U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL

Improving air quality
Compliance with the law

EPA Did Not Identify Volkswagen Emissions Cheating; Enhanced Controls Now Provide Reasonable Assurance of Fraud Detection

Report No. 18-P-0181 **May 15, 2018**

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Abbreviations

AECD	Auxiliary Emission Control Device
CARB	California Air Resources Board
CD	Compliance Division
CFR	Code of Federal Regulations
COC	Certificate of Conformity
EPA	U.S. Environmental Protection Agency
EVCIS	Engine and Vehicle Compliance Information System
GAO	U.S. Government Accountability Office
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
NVFEL	National Vehicle and Fuel Emissions Laboratory
OECA	Office of Enforcement and Compliance Assurance
OIG	Office of Inspector General
OTAQ	Office of Transportation and Air Quality
TATD	Testing and Advanced Technology Division
U.S.C.	United States Code
VW	Volkswagen

Cover Photo: Vehicle equipped with Portable Emissions Monitoring System to measure on-road vehicle exhaust emissions. (EPA OIG photo)

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U.S. Environmental Protection Agency
Office of Inspector General

18-P-0181
May 15, 2018

At a Glance

Why We Did This Project

We conducted this audit to determine whether, in light of the 2015 Volkswagen (VW) emissions fraud case, the U.S. Environmental Protection Agency (EPA) currently has internal controls that can effectively detect and prevent on-road light-duty vehicle emissions fraud. Effective internal controls provide reasonable—though not absolute—assurance that the potential for fraud is minimized.

The EPA's light-duty vehicle compliance program implements mobile source regulations for cars and trucks weighing up to 14,000 pounds. The EPA conducts various types of testing at its laboratory in Ann Arbor, Michigan, to verify that light-duty vehicles adhere to these regulations.

In addition to this audit of the light-duty vehicle compliance program, the Office of Inspector General (OIG) has another ongoing project examining the EPA's on-road heavy-duty vehicle and engine compliance program.

This report addresses the following:

- *Improving air quality.*
- *Compliance with the law.*

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What We Found

Overall, the EPA demonstrated that its current internal controls are effective and operate in an integrated manner to detect and prevent noncompliance in the light-duty vehicle sector. Noncompliance can and has led to excess emissions of pollutants, which have significant and quantifiable negative impacts on human health and the environment.

After uncovering VW's emissions fraud, the EPA's light-duty vehicle compliance program added controls to effectively detect and prevent noncompliance—a precursor to potential fraud.

In 2015, after being alerted to high emissions from VW vehicles by a third-party study, the EPA determined that VW used a "defeat device" in its diesel vehicles. This device fully activated the emission control system during regulatory testing (also referred to as "standard test cycles") but deactivated key functionality during all other kinds of operation, including normal driving. The EPA said it did not detect VW's fraud earlier because (1) light-duty diesels were a very small fraction of the total light-duty vehicle population and did not merit extraordinary oversight; (2) VW did not disclose, as required, the presence of a software design feature that modifies the way the emission control system operates when certain vehicle parameters exist; and (3) the EPA relied on standard test cycles and had no controls to detect VW's sophisticated defeat device.

Since the discovery of VW's emissions fraud in 2015, the EPA has responded to the risk of defeat devices by augmenting its testing with new control activities known as "special testing." By screening for defeat devices using variations of the standard test cycles, new test cycles, and Portable Emissions Monitoring Systems that measure on-road emissions, special testing can detect whether any design features are altering the operation of emission control systems. The EPA has effectively used special testing to detect noncompliance by other manufacturers.

While the OIG found that the EPA demonstrated that its existing internal controls are effective, we also identified some areas where these controls could be further strengthened. These improvements will help the EPA better address strategic risks and achieve compliance with mobile source regulations.

Recommendations and Planned Agency Corrective Actions

We made seven recommendations to the Assistant Administrator for Air and Radiation on defining performance measures; conducting a formal risk assessment; formalizing the role of special testing; tracking compliance issues; better using remote sensing and other data sources; updating email inboxes maintained for feedback; and developing protocols for sharing information with the EPA's regulatory partner, the California Air Resources Board. The EPA agreed with all of our recommendations and provided acceptable corrective actions, two of which are completed.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

May 15, 2018

MEMORANDUM

SUBJECT: EPA Did Not Identify Volkswagen Emissions Cheating;
Enhanced Controls Now Provide Reasonable Assurance of Fraud Detection
Report No. 18-P-0181

FROM: Arthur A. Elkins Jr.

TO: William L. Wehrum, Assistant Administrator
Office of Air and Radiation

This is our report on the subject audit conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). The project number for this audit was OPE-FY17-0009. This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established audit resolution procedures.

In accordance with EPA Manual 2750, your office provided acceptable corrective actions and milestone dates in response to OIG recommendations. All recommendations are resolved, and no final response to this report is required. However, if you submit a response, it will be posted on the OIG's website, along with our memorandum commenting on your response. Your response should be provided as an Adobe PDF file that complies with the accessibility requirements of Section 508 of the Rehabilitation Act of 1973, as amended. The final response should not contain data that you do not want to be released to the public; if your response contains such data, you should identify the data for redaction or removal along with corresponding justification.

We will post this report to our website at www.epa.gov/oig.

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Chapter 1
Introduction

Purpose

The objective of this audit is to determine, in light of the 2015 Volkswagen (VW) emissions fraud case, whether the U.S. Environmental Protection Agency's (EPA's) existing internal controls effectively detect and prevent on-road light-duty vehicle emissions fraud. Effective internal controls provide reasonable—though not absolute—assurance that the potential for fraud is minimized.

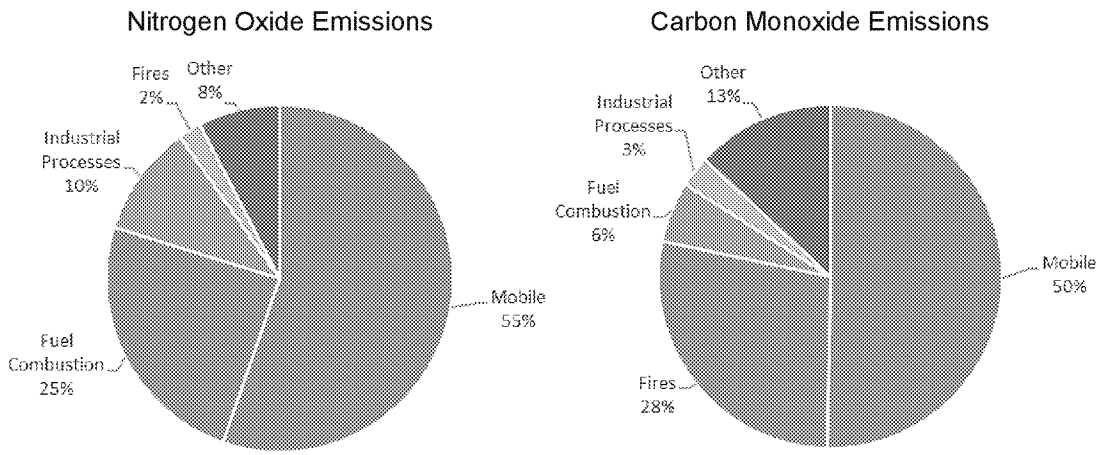
Background

Air Pollution From Mobile Sources

Mobile sources include aircraft, commercial marine vessels, non-road vehicles such as construction equipment, on-road light-duty vehicles such as cars and trucks, and on-road heavy-duty vehicles such as tractor-trailers and buses. Mobile sources are major contributors to air pollution in the United States. For example, mobile sources accounted for 55 percent of the total nitrogen oxide emissions and 50 percent of the total carbon monoxide emissions in calendar year 2014 (Figure 1). The pollution from mobile sources is generated primarily by internal combustion engines that burn gasoline, diesel and other types of fuels; the combustion byproducts create pollution.

The EPA is responsible for regulating air pollution from the mobile source sector. This report focuses on the EPA's compliance program for on-road light-duty vehicles, which include cars and trucks weighing up to 14,000 pounds.

Figure 1: 2014 U.S. nitrogen oxide and carbon monoxide emission sources



Source: Office of Inspector General (OIG) analysis of the 2014 EPA National Emissions Inventory.

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Statutory Authority and Regulations Relevant to Mobile Sources

The EPA's on-road light-duty vehicle compliance program implements various statutory requirements designed to improve air quality and fuel economy, as outlined in Table 1.

Table 1: Relevant compliance mandates

Law	Mandate
Clean Air Act	Domestic emission standards, certificate of conformity, testing and certification, in-use compliance.
Energy Policy and Conservation Act	Corporate Average Fuel Economy, fuel economy label, fuel economy test procedures.
Energy Independence and Security Act	Fuel economy and emissions labels.

Source: EPA and 42 U.S.C. Chapters 85, 77 and 152.

The EPA has developed regulations and guidance to implement the statutory requirements for the light-duty vehicle sector. These regulations and guidance cover numerous areas, including exhaust emissions, evaporative emissions, onboard diagnostics, durability and fuel economy. For evaporative emissions, the EPA has developed standards for total hydrocarbons. For exhaust or tailpipe emissions, the EPA has developed standards for nitrogen oxide, carbon monoxide and other pollutants.

Table 2 describes the specific tests (which are detailed in EPA regulations) that are required for manufacturers to demonstrate compliance with the exhaust emission standards for light-duty vehicles. The EPA requires multiple tests in an attempt to simulate real-world exhaust emissions under various driving conditions. These required test cycles are often referred to as "standard test cycles." For each model year, vehicle manufacturers must prove their vehicles can pass emission standards under each standard test cycle.

Table 2: Required federal testing cycles

Standard test cycle	Purpose
Federal Test Procedure	Simulates urban driving and includes engine start-ups and vehicle operation.
Highway Fuel Economy Test	Simulates rural driving with an average speed of 48 mph and a maximum speed of 60 mph. Primarily used to test fuel economy.
Air Conditioning Supplemental Federal Test Procedure	Simulates 95 degrees Fahrenheit days when the air conditioner is operational.
Aggressive Driving Supplemental Federal Test Procedure	Simulates aggressive driving via high speeds and accelerations.
Cold Temperature Federal Test Procedure	Same as the Federal Test Procedure except performed at 20 degrees Fahrenheit to verify compliance in cold temperatures.

Source: EPA and 40 CFR Parts 86, 600 and 1066.

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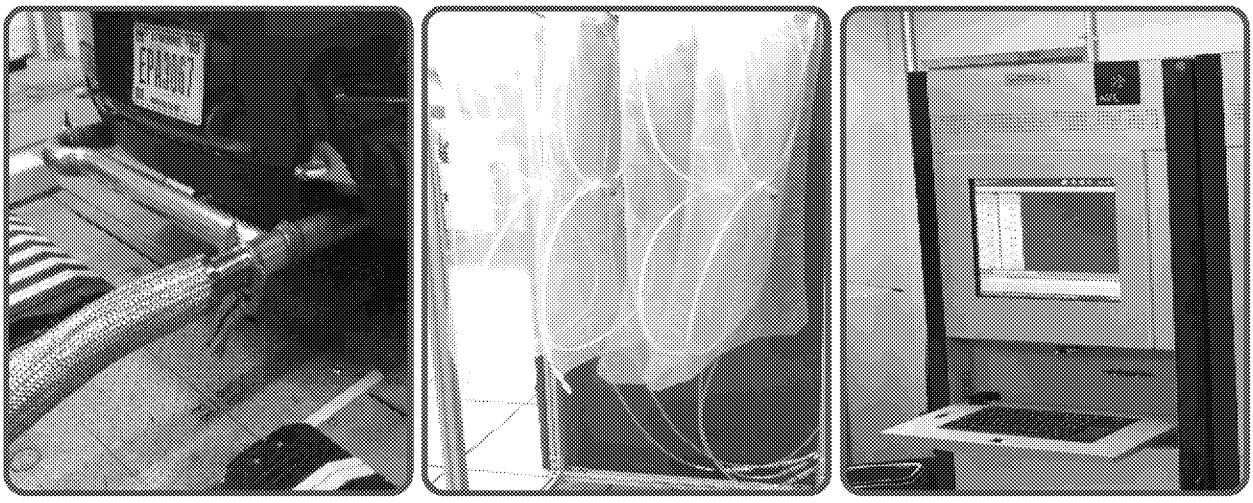
The EPA conducts most of its light-duty vehicle testing at its National Vehicle and Fuel Emissions Laboratory (NVFEL) located in Ann Arbor, Michigan. The standard tests are performed on chassis dynamometers, which consist of rollers connected to an electric motor; the vehicle being tested drives on the rollers, which simulate the speed and resistance of an actual road. Dynamometers simulate road surfaces and allow testing to be reproducible in a laboratory environment. Exhaust is captured from the vehicle and sent to gas sampling bags, which enable a gas analyzer to accurately measure pollutant levels in the exhaust (Figure 2).

Chassis dynamometer in the NVFEL cold test cell, which simulates driving conditions in below-freezing temperatures. (EPA OIG photo)

Figure 2: Dynamometer testing process



Source: EPA OIG photos.

Vehicles are driven on the dynamometer at specified speeds for prescribed amounts of time and in accordance with other strict parameters defined in EPA regulations for each test cycle. For example, Figure 3 is a graphical representation of information codified in the regulations regarding how a vehicle must be driven on a dynamometer for the Federal Test Procedure. As the figure shows, the vehicle must accelerate and decelerate at specific rates over the course of the test, which lasts a total of 1,874 seconds (about 30 minutes).

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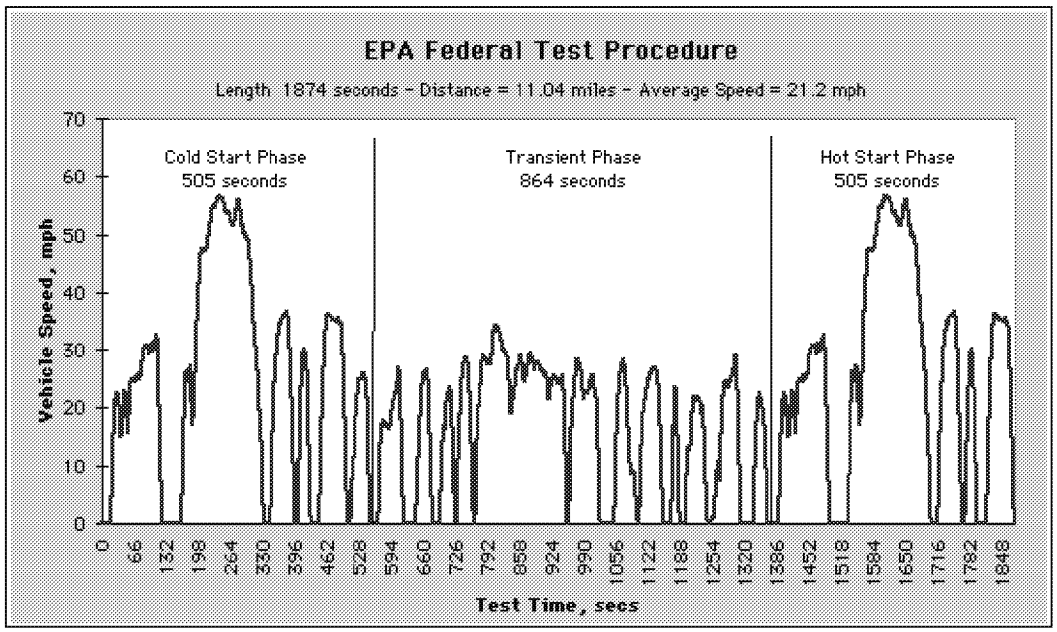
Figure 3: Graphical representation of standard test cycle on dynamometer

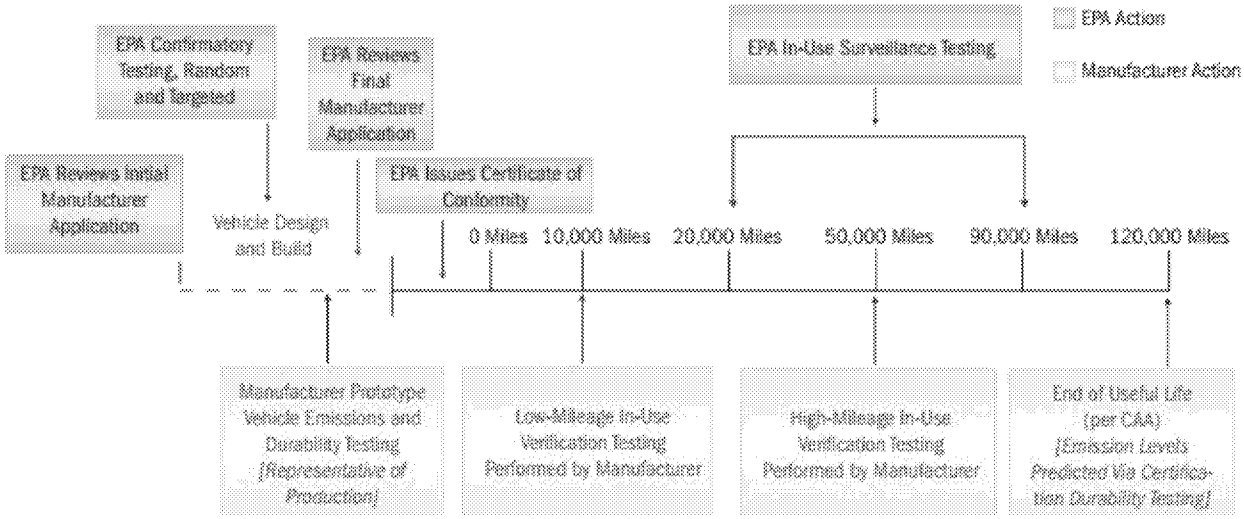


Source: EPA (based on test procedure described in 40 CFR Part 86, Appendix I).

Components of EPA's Light-Duty Vehicle Compliance Program

The components of the EPA's light-duty vehicle compliance program are designed so that a vehicle maintains compliance with regulatory requirements throughout its useful life, which is defined by regulations as up to 120,000 miles (150,000 miles for new standards being phased in from 2017 through 2025).[1] Figure 4 describes these components.

Figure 4: Light-duty vehicle compliance life cycle



Source: EPA.

[1] Depending on the requirement, useful life may also be a specified number of years (whichever comes first).

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The compliance life cycle begins with the manufacturer submitting a Certificate of Conformity (COC) application for a specific "test group" to the EPA for review. A test group, which may include multiple vehicle models, is a group of vehicles that share certain emission control system and vehicle/engine design features. The COC application includes data from the manufacturer's testing that demonstrate compliance with emission standards under all of the standard test cycles (outlined previously in Table 2), as well as disclosures of any Auxiliary Emission Control Devices (AECDs). AECDs are permitted in vehicles if they are disclosed in the COC application and meet one of the following four legal exceptions; otherwise, AECDs are considered illegal "defeat devices":[2]

Auxiliary Emission Control Device (AECD) means any part of the vehicle design that can identify changes to a parameter (e.g., temperature, vehicle speed, transmission gear) for the purpose of modifying the emission control system.

Defeat Device means an AECD that reduces the effectiveness of the emission control system under conditions that may reasonably be expected during normal vehicle operation and use.

1. Driving conditions when the AECD is operating are substantially reflected in standard test cycles.
2. The need for the AECD is justified in terms of protecting the vehicle against damage or accident.
3. The AECD only operates during engine starting.
4. The AECD applies only for emergency vehicles, and the need is justified.

The EPA reviews the COC application and selects certain vehicles based on targeted and random methods for confirmatory testing in the EPA's NVFEL. The EPA conducts confirmatory testing to verify the accuracy of the test data submitted by manufacturers. After reviewing the final application, test data from the manufacturer and any confirmatory test data, the agency will determine if the application is approved or denied. If approved, the EPA will issue a COC to the manufacturer, permitting the vehicles in the test group to be sold in the United States.

Before they can obtain a COC, manufacturers are also required to provide durability data as part of the application process to demonstrate that the emission control system will meet emission standards throughout the useful life of the vehicle. In addition, after the EPA issues a COC, in-use verification testing regulations help confirm durability by requiring manufacturers to test privately owned vehicles at different stages of vehicle life to determine whether the vehicles still comply with emission regulations. Since 2004, manufacturers have been required to test vehicles at low (10,000) and high (50,000) mileage and then report that data to the EPA. If testing reveals a failure to meet regulatory standards, manufacturers are required to initiate the In-Use Confirmatory Program and conduct additional testing to determine whether the failure is widespread or limited

[2] According to the EPA, the presence of an illegal defeat device does not always signify a deliberate attempt to deceive or cheat (i.e., fraud). Defeat devices may exist for various reasons, such as poor design decisions or a failure to fully understand technical interactions within the engine and emission control system. This is why the EPA requires manufacturers to disclose all AECDs in their COC applications.

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in scope. If further testing demonstrates widespread failure, it can lead to recalls or vehicle modifications. Manufacturers must report all emissions-related defects to the EPA and are required to take remedial actions. The EPA also conducts its own testing—known as in-use surveillance testing—of in-use, privately owned vehicles to complement the manufacturers' in-use verification testing.

History of Fraud Involving Defeat Devices

In 2014, the International Council on Clean Transportation commissioned a study titled *In-Use Emissions Testing of Light-Duty Diesel Vehicles in the United States*, which was conducted by West Virginia University's Center for Alternative Fuels Engines and Emissions. This study initially alerted the EPA to VW's potential noncompliance. On September 18, 2015, the EPA alleged that VW had installed software designed to detect standard test cycles (outlined previously in Table 2) and fraudulently meet emission standards for vehicles equipped with 2.0-liter diesel engines. This software allowed VW's vehicles to "emit up to 40 times more pollution than emission standards allow" during normal operation while appearing to pass the standard test cycles.[3] The EPA also alleged on November 2, 2015, that VW installed a similar device on vehicles equipped with 3.0-liter diesel engines, creating emissions nine times higher than the standards allow during normal operation while still passing the EPA's standard testing. The EPA's enforcement actions against VW[4] led to multiple settlements, including the largest reported criminal fine ever imposed on an automaker; as of January 2017, the U.S. Department of Justice case against VW has resulted in $4.3 billion in civil and criminal penalties and the indictment of six VW executives and employees for their roles in the case.

VW is not the first manufacturer attempting to bypass the EPA's emission standards using a defeat device. Prior to VW's 2015 case, there have been several cases related to light-duty defeat devices since 1973 (Table 3).

Table 3: Enforcement cases related to light-duty defeat devices prior to 2015

Year	Manufacturer	Compliance issue
1973	Chrysler, Toyota and General Motors	Removed ambient temperature sensors from new vehicles.
1974	VW	Failed to disclose two devices designed to alter the emission controls on approximately 25,000 model year 1973 VWs.
1995	General Motors	Installed undisclosed fueling strategies that reduced the effectiveness of emission controls on 470,000 model years 1991–1995 Cadillacs and various other model years 1991–1995 passenger cars.

[3] EPA, "Learn About Volkswagen Violations: Timeline of Key Milestones" webpage, *Volkswagen Light Duty Diesel Vehicle Violations for Model Years 2009–2016* website.
[4] VW collectively refers to Audi and Porsche brands as well, which were involved in the settlements.

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Year	Manufacturer	Compliance issue
1998	Ford	Installed illegal devices designed to alter the emission controls on 60,000 model year 1997 Econoline Vans.
1998	Honda	Disabled the misfire monitoring device on model years 1996 and 1997 Accords, Civics, Preludes, Odysseys and Acuras and model year 1995 Civics. Disabling this device, which is part of the onboard diagnostics and indicates when the engine needs servicing, resulted in increased emissions and possible damage to the vehicles' catalysts.
2003	Toyota	Failed to disclose onboard diagnostic system limitations to identify evaporative emission leaks on 2.2 million vehicles manufactured from 1996 through 1998.

Source: EPA.

EPA Response to Defeat Device Cases

In 1972, the EPA stated in guidance[5] that it "will refuse to certify vehicles equipped with emission control defeat devices." In 1978, 4 years after VW first failed to disclose two defeat devices, the EPA provided guidance[6] and assistance to manufacturers to distinguish between a valid AECD and a defeat device. In 1998, after both Ford and Honda were cited for noncompliance involving defeat devices, the EPA issued a letter requiring manufacturers to disclose and justify each AECD. In addition, the EPA enhanced its regulatory requirements over time to make the standard test cycles more closely reflect exhaust emissions from real-world driving conditions. Starting with a single standard test cycle known as the Federal Test Procedure in 1972, the EPA has expanded its testing to the five cycles referenced previously in Table 2.

> "EPA may test or require testing on any vehicle at a designated location, using driving cycles and conditions that may reasonably be expected to be encountered in normal operation and use, for the purposes of investigating a potential defeat device. Such testing can be expected in addition to the standard emissions test cycles where Emission Data Vehicles (EDV), and Fuel Economy Data Vehicles (FEDV) are tested by EPA. ... Manufacturers should expect that this additional testing may add time to the confirmatory test process and that additional mileage may be accumulated on the EDV's and FEDV's."
>
> *—From the EPA's September 2015 announcement to manufacturers in response to VW's emissions cheating*

Shortly after making public the allegations of VW emissions violations in 2015, the EPA announced to manufacturers that it would include additional defeat device screening protocols in its compliance oversight programs. The agency emphasized that this additional screening may add time to the EPA's review of COC applications. These new screening protocols have resulted in the EPA identifying noncompliance and the use of defeat devices by at least one other manufacturer.[7]

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[5] EPA, *Prohibition of use of Emission Control Defeat Devices*, Advisory Circular No. 24, December 11, 1972.
[6] EPA, *"Prohibition of Emission Control Defeat Devices" – Optional Objective Criteria*, Advisory Circular No. 24-2, December 6, 1978.
[7] In January 2017, for example, the EPA issued a Notice of Violation concerning an illegal defeat device designed to alter the emission controls in diesel engines on Fiat Chrysler's 2014, 2015 and 2016 Jeep Grand Cherokees and Dodge Ram 1500 trucks with 3.0-liter diesel engines.

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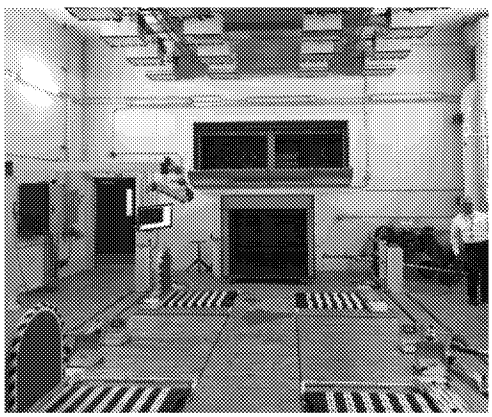
Compliance Program Organization and Coordination

The EPA's light-duty vehicle compliance program is located within the Office of Transportation and Air Quality (OTAQ). OTAQ's Testing and Advanced Technology Division (TATD) operates the NVFEL in Ann Arbor.[8] TATD conducts testing for other divisions within OTAQ, including the Compliance Division (CD), as well as for other EPA offices, such as the Office of Enforcement and Compliance Assurance (OECA).



The NVFEL hot test cell chassis dynamometer, with heat lamps on the ceiling simulating vehicle operation in hot environments. (EPA OIG photo)

TATD is responsible for conducting vehicle testing and producing test results. CD's Light-Duty Vehicle Center is responsible for selecting the vehicles and tests to be performed by TATD and for interpreting those test results to determine if a vehicle is meeting the regulatory standards. CD resolves most issues involving manufacturer noncompliance under its own administrative authority, but it coordinates with OECA to address compliance issues that CD determines may merit enforcement action. OECA attorneys handle administrative enforcement actions and, in coordination with the U.S. Department of Justice, help develop and prosecute civil and criminal enforcement cases.

Internal Control Standards

The U.S. Government Accountability Office (GAO) defines "internal control" in the following manner:

> [A] process effected by an entity's oversight body, management, and other personnel that provides reasonable assurance that the objectives of an entity will be achieved. … Internal control comprises the plans, methods, policies and procedures used to fulfill the mission, strategic plan, goals, and objectives of the entity.[9]

An "internal control system" is defined as follows:

> An internal control system is a continuous built-in component of operations, effected by people, that provides reasonable assurance, not absolute assurance, that an entity's objectives will be achieved. … Internal control is not one event, but a series of actions that occur

[8] "NVFEL" collectively refers to all EPA offices at its Ann Arbor facility, including the actual laboratory.
[9] GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G, September 2014.

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> throughout an entity's operations. … Management is responsible for an effective internal control system. As part of this responsibility, management sets the entity's objectives, implements controls, and evaluates the internal control system.[10]

According to the GAO, internal control has five components:

1. **Control Environment.** The foundation for an internal control system. The control environment provides the discipline and structure to help an entity achieve its objectives.

2. **Risk Assessment.** Assessment of the risks facing the entity as it seeks to achieve its objectives. This assessment provides the basis for developing appropriate risk responses.

3. **Control Activities.** Actions that management establishes through policies and procedures to achieve objectives and respond to risks in the internal control system, which includes the entity's information system.

4. **Information and Communication.** Quality information that management and personnel communicate and use to support the internal control system.

5. **Monitoring.** Activities that management establishes and operates to assess the quality of performance over time and to promptly resolve audit findings and other reviews.

The GAO notes that "17 principles support the effective design, implementation, and operation of the associated components, and represent [the] requirements necessary to establish an effective internal control system." These principles are described in Chapter 2 of this report in the context of the OIG's evaluation of each control component.

Office of Management and Budget Circular A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control,* issued July 2016, defines obligations for risk management and internal control in federal agencies. EPA Order 1000.24 CHG 2, *Management's Responsibility for Internal Control*, requires all EPA organizations to establish and maintain internal controls to achieve effective and efficient program operations, including evaluating internal controls on an ongoing basis and taking prompt actions to correct any vulnerabilities identified.

Responsible Office

OTAQ, within the EPA's Office of Air and Radiation, implements the emissions testing and compliance program for mobile sources, including light-duty vehicles.

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[10] *Ibid.*

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Scope and Methodology

We conducted our performance audit from March 2017 to February 2018. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

To answer our objective, we examined mobile source requirements for light-duty vehicles, including emissions testing requirements and protocols as described in statute, regulations and relevant guidance documents. We determined the roles and responsibilities for emissions testing and compliance, including the staff who implement and oversee the program. We reviewed the extent to which the EPA relies on contractors and third-party data. We examined the process the EPA uses to issue COCs and any auditing that the EPA performs on manufacturer-submitted data. We reviewed the process the EPA uses to audit new and in-use vehicles via standard and special test cycles in its NVFEL, as well as to measure on-road emissions using mobile devices. We visited the EPA's laboratory in Ann Arbor and observed first-hand TATD's testing of vehicles. Our work focused on the divisions in OTAQ supporting the light-duty vehicle compliance program, including CD and TATD. We also met with OECA and the Office of Research and Development to determine how these offices support the emissions testing and compliance program.

We interviewed multiple technical experts, management and staff from a variety of external organizations, including other regulatory agencies, nongovernmental organizations, academia and industry.

We conducted this audit to determine whether the EPA's existing internal controls are effective at detecting and preventing light-duty on-road vehicle emissions fraud. We did not retrospectively examine the EPA's internal controls before the discovery of VW's emissions cheating in 2015. By its nature, fraud begins with noncompliance. Thus, this audit focuses on whether OTAQ's internal control system provides reasonable assurance that noncompliance with mobile source emission standards is detected and prevented—one of the office's primary objectives. As noted in the GAO's *Standards for Internal Control in the Federal Government* and in Office of Management and Budget Circular A-123, absolute assurance is not attainable, as factors outside the control or influence of management can affect the entity's ability to achieve all of its objectives. All OIG findings are specific to OTAQ's light-duty vehicle compliance program and the divisions and centers within OTAQ that support the program.

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Chapter 2
EPA's Current Internal Controls Provide Reasonable Assurance That Fraud Will Be Detected and Prevented; Some Improvements Could Be Made

The EPA's light-duty vehicle compliance program has demonstrated that its current internal controls are effective at detecting and preventing noncompliance—a precursor to potential fraud;[11] however, there are opportunities for improvement. The OIG evaluated the EPA's controls based on the five components defined in the GAO's governmentwide internal control standards: control environment, risk assessment, control activities, information and communication, and monitoring. Effective internal controls are important for OTAQ to achieve its goal of ensuring compliance and detecting noncompliance with mobile source emission regulations. Noncompliance can and has caused excess emissions of pollutants, which have significant, quantifiable negative impacts on human health and the environment.

Control Environment

Control environment is the foundation for an internal control system. This component requires that management and employees establish and maintain an environment throughout the organization that sets a positive and supportive attitude toward internal control and conscientious management. The key principles that affect the accomplishment of this goal are described in Table 4.

Table 4: Control environment principles

	Principle
1.	The oversight body and management should demonstrate a commitment to integrity and ethical values.
2.	The oversight body should oversee the entity's internal control system.
3.	Management should establish an organizational structure, assign responsibilities and delegate authority to achieve the entity's objectives.
4.	Management should demonstrate a commitment to recruit, develop and retain competent individuals.
5.	Management should evaluate performance and hold individuals accountable for their internal control responsibilities.

Source: OIG analysis of GAO internal control standards.

[11] Per GAO's *Standards for Internal Control in the Federal Government* (GAO-14-704G), effective internal controls provide reasonable—though not absolute—assurance that the potential for fraud is minimized.

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The following conditions support the OIG's evaluation of this component:

- OTAQ has protocols (e.g., for potential conflicts of interest) and conditions (i.e., low staff turnover) in place to prevent inappropriate knowledge transfer to private industry.

- OTAQ management has created an organizational culture of integrity and ethical values by establishing policies and principles for staff to follow.

- All OTAQ staff interviewed feel comfortable reporting compliance issues to management. The OIG found no instances of interviewed staff being pressured to inappropriately approve or expedite COC applications from industry.

- OTAQ has procedures and systems in place to oversee its internal control system. For example, OTAQ developed and maintains the Engine and Vehicle Compliance Information System (EVCIS), which is the official database for compliance purposes and is used to oversee the compliance program and support enforcement cases.

- OIG analysis confirmed that EVCIS acts as a management and workflow tool designed to track the compliance process and select vehicles for testing. EVCIS also controls system access based on user role and tracks testing, certification and compliance decisions.

- OTAQ's quality assurance and control documents provide structured roles and responsibilities. OTAQ has detailed testing procedures for different points of the vehicle life cycle to help ensure compliance with regulatory requirements.

- TATD established, implements and maintains a quality management system, which operates according to the International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025 standard.[12]

- OTAQ demonstrates an ability to recruit competent staff (e.g., engineers and scientists) and retain staff (i.e., a low turnover rate).

- Management has a system in place to report, document and follow up on laboratory concerns, audit findings and corrective actions (such as issues with nonconforming work).

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[12] The EPA's NVFEL is accredited in accordance with the recognized ISO/IEC 17025:2005 certification. This accreditation demonstrates technical competence for the defined scope and operation of a laboratory's quality management system. For more information on the scope of this accreditation, visit the EPA's *Vehicle and Fuel Emissions Testing* website.

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- TATD has laboratory performance metrics that track laboratory use, as well as quality metrics that track the number of audits conducted. TATD also tracks nonconforming work and opportunities for improvement that were found as a result of the audits.

- CD tracks workflow via EVCIS and uses data reported through the manufacturer in-use verification program to track light-duty emissions compliance over time. However, CD does not have comprehensive performance metrics to measure or define the success of its light-duty vehicle compliance program.

Control Environment Conclusion

OTAQ's light-duty vehicle compliance program has demonstrated effective current controls addressing the five control environment principles outlined in Table 4. However, we found that CD does not have specific performance metrics to help it measure success. Performance metrics or indicators enable management to measure and demonstrate that the program is successful. Metrics can also incentivize certain activities that would contribute to OTAQ's goal of ensuring compliance, such as helping to increase attention on in-use compliance.

Control Environment Recommendation

We recommend that the Assistant Administrator for Air and Radiation:

1. Define performance measures to assess the performance of the EPA's light-duty vehicle compliance program.

Risk Assessment

As described in the GAO's *Internal Control Management and Evaluation Tool*,[13] a precondition to risk assessment is the establishment of clear, consistent goals and objectives. Once the objectives have been set, the agency needs to identify the risks that could impede the efficient and effective achievement of those objectives. Internal control should provide for an assessment of the risks that the agency faces from both internal and external sources. Once risks have been identified, they should be analyzed for their possible effects. Management then should formulate an approach for risk management and decide upon the internal control activities required to mitigate those risks, including during times of change. Table 5 highlights the principles under this component.

[13] GAO, *Internal Control Management and Evaluation Tool*, GAO-01-1008G, August 2001.

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Table 5: Risk assessment principles

	Principle
1.	Management should define objectives clearly to enable the identification of risks and define risk tolerances.
2.	Management should identify, analyze and respond to risks related to achieving the defined objectives.
3.	Management should consider the potential for fraud when identifying, analyzing and responding to risks.
4.	Management should identify, analyze and respond to significant changes that could impact the internal control system.

Source: OIG analysis of GAO internal control standards.

The following conditions support the OIG's evaluation of this component:

- OTAQ's stated goal for its compliance program is to achieve environmental and public health benefits by "implementing emission standards covering every vehicle, engine, and gallon of fuel sold … and ensuring that these standards are met over the life of the product."[14] In addition, CD has its own goals of implementing OTAQ's regulatory program by making determinations on certification and registration, ensuring compliance, and utilizing compliance data. Furthermore, CD's Light-Duty Vehicle Center has guiding principles to be consistent, equitable, reasonable and defensible.

- CD has performed informal risk assessments on an ongoing basis based on professional judgement.

- TATD develops annual laboratory plans based on resource assumptions and input from CD.

- CD has responded to past experiences with noncompliance and other external conditions, such as changes to vehicle technology, by modifying its program and clarifying or changing its policies. For example, CD has responded to past experiences with defeat devices by clarifying its policy regarding AECDs.

- The EPA has enhanced its regulatory requirements over time to include standard test cycles that more closely reflect exhaust emissions from real-world driving conditions. The agency started with a single standard test cycle known as the Federal Test Procedure in 1972 and expanded to the five test cycles previously outlined in Table 2.

- Risk is incorporated into targeted certification and in-use testing (e.g., test groups with new technology or previously identified issues).

[14] EPA, *2007 Progress Report: Vehicle and Engine Compliance Activities*, EPA-420-R-08-011, October 2008.

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- OIG analysis of EVCIS indicated that risk factors are identified by the EPA when it selects vehicles for confirmatory testing.

- The EPA said it did not detect VW's fraud earlier because (1) light-duty diesels were a very small fraction of the total light-duty vehicle population and did not merit extraordinary oversight; (2) VW did not include the disclosure required in a COC application of any element of design—software, in this case—that senses certain vehicle parameters and then modifies the way the emission control system operates when those conditions exist; and (3) the EPA relied completely on standard test cycles for confirmatory testing and thus had no controls to detect VW's sophisticated defeat device, which was specifically designed to operate during standard test cycles.

- External experts from other regulatory bodies, nongovernmental organizations and the private sector concurred that there was no clear red flag to indicate that VW committed fraud, especially given the sophistication of the defeat device itself and the assumption that the severe reputational risk of committing fraud and the potential enforcement penalties in the United States—which are known to be more robust than in Europe—would be sufficient deterrents.

- The EPA has responded to the risk from defeat devices by augmenting its standard test cycles with new control activities known as "special testing." Special testing screens vehicles for defeat devices by using random/off-cycle testing, which can be variations of the standard test cycles, or new test cycles. Special testing helps screen for AECDs that may be acting as defeat devices. More specifically, special testing can identify defeat devices that detect when a vehicle is being tested under standard test cycles and can thus detect whether emission control systems are being altered, as was done in the 2015 VW case.

- Special testing also includes the use of Portable Emissions Monitoring Systems to measure on-road emissions and more effectively screen for defeat devices. Portable Emissions Monitoring System testing has identified noncompliance and the use of defeat devices by other manufacturers.

- The OIG confirmed the EPA's increased use of special testing as part of its compliance program.

- OTAQ uses what it learned from the 2015 VW case to identify similar and additional noncompliance by other manufacturers, including compliance issues related to failed nitrogen oxide sensors and undisclosed AECDs that increase emissions.

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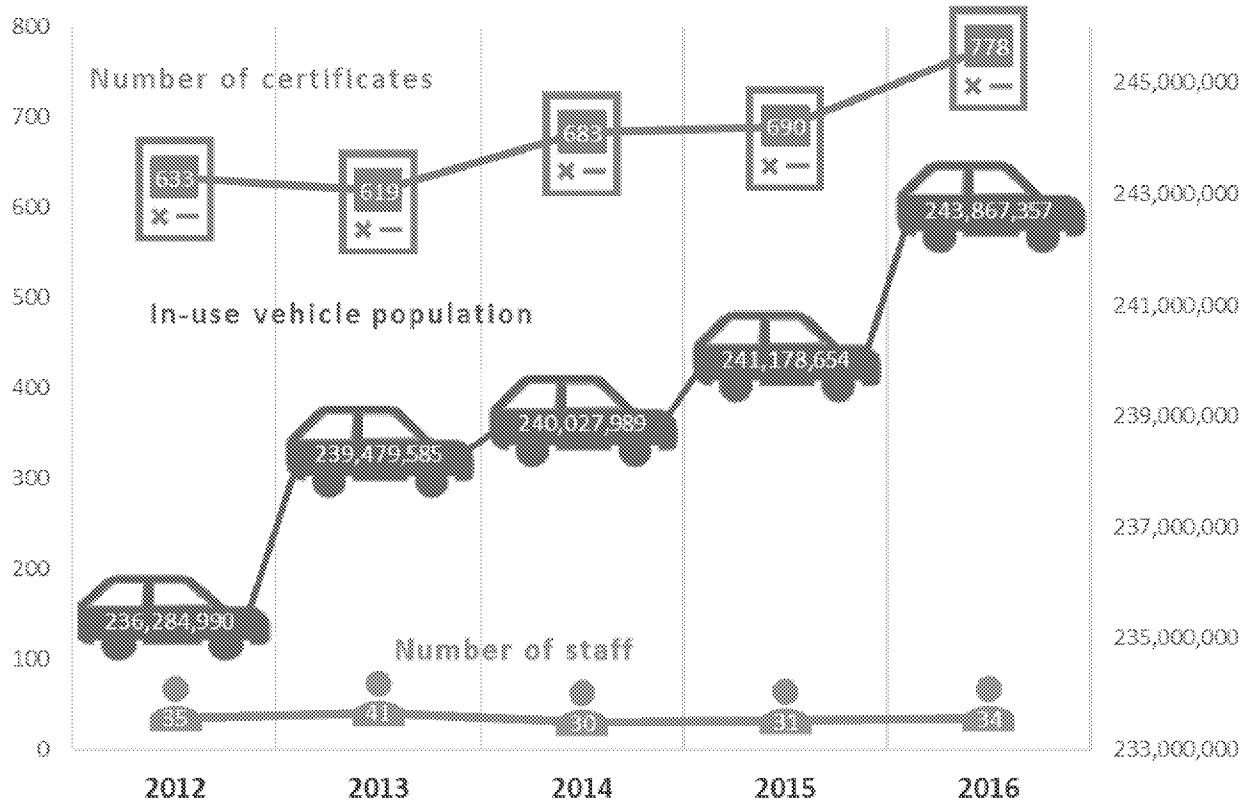
- External experts interviewed confirmed that special testing is the key control activity needed to address the risk of defeat devices.

- CD created a *Compliance Vision* document that contains a compliance risk framework and highlights that risk assessment is fundamental to CD's planning and daily work. It also describes risk assessment cycles. As of March 2018, this document was last updated in September 2015.

- One aspect of risk assessment is for management to identify the resources necessary to meet program objectives. The EPA noted that its resources have been stagnant while its regulatory oversight responsibilities have increased. The data show that although COC applications and the light-duty vehicle in-use population have increased since 2012 (which mean the workload for OTAQ staff has also increased), the levels of light-duty vehicle compliance staff in OTAQ have remained static (Figure 5). The implementation of special testing has also put additional pressure on OTAQ's resources.

Figure 5: Light-duty vehicle compliance staff levels versus the number of COC applications and in-use vehicles



Source: OIG analysis and image.

Note: Staff levels are measured in fiscal years; in-use vehicle population is measured in model years.

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Risk Assessment Conclusion

OTAQ's light-duty vehicle compliance program has demonstrated effective controls related to the four risk assessment principles outlined in Table 5. The EPA has demonstrated a history of responding to significant changes that could impact its internal control system. However, we did find that while the EPA informally assesses risk, it lacks a formalized risk assessment process. Based on discussions with EPA staff, the OIG concluded that no formal risk assessment has been conducted because (1) of the need to be agile, since risk changes quickly and is often revealed via in-use data or through defect/recall data; (2) there is no time to develop a written plan; and (3) it has not been deemed valuable given the frequency of discussions on risk that already take place. The OIG believes that a formal risk assessment can help the EPA be more proactive in responding to risks and can increase the probability that OTAQ will address broader strategic risks.

Risk Assessment Recommendation

We recommend that the Assistant Administrator for Air and Radiation:

2. Conduct and document a formal risk assessment for the EPA's light-duty vehicle compliance program that prioritizes risks and links specific control activities to specific risks. Update the risk assessment on a scheduled and periodic basis.

Control Activities

Internal control activities are the policies, procedures, techniques and mechanisms that help mitigate risks identified during the risk assessment process. They are essential to facilitate proper stewardship of and accountability for government resources and to achieve effective and efficient program results. Table 6 highlights the principles under this component.

Table 6: Control activities principles

	Principle
1.	Management should design control activities to achieve objectives and respond to risks.
2.	Management should design the entity's information system and related control activities to achieve objectives and respond to risks.
3.	Management should implement control activities through policies.

Source: OIG analysis of GAO internal control standards.

The following conditions support the OIG's evaluation of this component:

- OTAQ has control activities designed to achieve objectives and respond to risks, including policies and procedures that detail testing methodologies and audits to assess the control system. For example, OTAQ has control activities that address risks such as measurement uncertainty,

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nonconforming work, inefficient use of lab resources, poor quality test data and deviations to test processes.

- To maintain its ISO/IEC 17025:2005 certification, the EPA must follow strict processes and procedures. OTAQ has a Quality Services Team focused on quality control to confirm that these processes and procedures are followed. The team also helps ensure regulatory compliance, performs quality assurance project plan scope reviews, and performs quality process reviews for ISO considerations.

- After the VW emissions noncompliance was detected, the EPA implemented special testing, which enabled the agency to identify noncompliance by other manufacturers.

- The OIG confirmed that special testing and Portable Emissions Monitoring System testing have increased.

- EVCIS collects data to allow analysis and management of the certification process and in-use compliance through documentation, tracking and reports.

- OTAQ designed its information system and related control activities to achieve its objectives of detecting noncompliance and responding to risks. For example, OIG analysis of the EVCIS confirmed that system access is controlled and user privileges are limited depending on user role; workflow is managed and delegated based on user role; testing and certification/compliance decisions are tracked; and risk is factored into the EPA's decision-making, as evidenced by certification testing selection fields (e.g., random audit, new engine/technology and emissions failure).

- OTAQ sufficiently implements control activities through policies. OIG analysis included reviewing the statutory requirements for the policies and the activities that have been developed to achieve the goals and objectives of the policies. The OIG reviewed numerous policies and procedures that detail OTAQ's control activities and processes for updating control activities as policies change. For example, TATD's detailed quality management system sets forth the quality control policy and structure; it demonstrates OTAQ's policy to improve the effectiveness of technical operations.

- CD does not have written procedures to incorporate new special testing into its certification, production or in-use testing regimen.

Control Activities Conclusion

OTAQ's light-duty vehicle compliance program demonstrated effective controls related to the three control activities principles outlined in Table 6. The OIG did

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find that CD lacks written procedures that incorporate the new special testing into its certification, production or in-use testing regimen; this absence is primarily due to the recent adoption of special testing methods in response to the 2015 VW fraud case.

Special testing is needed to measure real-world emissions; the gap between real-world emissions and test cycle emissions has been demonstrated to widen over time as manufacturers optimize vehicle performance during standard test cycles. Formal, internal procedures that describe the role of special testing in the EPA's compliance program would reduce the probability that the EPA will discontinue the use of special testing, particularly in budget-constrained environments. Also, external guidance for manufacturers that explains the general parameters of special test screening and that clarifies expectations—without revealing the special test methods that will be employed—could enhance communication and compliance.

Control Activities Recommendation

We recommend that the Assistant Administrator for Air and Radiation:

3. Develop internal procedures or guidance on how special testing should be incorporated into certification, production and in-use testing programs to formalize the role of special testing in the EPA's light-duty vehicle compliance program.

Information and Communication

For an agency to execute and control its operations, it must have relevant, reliable information relating to external and internal events. The information should be recorded and communicated to management and other agency stakeholders in a form and within a timeframe that enables them to carry out their internal control and operational responsibilities. Table 7 highlights the principles under this component.

Table 7: Information and communication principles

	Principle
1.	Management should use quality information to achieve the entity's objectives.
2.	Management should internally communicate the necessary quality information to achieve the entity's objectives.
3.	Management should externally communicate the necessary quality information to achieve the entity's objectives.

Source: OIG analysis of GAO internal control standards.

The following conditions support the OIG's evaluation of this component:

- TATD has policies, procedures and a quality management system in place to provide quality information to CD and other stakeholders for use in compliance determinations, enforcement and other regulatory purposes.

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The NVFEL holds an ISO/IEC 17025:2005 certification, providing third-party confirmation that TATD's quality management system is effective.

- TATD tracks laboratory activity metrics, including types of testing and quality metrics. Quality metrics track the number of audits conducted, as well as any nonconforming work and opportunities for improvement that were found by the audits. In fiscal year 2017, approximately 30 percent of all tests were audited.

- EVCIS collects key compliance data and workflow information that enable management to oversee the certification process and analyze in-use compliance data.

- OTAQ internally communicates the quality information needed to achieve objectives, including management reports, audit reports, tracking spreadsheets and summary information.

- OIG analysis of CD's compliance issue referrals to OECA demonstrated internal communication across the two offices.

- The EPA provides guidance to manufacturers on how to comply with its regulations, policies and procedures. As conditions and regulations change, the EPA develops guidance and advisory circulars to assist the regulated community. Manufacturers interviewed were generally satisfied with the EPA's responsiveness to their questions and concerns.

- OTAQ has various channels to receive external communications and feedback, including public email addresses listed on OTAQ's website. OIG testing shows that several of the available email inboxes are monitored; however, some are no longer in use.

- OTAQ tracks compliance issues, such as certification and in-use issues, as well as referrals to OECA; however, tracking is done on an ad hoc basis.

- While state inspection/maintenance, remote sensing and other data sources are sometimes used to inform EPA testing, the use of this information is inconsistent and ad hoc, but OTAQ's Assessment and Standards Division is working to standardize this process.

- The EPA communicates and works closely with its co-regulator, the California Air Resources Board (CARB); however, the EPA does not have a blanket memorandum of understanding in place with CARB. Currently, the EPA and CARB develop memorandums of understanding on a case-by-case basis. The EPA and CARB staff and managers we interviewed, including senior management, indicated that a blanket memorandum of understanding or similar information-sharing agreement would be

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mutually beneficial to clarify the framework for legally sharing confidential business information and test result information for compliance assurance and enforcement purposes. This agreement would help improve information sharing and cost-effectiveness.

- CARB conducts its own in-use testing on select vehicles, but CARB relies on the EPA to conduct confirmatory testing at the front end of the process during certification.

Information and Communication Conclusion

OTAQ's light-duty vehicle compliance program has demonstrated effective controls related to the three information and communication principles outlined in Table 7. While OTAQ demonstrated effective controls, the OIG did identify four ways OTAQ's information and communication controls can be improved:

- **Formal tracking of compliance issues.** OTAQ may not be tracking compliance issues and referrals to OECA in a standardized way because some mobile source sectors have very few compliance issues or referrals to OECA, which can be easily tracked informally. However, standardized tracking would provide OTAQ knowledge about whether compliance issues are addressed; make it easier to rank the relative impact of compliance issues, which would help OTAQ and OECA decide how to prioritize issues; document successful methods for detecting potential noncompliance; and make it easier to detect trends.

- **Use of external data sources.** According to the EPA, data from state inspections and remote sensing may only be used in an ad hoc manner because the data collected via these sources may be of unknown quality, are voluminous, and require resources to curate before becoming useful or actionable from a compliance standpoint. However, consistently using data from these sources as a screening tool could help detect more instances of noncompliance. For example, upon retrospective analysis, it was found that emissions anomalies in VW vehicles were captured in remote sensing data from Colorado *prior* to the study that first alerted the EPA to the high levels of emissions. Additionally, it may be more cost-effective to utilize these data sources to screen for potential compliance issues and as a way to prioritize standard or special cycle testing.

- **Streamline email inboxes.** OTAQ has multiple email inboxes for receiving feedback from various stakeholders with different needs (e.g., manufacturer questions and consumer complaints). However, maintaining multiple email inboxes may increase the risk that follow-up does not occur.

- **Develop protocols for sharing information.** According to CARB and EPA managers and staff, clarifying how information can be shared

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between the two agencies would improve coordination and reduce duplication of compliance activities. One of the barriers to information sharing is the lack of clarity around the circumstances under which confidential business information can be shared between the co-regulators. Further clarifying protocols to define the circumstances under which information generated by the EPA, CARB or manufacturers can be shared would facilitate more efficient oversight.

Information and Communication Recommendations

We recommend that the Assistant Administrator for Air and Radiation:

4. Formally track light-duty vehicle compliance issues, including how issues were identified, the current status of these issues and the enforcement actions taken.

5. Enhance information and communication controls by creating regular, standardized reports from state inspection/maintenance, remote sensing and other data sources to help identify potential compliance issues.

6. Assess the necessity of email inboxes that the Office of Transportation and Air Quality maintains for feedback, delete unnecessary inboxes, and update websites as necessary.

7. Develop protocols for sharing information with the California Air Resources Board to facilitate sharing of emissions testing and other information for compliance assurance and enforcement purposes.

Monitoring

Internal control monitoring should assess the quality of performance over time and promptly resolve findings of audits and other reviews. Table 8 highlights the principles under this component.

Table 8: Monitoring principles

	Principle
1.	Management should establish and operate monitoring activities to monitor the internal control system and evaluate the results.
2.	Management should remediate identified internal control deficiencies on a timely basis.

Source: OIG analysis of GAO internal control standards.

The following conditions support the OIG's evaluation of this component:

- OTAQ internal control monitoring activities include the use of management reports; internal and external audits; and policies and procedures that guide management review, quality assurance and control processes.

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- OTAQ has controls in place to identify internal control deficiencies on a timely basis, including processes for identifying and tracking audit findings, customer service feedback, and opportunities for improvement and preventive actions.

- Internal and external audit reports identify strengths, opportunities, weaknesses and threats/risks. The audit reports are used to monitor the NVFEL's internal controls and evaluate the results. To maintain ISO/IEC certification, TATD's Quality Services Team focuses on quality control and enhancing the overall quality of laboratory testing, which includes managing a Concern Identification and Resolution Database comprising issues identified by staff or through audits.

- OTAQ's policies on concern identification and resolution are being implemented via a database. The Concern Identification and Resolution Database tracks relevant information such as concern description, root cause analysis for corrective actions, action or correction taken, Quality Service Team follow-up and/or verification performed, and status update information. Concerns and audit findings are identified and resolution is tracked.

- To monitor compliance testing quality, TATD has quality metrics for light-duty vehicle testing that track the number of audits conducted, as well as any nonconforming work and opportunities for improvement that were found as part of the audits.

- Staff interviewed feel comfortable reporting compliance issues and internal control deficiencies to management.

- In response to regulations issued in 2012, OTAQ conducted "road-load" audits to determine if manufacturers were complying with the new regulations. Road-load[15] is an important parameter for both emissions and fuel economy testing; when road-load is understated, emissions are understated and fuel economy is overstated. As a result of these audits, the EPA identified noncompliance, which resulted in a $100 million civil penalty.

Monitoring Conclusion

OTAQ's light-duty vehicle compliance program demonstrated effective controls related to the two monitoring component principles outlined in Table 8. The OIG does not have any recommendations related to the monitoring control component.

[15] Road-load is the force imparted on a vehicle driving at constant speed over a smooth level surface from sources such as tire rolling resistance, driveline losses and aerodynamic drag.

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Conclusion

OTAQ demonstrated that the existing controls for its light-duty vehicle compliance program are effective and operate in an integrated manner to detect and prevent noncompliance—a precursor to potential fraud. While the EPA demonstrated effective internal controls, we identified areas where controls can be improved. These improvements will help the EPA better address strategic risks and achieve compliance with mobile source regulations.

Agency Response and OIG Evaluation

The agency ultimately concurred with all recommendations and provided acceptable planned corrective actions; these recommendations are considered resolved with corrective actions pending. The agency has already completed the corrective actions for Recommendations 5 and 6.

The agency initially disagreed with Recommendation 7. After subsequent discussions with the OIG and CARB, the agency proposed a corrective action that meets the intent of the original recommendation. The OIG revised Recommendation 7 to better reflect the agreed-upon corrective action. The agency responded to the revised Recommendation 7 as follows:

> OAR agrees with this recommendation. OTAQ already works closely with its co-regulator, [CARB] and is able to routinely share certification and compliance information because CARB is an authorized representative as defined in 40 CFR 2.301(h)(3). OTAQ will engage CARB in developing two products to enhance the agencies' ability to take advantage of this information sharing provision. First, OTAQ and CARB will create and exchange documents to formalize the current understanding and application of 40 CFR 2.301(h)(3). Then the agencies will create and disseminate training materials and guidance for staff that clearly articulate the types of information that can be shared and the circumstances under which the information can be shared.
>
> OAR will complete the first action by the end of FY19 Q2 and the second action by the end of FY19.

In addition to a response to our recommendations, the agency provided technical comments on the draft report. Based on the technical comments received, we made revisions to the report where appropriate. Appendix A contains the agency's response to the draft report.

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Status of Recommendations and Potential Monetary Benefits

RECOMMENDATIONS

Rec. No.	Page No.	Subject	Status[1]	Action Official	Planned Completion Date	Potential Monetary Benefits (in $000s)
1	13	Define performance measures to assess the performance of the EPA's light-duty vehicle compliance program.	R	Assistant Administrator for Air and Radiation	3/31/21	
2	17	Conduct and document a formal risk assessment for the EPA's light-duty vehicle compliance program that prioritizes risks and links specific control activities to specific risks. Update the risk assessment on a scheduled and periodic basis.	R	Assistant Administrator for Air and Radiation	12/31/19	
3	19	Develop internal procedures or guidance on how special testing should be incorporated into certification, production and in-use testing programs to formalize the role of special testing in the EPA's light-duty vehicle compliance program.	R	Assistant Administrator for Air and Radiation	6/30/19	
4	22	Formally track light-duty vehicle compliance issues, including how issues were identified, the current status of these issues and the enforcement actions taken.	R	Assistant Administrator for Air and Radiation	12/31/18	
5	22	Enhance information and communication controls by creating regular, standardized reports from state inspection/maintenance, remote sensing and other data sources to help identify potential compliance issues.	C	Assistant Administrator for Air and Radiation	4/24/18	
6	22	Assess the necessity of email inboxes that the Office of Transportation and Air Quality maintains for feedback, delete unnecessary inboxes, and update websites as necessary.	C	Assistant Administrator for Air and Radiation	3/15/18	
7	22	Develop protocols for sharing information with the California Air Resources Board to facilitate sharing of emissions testing and other information for compliance assurance and enforcement purposes.	R	Assistant Administrator for Air and Radiation	9/30/19	

[1] C = Corrective action completed.
R = Recommendation resolved with corrective action pending.
U = Recommendation unresolved with resolution efforts in progress.

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Agency Response to Draft Report

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 2 6 2018

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Agency's Final Response to Office of Inspector General's report, *In Wake of Volkswagen Emissions Cheating, EPA Tightens Controls to Prevent Future Fraud (OPE-FY17-0009)*

FROM: William L. Wehrum
Assistant Administrator
Office of Air and Radiation 3-26-18

TO: Kevin Christensen
Assistant Inspector General
Office of Audit and Evaluation
Office of Inspector General

The EPA's Office of Air and Radiation (OAR) appreciates the opportunity to review and comment on the Office of Inspector General's (OIG) report titled *In Wake of Volkswagen Emissions Cheating, EPA Tightens Controls to Prevent Future Fraud* (Draft Report).

The Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to establish and implement regulations to protect human health and the environment, including regulations to control emissions from cars, trucks, and other mobile sources of air pollution. EPA's Office of Transportation and Air Quality (OTAQ) within the OAR fulfills this responsibility for EPA by setting motor vehicle emission standards and by monitoring compliance with the requirements. OTAQ collaborates with EPA's Office of Enforcement and Compliance Assurance (OECA) in cases that involve potential violations of the law and OECA exercises enforcement authority on behalf of the Agency.

OTAQ evaluates compliance through oversight activity at all stages of the vehicle lifecycle; that is, before, during, and after vehicle production. Before entering any vehicle into commerce, manufacturers must obtain a certificate of conformity from EPA. The certificate documents the Agency's determination that the vehicle design is sufficiently robust to satisfy emission standards throughout the useful life of the vehicle. OTAQ checks compliance during vehicle

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production through audits and other measures to confirm that production vehicles match the specifications set forth in the manufacturer's application for certification. OTAQ continues to monitor compliance years after vehicles have entered service by testing privately-owned vehicles and by reviewing manufacturer reports and emissions test results. As the Draft Report explains, OTAQ designed and implements this comprehensive approach to achieve two primary objectives: to minimize pollution from light-duty vehicles, and to ensure environmental standards are applied fairly across all manufacturers.

EPA's September 2015 Notice of Violation to Volkswagen and subsequent lawsuit in January 2016 introduced much of the world to the Agency's vehicle emissions oversight programs for the first time. That is because emissions cheating on the scale perpetrated by Volkswagen is rare. Since EPA began regulating vehicle emissions in the 1970s, OTAQ and OECA have developed strong and effective programs to detect and prevent noncompliance. Most noncompliance by vehicle and engine manufacturers are the result of technical design flaws or misinterpretation of regulations. While this type of noncompliance may stem from manufacturer error, it can also be the result of purposeful manufacturer decisions that result in noncompliance with federal emissions standards. Volkswagen was an unusual case, in which the company deliberately circumvented the law, resulting in the most serious light-duty emissions violation cases ever discovered.

One factor contributing to the efficacy of EPA's vehicle emissions oversight is that OTAQ routinely updates and adapts its program to respond to new information, technology, and circumstances. It is necessary for the program to continuously evolve as new information becomes available, such as the sophisticated use of a software-based defeat device in the Volkswagen case. As noted in the Draft Report, OTAQ has now added protocols to screen for defeat devices as well as other potential sources of excess, off-cycle emissions. These include special test cycles that capture more operating and environmental conditions than are covered by standard laboratory test cycles. OTAQ has also expanded its use of over-the-road testing using portable emissions measuring (PEMs) devices. OTAQ is applying these and other checks to both certification and in-use compliance evaluations.

Consistent with our interest in continuously improving our program, OAR welcomes the observations and recommendations the OIG has provided in the Draft Report. OAR's responses to OIG's specific recommendations follow.

Recommendation 1: Define performance measures to assess the performance of the EPA's light-duty vehicle compliance program.

Response 1: OAR agrees with this recommendation. OAR currently uses in-use vehicle emissions testing data to track light-duty emissions compliance over time. OAR will develop additional performance measures to better monitor emissions compliance and program success.

Planned Completion Date: OAR will implement this recommendation in four phases: 1) develop the performance measures; 2) implement, gather data, and evaluate; 3) revise measures as informed by evaluation, then fully implement measures; and 4) use those measures to inform program management moving forward. We project that this will be a three-year process. Step

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one will be completed by the end of Q2, FY2019. Step two will be completed at the end of Q2, FY2020, and step three will be completed at the end of Q2, FY2021. Step 4 is ongoing.

Recommendation 2: Conduct and document a formal risk assessment for the EPA's light-duty vehicle compliance program that prioritizes risk and links specific control activities to specific risks. Update the risk assessment on a scheduled and periodic basis.

Response 2: OAR agrees with this recommendation. OAR currently conducts an informal risk assessment of its light-duty vehicle compliance program. OAR will expand and formalize this process and will develop protocols for its implementation and documentation.

Planned Completion Date: OAR will complete this recommendation by the end of Q1, FY2020.

Recommendation 3: Develop internal procedures or guidance on how special testing should be incorporated into certification, production, and in-use testing programs to formalize the role of special testing in the EPA's light-duty vehicle compliance program.

Response 3: OAR agrees with this recommendation, and recognizes that it is important to have a formal process in place to memorialize the use of special testing in the light-duty vehicle compliance test programs. Currently, the use of special testing as a crucial component of compliance oversight and is a priority that enjoys strong support from OTAQ management and from a knowledgeable and experienced light-duty team. OAR will need to determine how best to document the use of procedures for special testing and other programs that are non-standard by definition.

Planned Completion Date: OTAQ anticipates preparing a document that describes how special testing is and will be integrated into our compliance oversight activities. We will complete this recommendation by Q3, FY2019.

Recommendation 4: Formally track light-duty vehicle compliance issues, including how issues were identified, the current status of these issues, and the enforcement actions taken.

Response 4: OAR agrees with this recommendation, and recognizes the importance of tracking compliance issues. Currently, OTAQ tracks issues informally but does not maintain a standard tracking format. OAR will develop a system for tracking various compliance issues, such as certification, in-use, and regulatory implementation and identify how the issues are resolved. OAR will also track the compliance issues it submits to OECA for possible enforcement action.

Planned Completion Date: OAR will complete this recommendation by the end of Q1, FY2019.

Recommendation 5: Enhance information and communication controls by creating regular, standardized reports from state inspection/maintenance, remote sensing, and other data sources to help identify potential compliance issues.

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Response 5: OAR agrees with this recommendation with the understanding that the intent is to facilitate and optimize use of data sources that are available to EPA. OAR will establish standard and trackable mechanisms for regular collaboration and information exchange among OTAQ divisions. The objective will be to routinely share and discuss external data to facilitate its use in both risk assessment and ongoing compliance oversight. For example, OTAQ will hold quarterly meetings, documented by agendas and discussion notes posted on a SharePoint site, to review information that may help identify potential compliance issues.

Planned Completion Date: OTAQ has completed the first step toward implementing this recommendation by scheduling the first meeting for April 24, 2018. The collaboration will continue, on an ongoing basis.

Recommendation 6: Assess the necessity of email inboxes that the Office of Transportation and Air Quality maintains for feedback, delete unnecessary inboxes, and update websites as necessary.

Response 6: OAR agrees with this recommendation and recognizes the importance of providing convenient and timely responses to the public and industry.

Planned Completion Date: Complete. OAR has already reviewed the email inboxes that OTAQ maintains for feedback and has eliminated unnecessary inboxes. OTAQ has also updated its website accordingly. OTAQ will continue to monitor these feedback mechanisms and provide updates as appropriate.

Recommendation 7: Develop a blanket memorandum of understanding with the California Air Resources Board to facilitate sharing of emissions testing and other information for compliance assurance and enforcement purposes.

Response 7: OAR does not agree with this recommendation. However, OAR staff will continue to work with the OIG to better understand the impetus of this recommendation and the perceived problems a blanket MOU may address.

Planned Completion Date: TBD

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If you have any questions regarding this response, please contact Byron Bunker, Director, Compliance Division, Office of Transportation and Air Quality, at (734) 214-4155.

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