



Ohio E-Check Annual Report

2019

This document is the 2019 Annual Report for the United States Environmental Protection Agency (U.S. EPA) on the Ohio Enhanced Inspection and Maintenance Program (I/M Program) known as E-Check. This report covers January 1 to December 31, 2019.

Ohio Vehicle
Inspection and
Maintenance
Program

Table of Contents

1	<i>Executive Summary</i>	2
1.1	Major Findings.....	2
2	<i>The Ohio I/M Program</i>	3
2.1	Purpose and Statistics of the Ohio E-Check Program	3
2.1.1	Ohio I/M Program Summary	4
2.1.2	Inspection Stations.....	5
2.1.3	Inspectors	5
2.1.4	Emissions Tests Administered.....	6
2.2	Do the right vehicles get tested?.....	7
2.2.1	Overall motorist compliance with testing requirements	7
2.2.2	Motorist Time Extensions.....	8
2.2.3	Registration File Audits and Compliance with Deadlines	10
3	<i>Is the testing equipment reliable?</i>	1140
4	<i>Quality Assurance</i>	12
4.1	Overt and Covert Audits	12
4.1.1	Overt Audits	12
4.1.2	Covert audits.....	13
4.1.3	Covert audit results	1443
4.2	Inspector Performance.....	1544
4.3	Fines collected	15
4.4	Station Compliance Documents	15
5	<i>Emission Tests Results</i>	16
5.1	Emission Reductions from Repaired Tailpipe-tested Vehicles in 2019	17

ATTACHMENTS

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

Attachment B: Detailed 2019 Emissions Reduction Test Data

1 Executive Summary

This document is the 2019 Annual Report for the United States Environmental Protection Agency (U.S. EPA) on the Ohio Enhanced Inspection and Maintenance Program (I/M Program) known as E-Check. This report covers January 1 to December 31, 2019.

This annual report is required by U.S. EPA under 40 CFR 51.366. U.S. EPA requires this report to cover four categories of information:

- emissions test data;
- quality assurance information;
- quality control information; and
- compliance and enforcement actions.

For the benefit of the public, it is worth noting that the statistics in this report directly and indirectly contribute to the maintenance and improvement of the air quality in the area that this vehicle emission testing program is located. The direct benefit is that it identifies and requires the repair of vehicles that fail the emissions test. Most of the benefit may come from the indirect effects. It is documented from actual data from an enhanced I/M program in Phoenix, Arizona that vehicles in an I/M program over a period of time are better maintained with routine maintenance. With the passage of time, the non-I/M versus I/M fleet emission rates diverge from each other with the I/M fleet emission rate being less than the non-I/M fleet emission rate. This difference is often referred to as the overall I/M reduction or I/M benefit. In addition, the State of Oregon conducted a 2011-12 study of what the vehicle failure rates were outside of their testing area. They found that the failure rate was 22% outside the testing area versus the 5% inside the testing area. This data shows that vehicle emissions testing programs are effective in promoting and assuring that the fleet of vehicles is better maintained and stays in the normal emitting versus the high emitting category. In addition, mobile source emission modeling indicates that the E-Check program removes 1,317 tons of nitrogen oxides and 1,100 tons of volatile organic compounds per year.

1.1 Major Findings

Emissions Tests Conducted

In 2019, 847,553 vehicle emission tests were performed, including initial tests, retests, and off-cycle tests due to change of ownership/registration. The total number of unique vehicles tested in 2019 was 809,504. Most of the tests on unique vehicles were completed using OBD at 97.5 percent and 2.5 percent received an ASM, Two Speed Idle, Opacity or Clean Screen test. Only 720 of the emission tests performed were opacity tests on diesel-fueled vehicles.

The number of vehicles tested in 2019 who failed, with no known final outcome (regardless of reason) was 14,113 or 1.7% of unique vehicles. This equals the sum of the number of subject vehicles in the subsets of vehicles initially failing tailpipe or OBD tests that: do not pass a retest; do not receive a waiver; get sold or move outside the

program area; are scrapped; or are otherwise prevented from operating within the program area.

Compliance and Enforcement

In 2019, 63,791 unique vehicles failed their initial tests for a 7.9% failure rate. 17,704 of those vehicles, or 2.2 percent of the total unique vehicles that were emission tested, received a repair waiver. Some of the vehicles that initially failed E-Check did not obtain a passing test or waiver.

In 2019, 17 investigations by Ohio BMV's Special Investigations Unit were initiated for E-Check-related vehicle registration violations which resulted in one criminal prosecution. Registration cancelation resulted in none of the cases.

Emissions Reductions from Tailpipe Tested Vehicles

In 2019, there were 1,489 vehicles that initially failed the Acceleration Simulation Mode (ASM 2525) (ASM) tailpipe test. The number of vehicles that failed the initial tailpipe test and passed later following repairs was 646. The repaired vehicles had an average emission improvement of 70.9 percent for hydrocarbon, 86.8 percent for carbon monoxide and 60.2 percent for oxides of nitrogen. Of the 847,553 total emissions tests performed in 2019, 97.3 percent were completed using the onboard diagnostic test and 2.7 percent received an ASM, Two Speed Idle, Opacity or Clean Screen test.

Quality Assurance

In 2019, Ohio EPA performed 213 covert audits, 313 performance audits, 150 equipment audits and 1,857 lane status audits to determine if stations were correctly performing all emissions tests and if the station's physical conditions meet all state requirements. As a result of these audits, there were no performance issues identified that warranted shutting down a station.

2 The Ohio I/M Program

2.1 Purpose and Statistics of the Ohio E-Check Program

The northeast Ohio area has been officially designated as attaining the 1997 National Ambient Air Quality Standards (NAAQS) for ground level ozone of 0.08 parts per million (ppm). However, there were areas in northeast Ohio designated nonattainment for the 2008 ozone standard of 0.075 ppm. In 2012, the U.S. EPA designated the Cleveland-Akron metro area as marginal nonattainment. On June 27, 2016, U.S. EPA issued a direct final rule determining the Cleveland area has clean data based upon 2013-2015 air quality data (84 FR 41497, 81 FR 41444). The determination became effective August 26, 2016. On July 6, 2016, DAPC submitted to U.S. EPA the re-designation request and maintenance plan for the Cleveland-Akron-Lorain area. On October 17, 2016 (81 FR 71444) U.S. EPA issued proposed approval of Ohio's request for the Cleveland-Akron-Lorain area. On January 6, 2017, U.S. EPA finalized the re-designation of this area to attainment, effective January 6, 2017 (82 FR 1603).

On December 28, 2015, based on U.S. EPA's review of the air quality criteria for ozone and related photochemical oxidants, U.S. EPA finalized revisions to the NAAQS for ground-level ozone (80 FR 65292). The rule sets more stringent air quality standards, lowering both the primary (health-based) and secondary (welfare-based) standards from 0.075 ppm to 0.070 ppm, and retained their indicators, forms (fourth-highest daily maximum, averaged across three consecutive years) and averaging times (eight hours). Ohio's recommended designations were submitted to U.S. EPA on September 30, 2016, and included Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit Counties in the Cleveland, OH designation area. The designations are based on 2013 to 2015 air quality data plus consideration any air quality data available for 2016. At that time, Cleveland (Lake County) had violating monitors. In addition, by the end of August 2016, monitors in the Cleveland (Gauga and Lake Counties) area already had a design value above the standard for 2014-2016. Final designations were effective August 3, 2018. The area continues to monitor nonattainment of the 2015 ozone standard.

Ohio EPA administers the vehicle emissions testing program, or E-Check, as authorized by Ohio Revised Code (ORC) 3704.14. The goals of the E-Check program are to identify gross-polluting vehicles for repair and provide a fair and accurate test with minimum inconvenience to Ohio's motorists. In 1996, Ohio contracted with Envirotec Systems to operate the Ohio I/M Program in the Dayton-Springfield, Cincinnati, and Cleveland-Akron metro areas. In 2005, the contract was extended for an additional two years in northeast Ohio with Envirotec Systems. In 2007, the contract was extended for an additional six months in northeast Ohio. Envirotec Systems was awarded a one-year contract in early 2008 to continue providing motor vehicle emission tests to motorists through June 2009. A six-month extension was granted in June 2009. The contract was renewed in October 2009 with Envirotec Systems until the end of June 2011. Beginning July 1, 2011, the contract was extended for one year until June 30, 2012.

In the summer of 2011, the Ohio legislature passed legislation for Ohio to implement a decentralized program by June 30, 2012. In January 2012, Envirotec Systems won a three-year contract to implement a decentralized vehicle testing program beginning June 4, 2012. The decentralized program involved adding 37 Lube Stops, 16 independent repair shops and 16 self-service testing kiosks to the 23 existing testing stations. All the new testing options only provide OBDII testing. The existing stations maintained the ability to perform OBDII, dynamometer, idle tail pipe and opacity testing. Effective July 1, 2015, the contract was extended through June 30, 2016. The contract was again extended through June 30, 2017. In February 2017, Envirotec Systems was awarded a two-year contract from July 1, 2017 to June 30, 2019, with two one-year extensions. In June 2019, the contract was extended one year through June 30, 2020. In May 2020, the contract was extended one more year and for its last extension of the contract to June 30, 2021.

2.1.1 Ohio I/M Program Summary

40 CFR 51.366 (d) (1) (i) An estimate of the number of vehicles subject to the inspection program, including the results of analysis of the registration database;

In 2019, 816,542 vehicles were expected to undergo emission testing. In 2019, vehicles were exempted from the emissions testing process if they were:

- model year 1994 or older;
- model year 2016 or newer;
- greater than 10,000-pounds gross vehicle weight rating;
- motorcycles, recreational vehicles, and motor homes; or
- vehicles operating on alternative fuels, such as propane or natural gas.

Vehicles are required to have a valid vehicle emission certificate every other year or when transferred to a new owner if not tested within 365 days of the previous test.

2.1.2 Inspection Stations

40 CFR 51.366 (b)(1)(i): The number of inspection stations and lanes operating throughout the year:

In 2019, there were 53 OBDII-only inspection stations (or independent repair shops) and 23 full service test stations. A total of 76 stations and 128lanes conducted emissions tests in 2019. Also, in July 2012, self-serve testing kiosks were installed at 16 of the existing testing locations operated by Envirotest Systems. In 2019, there were 74,740 (of unique vehicles) or 9.2% OBD II tests successfully conducted using the self-serve kiosks.

The 53 OBDII-only inspection stations are operated by a variety of independent businesses while the 23 existing E-Check stations and 16 self-serve kiosks continue to be operated by Envirotest Systems.

2.1.3 Inspectors

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

Table 1: Number of Inspectors in 2019

	# of Inspectors
Trained and Licensed to conduct testing in 2019	587

2.1.4 Emissions Tests Administered

The Ohio I/M Program utilizes six different types of emissions tests. Gasoline-fueled vehicles that are not Clean Screened receive the gas cap test and one of the following tests: On-Board Diagnostic (OBD II), transient (tailpipe), or two-speed idle (tailpipe). Diesel-fueled vehicles receive the gas cap test and an OBD II or opacity test. The Clean Screen or “Rapid Screen” testing process started in July 2012 and can remotely test vehicles as they operate under normal driving conditions. Each type of test is described below. With the exception of clean screen, all vehicles are also visually inspected to confirm that a gas cap and catalytic converter are present. If a vehicle fails the visual inspection, it fails the overall test, even if it passed the emissions portion of the test. Fails for vehicles not having a catalytic converter do not receive an emissions test but do receive the gas cap test. Percentages are calculated using the unique number of vehicles of 809,504.

1. Gas cap tests check the vehicle’s gas cap pressure to ensure the cap seals tightly and does not allow fuel vapors to evaporate into the air. If the vehicle fails the gas cap test, it fails the overall emissions test, even if the vehicle passed the emissions portion of the test.

2. On-Board Diagnostics: On-board diagnostics (OBD II) is a vehicle computer system installed on 1996 and newer cars and light trucks and 1997 and newer diesel vehicles. The computer continuously tracks and stores information about a vehicle’s performance. The on-board computer turns on the “check engine” light if it finds a problem with a vehicle’s emission control system. On January 5, 2004, Ohio began testing vehicles equipped with the OBD II systems. All OBDII equipped vehicles are initially attempted to be tested via the OBDII test, however if during the initial test the vehicle’s test cycle is not ready then the motorist can opt to have a tailpipe test if their vehicle meets one of the following conditions:

- 2000 model year or older with 3 or more readiness monitors not set to ready, or
- vehicles that are 2001 to 2003 with 2 or more readiness monitors not set,

There were 789,113 initial pass/fail tests or 97.5% OBD tests.

3. Transient tailpipe tests are used for most gasoline-powered vehicles that are not equipped with the OBD II equipment. For this test, Acceleration Simulation Mode (ASM 2525) standards are used. Vehicles are placed on a dynamometer, a treadmill-like device that puts resistance against the tires to simulate on-road driving. The vehicles are driven at 25 miles per hour for a minimum of 25 seconds and a maximum of 240 seconds.

Tailpipe emissions are then measured and recorded. Readings for hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) are compared to each pollutant's pass/fail points. The pass/fail points vary by vehicle type (car vs truck), model year, and, for trucks, weight category. In 2019, 13,453 or 1.67 percent of emissions tests were completed using the transient tailpipe test.

4. Two-speed idle (TSI) tests are used for gasoline-fueled vehicles that cannot receive an OBD II or ASM tailpipe test. These vehicles, for the most part, cannot be driven on the dynamometer and are mainly dedicated 4-wheel-drive vehicles. This test measures Hydrocarbon (HC) and Carbon monoxide (CO) emissions while the engine is operating at an elevated idle of 2,500 revolutions per minute (rpm) with no load on the engine. If it passes at 2500rpm, it is considered a passing test. If it fails at 2500 rpm then it is tested at idle for diagnostic purposes in order to compare the emissions of HC and CO at the 2500 rpm vs at idle. This test does not measure NOx emissions. In 2019, 3,201 or 0.4 percent of emissions tests were completed using the TSI test.

5. Clean Screen tests are used for a small percentage of gasoline-fueled vehicles that operate with exceptionally low emissions. This test measures emissions while the vehicle is operating normally on a public roadway. Clean Screen testing typically takes place at highway on-ramp locations in order to obtain emissions readings as vehicles are accelerating through the test equipment. To ensure accurate and uncontaminated readings, the emissions limits for this type of test are stricter than those of a standard tailpipe emissions test. Also, a vehicle must record two acceptable Clean Screen readings within a nine-month window in order to be documented as passing the E-Check requirements. In 2019, 3,027 or 0.4 percent of emissions tests were completed using the Clean Screen test.

6. Opacity tests use opacity meters to determine the “density” of the exhaust emitted from the vehicle's tailpipe. Only diesel vehicles receive an opacity test. In 2019, 710 or 0.09 percent of emissions tests were completed using the opacity test.

2.2 Do the right vehicles get tested?

2.2.1 Overall motorist compliance with testing requirements

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

In Ohio, the inspection lane computers determine which test a vehicle will receive based on model year and make information. Table 2 summarizes the 2019 overall compliance rate of the total number of unique vehicles registered in 2019 subjected to the test verses the number of unique vehicles actually receiving an I/M test. In 2019, the compliance rate (actual tests versus required tests) was 99.1 percent.

Table 2: Motorist Completing Testing Requirements

	Vehicle Count	Compliance % (unique vehicles versus registered vehicles)
Overall Testing Compliance		
Vehicles Subject to 2019 Test (registered BMV records)	816,542	
Unique Vehicles Tested in 2019	809,504	99.1%*

Note* This number varies because of the number of vehicles that are in the system that need tested but may be sold outside of the test area or other vehicles brought into the area or transferred to a new owner within the area that now need tested.

2.2.2 Motorist Time Extensions

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

The E-Check program offers repair waivers to individuals on their vehicle who attempt to repair their vehicle but cannot get it to pass E-Check. In most cases, a waiver will be issued if the vehicle meets the requirements. A waiver will then allow the vehicle to be registered with the State. If an individual spends at least \$200 on emissions-related repairs for a 1995 or older vehicle, shows a 30 percent improvement in emissions readings from the initial test readings, and passes a visual anti-tampering inspection, he or she may qualify for a conditional pass waiver. For 1996 and newer vehicles, there is also a repair cap waiver that allows the motorist to register the vehicle if he or she spends at least \$300 on emissions-related repairs and passes a visual tampering inspection. When a waiver is issued, the vehicle does not need to test for two years, or the next scheduled E-Check test, whichever comes first.

Ohio EPA offers a variety of extensions and exemptions to individuals who need more time to repair a vehicle or cannot have the vehicle tested at the current time.

- Non-permanent exemptions apply to those individuals who can have their vehicle tested out-of-state, are in the military, are currently a student outside of Ohio, or have a vehicle that will not return to Ohio within one year. The exemption allows a motorist to register the vehicle without receiving an E-Check test.
- Extensions are only available to individuals who need more time to have repairs performed, have difficulty affording repairs for the vehicle or are temporarily

located out-of-state in an area that does not have emissions testing and will return within one year. Extensions only extend the period of time that a vehicle has to comply with the program. A motorist has up to six months to comply with the current testing cycle.

- Permanent exemptions from testing are issued for vehicles with a gross vehicle weight rating (GVWR) over 10,000 pounds or operating on an alternative fuel source such as electric power, natural gas, butane, propane, and 100 percent alcohol.

Out-of-state exemptions account for the highest number of exemptions issued. If the motorist is in another state's emissions testing area, they must have the vehicle tested in that state. If the motorist is in a non-testing area, they can still obtain an out-of-state exemption if the vehicle will not be returning to Ohio before their next registration renewal date. Motorists can also obtain student and military exemptions which allow them to renew the vehicle's registration without receiving a test, for that test cycle.

The extensions require that a vehicle receive a test, but more time is provided to have it completed. The category of "other" in Table 3 includes special circumstances such as survivor and trust non-permanent exemptions that would require a vehicle to be tested out of its normal test cycle.

All electric and hybrid plug in vehicles can receive a permanent exemption by calling one of the E-Check offices or mailing in an application for a permanent exemption. These vehicles do not require an inspection. Alternative fuel vehicles, such as propane or natural gas, may receive a permanent exemption from the emission test requirement. These vehicles will need to be inspected by authorized Ohio EPA Mobile Source Section personnel. The inspection will include an anti-tampering inspection to ensure that all necessary emission control equipment is correctly installed on the vehicle. Any vehicle that does not pass the necessary inspection will be subject to the vehicle emission testing requirements. Vehicles that are more than 10,000 pounds gross vehicle weight rating and are plated with non-commercial plates also will be subject to inspection by authorized Ohio EPA Mobile Sources Section personnel prior to receiving a permanent exemption from the vehicle emission testing requirement, to be consistent with our rules, specifically OAC 3745-26-12(C)(2).

Table 3: Number of Extensions or Exemptions Issued in 2019

Type of Extensions or Exemptions	Number Issued
Extensions	3,853
Waivers	17,720
Permanent Exemptions	647
Out of State Exemptions	2,978
Student Exemptions	245
Military Exemptions	668
Hardship Extensions	3,796
Other	1
Total Number of Waivers, Extensions and Exemptions Issues	30,508

2.2.3 Registration File Audits and Compliance with Deadlines

40 CFR 51.366 (d)(2)(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

(ii) The number of registration file audits, number of registrations reviewed, and compliance rates found in such audits.

Ohio EPA works with Ohio Bureau of Motor Vehicles’ (BMV) Special Investigations Unit (SIU) to ensure that motorists are not falsely registering vehicles outside of a testing area to circumvent the testing requirements. When Ohio EPA receives a complaint regarding false registrations, Ohio EPA forwards the complaint to Ohio BMV SIU for investigation. Ohio BMV Registrar Offices also will forward any concerns they have about suspicious registrations along to the SIU Division. Overall in 2019, Ohio BMV SIU investigated 17 complaints regarding E-Check compliance. Of the 17 investigations, 3 resulted in registration cancellation, and none resulted in criminal prosecution.

At this time, no registration file audits are performed to determine compliance with the vehicle emission testing program in northeast Ohio.

3 *Is the testing equipment reliable?*

40 CFR 51.366 (c) Quality Control Report: The program shall submit ... basic statistics on the quality control program for January through December of the previous year, including:

- (1) the number of emission testing sites and lanes in use in the program;
- (2) the number of equipment audits by station and lane;
- (3) the number and percentage of stations that have failed equipment audits; and
- (4) the number and percentage of stations and lanes shut down as a result of equipment audits.

Within the Ohio I/M Program for 2019, there are 76 vehicle testing stations operating a total of 128 lanes.

Ohio EPA’s equipment audit procedure is designed to verify that the lane equipment is operating within the tolerances specified by federal and State guidelines. Equipment audits are inspections of emissions testing equipment performed overtly at least two times per year per lane. Ohio EPA’s equipment audits are performed by Agency staff and a contractor representative. If a lane fails any one of the audit criteria, the audit result is a fail and the lane is shut down until the issue is resolved.

Envirotest Systems’ equipment is required to undergo self-tests on either a per test, hourly, or weekly basis. The computer system will lock-down a lane if a self-test is not performed at the required time. The lane lock-down results in no additional vehicle testing occurring until the test is complete.

In 2019, there were 57 testing lanes with a dynamometer at the full service stations operated by Envirotest Systems that were successfully audited. A total of 150 equipment audits resulted in 140 audit passes and 10 audit failures, or an overall failure rate of 6.7 percent. The 10 equipment audit failures occurred at 9 of 23 unique stations, or 39.0 percent of the stations, and across 9 of 75 unique lanes, or 12 percent of the lanes.

Table 4: Number of Equipment Audits at Each Testing Station in 2019

Facility	Number of Equipment Audits
WESTLAKE	8
BEREA	9
NORTH ROYALTON	6
PURITAS	8
EAST 55TH	10
VALLEY VIEW	8
ST. CLAIR	3
WARRENSVILLE	12

EUCLID	9
WILLOUGHBY	6
PAINESVILLE	7
CHARDON	4
AUBURN	7
ROOTSTOWN	4
KENT	6
CUYAHOGA FALLS	5
BROWN STREET	12
COPLEY	8
MEDINA	7
SPENCER	4
AMHERST	3
ELYRIA	6
TWINSBURG	6

4 Quality Assurance

4.1 Overt and Covert Audits

Ohio EPA performs overt and covert performance audits to assess station and inspector performance. The results of the different types of audits are detailed below.

4.1.1 Overt Audits

40 CFR 51.366 (b) (1) (i) The number of inspection stations and lanes operating throughout the year;

For 2019, 76 stations operated 128 emission testing lanes.

40 CFR 51.366 (b) (2) The number of inspection stations and lanes operating throughout the year:
 (i) receiving overt performance audits in the year; or
 (ii) not receiving overt performance audits in the year.

During overt performance audits, Ohio EPA staff verifies that Envirotest Systems and the additional contracted private repair shop personnel are performing the emissions test in the proper manner while providing adequate customer service to Ohio's motorists. The performance audit is broken into three sections. The first section is *Test Procedures*, designed to evaluate how well the inspectors perform the emissions test procedures and

interact with the motorists. The second section is *Safety Conditions*, designed to evaluate if Envirotest Systems and the other private repair shops provide motorists with a safe testing environment. The third section is *Station Appearance*, designed to evaluate if the stations are being kept in a customer friendly condition. Ohio EPA staff record audit findings on a form and conduct exit interviews with the station manager, informing the station manager of the results.

All 23 full-service stations and all full-service testing lanes operated by Envirotest Systems in 2019 received overt performance audits. Upon arriving at a station, Ohio EPA staff will audit only the lanes that are open for testing during a performance audit. The average number of overt audits per lane was 4 with a total of 313 being performed in 2019. There were 0 overt performance audits completed at the 53 private repair shop testing locations. It is not practical for the Ohio EPA auditors to wait significant lengths of time for a vehicle to be tested to conduct performance audits at these locations. Therefore, Ohio EPA relied on the covert audits performed at these locations to also cover the performance issues in the same audit.

40 CFR 51.366 (b) (2) (v) Number of stations and lanes ... that have been shut down as a result of overt performance audits;

No station or lane was shut down as the result of an overt performance audit in 2019.

4.1.2 Covert audits

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

During covert audits, Ohio EPA staff will verify that Envirotest Systems and the additional contracted private repair shop personnel are performing the emissions test in the proper manner, while providing adequate customer service to Ohio's motorists. The *Test Procedures* section of the covert audit is identical to the *Test Procedures* of the overt audit and is scored as such.

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

Ohio EPA dedicates three vehicles for covert audits. The vehicles are tampered prior to testing to ensure that the vehicle fails the proper emission tests. Typically, a college intern

is hired to work during a three-month period to supplement and assist with achieving covert audit goals.

4.1.3 Covert audit results

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

Usually the covert vehicles are set up to fail the OBD test, or, if applicable, not allow the OBD II test to be performed by clearing the readiness monitors. A “false pass” during a covert audit is an inspection pass when the vehicle was set to fail. The audit does not directly indicate whether the false pass was a result of the equipment or the inspector. If a false pass was the result of the improper test being performed on the vehicle, Ohio EPA initiates enforcement action against Envirotest Systems. Most times, Envirotest Systems provides proper test procedures and/or additional training as follow-up action against false passes.

College interns are used to perform the covert audits in the summer because they are not recognizable to the lane inspectors like the regular state program auditors are due to the number of equipment and performance audits they do at the stations. The regular Ohio EPA auditors rotate around during the rest of the year so that they are not recognized. The 23 full-service test stations received 68 covert performance audits and the 53 repair shops received 145 covert performance audits.

Table 5: 2019 Covert Audit Results

Conducted with the vehicle set to fail per test type		
	ASM	0
	OBD	214
Conducted with the vehicle set to fail any combination of two or more test types		
	ASM & OBD	0
Resulting in a false pass per test type		
	ASM	0
	OBD	0
Resulting in a false pass for any combination of two or more test types		
	ASM & OBD	0

As seen in table five, 0 of the 214, or 0 percent, of the covert audits resulted in false passes.

4.2 Inspector Performance

As stated in Section 2.1.3, 587 inspectors were licensed or certified to conduct testing in 2019.

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

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

Ohio EPA and Envirotest Systems keep records of all fraud and bribery issues occurring at the testing stations. All cases brought to either Ohio EPA or Envirotest Systems are investigated thoroughly. If the situation warrants use of other agencies, such as the Ohio State Highway Patrol, the agencies work together to resolve these cases. The table below summarizes the results of Ohio EPA's enforcement actions against stations and inspectors.

Table 6: Non-Customer Initiated Fraud and Bribery Cases

The number of inspectors and stations	# inspectors	# stations
That were suspended, fired, or otherwise prohibited from testing as a result of covert audits	0	0
That were suspended, fired, or otherwise prohibited from testing for other causes	1	1

4.3 Fines collected

40 CFR 51.366 (b) (4) The number of inspectors and stations: (iii) that received fines;
 40 CFR 51.366 (b) (7) the total amount collected in fines from inspectors and stations.

EPA has not collected fines from stations or inspectors.

Ohio

4.4 Station Compliance Documents

40 CFR 51.366 (d) (1) (iii) The total number of compliance documents issued to inspections stations;
(iv) the number of missing compliance documents; and
(vi) the number of compliance surveys conducted, number of vehicles surveyed in each, and the compliance rates found.

Ohio EPA works with Envirotest Systems and Ohio BMV to ensure that no false compliance documents may be passed to Ohio BMV, resulting in vehicle registrations being approved. Each compliance document is printed with a specific type of printer, making the print difficult to copy. Furthermore, each compliance document issued contains a code that the BMV will verify prior to registration issuance. If the compliance code on the compliance certificate cannot be verified, Ohio BMV will reject the vehicle registration attempt.

5 Emission Tests Results

In 2019, there were 809,504 unique vehicles that received one or more emissions tests for a total of 847,553 tests that included passes and fails. The unique vehicle total included 63,791 vehicles, or 7.9 percent, that failed their initial test. This includes 3,027 “clean screened” vehicles. The Ohio E-Check program requires that motorists repair the vehicle and receive a passing test, waiver, or extension prior to the vehicle registration date. Please note:

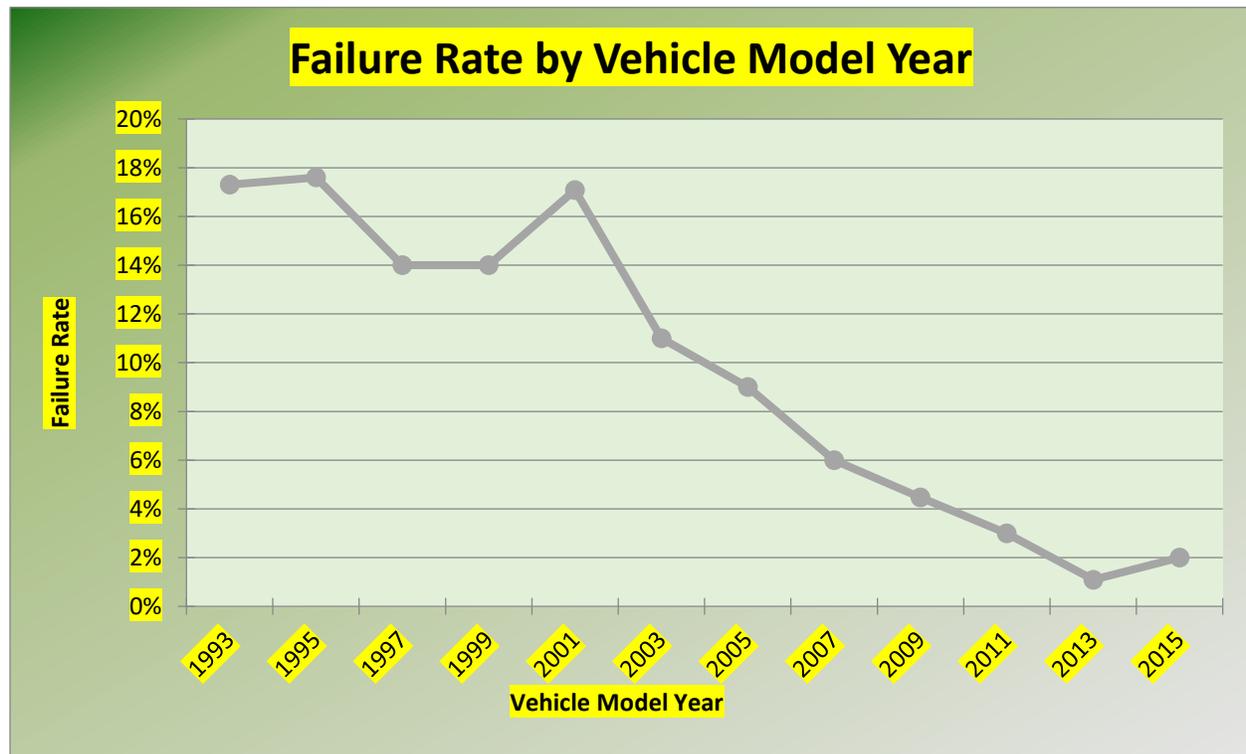
- Waivers were issued to vehicles that had repairs performed in excess of the required dollar amount and were still unable to pass a retest. In 2019, waivers were granted to 17,704 vehicles, or 27.7 percent, that initially failed the emissions test or 2.2% of total unique vehicles.
- Of the vehicles that failed the initial test during 2019, 14,113 vehicles, or 22 percent, had neither passed a retest, obtained a waiver, nor obtained an extension as of February 21, 2020.

The following is a summary of total tests:

Year 2019		
Test Type	(Pass & Fail) Count	Percentage
OBD (including 74,740 Kiosk)	825,071	97.3 (9.1)
ASM	15,301	1.8
Two Speed Idle	3,428	0.4
Opacity	720	0.08
RSD (Clean Screen)	3,033	0.36
Total Tests	847,553	

Details of all emission test results are available on the Ohio EPA website at www.epa.ohio.gov/dapc/echeck/whycheck/annual_reports.aspx

The following figure shows mission failure rates by model year. As can be seen, the age of a vehicle has a significant impact on failure rate.



5.1 Emission Reductions from Repaired Tailpipe-tested Vehicles in 2019

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

U.S. EPA requires states to calculate emissions reductions from vehicles that are repaired after failing a tailpipe test. Approximately 1,031 ASM tailpipe-tested vehicles that failed their initial test were successfully repaired and passed a tailpipe retest. Vehicles showed an average reduction of 70.9 percent for hydrocarbons (HC), 86.8 percent for carbon monoxide (CO), and 60.2 percent for oxides of nitrogen (NOx). A breakdown of average improvement by vehicle model year and type is shown in Attachment B.

Attachment A

Index of Report Pages Relevant to EPA Regulation Sections

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

Reporting Requirements	Reviewer Comments/Location in State Report
<p>(a) <u>Test Data Report</u></p> <p>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:</p>	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(1) The number of vehicles tested by model year and vehicle type;	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(2) By model year and vehicle type, the number and percentage of vehicles	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(i) Failing initially, per test type;	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(ii) Failing the first retest per test type;	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(iii) Passing the first retest per test type;	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(iv) Initially failed vehicles passing the second or subsequent retest per test type;	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(v) Initially failed vehicles receiving a waiver; and	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(vi) Vehicles with no known final outcome (regardless of reason). (vii)-(x) <i>[Reserved]</i>	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(xi) Passing the on-board diagnostic check;	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(xii) Failing the on-board diagnostic check;	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(xiii) Failing the on-board diagnostic check and passing the tailpipe test (if applicable);	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>
(xiv) Failing the on-board diagnostic check and failing the tailpipe test (if applicable);	<p>Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx</p>

Reporting Requirements	Reviewer Comments/Location in State Report
(xv) Passing the on-board diagnostic check and failing the I/M gas cap evaporative system test (if applicable);	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xvi) Failing the on-board diagnostic check and passing the I/M gas cap evaporative system test (if applicable);	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xvii) Passing both the on-board diagnostic check and I/M gas cap evaporative system test (if applicable);	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xviii) Failing both the on-board diagnostic check and I/M gas cap evaporative system test (if applicable);	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xix) MIL is commanded on and no codes are stored;	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xx) MIL is not commanded on and codes are stored;	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xxi) MIL is commanded on and codes are stored;	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xxii) MIL is not commanded on and codes are not stored;	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(xxiii) Readiness status indicates that the evaluation is not complete for any module supported by on-board diagnostic systems;	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(3) The initial test volume by model year and test station;	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(4) The initial test failure rate by model year and test station;	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx
(5) The average increase or decrease in tailpipe emission levels for HC, CO, and NOx (if applicable) after repairs by model year and vehicle type for vehicles receiving a mass emissions test.	Visit Ohio EPA's website at http://epa.ohio.gov/dapc/echeck/whyecheck/ar2018sd.aspx

Reporting Requirements	Reviewer Comments/Location in State Report
<p>(b) <u>Quality assurance report</u></p> <p>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:</p>	
(1) The number of inspection stations and lanes;	Section 2.1.2, page 5
(i) Operating throughout the year; and	Section 4.1.1, page 12
(2) The number of inspection stations and lanes operating throughout the year:	
(i) Receiving overt performance audits in the year;	Section 4.1.1, page 12
(ii) Not receiving overt performance audits in the year;	Section 4.1.1, page 12
(iii) Receiving covert performance audits in the year;	Section 4.1.2, page 13
(iv) Not receiving covert performance audits in the year;	Section 4.1.2, page 13
(v) That have been shut down as a result of overt performance audits;	Section 4.1.1, page 12
(3) The number of covert audits:	Section 4.1.3, page 13
(i) Conducted with the vehicle set to fail per test type;	Section 4.1.3, page 13
(ii) Conducted with the vehicle set to fail any combination of two or more test types;	Section 4.1.3, page 13
(iii) Resulting in a false pass per test type;	Section 4.1.3, page 13
(iv) Resulting in a false pass for any combination of two or more test types;	Section 4.1.3, page 13
(4) The number of inspectors and stations:	
(i) That were suspended, fired, or otherwise prohibited from testing as a result of covert audits;	Section 4.2, page 14
(ii) That were suspended, fired, or otherwise prohibited from testing for other causes; and	Section 4.2, page 14
(iii) That received fines;	Section 4.3, page 15
(5) The number of inspectors licensed or certified to conduct testing;	Section 2.1.3, page 5
(6) The number of hearings;	
(i) Held to consider adverse actions against inspectors at stations; and	Section 4.2, page 14
(ii) Resulting in adverse actions against inspectors and stations;	Section 4.2, page 15

Reporting Requirements	Reviewer Comments/Location in State Report
(7) The total amount collected in fines from inspectors and stations by type of violation;	Section 4.3, page 15
(8) The total number of covert vehicles available for undercover audits over the year; and	Section 4.1.2, page 13
(9) The number of covert auditors available for Undercover audits.	Section 4.1.2, page 13
<p>(c) <u>Quality control report</u></p> <p>The program shall submit to EPA by July of each year a report providing basic statistics on the quality control program for January through December of the previous year, including:</p>	
(1) The number of emission testing sites and lanes in use in the program;	Section 3, page 10
(2) The number of equipment audits by station and lane;	Section 3, page 11
(3) The number and percentage of stations that have failed equipment audits; and	Section 3, page 11
(4) The number and percentage of stations and lanes shut down as a result of equipment audits	Section 3, page 11
<p>(d) <u>Enforcement report</u></p> <p>(1) All varieties of enforcement programs shall, at a minimum, submit to EPA by July of each year a report providing basic statistics on the enforcement program for January through December of the previous year.</p>	
(i) An estimate of the number of vehicles subject to the inspection program, including the results of an analysis of the registration database;	Section 2.1.1, page 4
(ii) The percentage of motorists compliance based upon a comparison of the number of valid final tests with the number of subject vehicles;	Section 2.2.1, page 7
(iii) The total number of compliance documents issued to inspection stations;	Section 4.4, page 15
(iv) The number of missing compliance documents;	Section 4.4, page 15
(v) The number of time extensions and other exemptions granted to motorists; and	Section 2.2.2, page 8

Reporting Requirements	Reviewer Comments/Location in State Report
(vi) The number if compliance surveys conducted, number of vehicles surveyed in each, and the compliance rates found.	Section 4.4, page 15
(2) Registration denial-based enforcement programs shall provide the following additional information:	
(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	Section 2.2.3, page 9
(ii) The number of registration file audits, number of registrations reviewed, and compliance rates found in such audits.	Section 2.2.3, page 9
(3) Computer-matching based enforcement programs shall provide the following additional information:	
(i) The number and percentage of subject vehicles that were tested by the initial deadline, and by other milestones in the cycle;	Not Applicable
(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	Not Applicable
(iii) The number of enforcement system audits, and the error rate found during those audits.	Not Applicable
(4) Sticker-based enforcement systems shall provide 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;	Not Applicable
(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	Not Applicable
(iii) The number of parking lot sticker audits conducted, the number of vehicles surveyed in each, and the noncompliance rate found during those audits.	Not Applicable

Reporting Requirements	Reviewer Comments/Location in State Report
<p>(e) <u>Additional reporting requirements</u></p> <p>In addition to the annual reports in paragraphs (a) through (d) of this section, programs shall submit to EPA by July of every other year, biennial reports addressing:</p>	
<p>(1) Any changes made in program design, funding, personnel levels, procedures, regulations, and legal authority, with detailed discussion and evaluation of the impact on the program of all such changes; and</p>	None
<p>(2) Any weaknesses or problems identified in the program within the two-year reporting period, what steps have already been taken to correct those problems, the results of those steps, and any future efforts planned.</p>	None

Attachment B

Detailed 2019 Emissions Reduction Test Data

Post-Repair Emissions Reductions - Year 2019

Vehicle Year	Vehicle Type	Initial Fails	Initial HC ppm (Avg)	Initial CO ppm (Avg)	Initial NOx ppm (Avg)	Retest Pass (count)	Retest HC ppm (Avg)	Retest CO ppm (Avg)	Retest NOx ppm (Avg)	HC Improvement	CO Improvement	NOx Improvement
		(count)	(Avg)	(Avg)	(Avg)	(count)	(Avg)	(Avg)	(Avg)			
1995	HDGV	23	427.19	3.31	-	11	42.25	0.36	-	90.1%	89.0%	-
1995	LDGT1	175	77.55	0.76	1460.49	80	35.26	0.15	675.68	54.5%	80.1%	53.7%
1995	LDGT2	117	204.62	1.24	1395.49	60	59.89	0.26	670.83	70.7%	79.3%	51.9%
1995	LDGV	277	112.48	1.21	1177.02	106	40.86	0.12	551.18	63.7%	89.8%	53.2%
1996	HDGV	4	157.20	2.35	-	2	62.60	0.69	-	60.2%	70.6%	-
1996	LDGT1	9	94.90	0.81	1124.60	5	7.90	0.01	244.84	91.7%	98.5%	78.2%
1996	LDGT2	1	77.20	0.77	1641.20	0	0.00	-	-	-	-	-
1996	LDGV	7	88.54	1.22	1110.23	3	35.37	0.11	260.20	60.1%	91.3%	76.6%
1997	HDGV	11	539.76	3.74	-	7	21.63	0.18	-	96.0%	95.1%	-
1997	LDGT1	31	136.63	1.64	1118.62	11	39.86	0.15	373.39	70.8%	90.8%	66.6%
1997	LDGT2	14	326.57	2.37	828.65	4	68.95	0.24	773.80	78.9%	90.0%	6.6%
1997	LDGV	78	89.32	0.99	932.43	27	42.38	0.16	363.52	52.6%	84.3%	61.0%
1998	HDGV	1	243.60	1.36	-	0	-	-	-	-	-	-
1998	LDGT1	17	85.97	0.44	1360.52	9	23.13	0.15	352.76	73.1%	65.5%	74.1%
1998	LDGT2	1	94.20	1.43	1072.30	2	16.45	0.00	537.25	82.5%	100.0%	49.9%
1998	LDGV	33	165.93	1.67	965.70	16	30.77	0.12	163.17	81.5%	92.6%	83.1%
1999	HDGV	4	578.00	0.52	-	1	9.20	0.02	-	98.4%	96.1%	-
1999	LDGT1	65	81.78	0.54	1223.62	23	26.74	0.10	468.13	67.3%	81.6%	61.7%
1999	LDGT2	14	142.26	1.56	1417.27	5	14.24	0.12	320.15	90.0%	92.3%	77.4%
1999	LDGV	114	89.42	0.97	1073.16	41	30.45	0.11	297.44	65.9%	89.2%	72.3%
2000	HDGV	0	-	-	-	0	-	-	-	-	-	-
2000	LDGT1	26	94.03	1.29	1145.37	17	27.15	0.10	385.06	71.1%	92.1%	66.4%
2000	LDGT2	6	169.75	1.38	796.57	3	64.93	0.10	548.17	61.7%	93.0%	31.2%
2000	LDGV	47	75.45	0.94	772.26	17	25.75	0.17	315.73	65.9%	81.7%	59.1%
2001	HDGV	2	622.20	0.29	-	0	-	-	-	-	-	-

HDGV - Heavy Duty Gas Vehicles GVW >8500

LDGT1 - Light Duty Gas Trucks GVW <6001

LDGT2 - Light Duty Gas Trucks GVW >6000, <8500

LDGV - -Light Duty Gas Vehicles GVW <6001

Post-Repair Emissions Reductions - Year 2019												
Vehicle Year	Vehicle Type	Initial Fails	Initial HC ppm	Initial CO ppm	Initial NOx ppm	Retest Pass	Retest HC ppm	Retest CO ppm	Retest NOx ppm	HC Improvement	CO Improvement	NOx Improvement
		(count)	(Avg)	(Avg)	(Avg)	(count)	(Avg)	(Avg)	(Avg)			
2001	LDGT1	85	68.17	0.96	971.76	34	17.28	0.14	325.06	74.7%	85.0%	66.5%
2001	LDGT2	18	159.76	2.18	1125.97	9	58.06	0.40	544.99	63.7%	81.7%	51.6%
2001	LDGV	199	76.25	1.20	632.50	85	23.21	0.13	199.53	69.6%	89.5%	68.5%
2002	HDGV	4	315.85	1.72	-	2	10.70	0.00	-	96.6%	100.0%	-
2002	LDGT1	28	49.25	0.72	1052.33	16	14.07	0.03	205.10	71.4%	95.6%	80.5%
2002	LDGT2	8	116.86	0.58	1261.21	2	35.35	0.24	620.25	69.8%	59.7%	50.8%
2002	LDGV	59	59.96	0.69	1189.15	35	25.17	0.15	271.05	58.0%	78.7%	77.2%
2003	HDGV	7	449.14	0.47	-	3	3.07	0.03	-	99.3%	92.9%	-
2003	LDGT1	0	-	-	-	2	14.60	0.03	566.30	-	-	-
2003	LDGT2	0	-	-	-	2	55.45	0.31	1256.50	-	-	-
2003	LDGV	0	-	-	-	4	21.98	0.10	220.80	-	-	-
2004	HDGV	2	402.00	0.88	-	1	4.60	0.01	-	98.9%	98.9%	-
2004	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2004	LDGT2	1	84.10	0.92	2116.30	0	-	-	-	-	-	-
2004	LDGV	0	-	-	-	1	26.80	0.02	47.90	-	-	-
2005	HDGV	0	-	-	-	0	-	-	-	-	-	-
2005	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2005	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2005	LDGV	0	-	-	-	0	-	-	-	-	-	-
2006	HDGV	0	-	-	-	0	-	-	-	-	-	-
2006	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2006	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2006	LDGV	0	-	-	-	0	-	-	-	-	-	-
2007	HDGV	0	-	-	-	0	-	-	-	-	-	-
2007	LDGT1	1	247.10	7.61	57.50	0	-	-	-	-	-	-

HDGV - Heavy Duty Gas Vehicles GVW >8500

LDGT1 - Light Duty Gas Trucks GVW <6001

LDGT2 - Light Duty Gas Trucks GVW >6000, <8500

LDGV - -Light Duty Gas Vehicles GVW <6001

Post-Repair Emissions Reductions - Year 2019												
Vehicle Year	Vehicle Type	Initial Fails (count)	Initial HC ppm (Avg)	Initial CO ppm (Avg)	Initial NOx ppm (Avg)	Retest Pass (count)	Retest HC ppm (Avg)	Retest CO ppm (Avg)	Retest NOx ppm (Avg)	HC Improvement	CO Improvement	NOx Improvement
2007	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2007	LDGV	0	-	-	-	0	-	-	-	-	-	-
2008	HDGV	0	-	-	-	0	-	-	-	-	-	-
2008	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2008	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2008	LDGV	0	-	-	-	0	-	-	-	-	-	-
2009	HDGV	0	-	-	-	0	-	-	-	-	-	-
2009	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2009	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2009	LDGV	0	-	-	-	0	-	-	-	-	-	-
2010	HDGV	0	-	-	-	0	-	-	-	-	-	-
2010	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2010	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2010	LDGV	0	-	-	-	0	-	-	-	-	-	-
2011	HDGV	0	-	-	-	0	-	-	-	-	-	-
2011	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2011	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2011	LDGV	0	-	-	-	0	-	-	-	-	-	-
2012	HDGV	0	-	-	-	0	-	-	-	-	-	-
2012	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2012	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2012	LDGV	0	-	-	-	0	-	-	-	-	-	-
2013	HDGV	0	-	-	-	0	-	-	-	-	-	-
2013	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2013	LDGT2	0	-	-	-	0	-	-	-	-	-	-

Post-Repair Emissions Reductions - Year 2019

Vehicle Year	Vehicle Type	Initial				Retest				HC Improvement	CO Improvement	NOx Improvement
		Fails (count)	HC ppm (Avg)	CO ppm (Avg)	Initial NOx ppm (Avg)	Pass (count)	HC ppm (Avg)	CO ppm (Avg)	Retest NOx ppm (Avg)			
2013	LDGV	0	-	-	-	0	-	-	-	-	-	-
2014	HDGV	0	-	-	-	0	-	-	-	-	-	-
2014	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2014	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2014	LDGV	0	-	-	-	0	-	-	-	-	-	-
2015	HDGV	0	-	-	-	0	-	-	-	-	-	-
2015	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2015	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2015	LDGV	0	-	-	-	0	-	-	-	-	-	-
2016	HDGV	0	-	-	-	0	-	-	-	-	-	-
2016	LDGT1	0	-	-	-	0	-	-	-	-	-	-
2016	LDGT2	0	-	-	-	0	-	-	-	-	-	-
2016	LDGV	0	-	-	-	0	-	-	-	-	-	-
Total		1,489	116.16	1.13	1098.56	646	33.76	0.15	436.81	70.9%	86.8%	60.2%