pickup	1%	1%	<1%[9]	<1%	<1%	<1%
OBDII Tester	5%	1%	<1%	0%	<1%	0%
VMAS Visual Inspection	20%	4%	2%	2%	2%	<1%
VMAS Dilute O2 Sensor	31%	27%	8%	3%	3%	2%
VMAS SAO Flow	11%	4%	2%	<1%	<1%	<1%
Overall Audit Result	83%	55%	39%	31%	30%	20%
Combined Gas Bench and VMAS	38%	32%	12%	8%	7%	4%
Combined Critical Gas Bench/VMAS Audit Items	NA	13%	5%	5%	4%	2%

Table 7 demonstrates that equipment reliability improved significantly since 2003. Figure 1 compares the changes in failure rates between 2003 and the period covered by this report for six equipment components that had very high audit failure rates in 2003. Figure 1 shows that failure rates for all six of these audit parts sustained the decreases seen since 2003.

[9] Beginning in 2005, audit failures less than 1% have been indicated as "<1%".

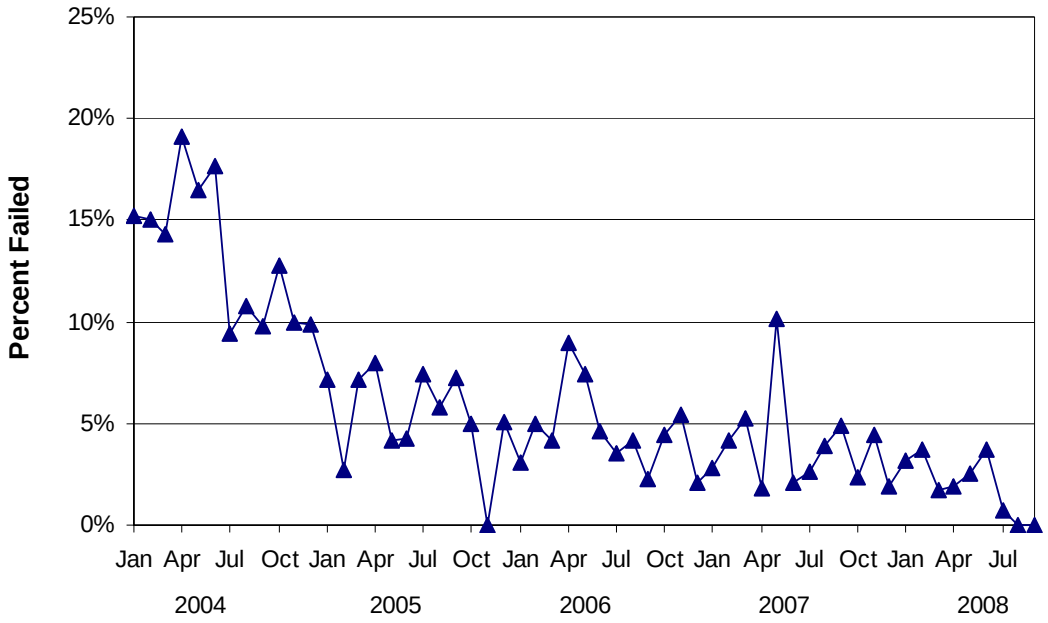
Figure 1: MassDEP Audit Failure Rates for Select Audit Parts 2003through September 30, 2008



4.2.4 AUDIT RESULTS FOR CRITICAL ITEMS

Of the critical workstation components, MassDEP monitored the performance of the gas bench and VMAS most closely. Figure 2 includes data from initial audits and re-audits, and presents the failure rate for combined critical gas bench/VMAS audits for 2004 through September 30, 2008. This graph highlights the significant improvement in failure rates for the combination of these critical components during the last half of the 2004, and the sustained improvements seen through September 30, 2008.

Figure 2: Combined Critical Gas Bench/VMAS Audit Failure Rate 2004-2008



4.3 Equipment Improvements and Contract Equipment Reliability Standards

Contract Amendment No. 4 (which was signed in June 2004) required specific changes in the Massachusetts I&M program that were designed to deal with equipment reliability issues that were identified through audits in 2002 and 2003. To meet the Amendment's reliability requirements, Applus found it necessary to replace all equipment supplied by one of the program's two equipment vendors. The replacement was completed in February 2005.

Contract Amendment No. 4 also established specific equipment reliability standards, which required the program contractor to significantly increase its maintenance and monitoring of workstations and to provide early identification of needed adjustments and

repairs. These standards ensured that the test equipment worked reliably enough to consistently identify vehicles with emission systems in need of repair. The standards were used to determine whether the equipment is working at a sufficiently high level of reliability:

- Equipment components that are critical for accurately measuring vehicle emissions (known as "Tier 1" equipment components) were required to achieve a 90% reliability rate, based on initial random audits performed by MassDEP or its auditing contractor;[10]
- Other, less critical equipment components (known as "Tier 2" equipment components) were required to achieve an 85% reliability rate, based on initial random audits performed by MassDEP or its auditing contractor; and
- Critical components that were repaired after failing any audit had to achieve a 95% reliability rate based on follow-up audits performed by MassDEP or its auditing contractor. (This contract requirement was known as the "Tier 1 reliability standard for follow-up audits.")

To ensure that these reliability standards are met, Applus agreed to:

- Audit each inspection station quarterly to identify equipment that needed to be repaired;
- Increase its maintenance and monitoring of workstations and implement other quality control measures that identified degrading equipment before it failed an audit; and
- Automatically lock workstations out of the computer network when they failed periodic self-checks so they could not be used until they were repaired.

An additional contract amendment (No. 6, signed by the Agencies and Applus on May 30, 2006) extended the contract through September 30, 2008, and augmented the reliability standards described above by requiring the contractor on an on-going basis to:

- Improve its response time to requests from inspection stations for workstation repairs,
- Meet performance standards for workstation maintenance and repairs identified by digital and MassDEP audits;
- Upgrade workstation software to correct gas bench response times and VMAS flow adjustments,
- Reformat the Vehicle Inspection Report and implement a communications plan to encourage motorists to use a Registered Repairer for emission control system repairs,
- Update and expand training for emission control repair technicians, and
- Correct the protocol for inspecting heavy-duty vehicles to require that parking brakes are "off" during an inspection.

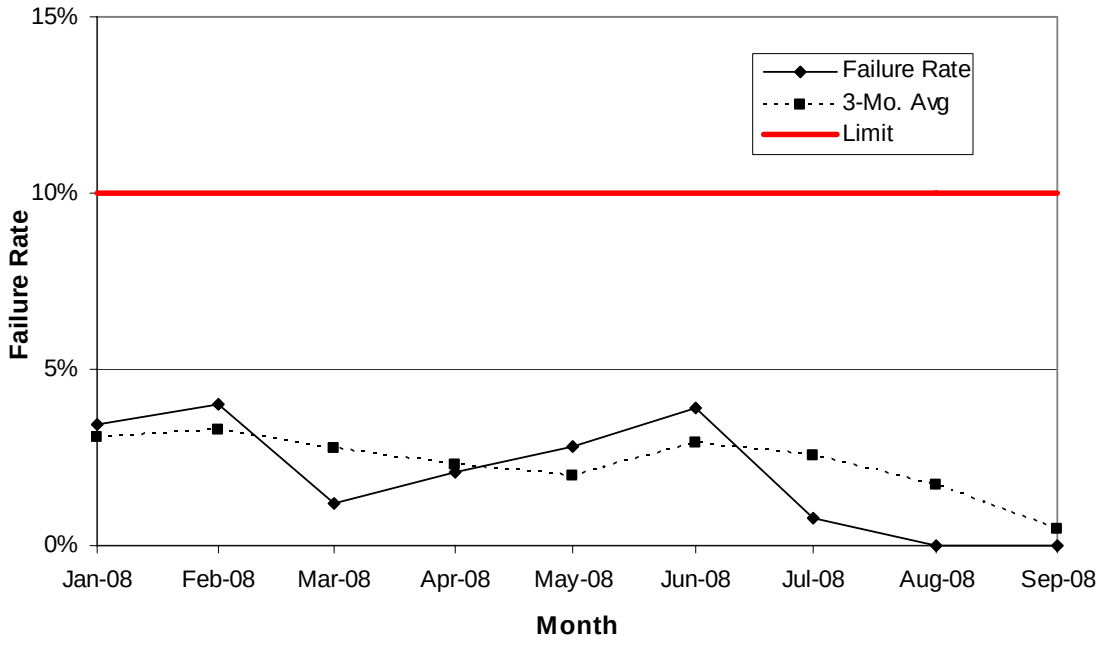
[10] Initial Random Audits are randomly selected using a protocol agreed to by MassDEP and Applus. MassDEP conducted the first Initial Random Audits pursuant to this protocol in July 2005.

The contract amendment included schedules for these requirements and performance standards to help ensure that the program contractor meets the requirements throughout the remaining term of the extended contract.

As a direct result of improvements in equipment service and maintenance made throughout 2006, 2007 and the first nine months of 2008, Applus achieved the equipment reliability standards established in Contract Amendment No. 4 in the period covered by this report.

The Tier 1 reliability standard focused on four audit criteria (combined critical bench and VMAS, gas cap tester, weather station barometric pressure, and OBDII test system), and required that their failure rates do not exceed 10% for initial random audits, measured by averaging failure rates for these items over rolling three-month periods. Figure 3 below plots monthly failure rates for combined bench and VMAS, the rolling three-month average failure rate, and the 90% reliability standard for initial random audits in 2008. The highest monthly failure rate for combined bench and VMAS was 4.0% in February 2008. In 2008, the three-month average failure rate did not exceed the Tier 1 standard of 10%. February 2008 had the highest three-month average failure rate for the year (3.3%).

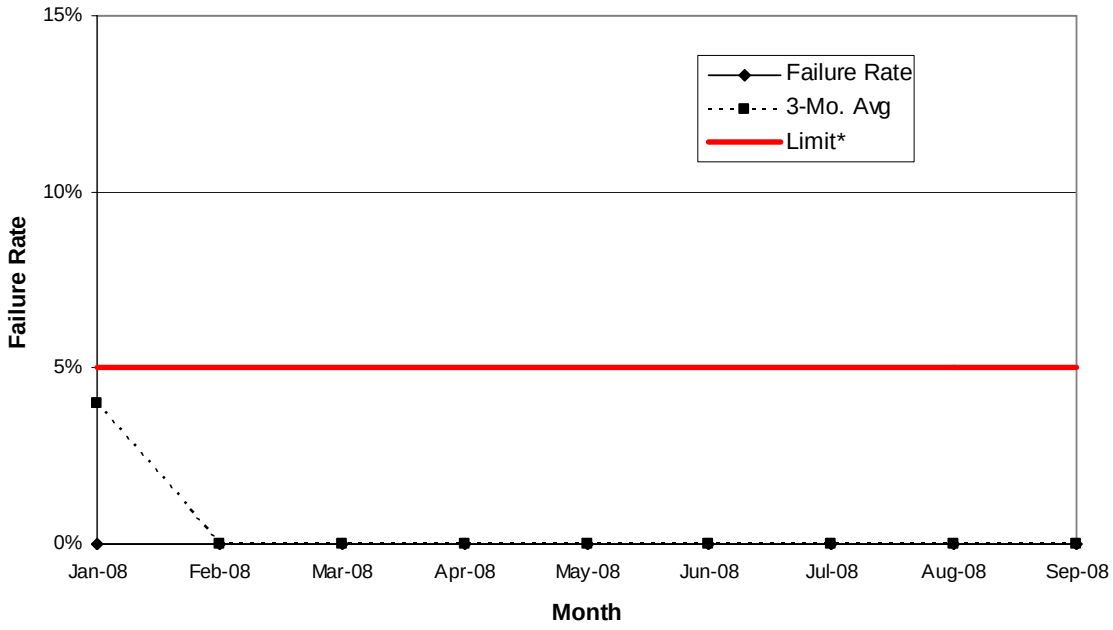
Figure 3: Tier 1 Initial Random Audit Failure Rate – Combined Bench & VMAS



The Tier 1 reliability standard also established a maximum failure rate of 5% for follow-up audits of the four critical items, averaged over rolling three-month periods. Figure 4 below plots the monthly failure rate between January 1, 2008 and September 30, 2008 for follow-up audits of the combined bench and VMAS, the rolling three-month average failure rate, and the 95% reliability standard. In this period, there were no months with

Tier 1 follow-up audit failures. The three-month-average combined bench and VMAS failures for follow-up audits did not exceed 5% in 2008. The three month average combined bench and VMAS failure rate was 4% in January, due to failures in 2007, and 0% for the remaining 8 months. .

Figure 4: Tier 1 Follow-Up Audit Failure Rate – Combined Bench & VMAS



The Tier 2 standards required that the three-month failure rate not exceed 15% for two additional but less critical audit criteria during initial random audits:

- First Gas Bench: the first gas bench audit failed, but the second gas bench audit (conducted after calibrating the bench) passed (i.e. the bench audit failure was not a Tier 1 failure) and
- Gas Cap Tester: the gas cap audit failed, but the second gas cap audit passed after recalibration (i.e. the gas cap audit failure was not a Tier 1 failure).

Between January 1, 2008 and September 30, 2008, the Tier 2 audit results had a uniformly low failure rate: monthly failure rates were usually zero, and were always below 1%. Therefore, in the period covered by this report, the failure rates for Tier 2 items met the established performance standards.

4.4 Equipment Audits Performed by the Program Contractor

Applus performed 5,012 equipment audits between January 1, 2008 and September 30, 2008, using performance standards that were comparable to those used by MassDEP and

SGS Testcom. Applus has provided MassDEP with data from their equipment audits conducted in 2008. A summary of this data is presented in Table 8.

Table 8: Equipment Audit Failure Rates from January 1, 2008 to September 30, 2008: A Comparison of MassDEP and Applus Technologies Audit Results

Audit Part	2008 MassDEP Failure Rate	2008 Applus Technologies Failure Rate
Visual Inspection	1%	<1%
Gas Analyzer Visual Inspection	4%	6%
Weather Station	21%	n/a
Leak Check	2%	<1%
1st Gas Bench Audit	2%	2%
2nd Gas Bench Audit	86%	n/a
Gas Cap Tester	<1%	<1%
Inductive RPM Pickup	<1%	n/a
OBDII RPM Pickup	<1%	n/a
OBDII Tester	0%	n/a
VMAS Visual Inspection	<1%	<1%
VMAS Dilute O2 Sensor	2%	<1%
VMAS SAO Flow	<1%	2%
Overall Audit Result	20%	9%
Combined Gas Bench + VMAS	4%	3%

The MassDEP and Applus equipment audits had somewhat different procedures. Most significantly, workstation components whose condition would result in a failure of a MassDEP audit were replaced or repaired during Applus' equipment audits. The data described in Table 8 identifies Applus audits as "failures" if Applus replaced or repaired a component during the audit even though the condition of the equipment at the end of an Applus audit would have passed.

As seen in Table 8, the MassDEP and Applus equipment audit results were generally comparable, except for the difference in overall audit results. MassDEP's overall audit failure rate (20%) was higher than Applus' overall audit failure rate (9%) primarily because MassDEP audits covered more parts, and therefore, presented more opportunities to fail than the audits conducted by Applus. For example, Applus audits did not address the weather station, the inductive RPM pickup, the OBDII RPM pickup, or the OBDII tester, which were all covered by MassDEP's audits.

5 STATION AND INSPECTOR OVERSIGHT

In the Massachusetts I&M Program, overt and covert audits are conducted to assess station and inspector performance. The results of each type of audit conducted between January 1, 2008 and September 30, 2008 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;

The RMV conducted regular site visits/performance audits to determine if the inspectors were correctly performing all tests and the station's physical conditions continued to meet program requirements. RMV typically visits inspection stations quarterly 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.

Between January 1, 2008 and September 30, 2008, Applus (through a subcontractor) maintained records of all inspections in a database to which MassDEP and RMV had access. RMV conducted 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 included the station's emissions testing and inspection failure rates, number of offline inspections, and vehicle characteristics recorded during the inspection that did not match the vehicle information in the registration database.

The RMV site visits covered 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 prepared a written report summarizing the results of each inspection. Violations of policies or regulations identified at site visits were forwarded to RMV headquarters for possible enforcement action.

Between January 1 and September 30, 2008, RMV conducted 4,098 overt station visits/audits. All 1,397 stations and 1,442 workstations that operated throughout the

period received at least one audit between January 1, 2008 and September 30, 2008, and most stations received an audit each quarter.

5.2 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. The covert audits described in this section were performed by Applus pursuant to their contract requirement.

Stations were selected for covert audits for four reasons, as described in Table 9.

Table 9: Covert Audit Selection Criteria
January 1 through September 30, 2008

Selection Criteria	Count of Audits
MassDEP or RMV Request	6
Data Analysis	394
Random Selection	860
High Volume of Inspections	2
TOTAL COVERT AUDITS	1,262

Some stations received more than one covert audit, as described in Table 10.

Table 10: Covert Audits Per Station
January 1 through September 30, 2008

Number of Audits Per Station	Count of Stations
1	482
2	256
3	80
4	7
Total Number of Stations Audited	825
Total Number of Audits	1,262

5.2.1 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 vehicle technology groups (e.g., carbureted and fuel injected vehicles) covered by the program. Ten vehicles were

used for covert audits between January 1, 2008 and September 30, 2008. The types and technologies of these vehicles are described in Table 13, in section 5.2.4 below.

Covert auditors are re-certified on an annual basis to perform covert vehicle and visual audits. During the period covered by this report, five full time auditors were employed by the contractor.

5.2.2 NUMBER OF COVERT AUDITS CONDUCTED BETWEEN JANUARY 1 – SEPTEMBER 30, 2008

> 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 11 summarizes the number of covert audits conducted between January 1, 2008 and September 30, 2008 for each type of inspection station.

Table 11: Number of Inspection Stations and Covert Audits
January 1, 2008 through September 30, 2008

			Covert Audits		
		# of Stations[11]	**Audited Stations**	**# Of Audits**	**Stations NOT Receiving Covert Audits**
Operating Throughout the Period	Fleet stations	26	0	0	26
	Public stations	1,371	788	1,214	583
	All stations	**1,397**	**788**	**1,214**	**609**
Operating Part of the Period	Fleet stations	84	0	0	84
	Public Stations	161	37	48	124
	All stations	**245**	**37**	**48**	**208**
TOTAL		**1,642**	**825**	**1,262**	**817**

Table 12 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 period" if it conducted at least one emissions inspection each month between January 1, 2008 and September 30, 2008. Since a workstation may have been located at multiple stations, more workstations operated throughout the period than did inspection stations.

[11] In order to be considered "operating throughout the period" a station must have conducted at least one emissions test during each month from January 1, 2008 through September 30, 2008.

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

Please note: only public stations received covert audits because fleet stations only tested vehicles that were part of the company's fleet, making it impossible for Applus to present a covert (or "undercover") vehicle for testing. Also, covert audits were not conducted at stations that inspect only diesel-fueled vehicles.

Table 12: Number of Workstations and Covert Audits
January 1, 2008 through September 30, 2008

	# of Workstations	Audited Workstations	# Of Audits	Workstations Not Audited
Operating Throughout the Period	1,442	800	1,235	642
Operating Part of the Period	191	18	27	173
TOTAL	**1,633**	**818**	**1,262**	**815**

5.2.3 COVERT AUDIT OVERVIEW

A "false pass" on a covert audit is an inspection that passes a vehicle that was set to fail. The covert audit does not indicate whether the cause of a false pass was related to the equipment or the inspector. Follow-up investigations conducted by Applus and the RMV addressed the cause of any false passes. When RMV staff investigated false passes as part of a site visit, they initiated enforcement actions and/or provide supplementary inspector training on proper test procedures. RMV referred other information about possible emissions equipment problems to MassDEP for follow-up.

Between January 1, 2008 and September 30, 2008, all covert vehicles were set to fail a combination of two test types: the gas cap test and either a transient, two-speed idle, or OBD test.

5.2.4 COVERT AUDIT RESULTS BY TYPE OF FAILING EMISSIONS TEST

40 CFR 51.366 (b) (3): The number of covert audits:
(i) Conducted with the vehicle set to fail per test type;
(iii) Resulting in a false pass per test type;

Table 13 and Table 14 (below) summarize the results of the covert audits by the type of emissions failure that was implanted in the covert vehicle. Table 14 shows the false

passes for transient, TSI, and OBD tests. All audits were conducted with vehicles set to fail one of these emissions test types.

All audits also were conducted with vehicles set to fail a second emissions test: the gas cap test. Table 15 summarizes the number of audits that falsely passed the gas cap test.

Key findings from the emissions tests presented in Table 14 are:

- 4.9% of all covert audits resulted in false passes for transient, TSI or OBDII emissions tests.
- None of the vehicles set to fail OBDII falsely passed this test (0.0%).
- Two covert audits (0.2%) that should have received an emissions test were incorrectly given a safety-only test. These two audits are counted as falsely passing in Table 14.

**Table 13: Covert Audit Results:
False Passes for Transient TSI and OBD Tests
(January 1 through September 30, 2008)**

Emissions Test Type Set to Fail	Model Year	Vehicle Type and Technology[12]	Specific Failures	Total Audits	Falsely Passed[13]	Percent Falsely Passed
Transient	1988 to 1995	LDGV & LDGT	HC and/or CO Failure	528	28	5.3%
Transient	1988 to 1995	LDGV & LDGT	NOx Failure	351	26	7.4%
OBDII	1996 and newer	LDGV & LDGT, OBDII equipped	OBDII Failure	292	0	0.0%
Two-Speed Idle	Any	LDGV, AWD	HC and/or CO Failure	91	8	8.8%
Totals for Audits Transient, TSI or OBD Set to Fail				1,262	62	4.9%

Because all covert audits that were set to fail the gas cap test were also set to fail another type of emissions test (transient, TSI, or OBDII), the false passes for gas cap tests are summarized separately in Table 14 below. The vast majority of covert audit false passes were for the gas cap test, with 70.8% of gas cap audits resulting in a false pass.

**Table 14: Covert Audit Results:
False Passes for Gas Cap Tests
(January 1 through September 30, 2008)**

Emissions Test Type Set to Fail	Model Year	Vehicle Type and Technology	Specific Failures	Total Audits	Falsely Passed[14]	Percent Falsely Passed
Gas Cap	Any	Any	Gas Cap Functional Failure	1,262	894	70.8%

See section 5.2.5 for a brief discussion of this failure rate.

[12] LDGV: light duty gasoline vehicle; LDGT: light duty gasoline truck; AWD: all wheel drive.
[13] "Falsely passed" includes inspections that passed on the correct type of emissions test, that passed on the incorrect type of emissions test, or that skipped the transient test based on the inspector's claim there was a safety issue. For the transient tests that were skipped due to safety, a transient test would have been required if the vehicle returned to the station for a re-test.
[14] "Falsely passed" includes inspections that passed the functional gas cap test, that incorrectly indicated that a gas cap adaptor was not available, or that did not test the gas cap because of improperly providing a safety only test.

5.2.5 COVERT AUDIT RESULTS OF VEHICLES SET TO FAIL A COMBINATION OF TEST TYPES

40 CFR 51.366 (b) (3): The number of covert audits:

(ii) Conducted with the vehicle set to fail any combination of two or more test types;

(iv) Resulting in a false pass for any combination of two or more test types;

Table 15 below summarizes the false passes for covert vehicles, by the number of emissions tests the vehicles were set to fail. Covert audits conducted with vehicles set to fail two types of emissions tests used a combination of test types including the gas cap test and one of the other three emissions tests: transient, TSI, and OBD II. 71.4% of these covert audits falsely passed one or more item.

As seen in table 15, 70.8% of all covert audits (894 of 1262) falsely passed the gas cap test and account for most of the audits that falsely passed one or more items. However, only a small percentage of the audits resulted in a vehicle receiving a falsely passing overall emissions test result (4.4%), because most of audited stations correctly failed the audit vehicles for the transient, TSI or OBDII test.

Table 15: Covert Audit Results:
By Number of Emissions Tests Set to Fail
(January 1 through December 31, 2008)

Covert Audit Results by Vehicle Test Type	Total Audits	Falsely Passed 1 or More Test Type	Percent Falsely Passed 1 or More Test Type	Falsely Passed Overall Emissions	Percent Falsely Passed Overall Emissions
Totals for Audits with Two Types of Emissions Tests Set to Fail	1,262	901	71.4%	55	4.4%

While the percentage of false passes may appear to be high, more than 30% of all covert audits were prompted by suspected problems at stations. Therefore, the expected percentage of false passes for the fleet as a whole is expected to be lower than the false-pass rate for covert audits.

Of the covert audit vehicles that had two audit criteria set to "fail", many were OBD-equipped. Since the OBD test checks the entire vapor control system, the inspectors who falsely passed these vehicles may not have understood that the gas cap test remained part of the inspection protocol, and therefore may have skipped this test element. Because more than three-quarters of initial emissions inspections in Massachusetts were OBD tests during the period covered by this report, and because the OBD system performs a more comprehensive check of vapor controls than the gas cap-only test that is also used for testing non-OBD equipped vehicles, Massachusetts phased out the gas cap test when the program transitioned to an OBD-only emissions test on October 1, 2008.

When a covert audit identified a false passing test, the result was made available to RMV for more in-depth investigation and possible enforcement action against the station and/or the inspector. Enforcement actions are described in Section 5.2.6 below.

5.2.6 STATION AND INSPECTOR HEARING RESULTS

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;

Table 16 summarizes the results of the Registry's hearings for stations and inspectors, and tabulates the written violations issued to stations and inspectors. This table describes all written violations ("adverse actions) that were issued between January 1 and September 30, 2008. These violations include those for which hearings were not requested, those for which hearings were held, and those for which the hearing result was appealed to the Registry's Board of Appeals. Data indicating which of these actions resulted from covert audits versus other performance assessments is not available.

Table 16: Enforcement Against Stations and Inspectors
January 1-September 30, 2008

	Number of Enforcement Actions[15]	
Stations		
Total Number of Written Violations	302	
Warning Letters (no hearing)	91	
Violations Filed (no action or hearing)	2	
Total Number of Hearings	201	
Hearing Outcomes:		
Revoke		6
Suspensions		101
Warnings		82
Other (abeyance, surveillance)		10
No action		11
Unresolved Cases (As of 9/30/08)	8	
Inspectors		
Total Number of Written Violations	340	
Warning Letters (no hearing)	95	
Violations Filed (no action or hearing)	2	
Total Number of Hearings	229	
Hearing outcomes		
Revoke		12
Suspensions		110
Warnings		95
Other(abeyance, surveillance)		10
No Action		8
Unresolved Cases (As of 9/30/08)	6	

5.2.7 FINES COLLECTED

[15] Some of the actions reported as taken this reporting period were for violations issued last year, and not all violations issued during this reporting period received action during this reporting period. As a result, the sum of the categories may not equal the total number of violations issued in this reporting period.

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;

Massachusetts did not collect fines from stations or inspectors in the period covered by this report.

5.2.8 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;

Due to issues with data transfer as this program and contract were closed out, the data needed for sticker accounting for the period between January 1 and September 30, 2008 is not available.

6 EMISSIONS TEST RESULTS

6.1 Emissions Tests and the Massachusetts Fleet

144,371 (9.2%) of the 1,564,484 unique gasoline-fueled vehicles that received initial emissions tests between January 1, 2008 and September 30, 2008 failed this test. Also, 197 (0.8%) of the 26,199 unique diesel-fueled vehicles that received an initial emissions test in this period failed this test. The Massachusetts I&M program requires that vehicles be repaired and re-tested within 60 days of failing their initial emissions test.

Table 17 summarizes the failure rates for initial emissions tests in Massachusetts in 2008:

Table 17: 2008 Failure Rate for Initial Emissions Tests
January 1, 2008 through September 30, 2008

	Initial Emissions Failure Rate[16]		
	Model Years 1984-1995	Model Years 1996 and newer	Total
Gasoline-Fueled Vehicles	11.4%	8.8%	9.2%
Diesel fueled	2.1%	0.4%	0.8%
All Initial Emissions Tests	11.1%	8.6%	8.9%

Please note:

- Eighty-nine percent of the vehicles that failed their initial emissions test passed a re-test.
- A very few vehicles were repaired but were still not able to pass a re-test, and were granted a waiver of the emission requirements. From January 1, 2008 through September 30, 2008, waivers were granted for 123 vehicles (or less than 0.1% of the vehicles that failed their initial emissions test).
- Of the vehicles that failed their initial test from January 1, 2008 through September 30, 2008, 12,965 (0.8%) had neither passed a re-test nor obtained a waiver by March 31, 2009.

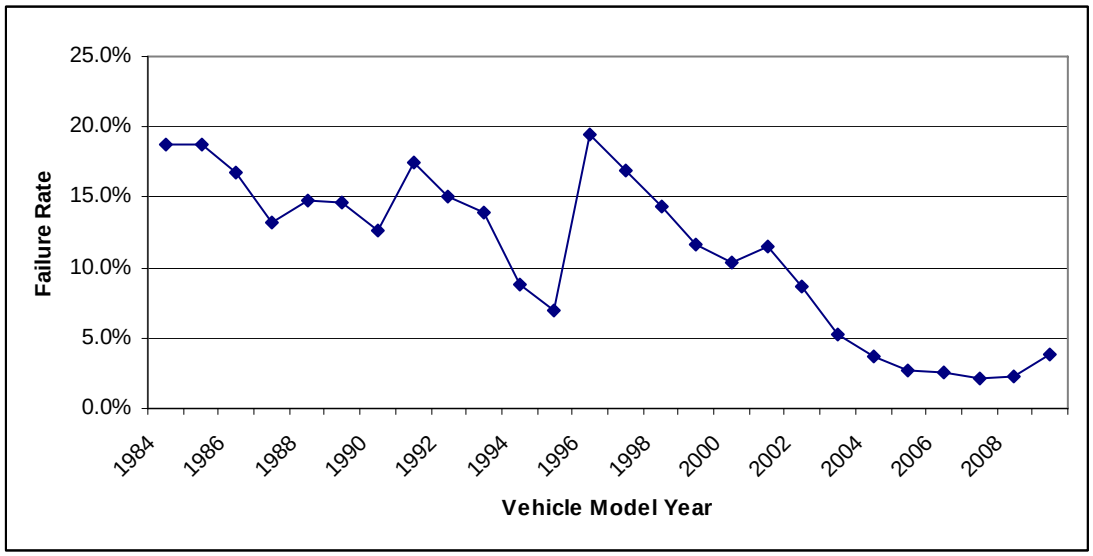
Details of all 2008 emissions test results are included in Attachment B.

Figure 5 below shows emissions failure rates from January 1, 2008 through September 30, 2008 by model year for gasoline-fueled vehicles. As can be seen, the age of the vehicle has a significant impact on failure rate. The Massachusetts I&M program is not

[16] The emissions failure rates only consider OBD and tailpipe results, and do not take into account visual or gas cap failures.

designed to achieve a specific overall failure rate or a specific failure rate for any particular test or type of vehicle.

Figure 5: Failure Rate by Model Year – Non-Diesel Initial Emissions Tests
January 1, 2008 through September 30, 2008



6.2 Emission Reductions from Repaired Transient-Tested Vehicles in 2008

40 CFR 51.366 (a) (5): The average increase or decrease in tailpipe emission levels for HC, CO, and NOx (if applicable) after repairs by model year and vehicle type for vehicles receiving a mass emissions test.

EPA requires states to calculate emission reductions from vehicles that are repaired after failing a "transient" emissions test[17]. Of the 18,337 vehicles that failed an initial transient test in 2008, 12,372 vehicles were successfully repaired and passed a subsequent transient test. Based on an examination of the emissions data for the initial failing transient test and the emissions data for the subsequent passing transient retests, these repairs were estimated to have reduced the emissions of those vehicles by an average of 73% for hydrocarbons, 79% for carbon monoxide and 61% for oxides of nitrogen.

Section 5 of Attachment B describes the average change in emissions measured by the transient test after repairs, by model year and vehicle type.

6.3 Overall Conclusions about Program Operation During 2008

[17] One of the three types of emissions tests used in Massachusetts, which measures specific pollutants in tailpipe exhaust from gasoline-fueled vehicles

Several conclusions can be drawn from the program information reviewed for Part 1 of the 2008 Annual Report:

- Equipment audits indicate that the performance of the testing equipment has improved markedly over the last four years. The contractor consistently met the three reliability standards established by Contract Amendment No. 4 during 2008, and audit failure rate for almost all criteria are well below contractual levels.

- Most vehicles that fail an initial emissions test are repaired successfully and pass a re-test, with significant improvements in emissions. The program continues to issue a very small number of waivers of the emission standards (123 in 2008), 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.

- The portion of the initial emissions tests that use OBD II has continued to grow (from 77.7% in 2006, 78.8% in 2007 to 84.2% in 2008). OBD testing provides better oversight of vehicle emission systems and identifies many problems before they become significant sources of emissions.

- On October 1, 2008, Massachusetts successfully transitioned to an OBD-only emissions testing program for almost all vehicles. Part 2 of this Annual Report describes program performance between October 1 and December 31, 2008.

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