**40 CFR Part 51 - Subpart S Inspection/Maintenance Program Requirements**
**51.366 - Data Analysis and Reporting Requirements**

**State of Delaware 2013 Annual Report**
**Report Dated: July 31, 2014**

| Reporting Requirement | Location in State Report |
|---|---|
| (a) Test Data Report<br>The program shall submit to EPA by July of each year a report providing basic statistics on the testing program for January through December of the previous year, including: | Annual Report for 1/1/13 - 12/31/13, dated July 31, 2014. |
| (1) The number of vehicles tested by model year and vehicle type; | 225,374-Appendix A |
| (2) By model year and vehicle type, the number and percentage of vehicles: | Appendix A |
| (i) Failing initially, per test type; | Table 3-7 |
| (ii) Failing the first retest per test type; | Table 3-7 |
| (iii) Passing the first retest per test type; | Table 3-7 |
| (iv) Initially failed vehicles passing the second or subsequent retest per test type; | Table 3-7 |
| (v) Initially failed vehicles receiving a waiver; and | Table 14 |
| (vi) Vehicles with no known final outcome (regardless of reason).<br>(vii)-(x) [Reserved] | Table 15 |
| (xi) Passing the on-board diagnostic check; | Table 8-12. |
| (xii) Failing the on-board diagnostic check; | Table 8-12 |
| (xiii) Failing the on-board diagnostic check and passing the tailpipe test (if appl.); | Not performed |
| (xiv) Failing the on-board diagnostic check and failing the tailpipe test (if appl.); | Not performed |
| (xv) Passing the on-board diagnostic check and failing the I/M gas cap evaporative system test (if appl.); | Not performed |
| (xvi) Failing the on-board diagnostic check and passing the I/M gas cap evaporative system test (if appl.); | Not performed |
| (xvii) Passing both the on-board diagnostic check an I/M gas cap evaporative system test (if appl.); | Not performed |
| (xviii) Failing both the on-board diagnostic check and I/M gas cap evaporative system test (if appl.); | Not performed |
| (xix) MIL is commanded on and no codes are stored; | Table 13 |
| (xx) MIL is not commanded on and codes are stored | Table 13 |
| (xxi)MIL is commanded on and codes are stored; | Table 13 |
| (xxiii)MIL is not commanded on and codes are not | Table 13 |
| (xvi) Readiness status indicates that the evaluation is not complete for any module supported by the onboard diagnostic systems; | |
| (3) The initial test volume by model year and test station | Appendix A |
| (4) The initial test failure rate by model year and test station; and | Appendix A |
| (5) The average increase or decrease in tailpipe emission levels for HC, | Not applicable |

| | |
|---|---|
| CO, and NOX (if applicable) after repairs by model year and vehicle type for vehicles receiving a mass emission test | |
| b) Quality assurance report.<br>The program shall submit to EPA by July of each year a report providing basic statistics on the quality assurance program for January through December of the previous year, including: | |
| (1) The number of inspection stations and lanes: | Table 1 |
| (i) Operating throughout the year; and stations; | All operate page 6 |
| (2) The number of inspection stations and lanes operating throughout the year; | Table 1 |
| (i) Receiving overt performance audits in the year; | Table 17 |
| (ii) Not receiving overt performance audits in the year; | Table 17 |
| (iii) Receiving covert performance audits in the year; | Table 17 |
| (iv) Not receiving covert performance audits in the year; and | Table 17 |
| (v) That have been shut down as a result of overt performance audits; | None, page 6 |
| (3) The number of covert audits: | |
| (i) Conducted with the vehicle set to fail per test type; | NA |
| (ii) Conducted with the vehicle set to fail any combination of two or more test types; | NA |
| (iii) Resulting in a false pass per test type; | NA |
| (iv) Resulting in a false pass for any combination of two or more test types; | NA |
| (4) The number of inspectors and stations: | Table 1 |
| (i) That were suspended, fired, or otherwise prohibited from testing as a result of covert audits; | Table 17 |
| (ii) That were suspended, fired, or otherwise prohibited from testing for other causes; and | Table 17 |
| (iii) That received fines; | Table 17 |
| (5) The number of inspectors licensed or certified to conduct testing; | Table 17 |
| (6) The number of hearings: | Table 17 |
| (i) Held to consider adverse actions against inspectors and stations; and | Table 17 |
| (ii) Resulting in adverse actions against inspectors and stations; | Table 17 |
| (7) The total amount collected in fines from inspectors and stations by type of violation; | Table 18 |
| (8) The total number of covert vehicles available for undercover audits over the year; and | Table 18 |
| (9) The number of covert auditors available for undercover audits. | Table 18 |
| (i) An estimate of the number of vehicles subject to the inspection program, including the results of an analysis of the registration data base; | NA |
| (ii) The percentage of motorist compliance based upon a comparison of the number of valid final tests with the number of subject vehicles; | NA |
| (iii) The total number of compliance documents issued to inspection station | NA |
| (iv) The number of missing compliance documents; | NA |

| | |
|---|---|
| (v) The number of time extensions and other exemptions granted to motorists; and | Page 30 |
| (vi) The number of compliance surveys conducted, number of vehicles surveyed in each, and the compliance rates found. | Page 30 Appendix H |
| (i) 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 | NA |
| (ii) The number of registration file audits, number of registrations reviewed, and compliance rates found in such audits. | NA |
| (3) Computer-matching based enforcement programs shall provide the following additional information: | NA |
| (i) The number and percentage of subject vehicles that were tested by the initial deadline, and by other milestones in the cycle; | NA |
| (ii) 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; and | NA |
| (iii) The number of enforcement system audits, and the error rate found during those audits. | NA |
| (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; | Page 29 |
| (ii) 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; and | Page 29 |
| (iii) The number of parking lot sticker audits conducted, the number of vehicles surveyed in each, and the noncompliance rate found during those audits. | Page 30 – completed until 1/2014 |

# State of Delaware

# Department of Natural Resources and Environmental Control

# 2013 Annual Report Submitted to U.S. Environmental Protection Agency on July 31, 2014

# Inspection and Maintenance (I/M) Program

## Acknowledgements

The Delaware Department of Natural Resources and Environmental Control (DNREC) acknowledge the efforts and assistance of the many agencies and individuals whose contributions were instrumental in the preparation of this annual report. In particular, DNREC wishes to acknowledge the Delaware Department of Transportation, and the Delaware Division of Motor Vehicles for their assistance.

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Appendix H – Enforcement Report
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## Acronyms and Abbreviations

CERT – Certified Emission Repair Technician
CO – Carbon Monoxide
DAQ – Division of Air Quality
DelDOT – Delaware Department of Transportation
DMV – Division of Motor Vehicles
DNREC – Department of Natural Resources and Environmental Control
DLC – Data Link Connector
DTC – Diagnostic Trouble Code
ECS – Emission Control System
FR – Federal Register
HC – Hydrocarbons
I/M – Inspection and Maintenance
KOEO – Key On Engine Off
KOER – Key on Engine Running
LDDT1 – Light Duty Diesel Truck1
LDDT2 – Light Duty Diesel Truck2
LDDV – Light Duty Diesel Vehicle
LDGT1 – Light Duty Gasoline Truck1
LDGT2 – Light Duty Gasoline Truck2
LDGV – Light Duty Gasoline Vehicle
MGVW – Manufacturer's Gross Vehicle Weight
MIL – Malfunction Indicator Light
MSA – Metropolitan Statistical Area
NAAQS – National Ambient Air Quality Standards
NOX – Oxides of Nitrogen
OBD – On-Board Diagnostics
OBD-II – On-Board Diagnostics Generation-II technology
RPM – Revolutions Per Minute
RSD – Remote Sensing Design
SIP – State Implementation Plan
USEPA – United States Environmental Protection Agency
VIN –Vehicle Identification Number
VIR –Vehicle Inspection Report
VOC – Volatile Organic Compounds

## I. Introduction

### Purpose of the Inspection and Maintenance Program

This report fulfills the annual reporting requirements of 40 CFR 51.366, the data analysis and reporting rule of the Inspection and Maintenance (I/M) Program of the United States Environmental Protection Agency (USEPA), dated July 1, 2004. The federal regulation, 40 CFR 51.366, was designed to ensure regular testing of vehicle emissions. The I/M program is a mandatory control measure to help the State of Delaware to reach attainment with meeting the National Ambient Air Quality Standard (NAAQS) for ozone. Under the I/M program, vehicles undergo emissions testing in conjunction with a safety inspection or when a change of ownership occurs. By requiring that vehicles with excess emissions to be repaired and maintained, the I/M emission testing program is a meaningful element of Delaware's State Implementation Plan (SIP) to meet federal air quality standards.

This report reflects the coordinated effort between the Delaware Department of Natural Resources and Environmental Control (DNREC) and the Delaware Department of Transportation, and the Delaware Division of Motor Vehicles. This report which represents the 2013 calendar year (January 1, 2013 through December 31, 2013)[1] is the thirteenth annual report submitted to the US EPA and provides summary statistics, evaluations of the enforcement mechanisms, the quality assurance system, the quality control program, and the testing requirements for the State of Delaware's I/M Program.

### EPA reason to evaluate the Inspection and Maintenance Program

Ground level ozone is a serious air pollutant that harms human health and the environment. High levels of ozone can damage the respiratory system and cause breathing problems, throat irritation, coughing, chest pains, and greater susceptibility to respiratory infection. High levels of ozone can also cause serious damage to forests and agricultural crops, resulting in economic losses to farming operations and forestation.

Ozone is generally not directly emitted to the atmosphere; rather it is formed in the atmosphere by a photochemical reaction between volatile organic compounds (VOC), oxides of nitrogen (NOX), and carbon monoxide (CO) in the presence of sunlight. Motor vehicle exhaust and gasoline vapors are major sources of ground level ozone in the atmosphere. Consequently, in order to reduce ozone concentrations in the ambient air, the Clean Air Act Amendments of 1990 requires all non-attainment areas are required to apply controls on VOC and NOX emission sources to achieve emission reductions.

[1] Meets the requirements of 40 CFR §51.366(a). The program shall submit to EPA by July of each year a report providing basic statistics on the testing program for January through December of the previous year.

## II. Background

### The Clean Air Act and Mobile Emissions

I/M programs are implemented to address both air quality issues and public health concerns. The federal Clean Air Act requires I/M programs in areas of the country with demonstrated poor air quality. Starting on January 1, 1995, Delaware's Kent and New Castle counties were designated as severe non-attainment areas. Delaware was required to implement a low enhanced I/M program in those portions of the state under the 1-hour ozone NAAQS, while Sussex County was designated as marginal non-attainment area on April 1, 1990 and was thereby required to implement a basic I/M program.

Both the basic and the low enhanced I/M are continued to this day because the State of Delaware is also in non-attainment for the 8-hour ozone standard. According to the EPA's anti-backsliding regulations, if an existing I/M area is not able to re-designate to attainment for the 1-hour ozone standard prior to revocation of that standard, and is also designated as non-attainment for the 8-hour standard, regardless of classification, then that area is required to continue implementing an I/M program until the 8-hour ozone standard is attained. **Figure 1** below presents the current network for monitoring ambient ozone concentrations.

**Figure 1 – Ozone Monitoring Sites in Delaware**

## Program Overview

The I/M Program in Delaware is a centralized system operated and administered by the Division of Motor Vehicles (DMV). The purpose of Delaware's emissions testing program is to identify vehicles that exceed tailpipe exhaust and evaporative emissions standards and prevent registration or renewals until vehicles meet emission standards.

The I/M Program is implemented at four (4) testing facilities, and consists of 30 total inspection lanes, including spare lanes[2]. **Table 1 – Delaware Inspection and Maintenance Information**, lists each Division of Motor Vehicle facility by county and location, the total number of inspection lanes, and total number of inspection lane technicians assigned at each facility. The inspection lanes are operated throughout the year - open daily (Monday, Tuesday, Thursday, and Friday from 8:00 am to 4:30 pm and Wednesday from noon to 8:00 pm) and are closed only in observance of State holidays. **Figure 2 – Delaware Inspection and Maintenance Facilities**, presents the geographical locations of each of the DMV inspection lanes in Delaware.

Table 1: Delaware Inspection and Maintenance Facility Information

| County | Location | DMV Inspection Lanes | DMV Inspection Technicians[3] |
|---|---|---|---|
| New Castle | New Castle | 5 (+1 spare) | 19 |
| | Greater Wilmington | 10 (+1 spares) | 17 |
| Kent | Dover | 4 (+2 spares) | 13 |
| Sussex | Georgetown | 8 (no spares) | 14 |

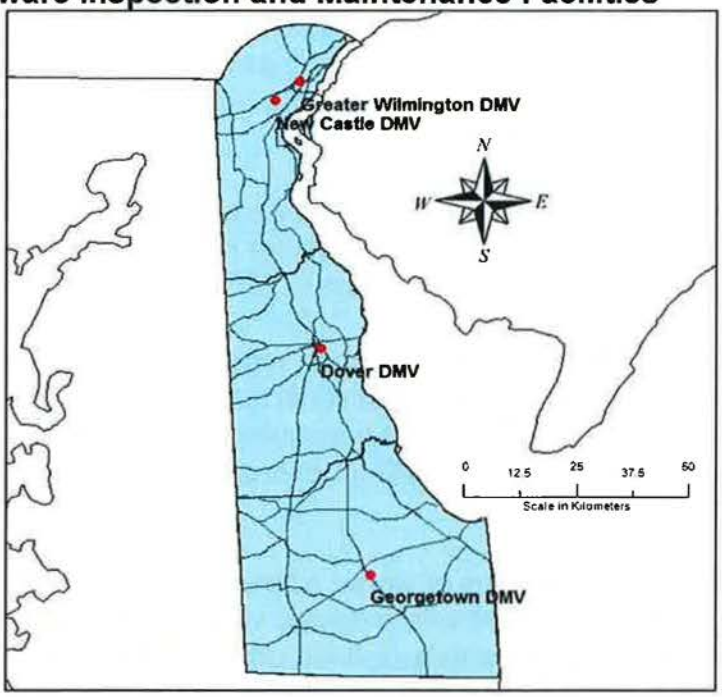
Spare inspection lanes are not actively used. They are additional inspection lanes usually reserved for use during busy periods or for use when one or more of the designated lane(s) is placed out of service due to an equipment problem. The spare lanes may also be utilized to re-check vehicles that have a failed a previous inspection.

The I/M program inspection schedule is biennial, requiring vehicles to pass safety and emission inspections once every other year. The I/M program provides Delaware motorists a choice as to where to have their vehicles inspected, and if necessary, re-inspected. The inspections are performed at no charge to the vehicle owner. The first five model years (i.e. 2008 and newer vehicles) are exempt from the I/M program in any given year. Any vehicle identified with excess emissions is required to be repaired before vehicle registration or renewal is obtained from DMV.

[2] Meets the requirements of 40 CFR § 51.366(b)(1)(i)

[3] Meets the requirements of 40 CFR §51.366(b)(5) - the number of inspectors licensed or certified to conduct testing.

**Figure 2 – Delaware Inspection and Maintenance Facilities**




## SIP Integration

A State Implementation Plan (SIP) is a state plan that identifies how that state will attain and maintain air quality that conforms to each primary and secondary National Ambient Air Quality Standard (NAAQS). The SIP is a complex, ever changing document containing regulations, non-regulatory items such as emission inventories, and source-specific requirements that reduce air pollution in Delaware.

Delaware's I/M program is an integral part of the SIP and serves as an effort to reduce mobile-source air pollution such as ozone and particulate matter. Of all highway vehicles, passenger cars and light duty trucks emit most of the vehicle-related pollutants. Although progress has been made in the reduction of these pollutants, the continuous increase in vehicle miles traveled on the highways has offset much of the technological progress thus far. Until automotive manufacturers and refineries develop and commercialize cleaner-burning engines and fuels, the main source of air pollution reduction derives from the proper maintenance of a vehicle during normal use.

Motor vehicles are dependent upon properly functioning emission controls and engine parts such as air filters, oxygen sensors, catalytic converters, air pumps, check valves, ignition wires, and spark plugs to keep pollution levels low. Minor malfunctions in an emission control system can significantly increase emissions. Since vehicle emissions may not be visibly noticeable and the subsequent malfunctions do not necessarily affect vehicle performance, frequent inspection is required to detect which vehicles require maintenance and repair.

In accordance with the requirements of the Clean Air Act, USEPA established a two-tier I/M regulation known as "enhanced" or "basic". According to 40 CFR 51.351, enhanced programs are required in ozone nonattainment areas, depending upon population and nonattainment classification.

The following analysis portrays the four (4) subcategories of the EPA Rule for determining enhanced or basic designation, first for classification and population criteria and then for extent of area of coverage.

- States or areas within an ozone transport region shall implement "enhanced" I/M programs in any metropolitan statistical area (MSA), or portion of an MSA, within the State or area with a 1990 population of 100,000 or more as defined by the Office of Management and Budget regardless of the area's attainment classification.

- Any area classified as serious or worse ozone nonattainment, or as moderate or serious CO nonattainment with a design value greater than 12.7 ppm, and having a 1980 Bureau of Census-defined urbanized area population of 200,000 or more, shall implement "enhanced" I/M in the 1990 Census-defined urbanized area.

- Any area classified, as of November 5, 1992, as marginal ozone nonattainment or moderate CO nonattainment with a design value of 12.7 ppm or less shall continue operating I/M programs that were part of an approved SIP as of November 15, 1990, and shall update those programs as necessary to meet the "basic" I/M program requirements. Any such area required by the Clean Air Act, as in effect prior to November 15, 1990, as interpreted in EPA guidance, to have an I/M program shall also implement a basic I/M program. Serious, severe and extreme ozone areas and CO areas over 12.7 ppm shall also continue operating existing I/M programs and shall upgrade such programs, as appropriate; and

- Any area classified as moderate ozone nonattainment, and not required to implement enhanced I/M, shall implement "basic" I/M in any 1990 Census-defined urbanized area with a population of 200,000 or more.

The determination of whether an area has a low enhanced or a high enhanced program depends on the emission reductions required for the area. If minimal reductions are needed to meet attainment, the low enhanced I/M (LEIM) program is acceptable, otherwise a high enhanced program must be adopted and implemented.

Because the entire State of Delaware is part of the Ozone Transport Region and designated nonattainment for ozone in Kent and New Castle County, Delaware met the first subcategory requirement for establishing a low enhanced I/M (LEIM) program. Sussex County, on the other hand, was required to meet the criteria for a

basic program. Sussex County is excluded from LEIM because Sussex does not have any metropolitan statistical areas. Both the low enhanced and basic I/M programs are required to improve air quality, however, the low enhanced I/M program was designed to detect gasoline-fueled motor vehicles operating with excessive emissions under test conditions that represent more realistic driving conditions.

The State of Delaware implemented the low-enhanced I/M program through the adoption of

- 7 DE Admin. Code 1131a - *Low Enhanced Inspection and Maintenance Program, of the State of Delaware Regulations Governing the Control of Air Pollution,* and

Delaware's "Plan for Implementation",

- 7 DE Admin. Code 1131b, *Low Enhanced Inspection and Maintenance Program,*" dated June 11, 2012.

Delaware also implemented the basic I/M program through the adoption of

- 7 DE Admin. Code 1126 - *"Motor Vehicle Inspection and Maintenance Program, of the State of Delaware Regulations Governing the Control of Air Pollution.*

Because the low-enhanced I/M program is only applicable to New Castle and Kent County, vehicles registered in either New Castle or Kent County are required to pass more advanced testing requirements for vehicle registration. Vehicles registered in Sussex County are only required under the basic program to have a tailpipe exhaust or idle emission test performed for registration compliance. In order to meet vehicle registration requirements, vehicles failing an initial inspection are required to be re-inspected, multiple times as necessary, before either passing or receiving a waiver.

## III. Data Reporting

In accordance with 40 CFR 51, this annual report presents the following I/M program activities which include: activity performance of DMV inspection technicians, summary statistics and effectiveness evaluations of the enforcement mechanism, the quality assurance system, the quality control program, and the testing elements. 40 CFR 51.366 requires four (4) data reporting areas: (a) test data, (b) quality assurance, (c) quality control, and (d) enforcement. As such, the remainder of this section discusses each of the four (4) data reporting areas.

### a. Test Data

This section presents only the statistical data from the operation of Delaware's low enhanced I/M program and includes the number and type of inspections performed, and the final outcomes of these inspections in Delaware. The data describes: (i) total emission inspections, (ii) OBD-II inspections, (iii) Emission Re-inspections, (iv) waivers, and (v) vehicles with no known final outcome.

#### i. Total Emission Inspections

There are 679,029 registered vehicles in the DMV database (model year 1968 to current five model year), but because the State has a biennial testing cycle, Delaware assumes that one half or 339,514 vehicles were eligible to be inspected. Since each vehicle does not receive each and every test, Delaware estimates that 225,374 vehicles were actually tested in 2013. The total number of vehicles was calculated from the facility totals as presented in **Appendix A – Compliance.**

Delaware motorists are provided ninety days before their vehicle registration expires to get their vehicle inspected. Typically, when a vehicle enters the test facility, the DMV inspection technician asks for the vehicle registration card from the driver and then enters the odometer reading and other essential information into a computer. The computer automatically selects the proper testing standards for the vehicle's model year and county of residence.

**Table 2 – Statewide Testing Procedures by Vehicle Model Year** defines the type of inspection a vehicle would receive based on the model year and county of residence under 7 DE Admin. Code 1126, *Low Enhanced Inspection and Maintenance Program* and 7 DE Admin. Code 1131, *Low Enhanced Inspection and Maintenance Program*.

| Table 2: Statewide Testing Procedures by Vehicle Model Year | | | |
|---|---|---|---|
| County of Residence | Vehicle Model Year | Type of Inspection | |
| | | Tailpipe Emissions | Evaporative Emissions |
| Kent and New Castle | 1967 & Older | No test performed | No Test performed |
| | 1968 – 1974 | Idle Test | No Test performed |
| | 1975 – 1980 | Idle Test | Gas Cap & Tank Pressure |
| | 1981 – 1995 | Two-Speed Idle | Gas Cap & Tank Pressure |
| | 1996 – To current five model year | On-Board Diagnostic (OBD-II) | On-Board Diagnostic (OBD-II) |
| | Current five model years | Exempt | Exempt |
| Sussex | 1967 & Older | No test performed | No Test performed |
| | 1968 – To current five model year | Idle Test | No Test performed |
| | Current five model years | Exempt | Exempt |

The purpose of the tailpipe exhaust emissions test is to determine how efficiently a vehicle's engine is performing. The test measures the levels of hydrocarbons and carbon monoxide emitted from the exhaust system. Vehicles in Kent and New Castle Counties receiving a two speed idle test are tested in park or neutral at low and high revolutions per minute (rpm); while vehicles in Sussex County receiving the idle test are only tested a low idle speed.

**Table 3 – Tailpipe Exhaust Emission Test**, presents a summary of the results associated with each initial emission test and each subsequent retest. The SIP requires at least a 20% stringency rate on all 1980 and older model year vehicles. A stringency rate is defined as the test failure rate expected in pre-1980 model year and older vehicles expressed as a percentage of the tests administered. Delaware maintains at least a 20% stringency rate on all 1980 and older vehicles. For more detailed statistics regarding the tailpipe exhaust test performed during the year 2013, please refer to **Appendix B – Tailpipe Test Data Report**.

| Table 3: Tailpipe Exhaust Emission Test | | | | | |
|---|---|---|---|---|---|
| Test | Pass | Pass Rate% | Fail | Fail Rate% | Total |
| Test #1 | 65,903 | 93.4% | 4,689 | 6.6% | 70,592 |
| Test #2 | 3,100 | 62.6% | 1,851 | 37.4% | 4,951 |
| Test #3 or more | 1,342 | 37.6% | 2,228 | 62.4% | 3,570 |

As part of the tailpipe exhaust emission test, a DMV inspection lane technician inserts a probe into a vehicle tailpipe for an emission control system check while the engine is running. After operating for approximately 30 seconds in both the low and high rpm, an analyzer captures a portion of the vehicle's exhaust to determine whether or not the vehicle is emitting excess pollutants, such as hydrocarbon or carbon monoxide. **Table 4 – Emission Control System Check** presents a summary of the results associated with each initial emission control system test and each subsequent retest.

| Table 4: Emission Control System Check | | | | | |
|---|---|---|---|---|---|
| Test | Pass | Pass Rate% | Fail | Fail Rate% | Total |
| Test #1 | 13,057 | 98.2% | 233 | 1.8% | 13,290 |
| Test #2 | 233 | 86.3% | 37 | 13.7% | 270 |
| Test #3 or more | 39 | 75.0% | 13 | 25.0% | 52 |

The tank pressure test is a procedure that examines if harmful evaporative emissions are escaping from a vehicle's fuel delivery system from the gas tank to the evaporative emission control canister into the atmosphere. A DMV inspection lane technician removes the gas cap and replaces it with a testing unit cap that will then apply pressure to the delivery system. The testing unit will verify if the system holds pressure for the required length of time and a perceptual determination will made as to whether or not fumes are escaping from the gas tank.

**Table 5 – Tank Pressure Evaporative Emissions Test**, presents a summary of the results associated with each initial emission test and each subsequent retest.

| Table 5: Tank Pressure Evaporative Emissions Test | | | | | |
|---|---|---|---|---|---|
| Test | Pass | Pass Rate% | Fail | Fail Rate% | Total |
| Test #1 | 5,219 | 88.1% | 706 | 11.9% | 5,925 |
| Test #2 | 318 | 56.8% | 242 | 43.2% | 560 |
| Test #3 or more | 173 | 50.3% | 171 | 49.7% | 344 |

A gas cap test is a procedure that examines if harmful evaporative emissions are escaping from a vehicle's delivery system into the atmosphere from the gas cap. A DMV inspection lane technician removes the gas cap and inserts the cap into a testing unit that will then apply pressure to the gas cap. **Table 6 – Gas Cap Pressure Evaporative Emissions Test**, presents a summary of the results associated with each initial emission test and each subsequent retest.

| Table 6: Gas Cap Pressure Evaporative Emissions Test | | | | | |
|---|---|---|---|---|---|
| Test | Pass | Pass Rate% | Fail | Fail Rate% | Total |
| Test #1 | 12,008 | 94.3% | 729 | 5.7% | 12,737 |
| Test #2 | 703 | 92.4% | 58 | 7.6% | 761 |
| Test #3 or more | 62 | 84.9% | 11 | 15.1% | 73 |

**Table 7 – Testing Summary** represents the total number of vehicles receiving each required test (including retests) at each of the four (4) DMV testing facilities. For further information, please refer to **Appendix B – Tailpipe Test Data Report by Facility**.

| Table 7: Testing Summary | | | | | |
|---|---|---|---|---|---|
| Test Type | Pass | Pass Rate% | Fail | Fail Rate% | Total |
| Exhaust Emission | 70,345 | 88.9% | 8,768 | 11.1% | 79,113 |
| Emission Control System Check | 13,329 | 97.9% | 283 | 2.1% | 13,612 |
| Tank Pressure | 5,710 | 83.6% | 1,119 | 16.4% | 6,829 |
| Gas Cap Pressure | 12,773 | 94.1% | 798 | 5.9 | 13,571 |
| Total | 102,157 | 90.3% | 10,968 | 9.7% | 113,125 |

Data is also presented in tabular form for each initial failure for each test received in **Appendix C – Tailpipe Test Data Report by Facility**. The data is summarized by facility, test type, and model year. The results for the Georgetown facility are included because the I/M program again provides Delaware motorists a choice as to where to have their vehicles inspected.

Additionally, the 1990 Clean Air Act requires some I/M programs to have more comprehensive testing in certain areas of the country. The tests are specifically designed to measure emissions and provide a thorough check of a vehicle emission

control system. The mass emission tailpipe test[4], also known as IM240, captures the entire exhaust stream through the use of a dynamometer and measures hydrocarbon (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) emissions in grams of pollutant per mile driven. The test also ensures that malfunctioning vehicles are truly repaired to acceptable emission levels.

The State of Delaware does not perform the mass emission tailpipe test; therefore, the State is not required to report increases or decreases in emission levels to the EPA.

### ii. Total OBD-II Inspections

Beginning with model year 1996, 40 CFR 51.351(c) requires Enhanced I/M programs to incorporate on-board diagnostic (OBD) testing as part of vehicle emission testing. All model year 1996 and newer light-duty vehicles and trucks have an advanced powertrain control computer which uses second generation OBD technology (OBD-II) to manage and monitor the operation of the engine and transmission. The OBD-II system monitors virtually every component that can affect the emission performance of the vehicle.

All vehicles registered in Kent and New Castle County receive OBD-II testing as part of the LEIM program. Because the southern portion of the state has a basic I/M program, vehicles registered in Sussex County do not receive OBD-II testing. The Georgetown facility located in Sussex County, however, does perform OBD-II testing but only on those vehicles registered in Kent and New Castle County.

The OBD-II test in the inspection lanes allows DMV technicians to visually examine a vehicle's OBD-II electronic dashboard display function and status to determine if there have been any malfunctions in the emissions-related systems, and replaces the traditional exhaust emission test. The OBD-II test also ensures that the OBD-II system itself is functioning properly.

If a problem is detected, the OBD-II system illuminates a warning lamp known as a Malfunction Indicator Light (MIL) on the vehicle instrument panel along with the phrase "Service Engine Soon" or "Check Engine" to alert the driver. The DMV technician (CERT) can accurately identify and fix the problem. **Figure 3 – Malfunction Indicator Light (MIL)** represents a typical symbol illuminated on the vehicle instrument panel.

[4] Delaware does not perform mass emission testing. The requirements of 40 CFR §51.366(a)(5) do not apply.

**Figure 3 – Malfunction Indicator Light (MIL)**

Vehicles failing their initial inspection are required to be repaired by a CERT and re-inspected at one of the four (4) DMV inspection lanes. A CERT is a specially trained technician who is qualified to perform emission related repairs on vehicles that fail the either the exhaust emission test or the OBD-II test. Alternatively, vehicle owners or a non certified emission repair technician are permitted to make repairs to the vehicle for the purpose of re-inspection; however, a CERT must verify the repairs. All failure-related emission repairs are recorded by the DMV because initially failed vehicles may require multiple re-inspections before either passing or receiving a waiver.

Dual-testing[5] is a term that refers to the simultaneous performance of the OBD-II and tailpipe, or pressure test, on 1996 and newer vehicles in the DMV inspection lanes. Dual-testing is not performed in Delaware and, as such, record keeping and reporting is, therefore, not applicable for the following types of vehicles:

- Those failing the on-board diagnostic check and passing the tailpipe exhaust emission test;
- Those failing the on-board diagnostic check and failing the tailpipe exhaust emission test;
- Those passing the on-board diagnostic check and failing the I/M gas cap evaporative system test;
- Those vehicles failing the on-board diagnostic check and passing the I/M gas cap evaporative system test;
- Those passing both the on-board diagnostic check and I/M gas cap evaporative system test; and
- Those vehicles failing both, the on-board diagnostic check and I/M gas cap evaporative system test.

[5] Delaware does not perform dual testing therefore the requirements of 40 CFR §51.366(a)(2)(xiii) – 51.366(a)(2)(xviii) do not apply.

An OBD-II electronic examination consists of the following individual components:

- the Malfunction Indicator Light (MIL) bulb check, the Data Link Connector (DLC) status, the vehicle readiness status,
- the MIL status (whether commanded on or off), and
- the Diagnostic Trouble Code (DTC) check for those vehicles with MILs commanded on. (The DTC has a number that corresponds to the type of fault or problem with a vehicle).

**Tables 8 through Table 11** summarize the overall OBD-II test results conducted by DMV at each of the four (4) facilities during 2013. Vehicles are categorized by model year 1996-2008 and EPA vehicle classification. For the purpose of this analysis, the vehicle class categories are as follows:

- Light-Duty Diesel-Fueled Truck 1 (LDDT1): a truck fueled on diesel fuel that has a Gross Vehicle Weight Rating (GVWR) up to 6000 lb. (e.g., pick-ups, minivans, passenger vans, and sport-utility vehicles).
- Light-Duty Diesel-Fueled Truck 2 (LDGT2): a truck fueled on diesel fuel that has a GVWR of 6001-8500 lb.
- Light-Duty Diesel-Fueled Vehicle (LDDV): a vehicle fueled on diesel that has a GVWR up to 8500 lb. (passenger cars).
- Light-Duty Gasoline-Fueled Truck 1 (LDGT1): a truck fueled on gasoline that has a Gross Vehicle Weight Rating (GVWR) up to 6000 lb. (e.g., pick-ups, minivans, passenger vans, and sport-utility vehicles).
- Light-Duty Gasoline-Fueled Truck 2 (LDGT2): a truck fueled on gasoline that has a GVWR of 6001-8500 lb.
- Light-Duty Gasoline-Fueled Vehicle (LDGV): a vehicle fueled on gasoline that has a GVWR up to 8500 lb. (passenger cars).

Each table presents the total number of vehicles that passed the OBD-II inspection, the vehicle pass rate, the vehicles that failed the inspection, the vehicle failure rate, and the total number of vehicles deemed "not ready" to be inspected by facility. DTC denotes the total number of vehicles that failed the OBD-II requirements by "commanding on" a diagnostic trouble code and the percentage of DTC vehicles in terms of failure.

| Table 8: OBD-II Results for the Dover Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | Failure Rate % |
| 1996 | LDGT1 | 497 | 281 | 56.5 | 216 | 43.5 | 164 | 33.0 | 52 | 10.5 |
| | LDGT2 | 276 | 181 | 65.6 | 95 | 34.4 | 73 | 26.4 | 22 | 8.0 |
| | LDGV | 779 | 495 | 63.5 | 284 | 36.5 | 202 | 25.9 | 82 | 10.5 |
| | LDDV | 2 | 1 | 50.0 | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 |
| 1997 | LDGT1 | 557 | 321 | 57.6 | 236 | 42.4 | 186 | 33.4 | 50 | 9.0 |
| | LDGT2 | 288 | 163 | 56.6 | 125 | 43.4 | 93 | 32.3 | 32 | 11.1 |
| | LDGV | 893 | 531 | 59.5 | 362 | 40.5 | 268 | 30.0 | 94 | 10.5 |
| | LDDV | 9 | 5 | 55.6 | 4 | 44.4 | 4 | 44.4 | 0 | 0.0 |
| 1998 | LDGT1 | 942 | 570 | 60.5 | 372 | 39.5 | 288 | 30.6 | 84 | 8.9 |
| | LDGT2 | 508 | 311 | 61.2 | 197 | 38.8 | 157 | 30.9 | 40 | 7.9 |
| | LDGV | 1,398 | 852 | 60.9 | 546 | 39.1 | 410 | 29.3 | 136 | 9.7 |
| | LDDV | 5 | 4 | 80.0 | 1 | 20.0 | 0 | 0.0 | 1 | 20.0 |
| 1999 | LDGT1 | 700 | 445 | 63.6 | 255 | 36.4 | 210 | 30.0 | 45 | 6.4 |
| | LDGT2 | 571 | 321 | 56.2 | 250 | 43.8 | 213 | 37.3 | 37 | 6.5 |
| | LDGV | 1,264 | 791 | 62.6 | 473 | 37.4 | 374 | 29.6 | 99 | 7.8 |
| 2000 | LDDT2 | 3 | 1 | 33.3 | 2 | 66.7 | 0 | 0.0 | 2 | 66.7 |
| | LDDV | 11 | 9 | 81.8 | 2 | 18.2 | 2 | 18.2 | 0 | 0.0 |
| | LDGT1 | 1277 | 856 | 67.0 | 421 | 33.0 | 343 | 26.9 | 78 | 6.1 |
| | LDGT2 | 662 | 439 | 66.3 | 223 | 33.7 | 184 | 27.8 | 39 | 5.9 |
| | LDGV | 2,349 | 1,443 | 61.4 | 906 | 38.6 | 667 | 28.4 | 239 | 10.2 |
| 2001 | LDDT2 | 12 | 4 | 33.3 | 8 | 66.7 | 0 | 0.0 | 8 | 66.7 |
| | LDDV | 6 | 5 | 83.3 | 1 | 16.7 | 1 | 16.7 | 0 | 0.0 |
| | LDGT1 | 1,102 | 616 | 55.9 | 486 | 44.1 | 372 | 33.8 | 114 | 10.3 |
| | LDGT2 | 593 | 373 | 62.9 | 220 | 37.1 | 181 | 30.5 | 39 | 6.6 |
| | LDGV | 1,663 | 1,024 | 61.6 | 639 | 38.4 | 479 | 28.8 | 160 | 9.6 |
| 2002 | LDDV | 20 | 16 | 80.0 | 4 | 20.0 | 2 | 10.0 | 2 | 10.0 |
| | LDGT1 | 1,638 | 1139 | 69.5 | 499 | 30.5 | 366 | 22.3 | 133 | 8.1 |
| | LDGT2 | 899 | 643 | 71.5 | 256 | 28.5 | 200 | 22.2 | 56 | 6.2 |
| | LDGV | 2419 | 1686 | 69.7 | 733 | 30.3 | 555 | 22.9 | 178 | 7.4 |
| 2003 | LDDV | 10 | 9 | 90.0 | 1 | 10.0 | 0 | 0.0 | 1 | 10.0 |
| | LDGT1 | 1,164 | 814 | 69.9 | 350 | 30.1 | 264 | 22.7 | 86 | 7.4 |
| | LDGT2 | 771 | 539 | 69.9 | 232 | 30.1 | 195 | 25.3 | 37 | 4.8 |
| | LDGV | 1,616 | 1118 | 69.2 | 498 | 30.8 | 372 | 23.0 | 126 | 7.8 |
| 2004 | LDDV | 16 | 11 | 68.8 | 5 | 31.3 | 3 | 18.8 | 2 | 12.5 |
| | LDGT1 | 1,803 | 1355 | 75.2 | 448 | 24.8 | 328 | 18.2 | 120 | 6.7 |
| | LDGT2 | 1131 | 871 | 77.0 | 260 | 23.0 | 216 | 19.1 | 44 | 3.9 |
| | LDGV | 2,406 | 1,854 | 77.1 | 552 | 22.9 | 417 | 17.3 | 135 | 5.6 |
| 2005 | LDDT1 | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 7 | 7 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,172 | 903 | 77.0 | 269 | 23.0 | 231 | 19.7 | 38 | 3.2 |
| | LDGT2 | 590 | 458 | 77.6 | 132 | 22.4 | 118 | 20.0 | 14 | 2.4 |
| | LDGV | 1,501 | 1,153 | 76.8 | 348 | 23.2 | 280 | 18.7 | 68 | 4.5 |
| 2006 | LDDT1 | 6 | 6 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDT2 | 2 | 1 | 50.0 | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 |
| | LDDV | 22 | 21 | 95.5 | 1 | 4.5 | 1 | 4.5 | 0 | 0.0 |
| | LDGT1 | 1,714 | 1407 | 82.1 | 307 | 17.9 | 235 | 13.7 | 72 | 4.2 |
| | LDGT2 | 1037 | 841 | 81.1 | 196 | 18.9 | 174 | 16.8 | 22 | 2.1 |
| | LDGV | 2,570 | 2,137 | 83.2 | 433 | 16.8 | 332 | 12.9 | 101 | 3.9 |

| Table 8: OBD-II Results for the Dover Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | Failure Rate % |
| 2007 | LDDV | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,034 | 832 | 80.5 | 202 | 19.5 | 179 | 17.3 | 23 | 2.2 |
| | LDGT2 | 689 | 511 | 74.2 | 178 | 25.8 | 163 | 23.7 | 15 | 2.2 |
| | LDGV | 1,829 | 1,413 | 77.3 | 416 | 22.7 | 379 | 20.7 | 37 | 2.0 |
| 2008 | LDDT1 | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDT2 | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1472 | 1254 | 85.2 | 218 | 14.8 | 199 | 13.5 | 19 | 1.3 |
| | LDGT2 | 1315 | 1075 | 81.7 | 240 | 18.3 | 222 | 16.9 | 18 | 1.4 |
| | LDGV | 2,952 | 2,548 | 86.3 | 404 | 13.7 | 367 | 12.4 | 37 | 1.3 |
| 2009 | LDDV | 8 | 8 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 411 | 371 | 90.3 | 40 | 9.7 | 33 | 8.0 | 7 | 1.7 |
| | LDGT2 | 295 | 267 | 90.5 | 28 | 9.5 | 26 | 8.8 | 2 | 0.7 |
| | LDGV | 1191 | 1055 | 88.6 | 136 | 11.4 | 129 | 10.8 | 7 | 0.6 |
| 2010 | LDDV | 2 | 1 | 50.0 | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 |
| | LDGT1 | 80 | 75 | 93.8 | 5 | 6.3 | 5 | 6.3 | 0 | 0.0 |
| | LDGT2 | 48 | 42 | 87.5 | 6 | 12.5 | 6 | 12.5 | 0 | 0.0 |
| | LDGV | 131 | 111 | 84.7 | 20 | 15.3 | 20 | 15.3 | 0 | 0.0 |

| Table 9: OBD-II Results for the Wilmington Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | Failure Rate % |
| 1996 | LDGT1 | 650 | 400 | 61.5 | 250 | 38.5 | 215 | 33.1 | 35 | 5.4 |
| | LDGT2 | 380 | 226 | 59.5 | 154 | 40.5 | 138 | 36.3 | 16 | 4.2 |
| | LDGV | 1,396 | 849 | 60.8 | 547 | 39.2 | 485 | 34.7 | 62 | 4.4 |
| 1997 | LDDV | 2 | 1 | 50.0 | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 |
| | LDGT1 | 882 | 465 | 52.7 | 417 | 47.3 | 365 | 41.4 | 52 | 5.9 |
| | LDGT2 | 347 | 207 | 59.7 | 140 | 40.3 | 126 | 36.3 | 14 | 4.0 |
| | LDGV | 1,702 | 988 | 58.0 | 714 | 42.0 | 619 | 36.4 | 95 | 5.6 |
| 1998 | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,170 | 739 | 63.2 | 431 | 36.8 | 377 | 32.2 | 54 | 4.6 |
| | LDGT2 | 509 | 291 | 57.2 | 218 | 42.8 | 195 | 38.3 | 23 | 4.5 |
| | LDGV | 2,476 | 1,626 | 65.7 | 850 | 34.3 | 727 | 29.4 | 123 | 5.0 |
| 1999 | LDDV | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 984 | 591 | 60.1 | 393 | 39.9 | 346 | 35.2 | 47 | 4.8 |
| | LDGT2 | 613 | 365 | 59.5 | 248 | 40.5 | 217 | 35.4 | 31 | 5.1 |
| | LDGV | 2,242 | 1,472 | 65.7 | 770 | 34.3 | 672 | 30.0 | 98 | 4.4 |
| 2000 | LDDV | 7 | 6 | 85.7 | 1 | 14.3 | 0 | 0.0 | 1 | 14.3 |
| | LDGT1 | 1,775 | 1191 | 67.1 | 584 | 32.9 | 503 | 28.3 | 81 | 4.6 |
| | LDGT2 | 768 | 514 | 66.9 | 254 | 33.1 | 220 | 28.6 | 34 | 4.4 |
| | LDGV | 3,935 | 2,657 | 67.5 | 1,278 | 32.5 | 1,103 | 28.0 | 175 | 4.4 |
| 2001 | LDDV | 4 | 4 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,362 | 826 | 60.6 | 536 | 39.4 | 471 | 34.6 | 65 | 4.8 |
| | LDGT2 | 585 | 364 | 62.2 | 221 | 37.8 | 200 | 34.2 | 21 | 3.6 |
| | LDGV | 2,909 | 1,838 | 63.2 | 1,071 | 36.8 | 938 | 32.2 | 133 | 4.6 |
| 2002 | LDDV | 18 | 16 | 88.9 | 2 | 11.1 | 1 | 5.6 | 1 | 5.6 |

| Table 9: OBD-II Results for the Wilmington Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | Failure Rate % |
| | LDGT1 | 2,590 | 1,830 | 70.7 | 760 | 29.3 | 653 | 25.2 | 107 | 4.1 |
| | LDGT2 | 974 | 727 | 74.6 | 247 | 25.4 | 223 | 22.9 | 24 | 2.5 |
| | LDGV | 4,285 | 3,129 | 73.0 | 1156 | 27.0 | 991 | 23.1 | 165 | 3.9 |
| 2003 | LDDV | 7 | 7 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,513 | 1,108 | 73.2 | 405 | 26.8 | 356 | 23.5 | 49 | 3.2 |
| | LDGT2 | 858 | 602 | 70.2 | 256 | 29.8 | 230 | 26.8 | 26 | 3.0 |
| | LDGV | 2,900 | 2,217 | 76.4 | 683 | 23.6 | 578 | 19.9 | 105 | 3.6 |
| 2004 | LDDV | 16 | 14 | 87.5 | 2 | 12.5 | 1 | 6.3 | 1 | 6.3 |
| | LDGT1 | 3,028 | 2,448 | 80.8 | 580 | 19.2 | 503 | 16.6 | 77 | 2.5 |
| | LDGT2 | 1,465 | 1123 | 76.7 | 342 | 23.3 | 301 | 20.5 | 41 | 2.8 |
| | LDGV | 4,100 | 3,382 | 82.5 | 718 | 17.5 | 620 | 15.1 | 98 | 2.4 |
| 2005 | LDDT1 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 9 | 9 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,682 | 1,357 | 80.7 | 325 | 19.3 | 288 | 17.1 | 37 | 2.2 |
| | LDGT2 | 720 | 578 | 80.3 | 142 | 19.7 | 125 | 17.4 | 17 | 2.4 |
| | LDGV | 2,657 | 2,183 | 82.2 | 474 | 17.8 | 417 | 15.7 | 57 | 2.1 |
| 2006 | LDDT1 | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDT2 | 1 | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 | 1 | 100.0 |
| | LDDV | 40 | 37 | 92.5 | 3 | 7.5 | 2 | 5.0 | 1 | 2.5 |
| | LDGT1 | 2,990 | 2,521 | 84.3 | 469 | 15.7 | 405 | 13.5 | 64 | 2.1 |
| | LDGT2 | 1351 | 1121 | 83.0 | 230 | 17.0 | 202 | 15.0 | 28 | 2.1 |
| | LDGV | 4,685 | 4,064 | 86.7 | 621 | 13.3 | 543 | 11.6 | 78 | 1.7 |
| 2007 | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,415 | 1,209 | 85.4 | 206 | 14.6 | 178 | 12.6 | 28 | 2.0 |
| | LDGT2 | 691 | 555 | 80.3 | 136 | 19.7 | 123 | 17.8 | 13 | 1.9 |
| | LDGV | 2,537 | 2,265 | 89.3 | 272 | 10.7 | 244 | 9.6 | 28 | 1.1 |
| 2008 | LDDT1 | 6 | 6 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 5 | 3 | 60.0 | 2 | 40.0 | 2 | 40.0 | 0 | 0.0 |
| | LDGT1 | 2,284 | 2,139 | 93.7 | 145 | 6.3 | 129 | 5.6 | 16 | 0.7 |
| | LDGT2 | 1524 | 1365 | 89.6 | 159 | 10.4 | 146 | 9.6 | 13 | 0.9 |
| | LDGV | 4,594 | 4,253 | 92.6 | 341 | 7.4 | 310 | 6.7 | 31 | 0.7 |
| 2009 | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 15 | 13 | 86.7 | 2 | 13.3 | 1 | 6.7 | 1 | 6.7 |
| | LDGT1 | 665 | 628 | 94.4 | 27 | 4.1 | 27 | 4.1 | 0 | 0.0 |
| | LDGT2 | 356 | 319 | 89.6 | 37 | 10.4 | 33 | 9.3 | 4 | 1.1 |
| | LDGV | 1870 | 1734 | 92.7 | 136 | 7.3 | 129 | 6.9 | 7 | 0.4 |
| 2010 | LDDV | 7 | 4 | 57.1 | 3 | 42.9 | 3 | 42.9 | 0 | 0.0 |
| | LDGT1 | 132 | 111 | 84.1 | 21 | 15.9 | 21 | 15.9 | 0 | 0.0 |
| | LDGT2 | 60 | 50 | 83.3 | 10 | 16.7 | 10 | 16.7 | 0 | 0.0 |
| | LDGV | 264 | 237 | 89.8 | 27 | 10.2 | 26 | 9.8 | 1 | 0.4 |

| Table 10: OBD-II Results for the New Castle Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | % DTC |
| 1996 | LDGT1 | 489 | 289 | 59.1 | 200 | 40.9 | 160 | 32.7 | 40 | 8.2 |
| | LDGT2 | 303 | 184 | 60.7 | 119 | 39.3 | 96 | 31.7 | 23 | 7.6 |

| Table 10: OBD-II Results for the New Castle Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | % DTC |
| | LDGV | 1,250 | 774 | 61.9 | 476 | 38.1 | 364 | 29.1 | 112 | 9.0 |
| 1997 | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 659 | 360 | 54.6 | 299 | 45.4 | 231 | 35.1 | 68 | 10.3 |
| | LDGT2 | 285 | 156 | 54.7 | 129 | 45.3 | 103 | 36.1 | 26 | 9.1 |
| | LDGV | 1,341 | 828 | 61.7 | 513 | 38.3 | 400 | 29.8 | 113 | 8.4 |
| 1998 | LDDV | 6 | 4 | 66.7 | 2 | 33.3 | 2 | 33.3 | 0 | 0.0 |
| | LDGT1 | 934 | 609 | 65.2 | 325 | 34.8 | 258 | 27.6 | 67 | 7.2 |
| | LDGT2 | 422 | 261 | 61.8 | 161 | 38.2 | 132 | 31.3 | 29 | 6.9 |
| | LDGV | 2,134 | 1,420 | 66.5 | 714 | 33.5 | 560 | 26.2 | 154 | 7.2 |
| 1999 | LDDV | 7 | 6 | 85.7 | 1 | 14.3 | 1 | 14.3 | 0 | 0.0 |
| | LDGT1 | 842 | 495 | 58.8 | 347 | 41.2 | 279 | 33.1 | 68 | 8.1 |
| | LDGT2 | 489 | 302 | 61.8 | 187 | 38.2 | 157 | 32.1 | 30 | 6.1 |
| | LDGV | 1,925 | 1,196 | 62.1 | 729 | 37.9 | 552 | 28.7 | 177 | 9.2 |
| 2000 | LDDV | 4 | 4 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,567 | 1073 | 68.5 | 494 | 31.5 | 388 | 24.8 | 106 | 6.8 |
| | LDGT2 | 679 | 457 | 67.3 | 222 | 32.7 | 182 | 26.8 | 40 | 5.9 |
| | LDGV | 3,568 | 2,380 | 66.7 | 1,188 | 33.3 | 909 | 25.5 | 279 | 7.8 |
| 2001 | LDDV | 8 | 8 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,344 | 801 | 59.6 | 543 | 40.4 | 431 | 32.1 | 112 | 8.3 |
| | LDGT2 | 561 | 355 | 63.3 | 206 | 36.7 | 165 | 29.4 | 41 | 7.3 |
| | LDGV | 2,397 | 1,524 | 63.6 | 873 | 36.4 | 663 | 27.7 | 210 | 8.8 |
| 2002 | LDDV | 14 | 9 | 64.3 | 5 | 35.7 | 3 | 21.4 | 2 | 14.3 |
| | LDGT1 | 2,142 | 1,556 | 72.6 | 586 | 27.4 | 454 | 21.2 | 132 | 6.2 |
| | LDGT2 | 963 | 728 | 75.6 | 235 | 24.4 | 191 | 19.8 | 44 | 4.6 |
| | LDGV | 3,667 | 2,753 | 75.1 | 914 | 24.9 | 693 | 18.9 | 221 | 6.0 |
| 2003 | LDDV | 6 | 6 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,465 | 1,098 | 74.9 | 367 | 25.1 | 268 | 18.3 | 99 | 6.8 |
| | LDGT2 | 716 | 526 | 73.5 | 190 | 26.5 | 167 | 23.3 | 23 | 3.2 |
| | LDGV | 2,425 | 1,858 | 76.6 | 567 | 23.4 | 435 | 17.9 | 132 | 5.4 |
| 2004 | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 15 | 14 | 93.3 | 1 | 6.7 | 1 | 6.7 | 0 | 0.0 |
| | LDGT1 | 2,671 | 2,195 | 82.2 | 476 | 17.8 | 357 | 13.4 | 119 | 4.5 |
| | LDGT2 | 1,342 | 1,072 | 79.9 | 270 | 20.1 | 214 | 15.9 | 56 | 4.2 |
| | LDGV | 3,551 | 2,944 | 82.9 | 607 | 17.1 | 467 | 13.2 | 140 | 3.9 |
| 2005 | LDDT1 | 3 | 2 | 66.7 | 1 | 33.3 | 0 | 0.0 | 1 | 33.3 |
| | LDDV | 10 | 10 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,412 | 1,178 | 83.4 | 234 | 16.6 | 175 | 12.4 | 59 | 4.2 |
| | LDGT2 | 628 | 488 | 77.7 | 140 | 22.3 | 115 | 18.3 | 25 | 4.0 |
| | LDGV | 2,202 | 1,816 | 82.5 | 386 | 17.5 | 300 | 13.6 | 86 | 3.9 |
| 2006 | LDDT1 | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 23 | 22 | 95.7 | 1 | 4.3 | 1 | 4.3 | 0 | 0.0 |
| | LDGT1 | 2,592 | 2,211 | 85.3 | 381 | 14.7 | 317 | 12.2 | 64 | 2.5 |
| | LDGT2 | 1,144 | 948 | 82.9 | 196 | 17.1 | 164 | 14.3 | 32 | 2.8 |
| | LDGV | 4,125 | 3,606 | 87.4 | 519 | 12.6 | 405 | 9.8 | 114 | 2.8 |
| 2007 | LDDT2 | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 1,188 | 1,083 | 91.2 | 105 | 8.8 | 87 | 7.3 | 18 | 1.5 |
| | LDGT2 | 524 | 441 | 84.2 | 83 | 15.8 | 74 | 14.1 | 9 | 1.7 |

| Table 10: OBD-II Results for the New Castle Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | % DTC |
| | LDGV | 2,320 | 2,085 | 89.9 | 235 | 10.1 | 187 | 8.1 | 48 | 2.1 |
| 2008 | LDDT1 | 3 | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 2,064 | 1,961 | 95.0 | 103 | 5.0 | 82 | 4.0 | 21 | 1.0 |
| | LDGT2 | 1,393 | 1,267 | 91.0 | 126 | 9.0 | 105 | 7.5 | 21 | 1.5 |
| | LDGV | 4,224 | 3,935 | 93.2 | 289 | 6.8 | 245 | 5.8 | 44 | 1.0 |
| 2009 | LDDV | 5 | 5 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 546 | 533 | 97.6 | 13 | 2.4 | 13 | 2.4 | 0 | 0.0 |
| | LDGT2 | 316 | 284 | 89.9 | 32 | 10.1 | 28 | 8.9 | 4 | 1.3 |
| | LDGV | 1,775 | 1,662 | 93.6 | 113 | 6.4 | 96 | 5.4 | 17 | 1.0 |
| 2010 | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDDV | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 62 | 55 | 88.7 | 7 | 11.3 | 7 | 11.3 | 0 | 0.0 |
| | LDGT2 | 36 | 32 | 88.9 | 4 | 11.1 | 3 | 8.3 | 1 | 2.8 |
| | LDGV | 153 | 146 | 95.4 | 7 | 4.6 | 7 | 4.6 | 0 | 0.0 |

| Table 11: OBD-II Results for the Georgetown Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | Failure Rate % |
| 1996 | LDGT1 | 16 | 10 | 62.5 | 6 | 37.5 | 5 | 31.3 | 1 | 6.3 |
| | LDGT2 | 28 | 18 | 64.3 | 10 | 35.7 | 8 | 28.6 | 2 | 7.1 |
| | LDGV | 38 | 23 | 60.5 | 15 | 39.5 | 14 | 36.8 | 1 | 2.6 |
| 1997 | LDDT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 34 | 25 | 73.5 | 9 | 26.5 | 8 | 23.5 | 1 | 2.9 |
| | LDGT2 | 34 | 15 | 44.1 | 19 | 55.9 | 15 | 44.1 | 4 | 11.8 |
| | LDGV | 49 | 31 | 63.3 | 18 | 36.7 | 14 | 28.6 | 4 | 8.2 |
| 1998 | LDGT1 | 63 | 38 | 60.3 | 25 | 39.7 | 21 | 33.3 | 4 | 6.3 |
| | LDGT2 | 29 | 21 | 72.4 | 8 | 27.6 | 8 | 27.6 | 0 | 0.0 |
| | LDGV | 70 | 42 | 60.0 | 28 | 40.0 | 20 | 28.6 | 8 | 11.4 |
| 1999 | LDDV | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 40 | 26 | 65.0 | 14 | 35.0 | 12 | 30.0 | 2 | 5.0 |
| | LDGT2 | 26 | 19 | 73.1 | 7 | 26.9 | 7 | 26.9 | 0 | 0.0 |
| | LDGV | 94 | 50 | 53.2 | 44 | 46.8 | 37 | 39.4 | 7 | 7.4 |
| 2000 | LDGT1 | 67 | 38 | 56.7 | 29 | 43.3 | 26 | 38.8 | 3 | 4.5 |
| | LDGT2 | 40 | 25 | 62.5 | 15 | 37.5 | 14 | 35.0 | 1 | 2.5 |
| | LDGV | 119 | 72 | 60.5 | 47 | 39.5 | 32 | 26.9 | 15 | 12.6 |
| 2001 | LDGT1 | 64 | 40 | 62.5 | 24 | 37.5 | 18 | 28.1 | 6 | 9.4 |
| | LDGT2 | 40 | 23 | 57.5 | 17 | 42.5 | 14 | 35.0 | 3 | 7.5 |
| | LDGV | 101 | 54 | 53.5 | 47 | 46.5 | 41 | 40.6 | 6 | 5.9 |
| 2002 | LDGT1 | 92 | 62 | 67.4 | 30 | 32.6 | 21 | 22.8 | 9 | 9.8 |
| | LDGT2 | 31 | 27 | 87.1 | 4 | 12.9 | 4 | 12.9 | 0 | 0.0 |
| | LDGV | 107 | 75 | 70.1 | 32 | 29.9 | 20 | 18.7 | 12 | 11.2 |
| 2003 | LDGT1 | 51 | 40 | 78.4 | 11 | 21.6 | 8 | 15.7 | 3 | 5.9 |
| | LDGT2 | 38 | 28 | 73.7 | 10 | 26.3 | 9 | 23.7 | 1 | 2.6 |
| | LDGV | 109 | 59 | 54.1 | 50 | 45.9 | 38 | 34.9 | 12 | 11.0 |
| 2004 | LDDV | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |

| Table 11: OBD-II Results for the Georgetown Facility | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model Year | EPA vehicle class | Total Tested | Pass | % Pass | Fail | % Fail | Not ready | % Not Ready | DTC | Failure Rate % |
| | LDGT1 | 84 | 70 | 83.3 | 14 | 16.7 | 11 | 13.1 | 3 | 3.6 |
| | LDGT2 | 68 | 53 | 77.9 | 15 | 22.1 | 13 | 19.1 | 2 | 2.9 |
| | LDGV | 129 | 96 | 74.4 | 33 | 25.6 | 25 | 19.4 | 8 | 6.2 |
| 2005 | LDDV | 2 | 2 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT1 | 58 | 48 | 82.8 | 10 | 17.2 | 10 | 17.2 | 0 | 0.0 |
| | LDGT2 | 29 | 26 | 89.7 | 3 | 10.3 | 2 | 6.9 | 1 | 3.4 |
| | LDGV | 80 | 68 | 85.0 | 12 | 15.0 | 10 | 12.5 | 2 | 2.5 |
| 2006 | LDGT1 | 84 | 63 | 75.0 | 21 | 25.0 | 16 | 19.0 | 5 | 6.0 |
| | LDGT2 | 65 | 49 | 75.4 | 16 | 24.6 | 11 | 16.9 | 5 | 7.7 |
| | LDGV | 140 | 114 | 81.4 | 26 | 18.6 | 20 | 14.3 | 6 | 4.3 |
| 2007 | LDGT1 | 48 | 44 | 91.7 | 4 | 8.3 | 3 | 6.3 | 1 | 2.1 |
| | LDGT2 | 36 | 26 | 72.2 | 10 | 27.8 | 7 | 19.4 | 3 | 8.3 |
| | LDGV | 85 | 72 | 84.7 | 13 | 15.3 | 9 | 10.6 | 4 | 4.7 |
| 2008 | LDGT1 | 70 | 63 | 90.0 | 7 | 10.0 | 7 | 10.0 | 0 | 0.0 |
| | LDGT2 | 60 | 52 | 86.7 | 8 | 13.3 | 6 | 10.0 | 2 | 3.3 |
| | LDGV | 108 | 98 | 90.7 | 10 | 9.3 | 9 | 8.3 | 1 | 0.9 |
| 2009 | LDGT1 | 13 | 13 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT2 | 17 | 15 | 88.2 | 2 | 11.8 | 2 | 11.8 | 0 | 0.0 |
| | LDGV | 52 | 46 | 88.5 | 6 | 11.5 | 5 | 9.6 | 1 | 1.9 |
| 2010 | LDGT1 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGT2 | 1 | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| | LDGV | 6 | 6 | 100.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |

**Table 12 - OBD-II Inspection Summary** includes a summary of the overall OBD-II data collected at all four (4) DMV facilities. The values represent the total number of vehicles that passed the inspection, the total number of vehicles that failed, and the total number of vehicles in the "not ready" to test situation for each initial inspection and each subsequent retest. Any "not ready" code due to evaporative emissions is deemed a failure. Model year 1996-2000 vehicles with more than two "not ready" codes in Delaware are deemed a failure. Model year 2001 and newer vehicles with more than one "not ready" code is also deemed a failure. The EPA definition does not consider readiness status as failure criteria. The "actual fail" percentages have been calculated and show the total number of vehicle failures. Further OBD-II information is presented by facility, model year and vehicle type in **Appendix D – OBD-II Test Data Report**.

| Table 12: OBD-II Inspection Summary | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Test | Total Vehicles | Pass | % Pass | Fail | % Fail | Not Ready | % Not Ready | Actual Fail% |
| Test 1 Results | 164,339 | 134,687 | 81.9 | 29,652 | 18.0 | 23,762 | 80.1 | 3.6 |
| Test 2 Results | 20,744 | 10,316 | 49.7 | 10,428 | 50.2 | 8,784 | 84.2 | 7.9 |
| Test 3 or more Results | 11,853 | 4,521 | 38.1 | 7,332 | 61.9 | 6,358 | 85.6 | 8.2 |
| All Result Totals | 196,936 | 149,524 | 75.9 | 47,412 | 24.0 | 38,904 | 82.0 | 4.3 |

In Delaware, if the DLC is damaged, missing, or obstructed, the motor vehicle has failed the OBD-II test. If the DLC is present and accessible, the OBD-II analyzer is connected to the DLC with the motor vehicle's engine turned off.

The MIL bulb check test is then performed by briefly turning the motor vehicle ignition system to the Key On, Engine Off (KOEO) position. If the MIL does not illuminate or is not functional, the motor vehicle has failed the OBD-II test.

The motor vehicle is then started and left running in the Key On, Engine Running position (KOER) to allow the OBD-II analyzer to attempt to communicate with the motor vehicle's OBD-II system. If the analyzer cannot successfully communicate, the motor vehicle is deemed "not ready" and has failed the OBD-II test.

Alternatively, if the analyzer indicates that the motor vehicle is deemed "ready" and determines that all components of the OBD-II system are functioning properly, then the motor vehicle has passed the OBD-II test. **Table 13: OBD-II MIL, DTC, and Not Ready Data** summarizes the overall OBD-II test visual aspect of those vehicles that passed, those that failed, and the total number of vehicles deemed "not ready" to be tested.

Table 13: OBD-II MIL, DTC, and Not Ready Data

| OBD Status | MIL Commands On – No DTC Present | MIL not Commanded On – DTC Present | MIL Commands On – DTC Present | MIL not Commanded On – No DTC Present |
|---|---|---|---|---|
| OBD-II Pass | 27 | 16,709 | 27 | 189,245 |
| OBD-II Fail | 13 | 3,797 | 18,079 | 42,078 |
| OBD-II Not Ready | 9 | 412 | 1,782 | 12,213 |
| Total | 49 | 20,918 | 19,888 | 243,536 |

### iii. Re-Inspections

There were 8,768 (11.1%) overall initial tailpipe exhaust emission test and 283 (2.1%) emission control system test failures out of the total 113,125 related inspections conducted. There were 29,652 (18.0%) overall initial OBD-II inspection failures out of the 196,936 OBD-II related inspections conducted in 2013. Vehicles failing their initial inspection are required to be repaired by a Certified Emission Repair Technician (CERT) and re-inspected at one of the four (4) DMV inspection lanes. In some cases, initially failed vehicles require multiple re-inspections before either passing or receiving a waiver.

### iv. Waivers

A waiver is an exemption from meeting the compliance standards. Waivers are issued to motor vehicles that cannot comply with the applicable exhaust emission standards or OBD-II system performance requirements and cannot be repaired for a reasonable cost. The issuance of a waiver applies only to any statewide vehicle registered in Delaware for failing a tailpipe exhaust emission test or those vehicles registered in Kent and New Castle County for failing the OBD-II test. Under certain conditions vehicle owners may apply to the DMV for a waiver. Waivers are not granted for failed evaporative fuel system tests or safety inspections.

To be eligible for a waiver, the following criteria must apply:

- The vehicle failed emission testing two or more times;
- Engine parameters are set to the vehicle manufacturer's specifications;
- Repair costs are met;
- The vehicle did not fail for visible smoke or any missing emission control equipment;
- All repair receipts and Vehicle Inspection Reports (VIR) must accompany the waiver application when presented to a DMV inspection technician for review; and
- The vehicle needs to be repaired within 90 days from the original date of inspection.

In Delaware, the repair cost of $75 for a vehicle in the 1968-1980 model year range remained the same as previous years. The cost increased for 1981 and newer vehicles registered in either New Castle County or Kent County from $798 to $810 in 2013. The waiver limit for 1981 and newer vehicles registered in Sussex County also remained at $200.

For OBD-II tested vehicles a CERT must perform all necessary repairs; parts and labor apply towards the waiver limit. If a vehicle owner or non-certified technician performs the repair, no costs apply towards the waiver limit.

Safeguards are in place to ensure waivers are only issued when they are warranted. DMV personnel insure that repair receipts are authentic, and all qualified receipts are permanently marked with a CERT's stamp so they cannot be revised or reused. Waivers are tracked, managed, and accounted for by the DMV with respect to time extensions or exemptions in the DMV's database so that vehicle owners cannot receive or retain a waiver improperly. Records are maintained in secured, limited access data files and cross checked by the DMV on a quarterly basis with the main

database to ensure waivers are being properly managed and re-inspected biennially.

As mentioned previously, some vehicles were subject to multiple inspections before either passing an emission inspection or being waived from the inspection requirements. Of the 29,652 overall initial OBD-II emission inspection failures, 10,316 passed a first retest, 4,521 passed a second or subsequent retest, and 486 received a waiver.

**Table 14 - Waivers** presents the 213 total vehicles in New Castle and Kent County and 273 total vehicles in Sussex County that were granted waivers and the total repair costs associated with those waivers. The statewide waiver rate is a percentage of the number of waivers issued compared to the total number of initial failures (4,689 tailpipe initial failures and 29,652 OBD-II test initial failures). The statewide waiver rate was calculated to be 0.7% and meets the SIP requirement of being below 3%. Additional information on waivers by county and vehicle model year is presented in **Appendix E – Waivers**.

| Table 14: Waivers[6] | | | |
|---|---|---|---|
| County | Waivers Issued | Waiver Rate (%) | Repair Costs |
| Kent | 38 | 0.1 | $35,316.28 |
| New Castle | 175 | 0.5 | $262,513.76 |
| Sussex | 273 | 0.9 | $79,713.90 |
| Statewide Total | 486 | 0.7 | $377,543.94 |

### v. Vehicles with No Known Final Outcome

Of the OBD-II tested vehicles, 481 total vehicles (1.4% of the initial failures) had no known final outcome (i.e. dropped out of the inspection cycle without having passed an emission test or received a waiver). There were also an additional 250 tailpipe tested vehicles that failed for one or more emission test (gas cap test, tank pressure test, emission control system check) that have no final result.

**Table 15 – Unknown Test Results** presents the total number vehicles with no known final outcome by test type, county, and EPA vehicle class. This analysis takes into consideration vehicles inspected late in 2013 that returned for re-inspection in early 2014.

[6] Meets requirements of 40 CFR §51.366(a)(2)(v) Initially failed vehicles receiving a waiver.

| Table 15: Unknown Test Results[7] | | | | | |
|---|---|---|---|---|---|
| Test Type | County | EPA Vehicle Class | | | |
| | | LDGV | LDGT1 | LDGT2 | Total |
| OBD-II Test | Kent | 80 | 43 | 28 | 151 |
| | New Castle | 197 | 78 | 39 | 314 |
| | Sussex | 8 | 6 | 2 | 16 |
| | Statewide Total | 285 | 127 | 69 | **481** |
| All Other Tests | Kent | 40 | 38 | 8 | 86 |
| | New Castle | 62 | 38 | 16 | 116 |
| | Sussex | 23 | 19 | 6 | 48 |
| | Statewide Total | 125 | 95 | 30 | **250** |

### b. Quality Assurance

Every state with an enhanced I/M program is required to have an on-going quality assurance program designed to discover, correct, and prevent fraud, waste, and abuse of the system. In addition, the quality assurance program should help the state assess whether or not inspection procedures are being properly implemented and are adequate to address the emissions problems.

#### i. Performance Audits – Overt

Performance audits are conducted by Division of Air Quality (DAQ) auditors at the DMV inspection lanes. Overt performance audits are open audits (i.e., the auditor's presence is known by the DMV inspection technicians and facility management) of the inspection technicians' performance of procedures and their ability to correctly apply vehicle characteristics to ensure the correct test and standards are used. DMV inspection lanes are not shut down for performance audits. 7 DE Admin. Code 1131 under the State SIP requires that each of the DMV inspection technicians at each of the four (4) facilities receive at least one overt performance audit monthly. In 2013 there were 605 total overt audits performed.

Table 16 – Audit Summary provides the total number of inspection stations and lanes receiving an overt or covert performance audit as required by 40 CRF 51.366(b).

[7] Meets requirements of 40 CFR §51.366(a)(2)(iv) Vehicles with no known final outcome (regardless of reason).

| Table 16 - Audit Summary | | |
|---|---|---|
| **Audit Type/Location** | **Station** | **Lane** |
| The number of inspection stations and lanes operating throughout the year **receiving overt performance** audits in the year; | 4 | 30 |
| The number of inspection stations and lanes operating throughout the year **not receiving overt performance** audits in the year; | 0 | 0 |
| The number of inspection stations and lanes operating throughout the year **receiving covert performance audits** in the year; | 4 | 30 |
| The number of inspection stations and lanes operating throughout the year **not receiving covert performance audits** in the year; | 0 | 0 |
| The number of inspection stations and lanes operating throughout the year that have been **shut down as a result of overt performance audits** | 0 | 0 |

The DAQ does not Q/A audit inspection stations and lanes, but rather the DAQ does audit the performance of inspection technicians in overt audits on a monthly basis and in covert audits on an annual basis. Although each DMV inspection technician received multiple performance audits in 2013, Delaware failed to meet SIP requirements by not completing the audits on a monthly basis. Delaware has taken a proactive approach to correcting this oversight; nearly all DMV inspections technicians received an overt audit on a monthly basis. All information on the overt audits performed in 2013 is presented in **Appendix F – Overt Audits**.

According to the discipline records of the DMV, no inspection technicians were disciplined, fined, suspended, or otherwise prohibited from performing regular duties as a result of performance. There is no incentive for a DMV technician to violate performance standards as all DMV inspection technicians are State of Delaware Merit employees covered by the protections of 29 Del.C. - Merit Rules. The Merit Rules outline the process to discipline employees that have been identified to violate performance standards and procedures at the agency level. The DMV and the immediate supervisor of the DMV inspection technician are ultimately responsible for all discipline and corrective action.

The DAQ, therefore, serves no role in the disciplinary action taken against the DMV inspection technicians at the time of the inspection nor does the DAQ impose any fines on the DMV inspection technicians that have violated performance standards and procedures.

### ii. Performance Audits - Covert

Covert performance audits are more time consuming and resource intensive. Covert audits allow the State to evaluate the overall facility and DMV inspection lane technician performance when the technician is unaware of the observation and audit. A covert technician performance audit may also include a remote observation where the auditor observes the station and the technician performance from a distance through the use of binoculars or surveillance cameras. In a

successful covert performance audit, the auditor observes an inspection as a "customer" and the inspection lane technician does not suspect the customer as an "auditor". In Delaware, all auditors are well known in the inspection lanes so they can't act as true "customers" but they are able to perform audits without the technicians' knowledge. A total of 16 covert performance audits were performed on a total number of 63 inspection technicians in 2013 resulting in a 24% completion rate.

**Table 17 – Covert Technician Performance Audit Summary** provides a summary of all covert audits performed in Delaware.

| **Table 17 – Covert Technician Performance Audit Summary**[8] | |
|---|---|
| **Audit Type** | **Total** |
| The number of inspectors that were suspended, fired, or otherwise prohibited from testing as a result of covert audits; | 0 |
| The number of inspectors that were suspended, fired, or otherwise prohibited from testing for other causes; and | 0 |
| The number of inspectors that received fines. | 0 |
| The number of hearings held to consider adverse actions against inspectors and stations; and | 0 |
| The number of hearings resulting in adverse actions against inspectors and stations; | 0 |
| The total amount collected in fines from inspectors and stations by type of violation; | 0 |
| The total number of covert auditors available for covert (undercover) audits over the year; and | 3 |
| The number of auditors available for covert (undercover) audits. | 3 |

During covert vehicle audits, auditors drive a vehicle subject to a full safety and emission inspection into a DMV facility. DAQ auditors observe the skills and inspection techniques of the DMV inspection technician. The covert vehicle is set to fail the inspection, so that the State already knows what the results of the inspection should be prior to the actual inspection. The test results are then monitored to see if the inspection results match the conditions of the audit scenario.

No covert vehicle audits were performed in 2013, as the State of Delaware fleet consists of only OBD-II equipped vehicles, and according to EPA, there is no technology or procedure currently approved for this purpose[9]. Delaware revised the *Low Enhanced Inspection and Maintenance Program - Plan for Implementation (PFI)* in June of 2012; the requirements for completing covert automobile audits were removed.

[8] Meets the requirements of 40 CFR §51.366 (a)(4)(i)-(iii), 51.366(a)(6)(i)-(ii), and 51.366(a)(7)

[9] Meets the requirements of 40 CFR §51.366(b)(8)-51.366(b)(9)

**Table 18 – Vehicle Audit Summary** provides a summary of all covert audits performed on vehicles in Delaware.

| Table 18 – Vehicle Audit Summary | |
|---|---|
| **Audit Type** | **Total** |
| The number of covert audits conducted with the vehicle set to fail per test type; | 0 |
| The number of covert audits conducted with the vehicle set to fail any combination of two or more test types; | 0 |
| The number of covert audits resulting in a false pass per test type; | 0 |
| The number of covert audits resulting in a false pass for any combination of two or more test types | 0 |

### c. Quality Control

Delaware's quality control program is designed to ensure that emission measurement equipment is calibrated and maintained properly, and that inspection records, calibration records, and control charts are accurately created, recorded, and maintained. Unlike the quality assurance program, the quality control program focuses directly on the emission testing equipment and its performance, rather than the overall performance of the inspection technicians and the inspection process.

| Table 19: Audit Performance Results[10] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Test Station** | **Exhaust Emission Analyzer** | | | | | **Pressure Test Equipment** | | | | |
| | **Number of Audits** | **Pass** | **% Pass** | **Fail** | **% Fail** | **Number of Audits** | **Pass** | **% Pass** | **Fail** | **% Fail** |
| Georgetown | 169 | 166 | 98.2 | 3 | 1.8 | 160 | 140 | 87.5 | 20 | 12.5 |
| Dover | 157 | 153 | 97.5 | 4 | 2.5 | 162 | 148 | 91.4 | 14 | 8.6 |
| New Castle | 140 | 127 | 90.7 | 13 | 9.3 | 191 | 132 | 69.1 | 59 | 30.9 |
| Wilmington | 248 | 237 | 95.6 | 11 | 4.4 | 133 | 80 | 60.2 | 53 | 39.8 |
| **Total** | **714** | **683** | 95.7 | **31** | 4.3 | **646** | **500** | 77.4 | **146** | 22.6 |

The DAQ has found a high failure rate in both the exhaust emission test and the pressure test audits. In general, most equipment that fails an audit in a DMV inspection lane requires only minor repairs to return to compliance. When the emission testing equipment fails a particular audit, all necessary repairs are performed as soon as possible by a DMV equipment contractor and a re-audit is performed on the equipment after the equipment is brought into compliance. A detailed summary of equipment audits performed is presented in **Appendix G – Equipment Audits**.

[10] Meets the requirements of 40 CFR §51.366(c)(2) and §51.366(c)(3)

As a result of all necessary repairs and each re-audit, Delaware had no DMV inspection lanes shut down or placed out of service in 2013 due to an equipment malfunction.

### d. Enforcement

In Delaware, the primary mechanism for enforcing the I/M inspection program is the registration denial system. The registration denial system is defined as rejecting an application for initial registration or re-registration of a used motor vehicle unless the vehicle has complied with specific I/M program requirements.

Delaware currently uses a sticker-based registration enforcement program. When a vehicle is titled or renewed in the State of Delaware, the DMV complies with registration security requirements established by the EPA. Delaware's I/M program includes a provision to prevent motorists from falsely registering vehicles out of the LEIM program area, or falsely changing fuel type or weight class on the vehicle registration. The DMV registration denial system verifies the county of residence of every vehicle that is inspected and registered in Delaware through the DMV database. The DMV also tracks and reports all vehicle license plate stickers issued to motor vehicles that have passed inspection requirements. Inspection stickers are maintained in secured, limited access areas and only handled by authorized personnel to ensure registration stickers are being properly managed.

The registration stickers are date stamped stickers, issued for up to five years for a newly titled motor vehicle and for one to two years for motor vehicles that meet all waiver or inspection requirements. The stickers are uniquely numbered at the time of registration to match the vehicle license plate number as shown in **Figure 4 – Example License Plate**. An expired sticker, a missing sticker, or a mis-numbered sticker on a vehicle visually indicates non-compliance with the program. Because the DMV has implemented the vehicle registration denial system, no additional analysis was necessary in 2013 to investigate activity to avoid program requirements.

**Figure 4 – Example License Plate**

The registration sticker is date stamped with a valid expiration date that expired on Sept. 29, 2013.

The sticker clearly identifies the license plate number (122222) along the bottom center.

When a vehicle has failed an emission related inspection, the motorist is eligible to apply for a temporary registration to operate the vehicle while repairs are made. Temporary registration tags are available for purchase at the DMV for $10 and are valid for up to (30) thirty days. In some cases, motorists are eligible to apply for a temporary tag multiple times before receiving a waiver. In 2013, there were 22,646 time extensions and other exemptions granted to motorists to allow for necessary repairs to be made. There were 65,448 vehicles inspected last year but only renewed registration for 12 months. Additionally, there were also 88,847 model year exemptions, as these vehicles are not covered by the I/M program and 45,025 classification exemptions, as the vehicle type is not covered by the I/M program (i.e. kit cars, mopeds, electric, diesel, over 8,500 lbs, and special tags).

When a noncompliant or expired vehicle inspection sticker is visually observed, Delaware law enforcement officers (e.g. state and local police) are authorized by Title 21 Del.C. to issue violation citations to motorists for expired or missing license plate inspection stickers. The visually observed license plates are checked against the DMV database at the time of the violation to determine if those vehicles have expired registration stickers and are due for vehicle inspection, or if the vehicle has already passed an emission inspection and the motorist has failed to place the renewal sticker on the license plate. The DMV and the DAQ may notify law enforcement of the expired license plates at their discretion. Law enforcement officers (e.g. state and local police) in Delaware are authorized by Title 21 Del.C. to issue violation citations to motorists for expired or missing license plate inspection stickers.

DAQ auditors were responsible for conducting monthly surveys of 63 "park-n-ride" and "park-n-pool" lots statewide with a combined total of 6,205 parking spaces. In 2013, a total of 33, 333 vehicles were surveyed in 74,365 parking spaces for a mean lot utilization rate of 45%. A total of 371 expired vehicle tags were observed.

Additionally, a total of 8,461 vehicles were identified by law enforcement with expired registration on routine traffic stops. The vehicle owners were referred to

the DMV for action and a total of $591,834.37 was imposed in fines. Delaware calculated a 99.99% compliance rate with the enforcement program based on the 679,029 vehicles registered. A detailed summary of the vehicle registration sticker compliance survey is presented in **Appendix H – Enforcement Report**.

### e. Additional Reporting Requirements

Delaware is fully dedicated to satisfying the reporting requirements set forth in 40 CFR 41.366 and intends on addressing discrepancies found in the annual I/M Report on a continual basis.

In recent years, for example, Delaware has been deficient in inspecting and reporting on-road emission testing for a portion of the eligible vehicle fleet. Delaware made considerable efforts to plan future remote sensing design (RSD) studies to be completed as a supplemental emission measurement on at least 0.5% of vehicles subject to I/M testing until 2016, if funding is available. RSD detects vehicle emissions when a light duty motor vehicle drives through an invisible light beam system, consisting of an infrared (IR) and ultraviolet (UV) light beam, across a single lane of road to a lateral transfer mirror. The mirror reflects the beam back across the street (creating a dual beam path) into a series of detectors that measure the concentration of pollutants in the vehicles exhaust stream. Some of the results of the 2013 RSD study concluded:

- Average emissions of Delaware registered light vehicles were 17 ppm HC hexane, 0.08% CO and 101 ppm NO.
- Tier 2 models, 2004 and newer, appear to have well controlled emissions.
- Contributions of on-road emissions were skewed towards the older vehicles. Among Delaware registered light vehicles, 2001 and older models accounted for 20% of on-road activity and for 62%, 53% and 66% of the HC, CO and NO emissions respectively.
- A small fraction of vehicles had very high emissions and contributed a substantial portion of light vehicle emissions:
    - 119 (1.2%) of vehicles had HC greater than 500 ppm or CO emissions greater than 3% or NO greater than 2000 ppm or smoke greater than 0.7 RSD smoke factor.
    - These high emitting vehicles emitted up to 32%, 22% and 18% of all light vehicle HC, CO and NO.
- Eighty percent of vehicles measured at the survey locations were registered in Delaware, 7% were from Pennsylvania, 5% from Maryland, 3% from New Jersey, 1% from Virginia, 1% from New York and 2% other states.

With the decrease in the ozone standard and attainment goals and transportation related funds in jeopardy, DNREC intends to use the results of the RSD study to identify gross polluters and determine if the enhanced I/M program should be expanded statewide. A copy of the 2013 Remote Sensing Report prepared by Envirotest is included in **Appendix I – Remote Sensing Study**.

## IV. Performance Evaluation

### a. Discussion of Results

Although progress has been made in reducing air emissions, the main source of air pollution continues to be improper maintenance and repair of motor vehicles during normal use. Figure 5 though 8 presents a comparison of 2010 through 2013 data for the Exhaust Emission Failures, the Emission Control System Check Failures, the Tank Pressure Test Failures, and the Gas Cap Pressure Test Failures, respectively.

**Figure 5 - Comparison of 2010/2013 Exhaust Emission Failures** shows the results from the Tailpipe Exhaust Emission Test are declining from 2010 to 2013. In 2010, there were 87,992 Tailpipe Exhaust Emission test performed that resulted in 11,774 failures. In 2011, there were 83,112 vehicles subject to the Tailpipe Exhaust Emission Test performed that resulted in 10,486 failures. In 2012, there were 82,166 vehicles subject to the Tailpipe Exhaust Emission Test performed that resulted in 9,026 failures. Of the 79,113 vehicles subject to the Tailpipe Exhaust Emission Test, 8,768 vehicles failed with the following statistics:

- 4,689 (6.6%) failed the first test,
- 1,851 (37.4%) failed the second, and
- 2,228 (62.4%) failed each subsequent re-test.

**Figure 5: Comparison of 2010/2013 Exhaust Emission Failures**

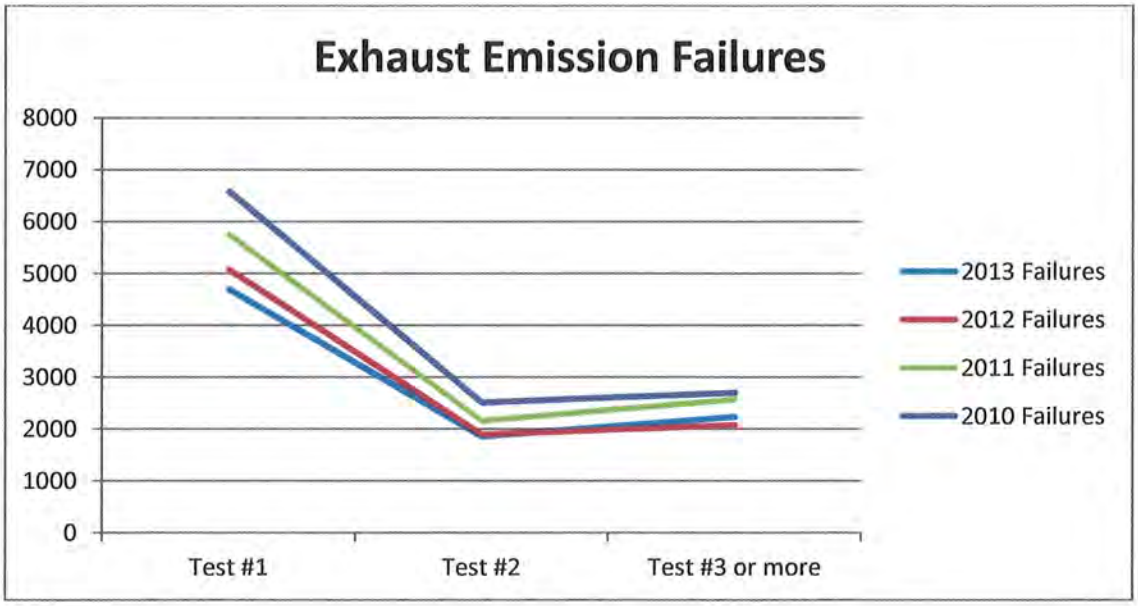



**Figure 6 - Comparison of 2010/2013 Emission Control System Check Failures** graphically shows the results from the Emission Control System Check Test are declining from 2010 to 2013. In 2010, there were 24,229 Emission Control System Checks performed that resulted in 403 failures. In 2011, there were 19,019 Emission Control System Checks performed that resulted in 352 failures. In 2012, there were 16,747 Emission Control System Checks performed that resulted in 314 failures. Of the 13,612 vehicles subject to the Emission Control System Check in 2013, 283 vehicles failed with the following statistics:

- 233 (1.8%) failed the first test,
- 37 (13.7%) failed the second, and
- 13 (25.0%) failed each subsequent re-test.

**Figure 6 - Comparison of 2010/2013 Emission Control System Check Failures**

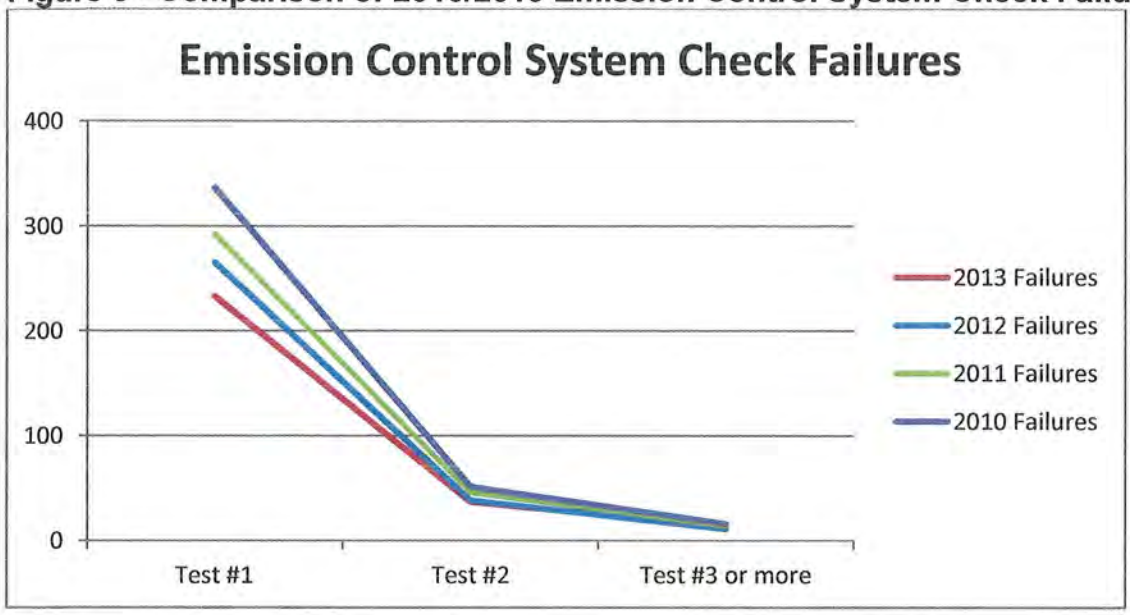
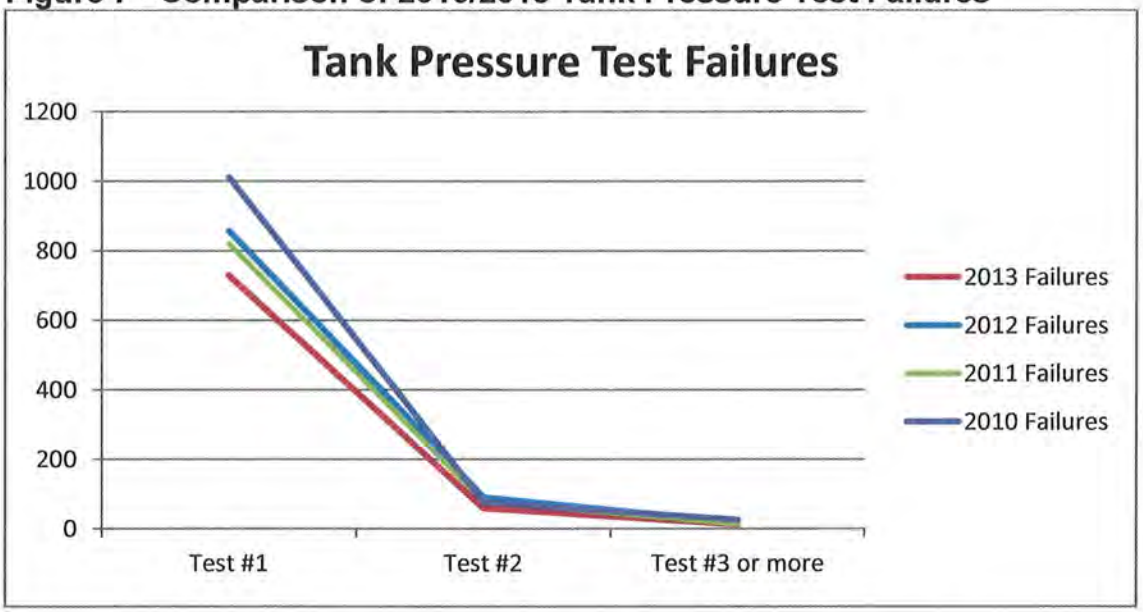



**Figure 7 - Comparison of 2010/2013 Tank Pressure Test Failures** graphically shows the results from the Tank Pressure Test are declining from 2010 to 2013. In 2010, there were 13,023 Tank Pressure Tests performed that resulted in 1,647 failures. In 2011, there were 13,023 Tank Pressure Tests performed that resulted in 1,647 failures. In 2012, there were 8,336 Tank Pressure Tests performed that resulted in 1,289 failures. Of the 6,829 vehicles subject to the Tank Pressure Test in 2013, 1,119 vehicles failed with the following statistics:

- 706 (11.9%) failed the first test;
- 202 (43.2%) failed the second, and
- 171 (49.7%) failed each subsequent re-test.

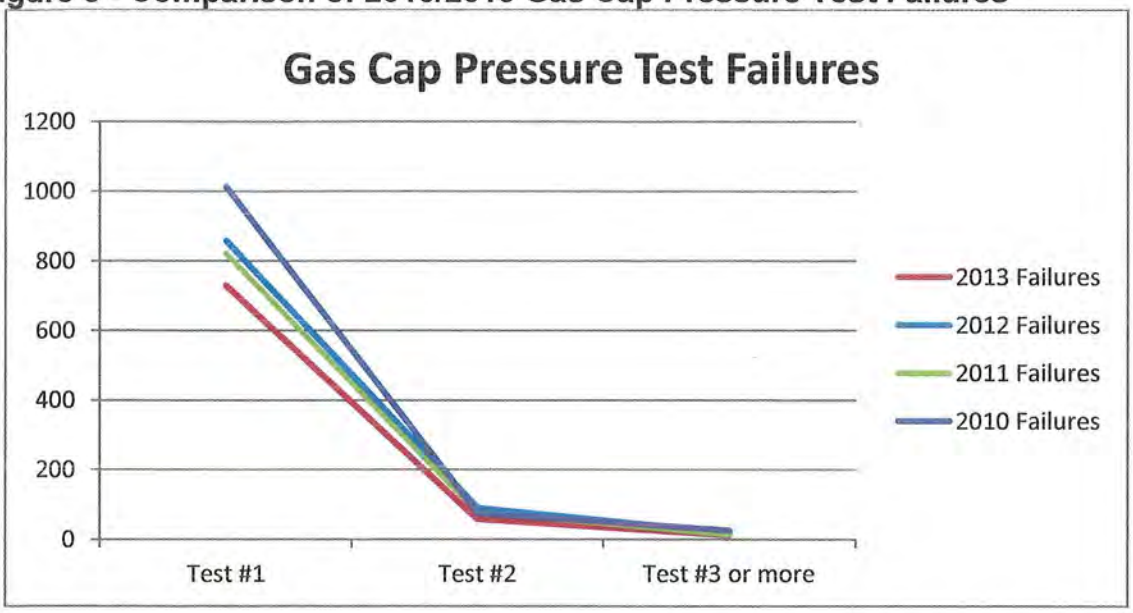
**Figure 7 - Comparison of 2010/2013 Tank Pressure Test Failures**




**8 - Figure Comparison of 2010/2013 Gas Cap Pressure Test Failures** graphically represents the results from the Gas Cap Pressure Test are declining from 2010 to 2013. In 2010, there were 24,287 Gas Cap Pressure Test performed that resulted in 1,111 failures. In 2011, there were 18,943 Gas Cap Pressure Test performed that resulted in 909 failures. In 2012, there were 16,754 Gas Cap Pressure Test performed that resulted in 965 failures. Of the 16,754 vehicles subject to the Gas Cap Pressure Test in 2013, 965 vehicles failed with the following statistics:

- 857 (5.5%) failed the first test,
- 90 (10.0%) failed the second, and
- 18 (13.2%) failed each subsequent re-test.

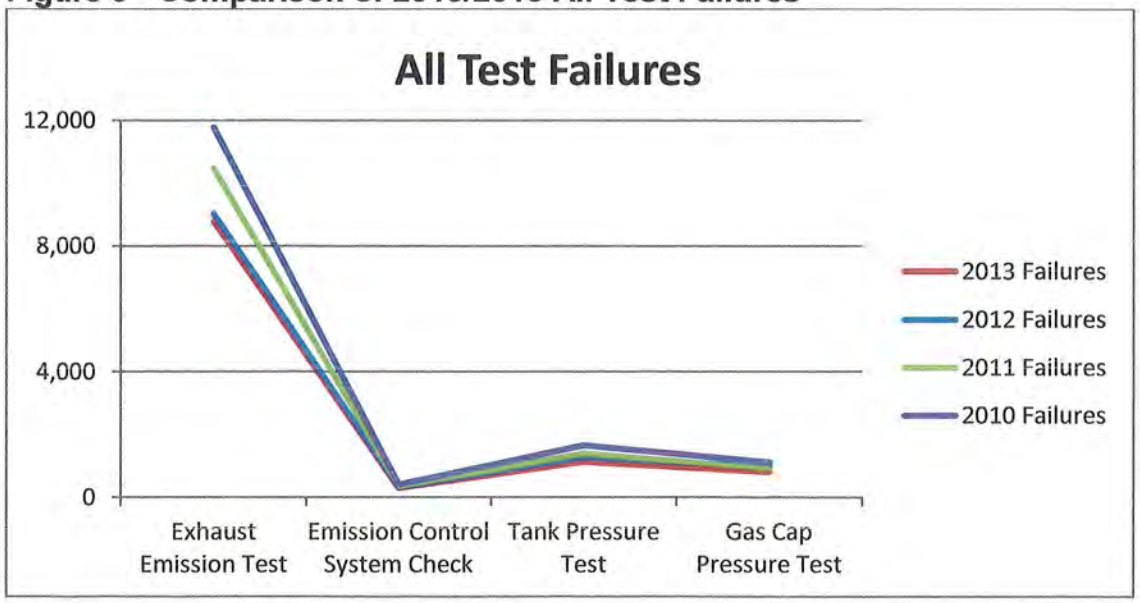
**Figure 8 - Comparison of 2010/2013 Gas Cap Pressure Test Failures**




The results for all tests are similar. In 2010 the results are high but the overall results have decreased in 2011 and 2013. All graphs are cyclical and show that the results drop drastically between Test #1 and Test #2 but the results steadily decline between Test #2 and Test#3 for each year and each test type. These results prove Delaware motorists are retaining and repairing their vehicles and later return to the DMV for subsequent re-test(s).

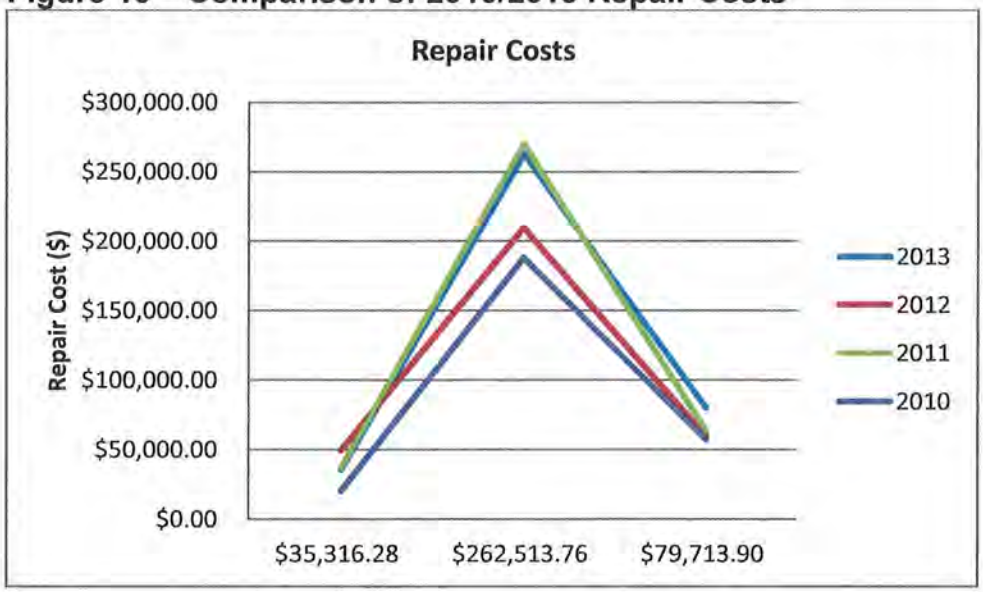
**Figure 9- Comparison of 2010/2013 All Test Failures** graphically shows a summary of all the results from each of the required tests are declining from 2010 to 2013.

**Figure 9 - Comparison of 2010/2013 All Test Failures**



In comparison, waivers have increased from 426 in 2010 to 486 in 2013. The repair costs also increased $112,309.89 from the amount spent in 2010 as presented in Figure 10 – Comparison of 2010/21013 Repair Costs. Data shows that Delaware motorists are spending more money in repair costs to retain their vehicles rather than replace them with a newer model.

**Figure 10 – Comparison of 2010/2013 Repair Costs**




Newer vehicles pollute less due to newer technology and the emission control devices installed on them. Emissions can only be kept to a minimum when the OBD-II systems are in proper working order. OBD-II test failures have increased from 2010 to 2013. Figures 11 through 14 visually represent the overall OBD-II test failure rates for each of the four (4) facilities during 2013. Vehicles are categorized by model year and EPA vehicle classification to include: Light-Duty Diesel Fueled Truck 1 (LDDT1), Light-Duty Diesel Fueled Truck 2 (LDDT2), Light-Duty Diesel Fueled Vehicles (LDDV), Light-Duty Gasoline-Fueled Truck 1 (LDGT1), Light-Duty Gasoline-Fueled Truck 2 (LDGT2), and Light-Duty Gasoline-Fueled Vehicles (LDGV). The results are similar for each facility. The failure rates increase as vehicles increase with model year or age. High failure rates occur for older vehicles as newer cleaner vehicles equipped with OBD-II technology are introduced into the state fleet.

**Figure 11 – OBD-II Failure Rates for the Dover Facility**

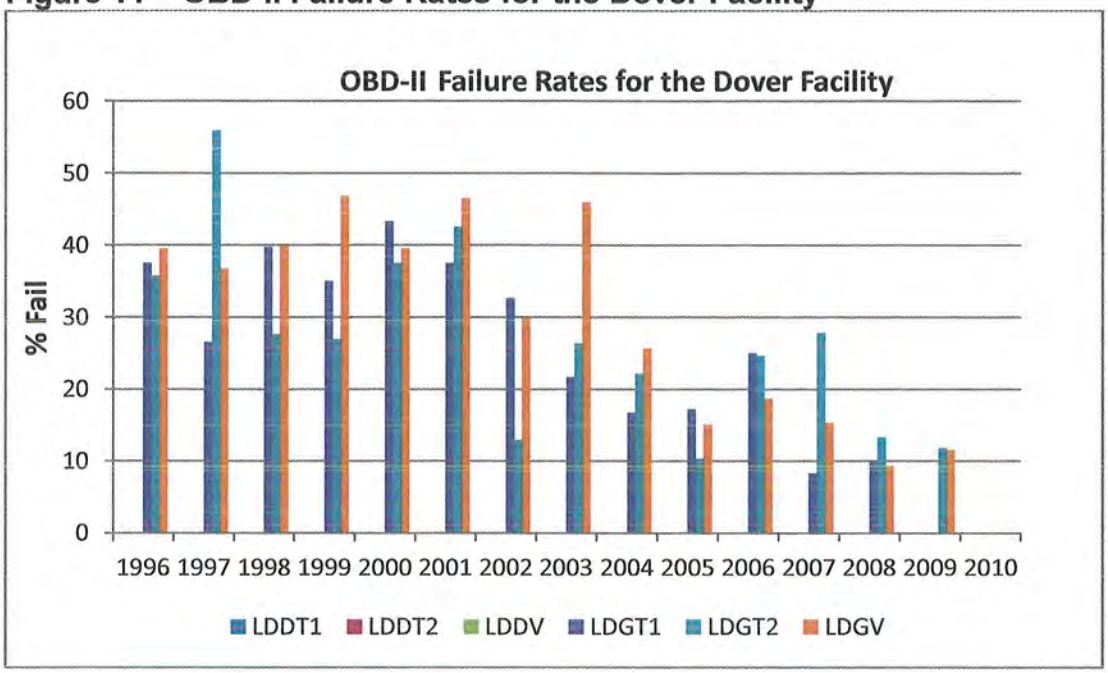



**Figure 12 – OBD-II Failure Rates for the Wilmington Facility**

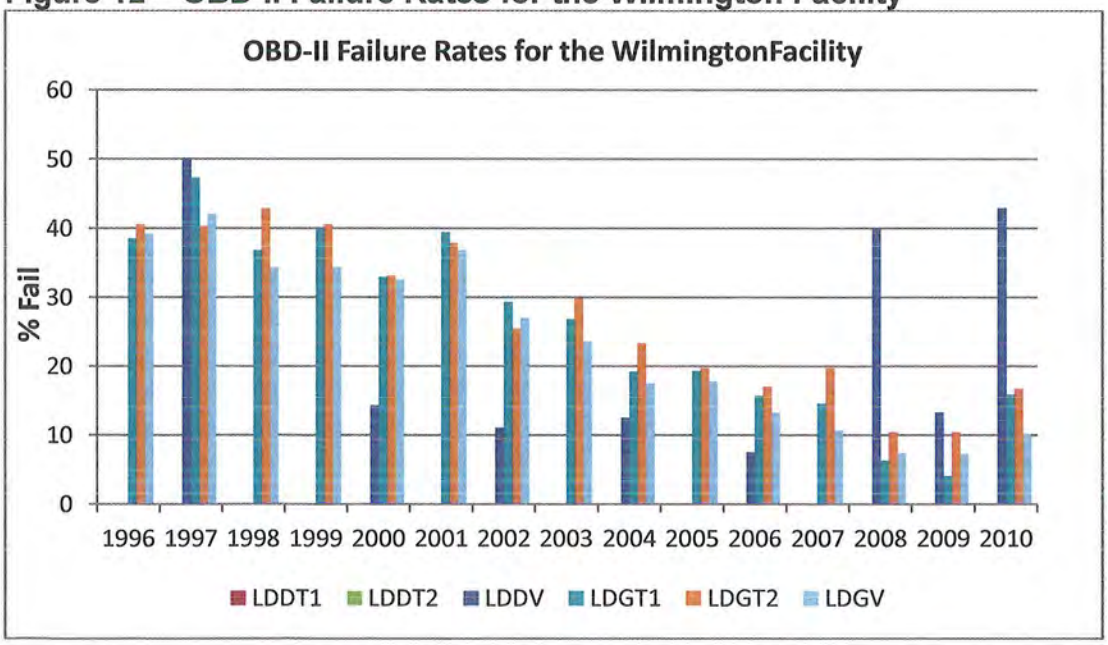


**Figure 13 – OBD-II Failure Rates for the New Castle Facility**

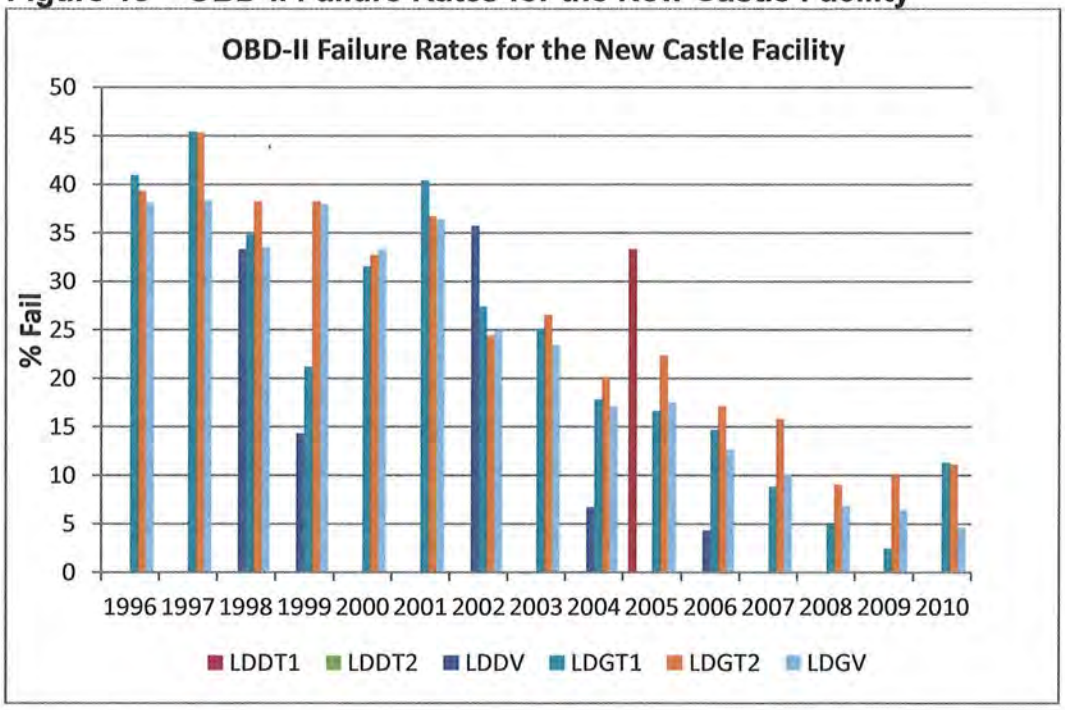
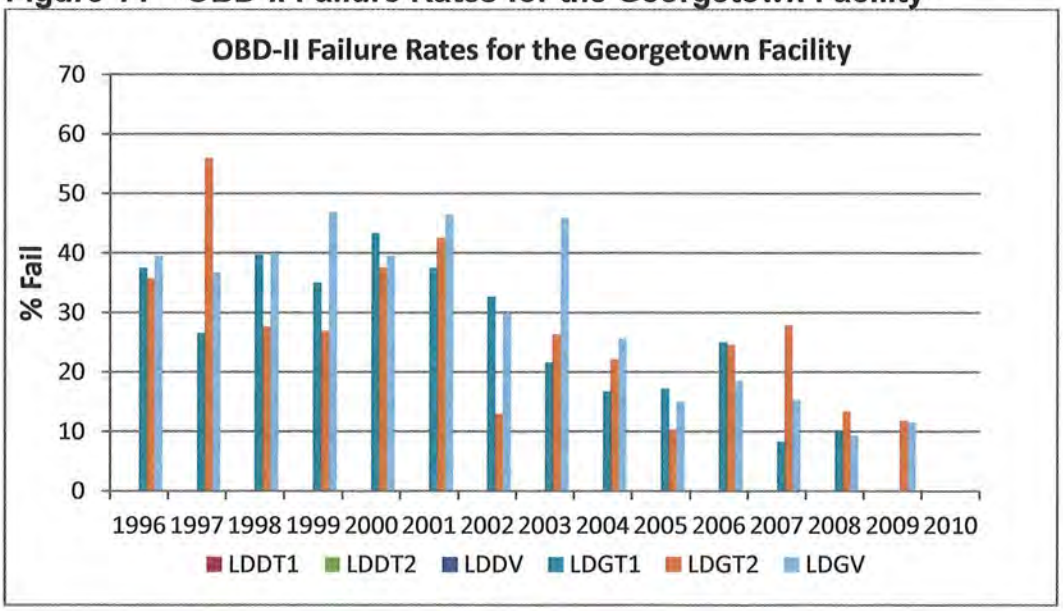



**Figure 14 – OBD-II Failure Rates for the Georgetown Facility**




Delaware motorists are retaining their older model vehicles. The results (Figures 11-14) show that, with age, as OBD-II equipped vehicles return to the DMV inspection lanes for re-inspection, the failure rate is much greater than each previous round of testing. Many factors may contribute to the high vehicle failures, one example may be that that a vehicle does not complete a drive cycle to reset the OBD-II monitor upon returning to the DMV. Since there are many different factors that can cause an ODB-II equipped vehicle to fail, it is hard to generalize the severity

of problems associated with a failed vehicle or its components. In the future, the DAQ will evaluate the OBD-II failures to improve the I/M program and customer confidence in the OBD-II test.

Further, the collection of accurate data is essential to the management, evaluation, and enforcement of the I/M program. As an example in 2013, technician performance audits were not completed in a timely manner, as well. With turnover over the past few years, there has been a breakdown in the overall evaluation and enforcement of the I/M program. Now that that the DAQ is fully staffed, auditing and evaluation of the I/M program will improve.

The DAQ has noticed a high failure rates in the pressure testing equipment audits and exhaust emissions equipment audits. The DMV has relied solely on the DAQ audits as a maintenance indicator after an audit failure. The DAQ recognizes the importance of implementing equipment performance control charts as a means of determining maintenance needs prior to an audit failure.

Overall, the I/M programs helps improve air quality by identifying vehicles in need of repair and requiring them to be fixed as a prerequisite to vehicle registration. The results of the 2013 I/M program along with this report prove that the State of Delaware is successful in achieving reporting requirements.

### b. Conclusions and Recommendations

As seen with the Discussion of Results section, the population of 1975 through 1995 model year vehicles is decreasing. Because these vehicles are getting older, the probability of future failure is increasing. The same can be stated for OBD-II vehicles (See Figures 8-11). High failure rates occur for older vehicles. As newer cleaner vehicles equipped with OBD-II technology are introduced into the state fleet, failure rates decrease. Until the fleet can be turned over, the state should continue to strive for clean air for the residents of the State of Delaware by the following

- To ensure the I/M program meets evolving federal requirements, DNREC will continue to monitor the standards used in the I/M program by initiating changes to state regulations, as needed, to conform to federal law.

- DNREC should revise its regulations to establish a statewide program that mirrors the current NC/Kent program. Or, as an alternative, make no changes to the Kent/New Castle Program, and modify the Sussex program by adding OBD-II to 1996 and newer vehicles. The DAQ concludes OBD-II would employ the best test for each model year.

- To reduce the number of waivers issued annually, DNREC should also revise it regulations to require annual testing for vehicles seeking an emissions waiver.

- As part of OBD-II testing, DMV should better communicate "not ready" status with customers. Vehicle owners do not know when their vehicle is "not ready". Vehicle owners should come in 90 days prior to their vehicle registration expiration and complete a drive cycle prior to testing.

- DNREC should develop a strong ongoing public outreach campaign that routinely informs the public of the need for an I/M program, its achieved benefits and overall performance. The I/M program should be viewed as fair and effective.

- An older vehicle study should also be performed. An air quality informational webpage can be developed to publish outreach materials such as this report, important facts about the I/M program, and annual performance results. Particular emphasis of the campaign should be placed on the public health and air quality benefits that can be achieved.