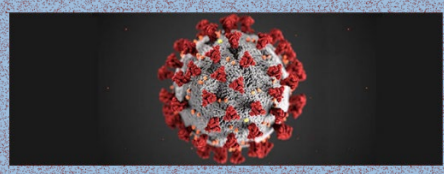




# EPA's National Vehicle and Fuel Emissions Laboratory Has Taken Steps to Mitigate Impact of Coronavirus Pandemic on Mobile Source Emission Compliance

## EPA OIG's [Response](#) to the **COVID-19** Pandemic



### Evaluation Purpose:

Determine how the coronavirus pandemic has impacted laboratory operations and testing at the EPA's Office of Transportation and Air Quality's National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan. The project number for this evaluation is [OE-FY21-0047](#).

### This evaluation addresses the following EPA goal:

- *Operating efficiently and effectively.*

### This evaluation addresses a top EPA [management challenge](#):

- *Maintaining operations during pandemic response.*

Address inquiries to our public affairs office at (202) 566-2391 or [OIG\\_WEBCOMMENTS@epa.gov](mailto:OIG_WEBCOMMENTS@epa.gov).

Full list of [EPA OIG reports](#).

The U.S. Environmental Protection Agency's Office of Inspector General initiated an evaluation to determine:

- How the coronavirus pandemic—that is, the SARS-CoV-2 virus and resultant COVID-19 disease—has impacted laboratory operations and testing at the EPA's Office of Transportation and Air Quality's National Vehicle and Fuel Emissions Laboratory, or NVFEL, in Ann Arbor, Michigan.
- Any resulting impacts on the OTAQ's compliance programs, which are designed to minimize the potential for emissions in excess of standards or for noncompliance with regulations in heavy-duty, light-duty, and nonroad vehicles, engines, and equipment.

This report addresses these objectives based on our work within the OTAQ and contains no recommendations. This report examines the EPA's activities to oversee mobile source compliance with clean air laws and regulations during the coronavirus pandemic. It highlights NVFEL's efforts to minimize the potential for noncompliance during the pandemic and the importance of returning to full testing capacity to provide the most effective oversight.

## Background

OTAQ's mission is to protect human health and the environment by reducing air pollution and greenhouse gas emissions from mobile sources and the fuels that power them, advancing clean fuels and technology, and encouraging business practices and travel choices that minimize emissions. OTAQ's programs address emissions from a range of mobile sources, including cars, light trucks, large trucks and buses, farm and construction equipment, marine engines, aircraft, locomotives, and lawn and garden equipment.

“EPA regulations apply to virtually every vehicle, engine and gallon of transportation fuel sold in the United States. It is EPA’s job to ensure that sources comply with emissions and fuel economy requirements. Compliance activities are critically important to achieving the air quality benefits promised by emissions regulations.”

--EPA [website](#)

#### TATD provides services such as:

- Testing preproduction, new, and in-use cars and light trucks to ensure compliance with OTAQ’s regulations, using standard and nonstandard test methods, both in the lab and on the road.
- Compliance testing of new and in-use heavy-duty and medium-duty engines, along with small nonroad gasoline engines.
- Compliance and enforcement testing of fuel samples.
- Research and testing to inform and support regulation development.
- Developing test methods for the transportation industry.
- Interlab correlation testing of vehicles, engines, and fuels.



Entrance to NVFEL in Ann Arbor. (EPA OIG photo)

OTAQ’s Assessment and Standards Division is responsible for developing mobile source emission control regulations and policies. OTAQ’s Compliance Division is responsible for implementing the EPA’s mobile source regulatory program. Among other things, the Compliance Division manages the certification, in-use compliance, and recall programs for vehicles and engines in the United States, including nonroad engines. In addition to the laboratory, NVFEL comprises the divisions of OTAQ located in Ann Arbor. OTAQ also has offices and staff in Washington, D.C.

OTAQ’s Testing and Advanced Technology Division is responsible for operating the laboratory at NVFEL in Ann Arbor. Depending on the test program, TATD provides compliance and enforcement data to the Compliance Division, the EPA’s Office of Enforcement and Compliance Assurance, and the Department of Justice.

#### Responsible Office

OTAQ, within the EPA’s Office of Air and Radiation, is responsible for the issues discussed in this report.

#### Scope and Methodology

See Appendix A for a description of our scope and methodology in conducting this evaluation.

#### Prior Reports

In OIG Report No. [18-P-0181](#), *EPA Did Not Identify Volkswagen Emissions Cheating; Enhanced Controls Now Provide Reasonable Assurance of Fraud Detection*, issued May 15, 2018, we reported that, 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. We identified some areas where these controls could be further strengthened and made seven recommendations on topics such as defining performance measures, tracking compliance issues, and using remote sensing and other data sources better. As reported in the Agency’s audit tracking system, the EPA agreed with all seven OIG recommendations and, as of May 2021, has completed six.

In OIG Report No. [19-P-0168](#), *EPA Demonstrates Effective Controls for Its On-Road Heavy-Duty Vehicle Compliance Program; Further Improvements Could Be Made*, issued June 3, 2019, we reported that the EPA demonstrated that its current internal controls are effective at detecting and preventing noncompliance in the on-road heavy-duty vehicle sector. We also reported on specific risks to the EPA’s goal of achieving public health and environmental benefits through its heavy-duty vehicle compliance program and identified areas where existing controls could be strengthened, such as developing procedures, and criteria for referring compliance issues to OECA. We made eight recommendations. As reported in the Agency’s audit tracking system,

## Prior reports:

- Report No. 18-P-0181, *EPA Did Not Identify Volkswagen Emissions Cheating; Enhanced Controls Now Provide Reasonable Assurance of Fraud Detection*, issued May 15, 2018.
- Report No. 19-P-0168, *EPA Demonstrates Effective Controls for Its On-Road Heavy-Duty Vehicle Compliance Program; Further Improvements Could Be Made*, issued June 3, 2019.

the EPA agreed with all eight OIG recommendations and, as of May 2021, has completed four.

## What We Found

### ***Impact of Coronavirus Pandemic on Laboratory Operations and Testing***

Due to the coronavirus pandemic, NVFEL implemented its Continuity of Operations Plan starting on March 23, 2020. The laboratory remained closed from March 2020 through September 2020. During this time, no testing staff members were present. In September 2020, NVFEL reopened some laboratory services. According to NVFEL, testing activities will increase in 2021, but the full range of testing services may not be brought online until it is deemed safe for NVFEL to return to normal operation.



Heavy-duty engine test cell at NVFEL. The red engine is in the foreground and the grey dynamometer is in the background. A dynamometer is an electric motor that simulates operating conditions and allows testing to be reproducible in a laboratory environment. Exhaust gas from the engine is sent to a gas analyzer in the adjacent room. (EPA OIG photo)

According to NVFEL, as of December 2020, there were 60 NVFEL personnel, representing 46 percent of the OTAQ staff, who regularly spent time on-site to conduct work that cannot be performed remotely. These staff members are typically on-site at least weekly. Staff members can go to the laboratory if they meet certain conditions, including whether they have work that cannot be performed remotely, can maintain social distancing in work areas through coordination with their management, and pass the daily self-assessment to determine whether they have any COVID-19 symptoms. According to NVFEL, staff members are not required to spend time on-site.

NVFEL provided information on measures it is employing to protect on-site personnel, including requiring daily self-assessments prior to on-site arrival and implementing alternating or staggered work schedules.

According to NVFEL, these measures were developed collaboratively between management and staff, based on recommendations by Agency safety experts, and benchmarked against practices shared by automotive industry laboratories. NVFEL says that these measures appear to be successful, as there have not been any cases of workplace-transmitted COVID-19 infections.

According to NVFEL, some testing services, such as fuels testing, are operating at nearly full capacity, while others, such as vehicle and engine testing, are still limited. The impact of the coronavirus pandemic on NVFEL’s various laboratory operations is described in more detail below.

**NVFEL staff members go on-site if they:**

- Have work that cannot be performed remotely.
- Can maintain social distancing.
- Pass the daily COVID-19 self-assessment.

**Impact on Vehicle and Engine Testing**

During preproduction, the EPA conducts “confirmatory testing” on select vehicles and engines to verify the accuracy of the testing data submitted by the manufacturer to ensure new model vehicles and engines meet emission standards. During postproduction, the EPA and manufacturers also conduct “in-use testing,” which measures emission levels under real-world operating conditions.

Table 1 summarizes NVFEL’s target test volumes and actual test volumes for 2019 and 2020. According to NVFEL, vehicle confirmatory and in-use testing proceeded within a typical range in the first two months of 2020, halted completely for seven months during COOP status and while other pandemic restrictions were in place, and was operating at around 60 percent testing capacity by the end of 2020. NVFEL’s engine confirmatory test programs are scheduled from September through December each year and were substantially disrupted by the COOP.

**Table 1: NVFEL total test volumes (target versus actual) for 2019\* and 2020**

Category	Type	2019*		2020	
		Target	Actual	Target	Actual
<b>Light-duty vehicles</b>	Confirmatory (number of vehicles)	150	146	150	43
	In-use (number of vehicles)	144	102	144	27
	All-testing (number of tests)	2,600	2,267	2,600	670
<b>Engines</b>	Heavy-duty diesel confirmatory (number of engines)	6	6	1	1
	Mid-range diesel confirmatory (number of engines)	6	6	2	2
	Small gasoline confirmatory (number of engines)	30	29	12	12
<b>Fuels</b>	Surveillance, enforcement, and lab correlations (number of tests)	4,000	3,513	4,000	839

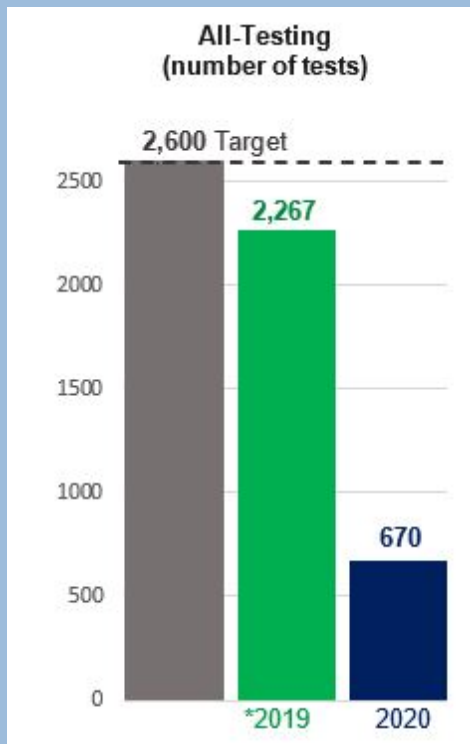
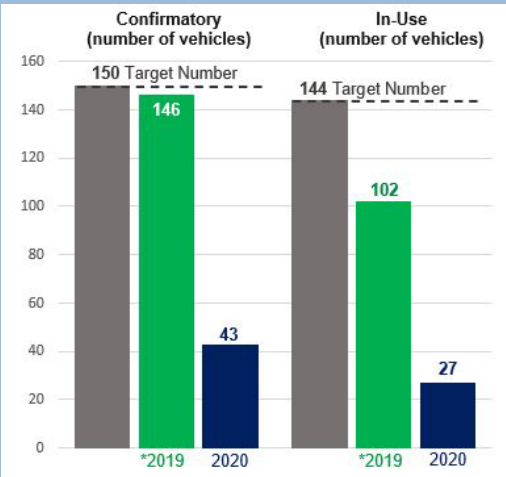
Source: OIG summary of EPA data. (EPA OIG table)

\* No data exist for January 2019 due to a lapse in Agency funding.

Note: Numbers reflect total test productivity in the lab, including valid and invalid test outcomes.



**Total light-duty vehicle test volumes at NVFEL (target versus actual) for 2019\* and 2020**



Source: OIG summary of EPA data. (EPA OIG image)

\* No data exist for January 2019 due to a lapse in Agency funding.

Note: Numbers reflect total test productivity in the lab, including valid and invalid test outcomes.

In September 2020, as COOP status ended and other pandemic restrictions were lifted, vehicle testing staff were allowed to begin preparations for resuming vehicle testing services, with restarting certification (preproduction) confirmatory testing as the top priority. In mid-October 2020, according to the EPA, a limited number of manufacturers’ vehicles arrived at NVFEL for confirmatory testing, including evaporative testing.<sup>1</sup> According to NVFEL, evaporative testing capabilities—including regulation development testing on motorcycles—have increased over normal, prepandemic levels due to equipment condition and availability of testing personnel. In other areas of vehicle testing, the priority has been bringing capabilities for regulation development and compliance testing screening online.

For confirmatory testing of heavy- and medium-duty diesel engines and small gasoline engines in 2020, NVFEL prioritized testing engines posing the greatest emissions risk, considering factors such as engines that employ new technologies or have a large market share (Figure 1). As of December 2020, according to the EPA, heavy-duty regulation development test sites are fully operational and available for testing as needed, and engine testing will continue to ramp up as more testing staff are able to return to the facility. According to the EPA, the light-duty research and outboard marine screening are also anticipated to resume in 2021, with the extent of resumption depending on availability of the facilities and testing staff.

**Figure 1: Total engine test volumes at NVFEL (target versus actual) for 2019\* and 2020**



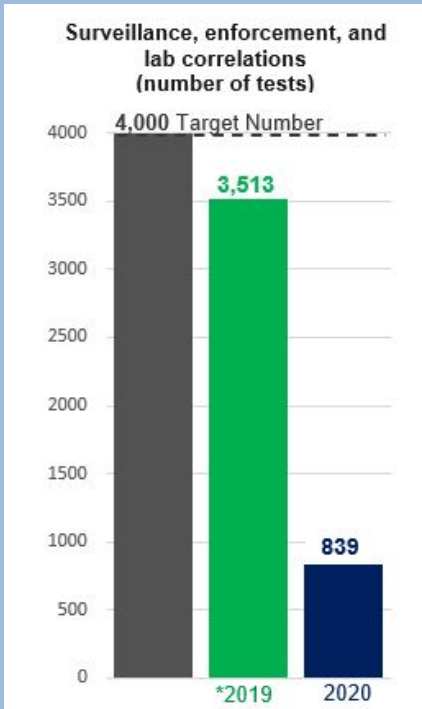
Source: OIG summary of EPA data. (EPA OIG image)

\* No data exist for January 2019 due to a lapse in Agency funding.

Note: Numbers reflect test productivity in the lab, not test outcomes, and include tests not accepted as “valid” in lab statistics.

<sup>1</sup> 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 (such as from evaporating gasoline), onboard diagnostics, durability, and fuel economy.

**Total fuel test volumes at NVFEL (target versus actual) for 2019\* and 2020**



Source: OIG summary of EPA data. (EPA OIG image)

\* No data exist for January 2019 due to a lapse in Agency funding.

Note: Numbers reflect total test productivity in the lab, including valid and invalid test outcomes.

The EPA conducts all light-duty confirmatory and in-use testing at NVFEL. For diesel and gasoline engine testing programs, the EPA uses both NVFEL and contract labs. Like NVFEL, manufacturer and contract laboratories also had to suspend operations during the pandemic for varying amounts of time in 2020, resulting in less overall testing as illustrated by Table 2.

**Table 2: Vehicle and engine compliance testing in 2019 and 2020\***

Category	Type	2019	2020
<b>Light-duty Vehicles</b>	Confirmatory	394 tests/ 123 vehicles	133 tests/42 vehicles
	In-use	318 tests/93 vehicles	135 tests/34 vehicles
	In-use verification program (conducted by manufacturer)	7,206 tests/2,132 vehicles	4,097 tests/1,187 vehicles
<b>Diesel Engines</b>	Confirmatory	20**	2
	In-use	2	2
	Heavy-duty in-use testing (conducted by manufacturer)	35	0
<b>Gasoline Engines</b>	Confirmatory	67	61
	In-use	1	5

Source: OIG summary of EPA data. (EPA OIG table)

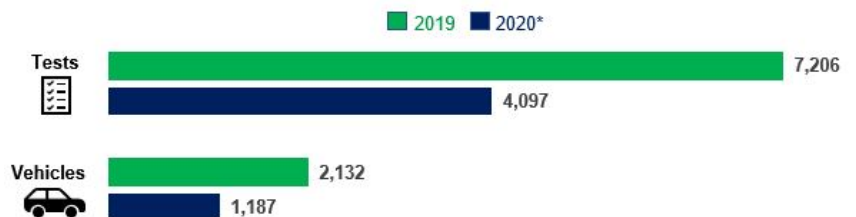
\*Includes contract lab testing and valid test outcomes only.

\*\*Testing number for normal year; 2019 impacted by lapse in government funding.

Note: These data reflect the number of unique vehicles or engines that NVFEL tested each year, including EPA testing conducted by contract labs, along with the number of valid tests producing results available for compliance action. Table 1 included all tests conducted at NVFEL only.

Figure 2 provides a graphic illustration of the testing conducted by manufacturers of in-use light-duty vehicles. 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 stay in compliance with emission regulations.

**Figure 2: Light-duty vehicle in-use verification program (conducted by manufacturer) for 2019 and 2020\***



Source: OIG summary of EPA data. (EPA OIG image)

\*Includes contract lab testing and valid test outcomes only.

The EPA also audits manufacturer facilities to determine whether vehicles and engines continue to meet emission standards. These audits enable the EPA to inspect the production and testing procedures along with vehicle and engine emission performance. OTAQ stated that it purposefully varies its use of compliance oversight tools, like audits, to keep manufacturers guessing and to address specific concerns or changes as they arise. For the light-duty vehicle sector, which includes passenger cars and light-duty pickup trucks, there is no consistent planned schedule for audits and no audits were planned for 2020. For the diesel engine sector, NVFEL typically conducts two or three audits yearly. In 2020, one audit was performed remotely and one audit was delayed but is underway as of March 2021. For the gasoline engine sector, NVFEL typically conducts 15 to 22 audits per year. In 2020, four audits were canceled, and one audit was performed remotely.

### Impact on Fuels Testing

The EPA stated that, in September 2020, NVFEL began ramping up testing of fuels in support of other testing programs and, as of December 2020, the fuels testing activities are operating at nearly full capacity. As the rest of NVFEL's testing centers fully ramp up in 2021, the timing of which is dependent on the pandemic, the Fuels and Chemistry Center will resume its full range of exhaust chemistry testing activities.

### Guidance Letters to Manufacturers in Response to Coronavirus Pandemic

Since March 2020, OTAQ has issued five [guidance letters](#) to manufacturers in response to the coronavirus pandemic. While all vehicle- and engine-compliance emission standards and deadlines remain in effect, these letters describe actions manufacturers can take if they have difficulty meeting compliance deadlines. For example, manufacturers can provide explanations of their inability to report compliance information when they submit compliance documents. These letters also highlight flexibilities that exist under the regulations to address compliance challenges. They also address adjustments to vehicle testing procedures at NVFEL as a result of the coronavirus pandemic.

### Application of Existing Flexibilities and Compliance Oversight

Some manufacturers requested flexibilities—as allowed by EPA regulations—for reasons such as manufacturer factory closures, manufacturer supplier shipment delays, parts shortages, and suspension of work due to the pandemic. According to NVFEL, OTAQ and manufacturers, together with the California Air Resources Board, collaborated to find flexibilities available under existing authority to address the unprecedented situation caused by the pandemic. For example, existing authority enables the EPA to modify test

“[Guidance] letters provide information, guidance, and instructions to the regulated industry on specific compliance topics and issues.”

--EPA [website](#)

requirements for vehicles that are difficult for manufacturers to procure in order to conduct required in-use testing.<sup>2</sup>

Another example OTAQ used to address the challenges posed by reduced laboratory capacity during the pandemic was to develop a system to prioritize which vehicles get tested. Under EPA regulations, the Agency has the flexibility to enable OTAQ or manufacturers to identify test groups that could more likely cause excess emissions or experience in-use emissions problems due to various factors, such as sales volume or technology vulnerabilities. Those test groups would be first in line for testing because of the value of using limited testing capacity to identify vehicles with emission problems. According to NVFEL, manufacturers are applying this prioritization system. The EPA stated that it was working with the California Air Resources Board to develop criteria to expand and apply the flexibilities that proved useful in responding to the coronavirus pandemic to future testing.

NVFEL has also employed alternative approaches to overseeing compliance, such as conducting certification testing and laboratory audits virtually instead of in person. While NVFEL says that it is confident that the alternative approaches it has developed are working, it acknowledges that there is no substitute for in-house testing capability and in-person site visits. The challenges NVFEL faced during the pandemic are described in greater detail below.

### ***OTAQ's Ability to Oversee Compliance with Mobile Source Emission Regulations Was Impacted by Reduced Laboratory Operations and Testing***

We asked OTAQ about the risks of increased emissions and the potential impacts on human health and the environment resulting from NVFEL's reduced operations during the coronavirus pandemic. OTAQ responded that these risks cannot readily be quantified, especially in the short term. OTAQ said that:

There are always factors that constrain our ability to test and/or conduct other compliance oversight activities at any point in time, resource constraints being the most persistent and pervasive. There are plenty of other reasons that can cause fluctuations in testing activities— for example, there have been times when lab upgrade work, or contract difficulties limited our access to testing at NVFEL.

It is our normal practice to shift emphasis from time to time. We do this for both unplanned reasons – such as the pandemic-caused shutdown – and for planned reasons that allow us to target new or different compliance concerns. To this end the reduced operations at NVFEL during the pandemic enabled staff to focus on areas other than testing that also have important potential to yield environmental and public health benefits. That said, we know from experience that in-house testing delivers a strong deterrent to noncompliance and offers one of our most effective oversight tools. Therefore, although we cannot

---

<sup>2</sup> [40 C.F.R. §86.1845-04](#): *Manufacturer in-use verification testing requirements*.



quantify the net change in environmental risk, we believe that despite our efforts to mitigate risk through alternate strategies, the loss of testing capacity at NVFEL certainly did increase the risk of noncompliance.

### Impact on Regulatory Development

NVFEL's laboratory testing also supports OTAQ's regulatory development. While not technically part of OTAQ's compliance program, we asked about any rulemakings that were delayed due to the reduction in laboratory services. OTAQ stated that the reduction in laboratory services delayed some testing for a highway heavy-duty low nitrogen oxide rulemaking proposal, referred to as the [Cleaner Trucks Initiative](#), and that additional factors impacted the timing of the rulemaking. OTAQ said that it:

[H]eard from stakeholders, including members of the heavy-duty truck industry, that their ability to engage with EPA and conduct their own testing was delayed due to the pandemic. Moving forward, OTAQ has shifted some of the testing for the proposed rulemaking to facilities operated by contractors for EPA, which allows EPA experts to oversee critical elements of the testing while also allowing us to conduct select testing at the EPA facility.

### Impact on Enforcement Referrals

OTAQ does not believe that pandemic-related disruptions to NVFEL operations affected the number of cases referred by OTAQ to OECA in 2020.<sup>3</sup> As confirmed by prior OIG reporting, OTAQ and OECA staff meet at least weekly to discuss emerging and ongoing compliance concerns. According to OTAQ, these meetings continued while the lab was closed and led to several new compliance cases for OECA during 2020. These regular discussions help determine whether a compliance issue is a violation of the law that merits enforcement action by OECA. Given that the transition from an initial concern to an actual allegation of a violation often occurs over a year or more, OTAQ said that it is possible fewer cases will become allegations of a violation over the coming years due to reduced testing in 2020. However, in 2020, OTAQ said that, together with OECA, it continued to find and work through a high volume of potential enforcement issues comparable to pre-pandemic volumes.

### Challenges NVFEL Faces in Supporting OTAQ Regulatory Development and Compliance Programs

According to OTAQ, the greatest challenges to supporting the compliance programs during the coronavirus pandemic were OTAQ's inability to conduct testing at NVFEL and the inability of staff to travel.



The EPA's heavy-duty chassis dynamometer. The top picture shows the front of the heavy-duty chassis dynamometer while the bottom picture shows the back. (EPA OIG photos)

<sup>3</sup> Referrals from OTAQ to OECA involve extensive discussions between the two offices before OECA decides to take a case. Therefore, the timing of when a compliance concern becomes a referral that is accepted by OECA for investigation or prosecution as an enforcement case is difficult to determine with precision.

#### OTAQ stated:

It is generally less efficient to test/audit/observe remotely than to conduct such activities in person or in house, creating logistical and potential testing issues. Inability to travel...caused difficulties for EPA and manufacturers... On-site work efficiency and productivity is adversely affected by the lack of face-to-face interaction and the inability to schedule multiple workers (working together and/or in concert) in a test area at the same time.

In addition to the activities described above, OTAQ said that, along with its stakeholders, it is improving its use of technology so it will be the best substitute for in-person interactions. For example, NVFEL addressed the challenge of managing remote and on-site work by expanding its use of virtual collaboration tools, including using tablets and implementing an expanded lab Wi-Fi network, to facilitate “face-to-face” communication between people on- and off-site. In addition, NVFEL accelerated the connection of laboratory computers to the Agency network and created a central repository on the network for accessing certain laboratory test data to facilitate the review and analysis of critical data by staff working remotely.

#### Conclusions

NVFEL has faced and continues to face challenges in adapting to the coronavirus pandemic while maintaining a strong compliance presence and engaging with the regulated community. While there have been impacts due to the pandemic, including laboratory closure, NVFEL mitigated these impacts on its compliance programs.

## ***Scope and Methodology***

We conducted this evaluation from December 2020 through April 2021 in accordance with the *Quality Standards for Inspection and Evaluation* published in January 2012 by the Council of the Inspectors General on Integrity and Efficiency. Those standards require that we perform the evaluation to obtain sufficient, competent, and relevant evidence to provide a reasonable basis for our findings, conclusions, and recommendations based on our objectives. While we did not independently verify every data element provided by the EPA, we believe that the evidence obtained provides a reasonable basis for our findings and conclusions.

We interviewed NVFEL staff and reviewed information that describes what NVFEL was and is doing to ensure compliance while the laboratory was closed during the beginning of the coronavirus pandemic and as it returns to full operational status. We reviewed fuel economy and emissions testing services provided at NVFEL before the coronavirus pandemic and services available during the pandemic, including the:

- EPA's estimates of when specific testing services are expected to return.
- Target and actual laboratory test volumes prior to and during the pandemic.
- Overall vehicle and engine compliance testing in 2019 and 2020.
- Percentage and number of NVFEL personnel required to conduct testing analysis or other duties on-site.
- Documents explaining the manufacturers' inability to report required compliance information.
- Manufacturers' reasons for not reporting required information.
- Requests for regulatory flexibilities submitted by manufacturers and which requests the EPA has granted.
- Guidance letters from the EPA to manufacturers in response to the coronavirus pandemic.
- Guidance NVFEL used when developing its facility-specific return to work plan.

## ***Distribution***

The Administrator  
Deputy Administrator  
Chief of Staff, Office of the Administrator  
Deputy Chief of Staff, Office of the Administrator  
Chief Financial Officer  
Assistant Administrator for Air and Radiation  
Agency Follow-Up Coordinator  
General Counsel  
Associate Administrator for Congressional and Intergovernmental Relations  
Associate Administrator for Public Affairs  
Principal Deputy Assistant Administrator for Air and Radiation  
Deputy Assistant Administrator for Air and Radiation  
Deputy Assistant Administrator for Mobile Sources, Office of Air and Radiation  
Senior Advisor to the Assistant Administrator, Office of Air and Radiation  
Director, Office of Transportation and Air Quality, Office of Air and Radiation  
Director, Office of Continuous Improvement, Office of the Chief Financial Officer  
Audit Liaison, Office of Transportation and Air Quality, Office of Air and Radiation  
Audit Follow-Up Coordinator, Office of Air and Radiation  
Audit Follow-Up Coordinator, Office of the Administrator