

**VOLKSWAGEN’S “DEFEAT DEVICE:”
UPDATE AND IMPLICATIONS FOR CALIFORNIA**

Senate Transportation and Housing and Environmental Quality Committees
Joint Oversight Hearing

Tuesday, March 8, 2016
1:30 p.m. — John L. Burton Hearing Room (4203)

BACKGROUND PAPER

Introduction

California has some of the most severe air-quality problems in the country. Nationally and statewide, the transportation sector is responsible for a major fraction of air pollution. Accordingly, the United States Environmental Protection Agency (U.S. EPA) regulations require that, prior to introducing a vehicle for sale in the U.S., manufacturers demonstrate that the vehicle meets federal emissions standards. In California, manufacturers must additionally demonstrate compliance with state air-quality standards. Manufacturers who fail to comply are subject to civil penalties and other enforcement actions.

On September 3, 2015, representatives of Volkswagen admitted to staff of U.S. EPA and California Air Resources Board (ARB) that a large number of their vehicle engines had been designed and manufactured with a “defeat device” to bypass, defeat, or render inoperative elements of the vehicles’ emissions control system. As a result, these vehicles are able to pass emissions tests despite exceeding federal emissions standards by up to 40 times. This is due to the fact that the emission control system works while the vehicle is being tested, but is turned off by the defeat device when the car is being driven on the road. According to vehicle sales data, there are estimated to be 617,000 of these vehicles nationally, 79,400 of which are in California.

This hearing will seek to answer the following questions:

- How was the defeat device discovered?
- How are U.S. EPA and ARB addressing the violations?

- How will California's air quality be impacted?
- How do we prevent this from happening again?

Discovery of the Defeat Device

As early as 2013, regulators in California and the European Union noticed that emissions from Volkswagen diesel engines were higher than expected when the cars were tested in actual operating conditions. Clear evidence that the vehicles' on-road emissions deviated from the levels registered in a laboratory setting came in May 2014, in a study by researchers at West Virginia University (WVU) working on behalf of the International Council for Clean Transportation (ICCT) and in cooperation with ARB.

ICCT had sought to test diesel cars sold in the U.S. market because they suspected that car companies could create cleaner vehicles than they were currently selling in Europe. Researchers were not attempting or expecting to catch violations. Manufacturers declined to participate in the test, so the researchers rented private cars, including a Volkswagen Passat and a Volkswagen Jetta. The vehicles met emissions standards when they were tested in ARB's labs, but substantially exceeded legal limits when the researchers measured emissions with portable devices as the cars were driven through urban Los Angeles and on a long-distance road trip.

The results of the WVU/ICCT study prompted both ARB and U.S. EPA to launch their own investigations. Volkswagen proposed a software recalibration "fix" for the problem, and in December 2014 initiated a voluntary recall of diesel vehicles from model years 2009-2014 — about 500,000 U.S. cars, an estimated 75,688 of them in California. ARB tests conducted the following spring, however, indicated that Volkswagen's fix only slightly improved on-road emissions, and oxides of nitrogen (NOx) emissions were still much higher than expected.

Volkswagen's Admission

In the months that followed, ARB and U.S. EPA held a series of technical meetings with Volkswagen officials. In a meeting on September 3, 2015, Volkswagen officials admitted that the diesel vehicles under scrutiny had been designed and manufactured with software that improved their environmental performance during laboratory testing only. This "defeat device" — a term taken from the language of the federal Clean Air Act — worked by detecting when the vehicle was undergoing emissions testing and activating elements of its emissions control system that would not run when the vehicle was in regular use. As a result, vehicles that emit up to 40 times more

pollution than allowed under federal emissions standards were able to successfully pass emissions tests.

The Clean Air Act defines a defeat device as “an auxiliary emission control device (AECD) that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use.” A manufacturer may equip a vehicle with a defeat device if it can justify the need for it in terms of preventing damage or accident, the AECD does not go beyond the requirements of engine starting, and the manufacturer discloses this information in its application to U.S. EPA for its certificate of conformity. Volkswagen failed to disclose the defeat device in any of its applications.

ARB and U.S. EPA’s Actions and Volkswagen’s Response

On September 18, 2015, U.S. EPA issued a Notice of Violation of the Clean Air Act to Volkswagen AG, Audi AG, and Volkswagen Group of America. The notice covered Volkswagen and Audi vehicles from model years 2009-2014 with 2.0-liter diesel engines. On the same day, ARB issued Volkswagen a directive requiring Volkswagen and Audi to develop a recall plan for the affected cars. In late September, U.S. EPA and ARB announced enhancements to their testing procedures for all vehicles.

Days after U.S. EPA and ARB commenced formal action, Volkswagen CEO Dr. Martin Winterkorn resigned. The company suspended top officials in the research and development departments for its Volkswagen, Audi, and Porsche brands and began a restructuring of its North American operations shortly thereafter. Volkswagen also took steps to regain the trust of its U.S. customers, offering those with 2.0-liter diesel cars a \$500 prepaid Visa gift card, a \$500 dealership card, and free 24-hour roadside assistance for three years.

On October 6, 2015, the U.S. House Energy and Commerce Committee called U.S. EPA officials and Volkswagen Group of America President and CEO Michael Horn to testify at a hearing on the emerging scandal. In the hearing, Horn stated that “We know that we can fix these vehicles to achieve emissions standards,” adding that the mileage of the vehicles would not be affected by the fix. Horn further stated that “Our plan is not to buy back the inventory — our plan is to fix the cars.”

On November 2, 2015, U.S. EPA issued a second Notice of Violation, this one additionally including Volkswagen subsidiaries Porsche AG and Porsche Cars North America. The second notice targeted 2014-2016 model year vehicles with 3.0-liter engines. Federal regulators alleged that the defeat devices on these cars concealed NO_x

emissions nine times above the EPA's limit. While Volkswagen initially claimed that its 3.0-liter models were not equipped with the illegal technology, less than three weeks later the company admitted that it had installed defeat devices on all 3.0-liter diesel engine models sold on the U.S. market since 2009 — an estimated 89,000 cars. ARB gave Volkswagen 45 business days to submit a recall plan for this second set of non-compliant vehicles.

Volkswagen's Recall Plans

On November 20, 2015, Volkswagen submitted its recall plan for affected 2.0-liter engine vehicles to ARB. Within a few days of receiving the plan, ARB informed the company that the plan was insufficient. Volkswagen submitted additional information to bolster the plan and requested an extension for a supplemental plan. ARB responded on January 12, 2016 by formally rejecting both the extension request and the original recall plan. At this point, ARB also issued its own Notice of Violation to the company, citing a number of violations and stating that "VW's submissions are incomplete, substantially deficient, and fall far short of meeting the legal requirements to return these vehicles to the claimed certified configuration."

Volkswagen submitted its recall plan for 3.0-liter engine vehicles to ARB on February 2, 2016; ARB is currently reviewing the plan.

Litigation

On January 4, 2016, the U.S. Department of Justice filed a civil complaint on behalf of U.S. EPA against Volkswagen AG and five subsidiary companies for violations of the Clean Air Act in nearly 600,000 vehicles. Several hundred class action lawsuits have also been filed against Volkswagen by vehicle owners and municipalities, nearly a fifth of them in California jurisdictions. These suits were consolidated in the Northern California federal district court in December and the federal complaint will likely also be transferred to this multidistrict proceeding.

The California Department of Justice has issued investigative subpoenas and interrogatories to a number of witnesses and is working closely with state and federal agencies, including ARB, but has not yet filed a lawsuit.

Why This Matters: Air Quality in California

California has some of the most severe air pollution problems in the country. The South Coast and San Joaquin air basins, which contain over half of the state's population, are

extreme nonattainment regions (the highest degree of severity) for ozone pollution and are both nonattainment regions for particulate matter (PM).

Ground level ozone (or tropospheric ozone) is a primary component of smog and is formed from the reaction of NO_x with volatile organic compounds in sunlight. Ozone has a number of negative health effects including irritated respiratory system, reduced lung function, aggravated asthma, and inflammation and damage of the lining of the lungs. Active children are at highest risk from ozone exposure.

PM can be directly emitted or can be formed in the atmosphere when gaseous pollutants such as sulfur dioxide and NO_x react to form fine particles. Very fine particulate matter is particularly dangerous since it burrows deep into the lungs where it can enter the bloodstream and harm the heart and other organs. Fine particulate pollution poses an especially critical health danger for children, the elderly, and people with existing health problems. Exposure to PM 2.5 is also linked to cardiovascular disease. A 2010 ARB analysis based on scientific assessments by U.S. EPA reported that approximately 9,000 people in California are estimated to die prematurely each year as a result of exposure to fine particle pollution.

On October 17, 2013, the specialized cancer agency of the World Health Organization, the International Agency for Research on Cancer, classified outdoor air pollution, and PM as a major component of outdoor air pollution, as carcinogenic to humans.

Transportation Is a Key Contributor to Air Pollution

Nationally and statewide, the transportation sector is responsible for a major fraction of air pollution, and in particular NO_x, which contributes to both ozone and PM formation. Across the U.S., motor vehicles emit more than half of all NO_x emissions. In California, the transportation sector accounts for approximately 80% of the NO_x emissions.

According to ARB's executive officer, due to stringent vehicle emissions standards and the variety of programs targeting mobile emissions, vehicles and equipment are over 90% cleaner than a decade ago. However, the NO_x emissions reductions needed to meet federal ozone standards continue to be formidable. Last October, ARB staff released a draft mobile source strategy to achieve an additional 80% reduction of NO_x emissions from today's levels by 2031.

Federal and State Air Quality Laws

The federal Clean Air Act and its implementing regulations are intended to protect public health and environmental quality by limiting and reducing pollution from various sources. Under the Clean Air Act, U.S. EPA establishes National Ambient Air Quality Standards (NAAQS) that apply to outdoor air throughout the country. These federal standards exist for several air pollutants due to their negative impact on public health above specified concentrations, including ozone, PM, NO_x, oxides of sulfur (SO_x), carbon monoxide, and lead. U.S. EPA reviews each NAAQS at five-year intervals to ensure that the standards are based on the most recent scientific information.

Regions that do not meet the national standards for any one of the standards are designated nonattainment areas. The Clean Air Act sets deadlines for attainment based on the severity of nonattainment and requires states to develop comprehensive plans, known as the state implementation plan (SIP), to attain and maintain air-quality standards for each area designated nonattainment for an NAAQS.

State and federal law require nonattainment regions of California to meet existing clean air standards by 2015 for annual PM 2.5, and by 2023 for the 8-hour average ozone standard. The South Coast and San Joaquin air basins recently missed the 2015 attainment deadline for the last PM 2.5 standard. Additionally, tougher federal air-quality standards for both particulates and ozone issued in 2006 and 2008 will require reductions in those regions well above and beyond those already planned.

Federal Regulation of Mobile Sources

As vehicles are one of the primary sources of air pollution nationally, the Clean Air Act authorizes U.S. EPA to establish and regulate emissions standards for mobile sources. These regulations include vehicle emission limits for hydrocarbons, carbon monoxide, NO_x, and particulates.

Current federal emissions requirements for new motor vehicles ("Tier 2" standards) began in 2000 and were phased in from model year (MY) 2004 to MY 2009. Specifically for NO_x, the Tier 2 standards required 88% to 95% reductions, depending on vehicle type. New vehicle emissions standards, or Tier 3 standards, were promulgated in 2014 and will be phased in from MY 2017 to MY 2025. Tier 3 standards for light-duty vehicles represent an 80% reduction compared to Tier 2 current standards (fleet average) for NO_x and a 70% reduction in per-vehicle PM standards.

U.S. EPA regulations require that, prior to introducing a vehicle for sale in the U.S., manufacturers obtain a certificate of conformity (COC). Certification requires manufacturers to demonstrate that the vehicle meets emissions standards. The COC application is required to list and justify all AECDs.

Manufacturers who sell new vehicles without a valid EPA-issued COC violate the Clean Air Act and are subject to civil penalties of up to \$37,500 per violation.

State Regulation of Mobile Sources

State law assigns ARB with primary responsibility for control of mobile-source air pollution, including adoption of rules for reducing vehicle emissions and the specification of vehicular fuel composition.

California, due to its preexisting vehicle-emission standards and severe motor vehicle air pollution problems, is authorized under the Clean Air Act to implement separate mobile emission standards from the federal government. Other states may choose to follow either the national standard or the stricter California standards.

Pursuant to its authority to control mobile-source air pollution, ARB has a host of programs designed to reduce emissions from mobile sources to help meet state and federal air-quality standards, including the Low-Emission Vehicle (LEV) standards for passenger vehicles. Adopted in 1990, the LEV I standards applied from 1994 through 2003. Amendments adopted in 1998, termed LEV II, tightened the fleet average emission standards for 2004-2010, and required significantly lower NO_x emissions from specific vehicle categories. In 2012, ARB adopted the LEV III amendments, which include more stringent emission standards for both criteria pollutants, including NO_x, and greenhouse gases for new passenger vehicles.

As with the federal program, vehicles are not legal for sale in California until they are certified. To be certified by ARB, a vehicle must demonstrate that its exhaust and emission-control systems are durable and comply with the emission standards for the vehicle's useful life. This is done through durability and certification testing of the prototype certification vehicles. In California, an application for certification must be submitted to, and approved by, both the ARB and U.S. EPA concurrently.

ARB's In-Use Compliance Program aims to ensure that manufacturers' vehicles meet emissions standards throughout their useful lives. The program obtains a limited sample of vehicles from a given test group or engine family and duplicates the manufacturers' vehicle emissions certification tests.

In the case of noncompliance within a given engine family, corrective action is usually taken in the form of a statewide recall in which the manufacturer will notify all affected vehicle owners and state when and where to seek the recall repair.

A violation of the requirement for certification can subject the vehicle manufacturers to enforcement actions, including a fine of up to \$5,000 per vehicle.

Questions for the Committee to Consider

The committee may wish to consider the following questions:

- Is ARB considering instituting on-road emissions tests to help prevent this situation from occurring again?
- Are ARB and/or U.S. EPA considering any other changes to the engine certification process?
- Is ARB investigating any other automakers for emissions violations?
- Should the state create stronger penalties to discourage non-compliance?
- Should diesel engine light-duty vehicles be eliminated from the California market?
- What is the potential emissions impact of Volkswagen's defeat device and how will it be mitigated?
- What is the impact on the owners of the affected vehicles and how might this impact be mitigated?

Attachment: Timeline of Events Related to Volkswagen's "Defeat Device"