



Emission Check Handbook for Authorized Emission Specialists and Authorized Repair Facilities



DEPARTMENT OF
ECOLOGY
State of Washington

Revised September 2016
Eighth Edition
Publication no. 95-210

Publication and Contact Information

This report is available on the Department of Ecology's website at <https://fortress.wa.gov/ecy/publications/SummaryPages/95210.html>

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Emission Check Handbook for Authorized Emission Specialists and Authorized Repair Facilities

by

Emission Check Field Services Staff

Air Quality Program
Washington State Department of Ecology
Olympia, Washington

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Acknowledgments

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First Edition August 1995

First Revision January 1996

Second Edition September 1998

Third Edition..... February 2004

Fourth Edition..... March 2008

Fifth Edition January 2010

Sixth Edition January 2012

Revised Sixth Edition January 2013

Seventh Edition..... January 2015

Eighth Edition..... September 2016

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Introduction

The Emission Check Program

Thank you for participating in the Emission Check Program. This program is comprised of two components, Inspection and Maintenance, referred to as I/M. Most motorists see only the inspection side, the test facility. However, thanks to maintenance and repair work performed by the automotive service industry, vehicle emissions are being lowered.

You make cars run cleaner

How important is the industry's participation? According to the Department of Ecology's review of Emission Check Program records, repaired vehicles showed average emission reductions of 73% for carbon monoxide and 75% for hydrocarbons.

Waived vehicles showed average emission reductions of 37% for carbon monoxide and 14% for hydrocarbons.

Results like these make it clear that appropriate repairs directed at reducing emissions make a major difference in the air we breathe. The repairs to the dirtiest vehicles make the entire group of vehicles in the Emission Check area more than 20% cleaner. This helps keep the air healthier for everyone.

Asthma attacks can come from air pollution. Research has shown that children and seniors are more susceptible to breathing challenges due to air pollution. In addition, since children breathe twice as often and twice as much air as adults, we want to reduce air pollution as much as possible for their young lungs.

We help each other

Your participation in the Emission Check Program is 100% voluntary. There are rules to ensure effective repairs and maintain consumer confidence. Ecology authorizes both the emission specialists and the vehicle repair facilities.

Ecology provides the following for shops and technicians in the Emission Check Program:

- A list of Emission Check shops available online at www.emissiontestwa.com. Statewide, over 100,000 vehicles are referred annually to the authorized shops.
- Technical support available through your local field office. When in doubt about a part, procedure, or problem, do not guess, call. The toll free number is 1-800-272-3780 or 509-329-3491 if calling from Spokane.

Save and use this handbook

There are three areas of information covered in this manual:

- Emission Check rules and policies that apply to participating automotive repair businesses.
- Practical information and tips from Ecology's Emission Check field staff.
- General information, which includes maps, charts, agency forms, and internet links.

This handbook describes how the Emission Check Program works and how it is supervised.

The laws that authorize the Emission Check Program are included in the Revised Code of Washington (RCW): Chapter 70.120A Motor Vehicle Emission Standards.

The regulations are included in the Washington Administration Code (WAC): Chapters 173-421 Emission Controls, Inspections, and 173-422A Motor Vehicle Emission Inspection.

This handbook does not replace technical training or experience. Your skills and background are important. They help keep Washington a healthier place to breathe.

Chapter 1: The Basics

What is Washington State's Emission Check Program?

Our program helps identify grossly polluting vehicles. It is part of the same national strategy that requires automobile manufacturers to build vehicles with pollution controls. I/M programs like Emission Check help make sure that each vehicle's emission control system is doing its job. Parts of the country that have had air pollution problems use I/M programs to attain or maintain good air quality.

History: The Emission Check Program began in Seattle and surrounding areas in 1982 with an idle only test. At this time, the test was designed to pinpoint gross polluters and the limits were set quite high at 6.0% Carbon Monoxide (CO) and 1000 ppm Hydrocarbons (HC). Spokane and surrounding areas began testing in 1985. During 1990, two-speed testing began so both cruise and idle emissions could be tested. The emission standards were lowered over time and included multiple ranges to cover the various years of vehicles on the road. In 1993, responding to changes in the federal Clean Air Act, Ecology expanded the program to include the Vancouver area, and more of the Spokane and the Puget Sound regions. Diesel vehicles also began to be tested. Most vehicles were tested on a dynamometer to replicate on road conditions. Changes in 2002 kept pace with technology and the needs of the environment by adding an On Board Diagnostics II (OBDII) Diagnostic Trouble Codes (DTCs) check. The computer instead of the tail pipe now tested model years 1996 and newer gasoline cars, and light duty trucks. With technology advances, the test program was changed once more in 2012. Fewer vehicles are tested due to new car standards and administrative moves to simplify the testing process. A significant change was the move toward being a "Hybrid" program. Meaning that Emission testing may also be performed at retail establishments as well as the test stations. These retail test stations are called Authorized Test Facilities (ATFs)

Gasoline vehicle inspection: The program tests for DTC on OBDII compliant vehicles and HC and CO emissions are tested at the tail pipe on older and heavy-duty vehicles.

Diesel vehicle inspection: The program tests for the opacity or smoke density of the exhaust plume. The standard SAE J-1667 snap method is used. This incorporates a series of throttle snaps to clear and then sample the exhaust plume.

Vehicles affected in an emissions check area: Unless otherwise exempted, vehicles less than 26 years, gasoline vehicles older than model year 2009, and diesel vehicles older than model 2007 are tested. Vehicles determined by the Environmental Protection Agency (EPA) to exceed 50 mpg are exempt. These are the Toyota Prius and Honda Insight. Vehicles registered as being solely powered by Compressed Natural Gas (CNG), Liquid Petroleum Gas (LPG), or electricity are exempt. Diesel vehicles with a scale weight of less than 6000 lbs are also exempt. The test is determined by model year. The test cycle for 1995 and older vehicles is even year vehicles test in even years and odd year vehicles in odd years. The test cycle for 1996 and newer vehicles is odd year vehicles test in the even years and even year vehicles test on the odd years.

A passing Emission Check certificate is valid for twelve (12) months.

Fees at an Applus test station: Fees are \$15 cash (No Canadian funds), check (traveler's checks maximum \$50) or credit card (Master Card, Visa, Discover). The fee includes one free retest after the initial failure, but after that, each additional inspection is \$15.

Fees at an ATF: Fees are set by the ATF's price schedule and may vary from shop to shop. Vehicles that fail the emission test will NOT receive a free re-test at an Applus test station or an ATF.

Vehicles that fail: Over 90% of all tested vehicles in Washington pass the first inspection. If the vehicle fails, the driver receives a list of Ecology authorized repair shops. Most vehicles, nearly 50,000, pass the first retest and another 8,000 pass the second retest, after receiving appropriate repairs or diagnostics. Emission Check's goal is to reduce emissions. There is no restriction on who performs repair work, as long as the vehicle passes a retest. However, to be eligible for the waiver program, an Authorized Emission Specialist must perform repairs at an authorized repair shop.

Waivers: A vehicle owner may obtain a waiver after attempting to have the vehicle repaired or properly diagnosed. To be eligible for a waiver, these repairs and/or diagnostics must be made by an AES at an authorized repair shop. The cost of parts, labor, supplies, and sales tax must total at least \$150.00. The waiver process allows motorists to avoid costs that many cannot afford. Waivers are issued by test facility staff and, in certain cases, by Ecology. Less than three percent of all vehicles inspected receive a waiver. The waiver is for the current test cycle. There is no limit to how often a customer may receive a waiver.

Telephone help: Motorists are able to call Ecology's Emission Check staff with questions or concerns at the numbers listed by county.

King, Snohomish, Pierce, and Clark, counties: 1 (800) 272-3780
Spokane County (509) 329-3491

Air Pollution

What is air? Air contains about 78% nitrogen, 21% oxygen, and one percent other gases, plus water vapor. The oxygen in the air keeps people and animals alive. The nitrogen is inert; it does not help and it does not hurt. Most of the other gases, but not all, are harmless, too.

How much air does a person need? Each day you breathe about 35 pounds of air. That is about 3,400 gallons a day or two gallons a minute. Compare that to your need for water; several glasses a day. Without water, you can live a few days. Without air, you may last a few minutes, at most.

What is air pollution? Air pollution, in one form or another, has always existed. In nature, pollution comes from volcanoes, dust storms, decaying vegetation, and even evergreen forests. People cannot control this kind of pollution. However, we can control the types of pollution we cause. Air pollution can affect our health at relatively low concentrations measured in parts per million or billion, depending on the pollutant.

How much do automobiles pollute the air? Vehicles contribute a large share of the air pollution caused by humans. Vehicles contribute about half of both HC and Oxides of Nitrogen (NO_x), as well as three quarters of the CO.

How much air pollution is too much? Since even nature does not produce pure air, people cannot expect to eliminate all pollution. The federal government has set health standards for the outdoor air. These standards set limits on how much of each of the major pollutants the air can contain and still not cause health problems. Pollution control efforts aim to meet these health standards.

How are automobile emissions controlled? Since 1968, the U.S. Government has required automakers to control the amount of pollution in the exhaust. The carmakers redesigned parts of the engine and developed emission control systems. Today's cars produce many times less pollution than those built before the 1968 emission requirements.

Why do only some places have emission inspections? Most air pollution occurs in and around large cities where most of the people and most motor vehicles are located. Based on air pollution monitoring, the U. S. Government has declared "nonattainment" areas in places that have had trouble keeping air pollution within the health standard. In these non-attainment areas, the federal government requires states to monitor for and to improve air quality. Pollution from motor vehicles contributes to the problem. If a non-attainment area succeeds in achieving good air quality, it becomes a "maintenance area" and I/M programs often remain in place to help keep air pollution under control.

What are the problem emissions from cars and trucks? In Washington, they are carbon monoxide and hydrocarbons from gasoline vehicles, and fine particles from diesel vehicles.

- **Carbon monoxide** is produced in large quantities by the automobile. It is a result of incomplete combustion of gasoline. It is a colorless, tasteless, and odorless gas. CO displaces oxygen in the blood. The highest levels occur in cities where traffic is concentrated. The most likely times for high CO levels are the calm, cold periods between storms in the winter. Urban areas in Washington State seldom have CO problems anymore.
- **Hydrocarbons** are vapors of unburned gasoline. They can irritate the eyes and some hydrocarbons are known or suspected causes of cancer and other health problems. On sunny, hot days, they mix with other air pollution to form ozone (smog) at ground level. This is not the same as the depletion of the ozone layer high in the atmosphere. Ozone irritates eyes and breathing passages, and harms crops and forests. The most likely times for high ozone levels are on sunny, calm hot summer days.
- **Particulate matter (PM)** are fine particles produced by diesel engines. The particles are too small to see with the naked eye except when concentrated as smoke. They can be present even when there is no obvious smoke. The particles are easily inhaled deep into the lungs. They can damage the delicate tissue that allows oxygen to pass from the air to the blood. In addition, toxic chemicals can "hitchhike" into the lungs on these particles. . Periods of calm winter weather and during temperature inversions are the most likely times for high levels of fine particles. "Burn Bans" are often called during these periods.

Gasoline engine emission controls

The need to control the emissions from automobiles gave rise to the computerization of the automobile. HC, CO and NO_x are created during the combustion process and are emitted into the atmosphere from the tail pipe. There are also hydrocarbons emitted as a result of vaporization of gasoline and from the crankcase of the automobile. The clean air act of 1977 set limits as to the amount of each of these pollutants that could be emitted from an automobile. The manufacturers answer was the addition of certain pollution control devices and the creation of a self-adjusting engine. 1981 saw the first of these self-adjusting engines. They were called feedback fuel control systems. An oxygen sensor was installed in the exhaust system and would measure the fuel content of the exhaust stream. It then would send a signal to a microprocessor, which would analyze the reading and operate a fuel mixture or air mixture device to create the proper air/fuel ratio. As computer systems progressed, they were able to adjust ignition spark timing as well as operate the other emission controls that were installed on the vehicle. The computer is also capable of monitoring and diagnosing itself. If a fault is seen, the computer will alert the vehicle operator by illuminating a malfunction indicator lamp. The computer will at the same time record the fault in its memory, so that a technician can at a later date retrieve that fault in the form of a code, which will help them determine the proper repair. The following are some of the more typical emission control devices installed on an automobile.

PCV valve: The purpose of the positive crankcase ventilation (PCV) system is to take the vapors produced in the crankcase during the normal combustion process, and redirecting them into the air/fuel intake system to be burned during combustion. These vapors dilute the air/fuel mixture so they have to be carefully controlled and metered in order to not affect the performance of the engine. This is the job of the positive crankcase ventilation (PCV) valve. At idle, when the air/fuel mixture is very critical, just a little of the vapors are allowed in to the intake system. At high speed when the mixture is less critical and the pressures in the engine are greater, more of the vapors are allowed in to the intake system. When the valve or the system is clogged, vapors will back up into the air filter housing or at worst the excess pressure will push past seals and create engine oil leaks. If the wrong valve is used or the system has air leaks, the engine will idle rough, or at worst, engine oil will be sucked out of the engine.

Evaporative controls: Gasoline evaporates quite easily. In the past, these evaporative emissions were vented into the atmosphere. 20% of all HC emissions from the automobile are from the gas tank. In 1970 legislation was passed, prohibiting venting of gas tank fumes into the atmosphere. An evaporative control system was developed to eliminate this source of pollution. The function of the fuel evaporative control system is to trap and store evaporative emissions from the gas tank and carburetor. A charcoal canister is used to trap the fuel vapors. The fuel vapors adhere to the charcoal, until the engine is started, and engine vacuum can be used to draw the vapors into the engine, so that they can be burned along with the fuel/air mixture. This system requires the use of a sealed gas tank filler cap. This cap is so important to the operation of the system, that a test of the cap is now being integrated into many state emission inspection programs. Pre-1970 cars released fuel vapors into the atmosphere through the use of a vented gas cap. Today with the use of sealed caps, redesigned gas tanks are used. The tank has to have the space for the vapors to collect so that they can then be vented to the charcoal canister. A purge valve is used to control the vapor flow into the engine. The purge valve is operated by engine vacuum. One common problem with this system is that the purge valve goes bad and engine vacuum draws fuel directly into the intake system. This enriches the fuel mixture and will foul the spark plugs.

Most charcoal canisters have a filter that should be replaced periodically. This system should be checked when fuel mileage drops.

EGR valve: The purpose of the exhaust gas recirculation valve (EGR) valve is to meter a small amount of exhaust gas into the intake system. This dilutes the air/fuel mixture to lower the combustion chamber temperature. Excessive combustion chamber temperature creates oxides of nitrogen, which is a major pollutant. While the EGR valve is the most effective method of controlling oxides of nitrogen, in its very design it adversely affects engine performance. The engine was not designed to run on exhaust gas. For this reason, the amount of exhaust entering the intake system has to be carefully monitored and controlled. This is accomplished through a series of electrical and vacuum switches and the vehicle computer. Since EGR action reduces performance by diluting the air /fuel mixture, the system does not allow EGR action when the engine is cold or when the engine needs full power.

Catalytic converter: Automotive emissions are controlled in three ways, one is to promote combustion that is more complete so that there are less by products. The second is to reintroduce excessive hydrocarbons back into the engine for combustion and the third is to provide an additional area for oxidation or combustion to occur. This additional area is called a catalytic converter. The catalytic converter looks like a muffler. It is located in the exhaust system ahead of the muffler. Inside the converter are pellets or a honeycomb made of platinum or palladium. The platinum or palladium are used as a catalyst (a catalyst is a substance used to speed up a chemical process). As hydrocarbons or carbon monoxide in the exhaust are passed over the catalyst, it is chemically oxidized or converted to carbon dioxide and water. As the converter works to clean the exhaust, it develops heat. The dirtier the exhaust, the harder the converter works and the more heat that is developed. In some cases, the converter can be seen to glow from excessive heat. If the converter works this hard to clean a dirty exhaust it will destroy itself. In addition, leaded fuel will put a coating on the platinum or palladium and render the converter ineffective. This is why, in the U.S.A., all fuels designed for automobile engines are now unleaded.

Air injection: Since no internal combustion engine is 100% efficient, there will always be some unburned fuel in the exhaust. This increases hydrocarbon emissions. To eliminate this source of emissions an air injection system was created. Combustion requires fuel, oxygen, and heat. Without any one of the three, combustion cannot occur. Inside the exhaust manifold, there is sufficient heat to support combustion, if we introduce some oxygen than any unburned fuel will ignite. This combustion will not produce any power, but it will reduce excessive hydrocarbon emissions. Unlike in the combustion chamber, this combustion is uncontrolled, so if the fuel content of the exhaust is excessive, explosions that sound like popping will occur. There are times when under normal conditions, such as deceleration, when the fuel content is excessive. Under these conditions, we would want to shut off the air injection system. This is accomplished through the use of a diverter valve, which instead of shutting the air pump off, diverts the air away from the exhaust manifold. Since all of this is done after the combustion process is complete, this is one emission control that has no effect on engine performance. The only maintenance that is required is a careful inspection of the air pump drive belt.

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Chapter 2: General Requirements

Authorized emission specialists

An Authorized Emission Specialist (AES) must be familiar with Chapter 173-421 WAC and Chapter 173-422A WAC, which are included in appendices C and D of this handbook.

To become an AES, one must:

- Complete a course of study and/or pass an examination meeting Department of Ecology requirements.
- Sign an AES inclusion form agreeing to abide by the requirements for an AES.

When these two steps are met, Ecology issues an AES certificate to the technician. The certificate contains the specialist's number and an expiration date. It also states whether the specialist is authorized for gasoline or diesel engines or both. The certifications are valid for two years. Before your certificate expires, make sure your training is current if you want to continue as an AES.

Notify Ecology when you change employment or locations. Your work may not be accepted toward processing a waiver if work is performed at a shop in which you are not registered.

There are separate training and certificates for those who are ATF testers. ATF testers are not required to also be an AES. ATF training is a hands-on class with the analyzer that they are assigned to.

Training is available for both gasoline and diesel technicians

Ecology works with community colleges, technical colleges, and independent instructors to provide quality training that is affordable and convenient.

Ecology also approves other training. Contact Ecology for training opportunities or courses available for the Washington Emission Check requirements.

Ecology may also accept the ASE L1 or ASE A1, A6, A8, or other auto manufacturer's technical training courses. If you have taken one of these courses or tests, please provide your Ecology Emission Check field office with a copy of your certificate from that program. You will need to study this manual and take a short exam to show your knowledge of the state requirements.

Ecology staff may provide training and exams for diesel specialists. Contact your Regional Ecology representative for information.

To maintain certification

An AES may work at only one Emission Check authorized shop. You may sign Emission Check test forms only for your own work at that shop. There are exceptions allowed for some fleet situations.

Again, you must notify Ecology when you change employment. Your work may not be accepted if it is performed at a shop in which you are not registered.

You must never tamper with emission control systems, including adjusting an engine outside of the manufacturer's specifications.

You must not obtain or attempt to obtain a certificate of compliance (passing test report), certificate of acceptance (repair waiver) or an exemption from Emission Check requirements by providing false information or any fraudulent means.

Do not violate or help someone else to violate Chapter 173-421 WAC (illegal engine switching or alterations of emission control components) or Chapter 173-422A WAC (overall Emission Check Program).

Sign and clearly write your AES number on the Vehicle Inspection Report. Remember to do this even if you have only completed a partial repair or if the vehicle is not eligible right now for a waiver. Your signature only indicates that you performed the diagnostics and repair indicated on your repair order.

Under WAC 173-422A-400, Ecology may suspend or permanently remove a specialist from the Emission Check Program for a violation.

If you perform an illegal engine swap or alter emission control components or if you create fraudulent repair waivers, your certificate can be suspended for up to one year for a first offense and permanently revoked for a second offense.

If your certificate is suspended or revoked, you have the right to appeal within 30 days to the Washington State Pollution Control Hearings Board.

If your certificate is suspended, you may apply for a new certificate one year after the date of suspension. You must meet all the requirements outlined earlier in this chapter in "To Become an AES."

Ecology will not issue a new certificate to someone whose AES certificate was permanently revoked.

Authorized emission check repair facilities

Repair shops may become Authorized Emission Check repair facilities if they meet all of the following requirements.

- Employ at least one Authorized Emission Specialist.
- Own and properly maintain an OBDII compliant scanner. The scanner must be capable of duplicating the OBDII test failures. There are four areas:
 - Retrieve the Status of Non Continuous monitors for readiness.
 - Display Diagnostic Trouble Codes (DTC).
 - Display the malfunction indicator lamp (MIL) status.
 - Retrieve generic OBDII DTC codes that are set and have commanded the MIL to illuminate.
- Agree, by having management or the owner sign a Business Inclusion form agreeing to abide by Emission Check requirements and policies.

When the owner or manager signs an application and Ecology certifies that all requirements are met, the business is issued a number and listed as an Authorized Emission Check Repair Facility.

Ecology will issue and publish the business' name and address in a packet given to motorists whose vehicles fail inspections at an Emission Check facility. The business will be advertised as an Authorized Emission Check repair facility.

Ecology provides lists of authorized shops and specialists. You may obtain this information from the Emission Check web site at <http://www.emissiontestwa.com/e/AESSearch.aspx>

Instructions on the list advise motorists to have diagnosis and repairs completed at one of these shops in order to participate in the repair waiver process. The list includes emission check information and repair hints.

A much longer and more detailed list is available for anyone to review at each Emission Check facility. It lists all Emission Check authorized shops, with the names of the authorized diesel or gasoline specialists who work there. It is available for viewing at the customer service desk in the facility office.

To be on this list, the owner or manager of a repair shop agrees and promises to follow these rules and policies:

- Familiarize management with Chapters 173-421 WAC and 173-422A WAC.
- Employ at least one Ecology Authorized Emission Specialist.
- Display the specialist's AES certificate where customers can see it.
- Gasoline shops: Properly maintain and use a scan tool capable of communicating with the on board diagnostic (OBDII) systems installed on all U.S. Environmental Protection Agency certified 1996 model year and newer gasoline vehicles to diagnose emission test failures and as a final check for emission repairs or adjustments.
- Diesel shops: Your authorized diesel emission specialist does not need an opacity meter to check repairs. If you base your readings on visual plume density, use an opacity chart or similar guide to note the opacity reading.

- Only an AES who works for you may perform repairs, diagnosis, or maintenance in your shop that can qualify for an Emission Check waiver.
- An AES may not sign for work done by anyone else. Do not ask or order an AES to sign for someone else's work.
- Your AES should perform an "appropriate repair." This means the diagnosis of the cause(s) of an emission test failure and/or the repair of one or more of these causes. An appropriate repair should (not must) reduce at least one test reading from a tail pipe test or diagnose and/or repair an emission problem identified by the on-board diagnostic (OBDII) system.
- For every Emission Check repair job, your AES must use an invoice / receipt form that is pre-numbered and preprinted with the name and address of your business and itemize all appropriate diagnosis or repairs that were performed.
- Gasoline specialists: Record the vehicle's emission readings or OBDII status after diagnosis and/or repairs are completed. Do this even though an analyzer is no longer required for authorization. You should have one on hand if you are going to work on a vehicle that receives a tail pipe test.
- Describe the vehicle, including its license number, vehicle identification number, and odometer reading.
- List the customer's name, address, and phone number.
- List any missing or inoperative emission control components that fail a visual inspection.
- List any further recommended emission repairs or diagnosis he or she recommends.
- Sign and clearly write his or her AES number on the Vehicle Inspection Report.
- When your customer brings a test report from the test facility, the AES must complete the repair information section at the bottom. The AES should neatly print his or her AES number, name, the date and time, and sign the form.
- Do not allow tampering with emission control systems, including adjusting an engine outside of the manufacturer's specifications.
- Do not provide or allow your staff to provide false information or use fraudulent means to obtain, or attempt to obtain, a certificate of compliance (passing test report), certificate of acceptance (repair waiver), or an exemption from Emission Check requirements.
- All emission control equipment must be intact, in place, and operational or a vehicle is not eligible for a waiver. The customer must be informed if a vehicle is not eligible for a repair waiver.
- Do not allow violations of Chapter 173-421 WAC (illegal engine switching or alterations of emission control components) or Chapter 173-422A WAC (Overall Emission Check program).
- Allow Ecology Emission Check staff access to your facility during normal business hours. Ecology staff will check the status of your repair staff, equipment, and procedures relating to the Emission Check Program.

- You may represent and promote your business as an authorized Emission Check repair facility. In advertisements, you may state that your business is an authorized Emission Check repair facility and you may reproduce the Emission Check logo. However, you must be able to change your advertising statements immediately if Ecology removes or suspends your business from the Emission Check Program.
- Do not mention or promote your shop as Emission Check authorized in phone book ads, calling cards, internet adds, pre-printed invoices, etc. These cannot be changed quickly enough.
- Ecology does not approve, endorse, or recommend shops.
- Give your customers the most accurate and appropriate information possible.
- If your customers do not have direct contact with your AES, Ecology strongly urges you to see that your customer service staff is well versed with Washington's Emission Check requirements.
- Ecology recommends that your customer service staff understand this handbook's information on Emission Check basics, waivers, tampering, change in ownership of used vehicles, common customer concerns, terms in the glossary, and Washington's auto repair law.
- Contact your Ecology representative for information on optional, but recommended, training for service writers and customer relations staff.

Ecology may remove a shop from the list of authorized shops. Ecology may suspend or permanently remove a shop from the authorized shop list and require the business to stop advertising itself as Emission Check Authorized.

- If your business violates Chapter 173-421 WAC or 173-422A WAC your shop's name can be suspended from the list for up to one year for a first offense and permanently removed for a second offense.
- If your facility listing is suspended or removed, you have the right to appeal to the Washington State Pollution Control Hearings Board within 30 days.
- If your shop listing is suspended, you may apply for a new listing one year after the suspension. You must meet all the requirements outlined earlier in this chapter, in "To Get and Stay on The List."
- Ecology will not restore a shop to the list that has been permanently removed.
- If your shop is removed from the list, you must immediately change any advertising so that it no longer says that your shop is an authorized facility.

Authorized test facilities (ATF)

These are retail or private businesses authorized by the Department of Ecology to perform vehicle emission tests. An ATF is not required to be an AES shop.

Any party interested in performing authorized emission testing can obtain the approved equipment and training from Applus Technologies if they meet strict guidelines.

This same equipment is used at an Applus test station. The equipment is available in a number of configurations. OBD, OBD-DIESEL, OBD-TSI, OBD-TSI-DIESEL. An ATF is also required to have a lane camera installed to record each test conducted.

An ATF pre-pays for a block of tests. The retail charges for the tests are set by the business and may be different from the standard charge.

Vehicles that fail the emission test will NOT get a free re-test at an Applus Test Station or Authorized Test Facility

Authorized emission specialists who become Authorized Testers can perform test #1, perform appropriate repairs, and perform test #2. Any vehicle needing a waiver needs to complete the waiver process at an Applus test station office to verify the paper work and perform the tampering and under hood inspections.

Chapter 3: Certificate of Acceptance (repair waiver)

Overview

Ecology encourages motorists to repair their vehicles if possible. Often the problem that causes an emission failure also shortens engine life, lowers mileage, and increases tailpipe emissions.

However, a complete automotive repair may be too costly. Therefore, the Emission Check Program has a waiver process, officially called a Certificate of Acceptance (COA). The Legislature established the waiver to set limits on what the consumer must spend on trying to fix the cause of an Emission Check failure.

A waiver means that someone has made a “good faith” effort to bring emissions from his or her car within standards. The waiver requirements described in this chapter define that “good faith” effort.

About two percent of all the vehicles in the Emission Check Program eventually are waived. That is a small percentage, but it works out to less than 30,000 cars and trucks each year. The waiver process directs customers to authorized shops.

People naturally fear repair bills. They see the waiver process as a way to control those costs, if necessary.

Only appropriate repairs done by an authorized specialist at an Emission Check shop qualifies for a waiver. People come to your shop for that reason.

There is nothing that restricts people from working on their own cars or using a non-authorized shop. If they pass a retest, fine. However, if they do not, the money spent will not count toward a waiver.

So much time is spent on the waiver issue, it is easy to overlook how smoothly most people pass through the Emission Check Program. Of the vehicles that do fail, nearly 60,000 pass subsequent tests during that test year. Another 15,000 are replaced or repaired during the next year.

If a vehicle fails an Emission Check, there are two ways to complete the process:

- Pass a retest. Usually the vehicle needs repairs to do this.
- Obtain a waiver by meeting all of the necessary conditions.

Warranty rules and policies

Federal warranty laws

- The Magnuson-Moss Warranty Act (15 U.S.C. 2302(C)) - This federal law regulates warranties for the protection of consumers. The essence of this law concerning aftermarket auto parts is that a vehicle manufacturer may not condition a written or implied warranty on the consumers using parts or services which are identified by brand, trade, or corporate name (such as the vehicle makers brand) unless the parts or service are provided free of charge. The law means that the use of an aftermarket part alone is not cause for denying the warranty. However, the law's protection does not extend to aftermarket parts in situations where such parts actually caused the damage being claimed under the warranty. Further, consumers are advised to be aware of any specific terms or conditions stated in the warranty, which may result in its being voided. The law states in relevant part:

No warrantor of a consumer product may condition his written or implied warranty of such product on the consumers using, in connection with such product, any article or service (other than article or service provided without charge under the terms of the warranty) which is identified by brand, trade or corporate name... (15 U.S.C. 2302(C)).

- Clean Air Act Warranty Provisions (42 U.S.C. S 7541 (C) (3) (B)) - The federal Clean Air Act requires vehicle makers to provide two emissions-related warranties -- a production warranty and a performance warranty. The production warranty requires the vehicle maker to warrant that the vehicle is designed, built, and equipped so that it conforms to emissions requirements at the time of sale. The performance warranty requires the vehicle maker to warrant that the vehicle will comply with applicable emissions requirements as tested under state vehicle emissions inspection programs for the warranty periods specified in the law (for model year 1995 and later vehicles, the warranty is 2 years/24,000 miles for all emissions-related parts and 8 years/80,000 miles for the catalytic converter, electronic emissions control unit and on-board diagnostic device). The performance warranty is conditioned on the vehicle being properly maintained and operated.

Your job: Make sure the job is outside warranty coverage. If your customer is entitled to warranty repairs, refer him or her to an authorized warranty repair facility. Customers may be entitled to free repairs under recall programs.

Vehicle has all its emission controls. The original emission controls, or their EPA approved replacements must be:

- Installed - If a component is missing, the waiver will be denied.
- Operational - Components must be in working condition, with all belts, hoses, wires or other connections in place.

The waiver applies only to repairs on intact, properly configured engines and emission control systems. There is no Emission Check waiver cost limit to the customer to restore a vehicle to its

legal configuration. Certain performance modifications are allowed, if they are federal and California Air Resources Board (CARB) approved.

Only appropriate repairs and diagnosis count toward a waiver.

An “appropriate repair” is when you:

- Diagnose the cause(s) of an emission test failure.
- Repair one or more of these causes.
- Reduce at least one emission test reading or diagnosis and/or repair an emission problem identified by the on-board diagnostic (OBD) system.

Contact Ecology for guidance if you face a situation where these conditions cannot be met. If your customer insists on inappropriate repairs and wants to claim them toward a waiver, you may refuse the job or have the customer sign a disclaimer statement on the invoice. Only an Ecology Authorized Emission Specialist at the Emission Check shop where he or she is registered may perform waiver work.

Required paperwork:

- Use an invoice / receipt form that is pre-numbered and pre-printed with the name and address of your business.
- Itemize all appropriate repairs and / or diagnosis performed.
- Record the vehicle’s emission readings and / or repair of problem(s) identified by the on-board diagnostic (OBD) after appropriate Emission Check repairs.
- Describe the vehicle, including license number, vehicle identification number, and odometer reading on the invoice / receipt.
- List the customer’s name, address, and phone number on the invoice / receipt.
- List any missing or inoperative emission control components.
- List any further appropriate emission repairs you recommend.
- The AES must sign and clearly write his or her AES number on the test form.
- Give the customer the original copy of the invoice/receipt.
- The specialist who does the work must fill out the repair information section on the bottom of the customer’s Vehicle Inspection Report (VIR).
- The specialist must neatly write his or her name, AES number, the date and time, and must sign the form.
- Return the form to the customer.
- It is the customer’s responsibility to bring the VIR to the repair shop. Without it filled out as described here, he or she cannot receive a waiver at the test facility.
- The cost of appropriate repairs must at least reach \$150 towards applicable diagnosis and/or repairs after the first test. Sales tax and shop environmental fees are included.

Vehicle fails a re-test:

- To apply for a waiver, the customer must return or proceed to an Emission Check Test Station and provide the signed receipt and the signed VIR
- Then the test facility staff visually inspects the vehicle for missing or inoperative emission control components. If the vehicle is missing emission control components or has any that are disconnected or not operational, the waiver is denied, and the vehicle is rejected electronically.
- Vehicle passes a visual inspection at the Emission Check Test Station.

Understanding the waiver

Customer's viewpoint: Occasionally there are customers who do not fully understand the goals and purpose of the Emission Check Program. They view the waiver process as a kind of tax and want you to do as little as possible to get them to the \$150 requirement and out of the system. That, of course, is not the idea. The Emission Check Program is about repairing cars with emission system problems. You may be able to advise such a customer how his or her vehicle and pocket book benefit from appropriate maintenance and repair.

Average Operating Costs per mile (AAA 2014)

Driving costs	Small sedan	Medium sedan	Large sedan	Average
	46.4 cents	58.9 cents	72.2 cents	59.2 cents

The emission test identifies vehicles that have systems not working properly and frequently can prevent more catastrophic issues from occurring.

Shop viewpoint: Provide quality repairs, good customer service, generate repeat business and maintain their reputation and status as AES shops.

Ecology viewpoint: Different shops have different capabilities. Some shops are set up for full-service diagnosis, repair, and can operate at very sophisticated levels. Some shops target customers seeking prompt, inexpensive, and routine maintenance services. Ecology has never attempted to draw a line based on shop capabilities. There are too many factors involved. However, a few shops damage everyone's reputation by attempting repairs they are not qualified to perform. Fortunately, there are many examples of shops that are honest with themselves and their customers. When they cannot tackle a job, they say so and often provide a referral. That's the right way to handle it. The Emission Check Program is not meant to be a quick \$150 repair order. The repair program must represent the highest standards in value and service to the customer.

Questionable invoice/receipt

If an invoice / receipt does not clearly show appropriate repairs and/ or diagnosis, it is considered incomplete and the Emission Check facility staff will refer it to Ecology. Ecology field staff will review the matter by gathering information about the situation. This information will be used to determine whether Emission Check Program rules or policies were violated and whether the shop or specialist needs guidance or additional training in making appropriate repairs and or diagnosis.

Field staff review may include:

- Reviewing the invoice / receipt.
- Contacting the specialist.
- Contacting shop owner or management.
- Contacting the customer.
- Inspecting the vehicle.

Depending on the findings, Ecology may:

- Approve the waiver.
- Deny the waiver and take corrective action.

Corrective action may include:

- Directing that appropriate repairs be performed. Ecology will explain which repairs were not appropriate and why.
- Providing technical guidance to the specialist or shop.
- Suspending a shop or specialist. This usually occurs when Emission Check rules and policies are ignored or disregarded, or when a shop or specialist repeatedly performs questionable repairs.
- Permanently removing a shop or specialist. This occurs in cases of severe, willful, and repeated violations of Emission Check rules and policies.

To avoid potential corrective action against you, decline customer requests to apply inappropriate repairs toward a waiver. If the customer insists, you may want to ask him or her to sign a disclaimer statement. This may help make the point about appropriate repairs.

Emission repair order requirements

Emission repair orders must have the following:

- A pre-printed invoice/receipt form that is pre-numbered and preprinted with the name and address of the authorized Emission Check shop.
- The customer's name, address and phone number.
- Description of the vehicle, including its license number, vehicle identification number, and odometer reading.
- An itemized list of all appropriate emission repairs and/or diagnosis you performed or recommended. Address all DTCs present. Be sure to list parts and labor separately.
- A record of the vehicle's tail pipe emission readings or codes after appropriate diagnosis / repairs on customer's copy of the receipt.
- A list of any further appropriate emission repairs you recommend.
- A list of any missing or inoperative primary emission control components.

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Chapter 4: Tampering

Overview

Tampering is any change to the manufacturer's design or element of the vehicle. This includes the removal or disabling of an emission control device or system, or making adjustments outside the manufacturer's specifications. Tampering also includes replacing the engine with one from another vehicle manufacturer or one other than an original configuration.

Tampering is a violation of both state and federal laws.

Tampering laws apply:

- In all places, not just test areas.
- To all persons, not just Ecology authorized specialists.

In section 203(a) (3) of the Clean Air Act, the following acts are prohibited:

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to sale and delivery to the ultimate purchaser, or for any person knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser; or

(B) for any person to manufacture or sell, or offer to sell, or install, any part or component intended for use with, or as part of, any motor vehicle or motor vehicle engine, where a principal effect of the part or component is to bypass, defeat, or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title, and where the person knows or should know that such part or component is being offered for sale or installed for such use or put to such use.

In Washington's Emission Check Program, a tampered vehicle cannot receive a waiver. When a motorist applies for a waiver, the Emission Check facility staff inspects the vehicle for missing or inoperative emission control components. When doing Emission Check repairs, the Authorized Emission Specialist must list on the invoice / receipt any missing or inoperative emissions control components. Explain to the consumer that the vehicle cannot qualify for a waiver without all of its emission controls in place and operational.

Customers need to understand the importance of having the emission devices in place and operating at manufacturer's specifications so that the vehicle will perform as originally intended.

Forms of tampering

A vehicle that has emission devices missing, modified, or disconnected will be considered a tampered vehicle.

Missing: If a device is required and it has been removed, then it is considered missing (tampered).

Example: Your manual or under-hood label states that an air injection system is required. You observe that the air pump is not there. You would then identify the vehicle as tampered.

Modified: If a device is required, but has been:

- Physically or functionally altered or changed.
- Replaced with a non-original part identified by the manufacturer as not legal for use on pollution controlled vehicles.
- Replaced with a part designed for a different application than currently used ...it is considered modified (tampered).

Example: If a vehicle's stock air cleaner has been replaced with a cool air intake that is not CARB or EPA approved or was not available from the factory, you would then identify the vehicle as tampered.

Disconnected: If a device is required and is present, but missing a hose, wire, or belt needed to put it into operation, it is then considered disconnected (tampered).

Example: If a vehicle is required to have an EGR system and the device is present but missing the vacuum hose or the vacuum hose has been plugged, you would then identify the vehicle as tampered.

To remedy this situation, identify the defective emission control components on the work order. Inform the customer of the condition of the emission control components. The customer must decide if he or she wants to replace or repair tampered components or address the emission failure knowing the vehicle will not qualify for a waiver.

Engine switching: A replacement engine must match the certified configuration. EPA's policy allows engine switches as long as the resulting vehicle matches exactly to any certified configuration of the same or newer model year as the chassis. Vehicle chassis and engine designs of one vehicle manufacturer are very distinct from those of another, such that it is generally not possible to put an engine into a chassis of a different manufacturer and have it match up to a certified configuration. Therefore, limit engine switches to installation of another engine, which was certified to be used in that same make and model, or a "twin" of that make and model. In addition, converting a vehicle into a different certified configuration is likely to be very difficult, and the cost may prove prohibitive.

Tampering and waivers - the bottom line: The cost of restoring tampered emission control devices may be counted toward the waiver as long as all of the devices are in place, in proper configuration, and operational at the time the vehicle is inspected for the waiver. The vehicle must be restored to its proper configuration, regardless of the total cost to be considered for a waiver.

Example: A vehicle is identified as being tampered. It is missing the original air intake and mass airflow sensor. All of the other required devices are in place and operational. Itemized replacement costs are as follows: \$300 for the air box replacement and \$75 for the MAF replacement, both including labor. The consumer must replace or repair both items to be eligible for the waiver. The \$375 spent would not count toward the waiver amount.

If you have any specific questions regarding tampering or engine changes, contact Ecology. Remember: The vehicle must have all of its emission control devices intact and operational before it qualifies for a waiver.

Special cases: There are special case vehicles that may fall out of the normal realm of testing. These may include Gray market, Home Built, and Reproduction. When in doubt about how to test these vehicles, contact Ecology for assistance

Performance parts (usually aftermarket) can be installed and not be considered as tampered if done properly and with approved parts. The EPA or CARB must approve the parts and no emission control components may be removed or rendered inoperative.

Engine performance components such as modified computer chips, turbo units, exhaust headers, intake manifolds, and other emissions related components can pose emission check problems. If proof is shown that the upgrade units are federally approved or legal for use in California, (they possess an EO number) or they are OEM parts, they will not cause a vehicle to fail the visual inspection. EO stands for Executive Order. This is a number given to the emission upgrade component by the CARB. The EO number indicates the performance upgrade part is California emissions legal. Most manufactures of aftermarket performance parts will stamp the EO number on the unit or they will print in the unit's manual or other document, which pertains directly to the performance upgrade component being installed or inspected. Most late model upgrade components however will have the EO number stamped on the upgrade part's body. See Appendix L for EO sticker examples.

Contact Ecology office when in doubt.

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Chapter 5: Repair Shop Equipment Standards and Procedures

Washington's emission standards are limits intended only to identify grossly polluting vehicles. Never adjust a vehicle to these standards. Always use the manufacturer's specifications when repairing or adjusting a vehicle. Use the emission standards only as a guide to assist you with repairs and / or recommendations.

This chapter describes Ecology's requirements for emission testing equipment, tailpipe emission standards, and some basic emission testing procedures.

Gasoline equipment, emission standards, and procedures

The **two speed idle** (TSI) test measures the concentration of gases coming from the vehicle's exhaust pipe. The OBD II test is an electronic test that uses a hand-held reader device plugged into the vehicle's computer through a port mounted under the dash. The vehicle's computer will communicate if there are any components that are deteriorating or failing that may cause the vehicle to exceed allowable emissions limits.

Table 1. Two Speed Idle Test Exhaust Emission Standards

Model Year	HC	CO	CO2*
1996 – 2008	220 ppm	1.2%	6.0%
1995 and older & Trucks over 8500GVW	400 ppm	3.0%	6.0%

*CO measured as a percentage (%) and HC parts per million (ppm) of the exhaust volume.

*The CO reading added to the CO2 reading must be equal to or greater than 6.0% or the test is not valid. If the sum of the two readings is less than 6.0%, the vehicle is rejected. (Usually this occurs when there is a leak in the exhaust system, which draws in fresh air and dilutes the tailpipe emissions, giving a false reading.)

The engine must idle below 1,100 rpm in neutral or park, during a tail pipe test or the test is not valid. Vehicles that idle faster than 1,100 rpm cannot be tested at Emission Check facilities, and will be rejected for repairs, which will not count toward waiver as work performed prior to first completed test.

Optimum readings: Most vehicles' emission readings should be less than 100 ppm HC and 0.5% CO at the tail pipe if properly adjusted to manufacturer specifications. Properly operating OBDII systems will usually be lower than this.

Gasoline emissions tail pipe test procedures

1. Before each test, assure there is no HC or CO hang-up.
2. Make sure the analyzer has been warmed up according to the manufacturer's specified time. This is an ideal time to warm up the vehicle to be tested.
3. Check the vehicle for all applicable emission control components.
4. Close the hood.
5. Check the vehicle exhaust system for leaks.

6. Make sure the engine and catalytic converter are at normal operating temperature and all accessories are turned off.
7. Do not exceed the time cycle (limit) that the vehicle is tested at the test facility. (Test for 30 seconds and if failing, not to exceed 180 seconds.)

OBDII System: Standardized on-board diagnostic (OBD) systems (also known as OBDII) were required by EPA starting with 1996 model gasoline vehicle cars and light trucks. If a 1996 or newer model vehicle is equipped with an EPA certified OBD system, the information stored in the on-board computer must indicate that all emission related functional checks have been completed. Exceptions include: for 1996 to 2000 model year vehicles that can have up to two readiness monitors not set to ready, or 2001 or newer model year vehicles that have one readiness monitor not set to ready, and no malfunctions detected that would command the malfunction indicator lamp to be illuminated.

OBDII scanner: The OBDII scanners must be capable of identifying the OBDII test failures from four areas.

- Status of Non-Continuous monitors for readiness.
- Diagnostic Trouble Codes (DTC).
- MIL (malfunction indicator lamp) commands.
- Generic OBDII (DTC) codes that are set and have commanded the MIL to illuminate.

OBDII test procedure

- Read the emission check form from the test facility first. Become familiar with the failure at the test facility before testing the vehicle in your facility. Duplicate the test as it was performed at the test facility.
- Start the vehicle and inspect to see if the check engine light (CEL) comes on while the key is in the on position with the engine running (KOER)
- Shut the vehicle off, remove the key from the ignition, and then proceed to plug the adapter into the Data Link Connector (DLC) of the vehicle. If the DLC is missing or damaged in a way that makes it inaccessible, or modified, the vehicle will fail the OBDII test. Once the adapter has been plugged into the DLC of the vehicle, initiate the communication part of the OBDII test. If no communication is established during the initial test, the vehicle fails.
- Check for any DTC(s) set that commanded the MIL to illuminate, note them at this time. If any are present, the vehicle fails.
- If no DTC(s) are present that have commanded the MIL to illuminate, check the status of the readiness monitors.
- If the vehicle is not ready due to appropriate readiness monitors set to not ready, the vehicle will fail the test.
- If enough readiness monitors are set to ready, up to two for 96 – 2000 and one for 2001 – 2008 and no other part of the OBDII test failed, the vehicle is ready for testing.
- If a vehicle fails at the test facility, there is a reason. A full discussion on OBDII emission diagnosis and repair is beyond the scope of this chapter and handbook.

Chapter 10 provides several tips and ideas on identifying and correcting the cause or causes of an OBDII failure.

There are special emission testing procedures for certain makes and models. Check your service manuals and bulletins.

The goal is to re-create the conditions under which the vehicle failed. This chapter also lists common causes of failures. In the end, your most valuable tools are your knowledge and experience.

If you have any questions about a part, procedure, or problem, contact Ecology.

Diesel equipment, emission standards and procedures

Diesel specialists

You must complete an Ecology approved diesel course of study for consideration as a diesel Authorized Emission Specialist. Ecology accepts ASE A9 and/or L2 along with equivalent ASE courses of study as part of the gasoline requirements including factory or manufacturer courses. Ask your Ecology representative for details of approved courses.

Diesel opacity meters

Emission Check authorized diesel repair shops do not need an opacity meter to check repairs. If you base your readings on visual plume density, use an opacity chart or similar guide to note the opacity reading. (See next page)

Contact Ecology for more information before purchasing an opacity analyzer.

Diesel emission standards

Washington's emission standards are maximum limits intended only to identify grossly polluting vehicles. Never set a vehicle to these standards. Always use the manufacturer's specifications when repairing or adjusting a vehicle. Use the emission standards only as a guide to assist you with repairs and/or recommendations.

Table 2. Washington's Diesel Engine Standards

Model year	Opacity limit
1991 and earlier	50%
1992 – 1996	40%
1997 – 2008	30%

Snap-Idle procedure

This procedure is based on SAE J-1667 Snap Acceleration Smoke Test Procedure

To properly test a diesel vehicle in your shop, you will need to check these things first:

- Check the vehicle for all applicable emission control components.
- Close the hood.
- Check the vehicle exhaust system for leaks.
- Ensure the throttle pedal can move to full range.

- Ensure that all fluid levels are at manufacturer specifications and the engine is at the manufacturer specified normal operating temperature.
- On some air brake equipped vehicles, it may be necessary to release the park brake before testing.
- After the above have been verified, you may begin the snap-idle test.
- Perform three quick full throttle pedal snaps to clean out the exhaust.
- Move the accelerator pedal from normal idle to full power position rapidly and release the accelerator pedal to base idle. Repeat the above steps until you have three readings in a row that meet or beat the standard for that vehicle. These snap readings must be within 10% of each other to ensure accuracy. Be sure not to exceed nine snaps during the test. If you have a question about a part, procedures, or problem, contact Ecology.
- When a vehicle fails an opacity test, it means the concentration of smoke exceeds Washington's diesel exhaust opacity standard. Opacity is the degree that smoke obscures the view of light. Opacity is measured as a percentage. A clear window has no opacity. A brick wall has 100 percent opacity.
- Excessive opacity may indicate any of a number of possible problems with the vehicle. The first step is to note the color of the smoke. A qualified technician can, by analyzing the exhaust smoke of a diesel engine, quickly evaluate the engine's performance and determine the source of trouble.
- Evaluation of exhaust smoke to determine the cause of engine trouble should never be attempted when the engine is not at its proper operating temperature. For example, when the engine is too cool, the combustion chamber is not hot enough to completely burn all the fuel.

The figure below displays the Ringlemann Smoke Chart. It is a standard measuring tool in the industry. It only estimates smoke opacity and is not a substitute for an actual opacity test

To estimate the vehicles peak smoke opacity, hold the chart at arm's length while someone performs a snap test. Compare the vehicles exhaust / smoke with the chart. The closest match will give you a basic idea of the vehicles peak opacity.

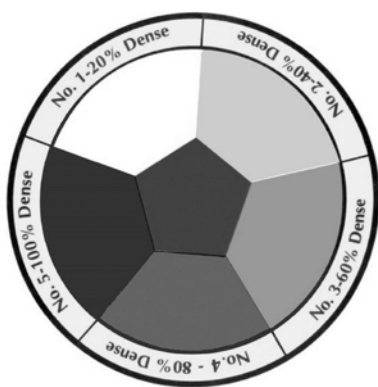


Figure 1. Ringlemann / Smoke Chart

Chapter 6: Test Facility Equipment and Calibration

The “Ping-Pong effect”

The two most common customer complaints in the Emission Check Program are:

- “My vehicle passes at the shop but fails at the test facility!”
- “My vehicle shouldn’t have failed. Those test facilities use poor equipment and bad test methods. I don’t believe the test was accurate!”

The customer may feel he or she is being bounced back and forth between the shop and test facility. This is commonly referred to as the “ping-pong effect.” Customers and technicians may feel tempted to blame the test facilities. This chapter describes the Quality Assurance (QA) requirements used at the test facilities so you and your customer can rely on an accurate, fair, and consistent emission test.

Quality assurance (QA) definition

Quality Assurance (QA) is defined as a system for integrating quality planning, assessment, and improvement efforts of various groups in the organization. In pollution measurement, quality assurance is concerned with all activities affecting the quality of measurements. The establishment of methods and techniques to enforce compliance with requirements is a major goal. The ultimate objective of the I/M quality assurance program is to assure accurate and complete inspections are being performed and repairs are effective in reducing emissions.

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Chapter 7: Vehicle Change of Registration

All buyers of used vehicles need to know this!

If you live in an Emission Check area and you've acquired a used car from a private party or an out-of-state dealer and the vehicle is five years old or less than 25 years old, you need to have a valid Vehicle Emission Test Report when you change the registration over to your name.

Many people misunderstand this requirement. This chapter explains what people should do if they live in a test area and are buying a used vehicle.

What does “valid Vehicle Emission Test Report” mean?

- The test printout in the “Test Results” area in the upper left corner says, “Pass” “Fail or “waive.” If Ecology or the test facility manager has approved an “Extension,” then that would be printed in the results block. The extension will allow a customer to renew tabs or transfer a title in lieu of a passing test to give the customer time to complete the test process.
- A test report remains valid for one year from the date it was issued. This means the seller of a used car can pass the report along to the buyer within one year of that date and no new inspection is needed. This test information is also available for the customer at any Licensing office.

Which changes of ownership are exempt?

- Used vehicles bought from a Washington licensed automobile dealer
- The person buying the used vehicle does not live in a test area and the vehicle will not be garaged and operated in an Emission Check area.
- The vehicle does not need to be licensed; it is being sold as scrap to a scrap dealer.
- The vehicle registration is being transferred from the legal owner to the registered owner, such as from a bank or institution.
- A public agency is acquiring the vehicle.
- The vehicle is being transferred to an immediate family member (details follow).

What if a vehicle is transferred between family members?

- No test report is needed if the change of ownership is between parents, siblings, grandparents, grandchildren, spouse, or present co-owners.
- A vehicle's title may be transferred between family members without an emissions test.

Licensing tip: The Department of Licensing requires the transfer of registration within 15 days of purchase and a current emission test if in the test area. This test information is available to Licensing electronically.

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Chapter 8: Tips for your customers

Each year, about 100,000 vehicles statewide fail an emission check and their owners become repair customers. To most of them, the repair process and waiver requirements are new. The prospect of potentially expensive repair work may cause some anxiety. Most owners do not understand what a malfunction indicator lamp (MIL) is. In fact, many may think of it as a service soon light or oil light.

Over the years, Ecology's Emission Check staff has found that customers benefit from certain tips and advice. Ecology provides much of this information in the literature a motorist receives when their vehicle fails an inspection. This helps many people, but many more can benefit from having this advice repeated and emphasized. This chapter talks about the things we would tell each Emission Check customer if we had the chance. Many shops already offer this advice.

Test facility tips

This advice is especially important after repairs and before the customer returns to the test facility for a re-test:

- Your vehicle needs to be at its proper operating temperature. Give it a warm up drive, go when lines are short, and keep it running if there is a line. Proper operating temperature means more than what the dashboard temperature gauge indicates. This gauge tells you about your engine's cooling system, but not about the temperature of your catalytic converter. If your catalytic converter is not warm enough, it cannot control emissions as designed. Follow these tips to get the most from the catalytic converter:
- If you are getting a tail pipe test, take a ten to twenty minute drive at highway or freeway speeds. If there is a test facility quite close, use the next nearest one to make sure your car is warmed up.
- Aim for short lines: Avoid the end and the beginning of the month. Lines tend to be shortest mid-month, and often times midday between 2 p.m. and 4 p.m.
- Plan ahead: Your Department of Licensing renewal notice normally arrives 30 - 45 days before your tabs expire. Do not wait until you are forced to test during a peak period. Hint: Vehicle Emission Test Reports are valid for one year. You can have your Emission Check (and repairs, if needed) up to six months in advance. Give yourself an early start; beat the rush! Do not wait until the temperature is 100°, and the lines are too long.
- While in line: Keep the engine running before a tailpipe test to warm the converter. Turn off all accessories.
- There are times to turn off the engine, but only when Emission Check facility staff direct you to do so.
- Test Fees: The test fee is \$15 at Applus test facilities. They accept checks (local only, traveler's checks (\$50 and under), cash (no Canadian funds), or credit cards (Visa, MC, Discover), and your first re-test is free. All additional tests are \$15 each. Charges for the tests at an ATF are set by the business and may be different from the standard charge. Check with the individual business for costs and hours of operation.

Test first, repair later

- A motorist may want to “prep” for an inspection, but doing so may prevent him or her from taking full advantage of the waiver process.
- Protect your eligibility for a waiver. Repairs made before an Emission Check do not count. Of course, you should keep your car on its recommended maintenance schedule. However, if you are counting on being able to qualify for a waiver, plan ahead.
- If you know you need emission repairs, get the test first anyway. Then get repairs at an authorized Emission Check repair shop. If you decide later you want to apply for a waiver, you have kept that option open.
- If your tabs expire within one year, get an Emission Check before having maintenance or repair work done. Many common maintenance services and repairs (performed by authorized specialists) can qualify for a waiver.

Varied results in tail pipe tests

- Motorists find it frustrating to get significantly different results at the repair shop and the Emission Check facility or at different test facilities.
- Inspections at Emission Check facilities are accurate. Remember the analyzers at the test facilities cannot produce HC or CO, nor do they hold previous samples. The emissions come from your customer’s vehicle. Some cases require extra detective work to find the cause.
- Vehicle preparation and conditions can vary. Ask a few questions. There are factors that can influence test results. Were the engine and catalytic converter at their proper temperatures? Was there a long line? Was the outside temperature different when each test was taken? Was the hood down when the vehicle was tested in the shop? Direct your customer to properly warm the vehicle and avoid long test facility lines.
- Intermittent engine problems can affect emissions. Parts can perform inconsistently as they age. A sensor may intermittently fail, a spark plug may misfire, the surface of a valve may have a fault, an electrical wire may need replacing, and a PC valve may not open and close properly. These things may cause variations in engine performance. They may be sporadic and tricky to spot.

Common customer comments

- “Here’s \$150, get me out of this system.” Some customers see the waiver minimum as a “tax” they have to pay because their vehicle failed. In fact, something is wrong with the vehicle’s emission system and it needs adjustments or repairs. Explain to your customer that you will try to find the cause of the failure and repair it. The state requires you to make a good-faith effort by attempting repairs and/or diagnosing the failure.
- “My car runs fine.” The driving public is often unable to detect a malfunction of the emission control system. While some minor malfunctions can increase emissions significantly, they do not affect drivability and may go unnoticed for a long time. A failure calls attention to these hard to detect problems before they become bigger and more expensive.

Customer has not read instructions

Ecology makes sure every customer gets a written set of instructions. If read, these instructions make the repair and waiver process clear. Here is what your customer should be reading:

- Test report: Every vehicle gets one, pass, or fail.
- Repair information packet is given to every vehicle owner that fails an emission check. It lists all the authorized shops in the area, has general information on common emissions, and the waiver process.

Customer requests inappropriate work

Only repairs or adjustments directed at correcting the cause of the emission failure can count toward a waiver. If a customer demands specific work that would not be waiver eligible, you may want to have the customer sign a disclaimer statement.

Here is an example:

I have requested repairs on my vehicle, license number _____, test report number _____ that are not necessarily aimed at correcting the emission test failure. In the event my vehicle fails a re-test at the test facility, I understand that the dollar amount for these repairs may NOT be included in the dollar amount necessary to obtain a Certificate of Acceptance (waiver) at the test facility.

You have the right to refuse to perform inappropriate work

Of course, a vehicle may need some non-emission repairs. If a job includes emission and non-emission work, either use a separate invoice / receipt for each or, if using one, make very clear which labor and parts are for emission repairs and which are not. Make a note if installing customer supplied or sublet parts, as they may not count toward the waiver.

Used car buyers

Every used car buyer should make sure the used vehicle has a valid emission test report before buying the vehicle. Consider having a pre-purchase inspection, with a qualified technician checking the vehicle for safety and engine conditions before you pay the seller. This applies whether you buy from a dealer or a private party. A used car check should include a comprehensive analysis of engine operation, brake inspection, engine and transmission leaks, and cooling system for corrosion and antifreeze mixture.

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Chapter 9: Technician Tips

Your goal as an Authorized Emission Specialist at an authorized shop is to repair your customer's vehicle so it will pass the States emission test. This chapter offers tips on achieving that goal. (Remember, this handbook is not intended to replace Ecology-approved technical training.)

The key steps are:

- Understand the conditions present when the vehicle failed. You may need to recreate them.
- Be aware of makes and models with “pattern failure” problems that require special preconditioning before testing their emissions.
- Diagnose the problem.
- Correct the problem.
- Verify the correction.

Understand the conditions under which the vehicle failed

- Ask questions! The technician, manager, or service writer should ask the customer these questions in the case of a tailpipe failure:
 - How far was the vehicle driven before the test? If it was driven less than 10 miles on the freeway, the vehicle may not have reached normal operating temperature when tested.
 - How long was the vehicle in line before the test? The wait time can vary considerably and is critical to lead you toward a proper diagnosis.
 - Was the vehicle shut off while in line? Again, this can affect whether the emission control systems were at normal operating temperature and functioning as designed.
 - What was the outside temperature when the test was taken? The temperature can play a critical role in proper diagnosis. Idling in line during very hot weather can lead to a test failure. On cold days, the vehicle components may cool, causing a failure.

These basic questions can help you find out if the vehicle was at proper engine or catalyst temperature when it was tested.

Recalls, pattern failures, and preconditioning

Recalls: Automakers and the EPA use “emission recalls” to correct emission control problems that have become apparent in a large group of vehicles. Recall repairs not only protect air quality, but they improve vehicle performance. Most recalls are voluntary, but some are ordered by the EPA. Note: Other federal agencies can order recalls for safety defects.

The recall repair is free to the owner. Recalls ordered by EPA remain in effect, no matter how long ago the recall began. Voluntary recalls may have expiration dates and may be issued as service bulletins, rather than special recall notices. It is up to the owner to contact the dealer and

make an appointment for recall work. Manufacturers mail recall notices to all known owners of their vehicles. However, it is nearly impossible for automakers to keep track of used vehicle owners. This problem limits the effectiveness of recall campaigns.

If your shop has information on recall bulletins, you can help your customers learn if they are entitled to free recall repairs. You or your customer can contact a nearby dealer with the Vehicle Identification Number (VIN) to learn if it has been included in any recall.

Pattern failures occur when a large number of vehicles with the same engine and / or emission control devices fail an emission test. Many pattern failures can be avoided by preconditioning specific vehicles before taking exhaust readings. There are several reasons why pattern failures may occur:

- **Cold start results:** Most vehicles are designed to operate in an enriched mode for a short time during warm-up operation. This rich mixture could cause the vehicle to fail the test if it is not fully warmed up. Be sure that the vehicle is at operating temperature before testing its exhaust in your shop. Tell your customer to keep the vehicle up to operating temperature during its test at the Emission Check facility.
- **Computer feedback controls:** Vehicles with feedback controls must meet certain conditions in order to operate in “closed-loop” mode. In closed-loop, the computer utilizes input from sensors to control actuators, which control fuel metering, ignition, and emission control systems. When the computer does not respond to oxygen sensor input, it is in “open-loop” operation. Some of the conditions that must be met for the computer to operate in closed-loop are:
 - **Operating temperature threshold:** The engine must reach and remain at operating temperature (190° or above). Some newer designs reach open loop sooner at lower operating temperatures to further reduce emissions.
 - **Sensors:** The O₂ or air fuel ratio sensors must reach approximately 550° F and send varying voltage signals to the computer. Usually seen as more than 11 cross-counts in 5 seconds at 2000 rpm as well as a voltage change between .2 and .8 volts with rise times of 200ms.
 - **Evaporative canister:** Many feedback systems purge the evaporative canister during the first cruise mode of operation after the vehicle is at operating temperature. If this occurs during your test or at the test facility, it could affect the CO results.
 - **Catalytic converter:** The catalytic converter will not function unless it is at the proper temperature of approximately 750° F or more. If the engine idles for an extended period or is turned off, the catalytic converter could cool down and not function as designed by the manufacturer.

Diagnose the problem

Once you have recreated the test facility conditions, you are in a position to check for causes. A key principle in diagnosing an emission failure is the air/fuel ratio. This section describes some common problems and causes associated with each type of failure. These are starting points for your diagnosis. You may need to probe more deeply.

CO failures: A CO failure indicates that fuel is only partially burned due to a rich air/fuel mixture. This can be caused by a problem anywhere in the engine's air intake system or a problem related to the fuel system. On fuel injected vehicles, causes of high CO emissions can involve such things as problems with the injectors themselves or the sensors and computer that monitor engine conditions and adjust settings.

- **Vehicle warm up:** Large portions of false failures are related to engine and catalyst temperatures.
- **Air intake restriction:** A restricted fresh air supply enriches the air/fuel mixture because of the decreased air available for mixing with the metered fuel. This results in higher CO readings, especially at higher engine speeds. Other possible problems related to restricted air intake include, poor fuel economy, rotten egg odor, and black smoke from exhaust.
- **Air filter:** Do not rely on the air filter's appearance to the naked eye. Sometimes it does not take much of an air restriction to create a cruise CO failure. If you suspect a problem with the air filter, test the vehicle for the cruise CO failure with the air filter installed and then without the air filter. Change the filter if needed. Certain "double," "heavy duty," or "dual stage" air filters, even if new, can cause CO failures.
- **Crankcase ventilation:** Crankcase ventilation systems affect air/fuel ratios and problems can result in high CO emissions. Other possible problems related to crankcase ventilation include engine oil contamination of air cleaner housing or filter, over-full dipstick reading from excessive oil dilution.
- **PCV system plugged:** This enriches the air/fuel mixture.
- **Engine oil dilution:** Fuel vapors will be drawn out of the crankcase by the PCV system and enter the intake manifold below the carburetor. These vapors add to the fuel mixture supplied by the fuel delivery system, resulting in high CO emissions.
- **Fuel injector malfunction:** Injectors are high precision fuel nozzles and valves. Mechanical injectors use a spring-loaded valve to allow fuel to spray out of the nozzle when line pressure overcomes spring tension that holds the valve closed. Electronic injectors use a spring-loaded solenoid to open a pintle or ball type valve when the injector is energized by the computer. This allows pressurized fuel in the fuel rail to flow through the injector and spray out of the nozzle.
- **Solenoid failure:** On electronic injectors, a failed solenoid results in a dead injector. More commonly, the real problem is a loose or corroded wiring connector or a bad injector driver circuit in the engine computer.
- **Clogging:** "Dirty" injectors are not usually clogged with dirt but with a buildup of fuel varnish deposits. These can cause hesitation, high emissions, and performance problems. Even minor buildup can cause droplets in the normal cone shaped spray pattern that inhibit proper fuel atomization and vaporization. Some fuel injectors can be damaged by certain cleaning compounds. Be sure to use an approved cleaner for the type of injector being cleaned.
- **Sensors and computer controls:** Problems with sensors and devices that supply the computer with engine condition information prevent the computer from properly controlling

the fuel system. This is especially true in fuel-injected engines. Many problems arise in the related systems that affect fuel injection system performance.

- **O2 sensor:** The oxygen sensor constantly sends a signal to the computer in response to the fuel mixture (Lambda) in the exhaust. The computer uses this data to richen up or lean out the fuel system. There are two ways to test the response of an oxygen sensor. Output voltage: This electrical signal should change in response to the lambda reading of the exhaust. Check it by varying the lean/rich fuel condition and see if the output changes in response. If the output fails to change or is sluggish, replace the sensor.

NOTE: Be careful if you are diagnosing a wide range O2 sensor or Air Fuel sensor as the voltage will act completely different from a Zirconia sensor. You could end up replacing a good part.

- **Engine cooling system:** Check the cooling system. Look for rusty coolant and inoperative thermostats, cooling fans, and cooling fan switches. Remember that manufacturers may require specific coolants. Use of the wrong coolant could be disastrous.
- **Intake air temperature sensor:** The sensor may be working, but the tip, threads, or both, are covered with deposits. A sensor that responds slowly may affect the computers decision to vary the fuel mix. As a rule, a sensor not in “as manufactured” condition is suspect in any diagnostic procedure.
- **Other considerations:** Several more sensors and devices affect the computer’s ability to properly control the air / fuel mixture. Never assume the same failure has the same cause on every vehicle.

HC failures: HC readings measure the concentration of unburned fuel emitted through the exhaust. High readings often indicate that combustion is not happening (misfire), happening at the wrong time (ignition timing), or not being properly contained (mechanical problems).

- **Misfiring:** In a faulty ignition system, one or more spark plugs do not fire, and no fuel is burned in the affected cylinder (misfire). The unburned HC air mixture passes through the exhaust and results in high HC emissions. Another symptom is rough engine operation.
 - Spark plugs and wires: A wire can develop more resistance than the coil can overcome, so the plug does not fire. Loose or corroded connections can cause intermittent misfire under load, or, if bad enough, a continuous misfire. High under hood temperatures can break down the wire’s insulation. The spark will then follow the path of least resistance to ground.
 - If carbon deposits bridge or foul the electrode gap, there can be no spark.
 - Burned internal resistors or cracked insulators can also cause misfires.
 - Wet weather can cause problems with connectors. Check insulation.
- **Timing:** If the timing differs from the manufacturer’s specifications, or if the wrong source of vacuum is applied to the vacuum diaphragm(s), incorrect spark timing may result in excessive emissions. The more ignition timing is advanced, the cooler the cylinder walls, combustion chamber, and exhaust system will become. This prevents complete burning and increases HC emissions. Other symptoms can include pinging and rough idle. On computer-controlled systems timing may be incorrect if a knock sensor is sending a false reading or the

intake air temperature is reported as too high. There can be other reasons that are programmed in a strategy to protect the engine.

- **Gaskets:** Intake manifold gasket leaks will draw extra air into the engine below the manifold causing a lean condition.
- **PCV valve:** If the PCV valve is stuck in the high flow position, or if an incorrect replacement PCV valve has too high a flow rate, the air/fuel mixture becomes lean.
- **EGR system malfunctions:** The exhaust gas recirculation system reduces oxides of nitrogen emissions by re-circulating a small amount of exhaust gas into the air/fuel mixture.
 - If the EGR is stuck open during idle, a misfire can occur. Symptoms of high HC, low or normal CO is similar to a lean misfire, but the cause is exhaust gas dilution of the air/fuel mixture, not a lean air/fuel mixture. The idle adjustment should not be adjusted to overcome this condition because it would not solve the EGR problem and would cause high CO.
 - EGR passage: If the EGR passage is restricted, it can cause a cruise HC failure.
 - EGR valve gasket leaks: If warped or blown, the gasket can allow exhaust gases to flow into the intake passage without being controlled by the valve, or can cause a vacuum leak on the intake side of the valve.
- **Improper vacuum hose routing and hookup:** Carefully check and follow the under-hood label for proper routing, sources, and operational check procedures. If the label is gone, consult the service manual.
- **Mechanical engine defects:** Worn or defective parts can defeat features of the engine design. Symptoms can include very high HC with normal CO, misfire, mechanical noises, and poor performance with blue-black smoke in exhaust.
 - Burned valve: Lower compression so that fuel is not burned, resulting in high HC emissions.
 - Camshaft: Certain high lift camshafts can cause less than 110° overlap which can increase HC emissions, especially at idle. **NOTE:** Manifold vacuum will also be low.
 - Worn piston rings: Lowers compression, resulting in higher than normal HC emissions (compression leak down test).
 - Excessive engine deposits can increase HC by absorption and adsorption or by increasing compression, which disrupts the normal flame front travel pattern.

HC and CO Failures: Any combination of causes may be responsible. There may be any combination of symptoms.

- **Over rich mixture:** An extremely rich air/fuel mixture can produce high CO and moderately high HC emissions. With too much fuel in the combustion chamber, most will be partially burned, producing high CO emissions. Some of the fuel will go out with the exhaust, producing moderately high HC emissions.
- **Over rich and misfiring:** If a misfire is detected, there may be a rich mixture and some other HC related problem. Symptoms include very high CO and HC readings. If a misfire is plainly evident, it most likely is causing the high HC emissions.

- **Which to fix first, the HC or the CO?** Your course of action depends on whether there is an obvious misfire or not. It is a good idea to correct for CO first.
- **High CO and HC with obvious misfire:** A misfiring cylinder is a likely cause of the HC failure. Another possible cause is a mechanical engine defect. Correct the misfire condition first. Next, check and adjust ignition timing to the manufacturer's specifications, if necessary. This will correct any problems related to over advanced initial timing. Any further diagnostic procedures to identify the CO problem will then be based on accurate readings and a stable engine. Next, correct the CO problem. HC emissions may also decrease as a result.
- **High CO and HC without obvious misfire:** First, check and if necessary, adjust ignition timing to specifications. Then, correct the CO problem first, which may also decrease HC. If still necessary, correct any HC problems.
- **Post combustion control systems:** AIR (air injection reaction) systems and catalytic converters reduce both HC and CO. Anything that reduces their effectiveness will raise HC and CO.
- **AIR:** Air pump belts must be in place and properly adjusted. The air pump adds extra air to exhaust gases to burn or oxidize the HC and CO more. Systems vary among automakers. Carefully check and follow service manual diagnostic and repair procedures.
- **Converter:** The converter is only effective within a narrow range of fuel mixtures. The catalytic converter must be in place and have a supply of oxygen. Depending on the automaker, a lean mixture or an air pump provides the oxygen.

CO2 Failures: Carbon dioxide is a byproduct of the internal combustion engine. It is measured to help determine if the test facility equipment is getting a proper sample of the exhaust and integrity of the exhaust system. The CO2 standard is a minimum of six percent. CO2 failures generally result from exhaust system leaks (or restrictions) or from extremely high HC emissions.

- Exhaust system: Repairs to exhaust system components located behind the catalytic converter, (such as mufflers and tailpipes) do not count toward a waiver.
 - Exhaust system leaks in this area do need to be repaired in order to obtain a valid emission reading, but such repairs have no effect on actual emissions.
 - For exhaust system repairs from the engine up to and including the catalytic converter, get authorization from Ecology before proceeding.
- HC: Follow the diagnostic and repair procedures discussed earlier in this chapter and in your service manual.

Correct the problem

You are participating in the Emission Check Program because of your knowledge, experience, and training. A full discussion of repair and diagnostic procedures would fill many textbooks and service manuals. Ecology's main concern is that customers understand and technicians perform appropriate repairs.

"Appropriate repair" means the diagnosis of the cause(s) of an emission test failure and/or the repair of one or more of these causes. An appropriate repair should reduce at least one emission test reading or diagnose and/or repair an emission problem identified by the OBDII system. Appropriate repairs depend on the diagnosis. Try to achieve the most improvement possible. Contact Ecology before proceeding if you have questions.

Here are some examples of appropriate and inappropriate repairs. **NOTE:** this is not meant as a complete list.

CO Carbon monoxide failures

Appropriate repairs:

- Repairs related to the delivery of air or fuel.
- Carburetor repairs or adjustments.
- Cooling system repairs, being too cold or too hot will affect the fuel.
- Fuel injection system repairs or adjustments.
- Emission control system repairs associated with air/fuel mixture delivery. Such as mass airflow sensors and intake air leaks.
- Oxygen sensor, computer, and computerized air/fuel mixture systems.

Inappropriate repairs include:

- Ignition repairs such as distributor cap, spark plug wires, etc.
- Air/fuel mixture screw adjustments for a cruise CO failure.

HC – Hydrocarbon failures

Appropriate repairs include;

- Repairs related to mechanical, ignition, or fuel system problems;
- Extremely lean or rich air/fuel ratio. (Lambda above 1.2 or below 0.8)
- Carburetor repairs and/or adjustments.
- Fuel injection system repairs and/or adjustments.
- Valve adjustments and/or repairs
- Ignition system repairs.
- Mechanical (engine) repairs.

Inappropriate repairs include:

- Air filter.
- Most air/fuel related adjustments and/or repairs. Contact Ecology before proceeding.

CO2 – Carbon dioxide failures

Appropriate repairs:

Repairs to exhaust system components, such as mufflers and tailpipes, may be performed to eliminate leaks that give a false CO2 failure. However, these repairs do not count toward a waiver because they do not reduce actual emissions. Such repairs may be needed to ensure an accurate test. Get authorization from Ecology before doing exhaust system work from the engine to and including the catalytic converter.

Inappropriate repairs:

Repairs to exhaust system components located behind the catalytic converter never count toward a waiver.

Verify the correction. Recreate the conditions again under which the vehicle initially failed at the test facility. This includes the warm up and time in line. Direct the customer on how to fully warm the vehicle and avoid a test facility line. If the customer limited the repairs you performed under the waiver provisions, explain what work the vehicle still needs and why it may not pass the retest. Be sure the customer signed a disclaimer.

Diesel vehicle smoke failures

- **White/Gray smoke:** White to gray exhaust smoke emitted from an engine at operating temperature indicates that part of the fuel in the combustion chamber has not been properly ignited. This may be caused by low compression due to broken piston rings, leaking valves, or misadjusted valves. (i.e., anything that will cause low compression or chamber temperatures).

Verify the cause. Check cylinder pressure, blow by, and valve adjustment. If the engine has a misfire, locate the missing cylinder first! Then check the injectors and nozzles. There may be a leaking fuel nozzle, the opening pressure may be too low, or the injector orifices may be enlarged. The injection timing may be too late or the injectors may be misadjusted.

- **Blue gray smoke:** This color indicates the engine is burning excessive crankcase oil. Check the crankcase oil for proper consistency and level. The crankcase oil may be too light for the ambient temperature or the crankcase may have been over filled. Excessive oil is then thrown onto the cylinder walls and the piston rings are unable to contain it. Worn main bearings and connecting rod bearings, as well as excessive oil pressure, can also cause oil to pass by the piston rings. Excessive oil in the air cleaner housing or worn guides and seals can create a dangerous situation, allowing oil to be drawn into the combustion chamber during the intake stroke; the engine could easily run away. Other possible sources of blue gray smoke are worn turbocharger and supercharger oil seals.

Perform a compression test of the cylinders and test for excessive crankcase blow by. Check the crankcase breather; a plugged or restricted breather can increase crankcase pressures. When an oil bath cleaner is being utilized, do not forget to check for proper level. Check the valve guides and valve seals for excessive wear.

- **Black smoke:** This indicates the fuel being injected into the combustion chamber has not burned completely. This may be caused by three basic conditions in the cylinder:
 - **Poor atomized fuel** - check for clogged fuel filters, leaking injector nozzles, low injection pressure, worn nozzles, and excessive combustion chamber carbon build up.

- **Insufficient cylinder temperatures** - check for low compression, cooling system malfunctions, over fueling, injection timing out of specifications, engine cooling system and the oil level, (both will affect the engine's temperature) and low engine or ambient temperatures
- **Poor air turbulence** - check for turbo lag, turbo malfunction, air intake restriction, engine lugging, exhaust restriction, and intake and exhaust valve timing and adjustment

If the vehicle is turbo charged, make sure the boost compensation, aneroid, or the fuel ratio control system is functioning properly.

If the vehicle is electronically controlled, check for possible diagnostic codes. Check the injector timing, injector adjustment, or injection pump timing. Check the governor or fuel rack adjustment. If necessary, check the injector opening pressure and spray pattern.

The most common tampering to diesel vehicles includes aftermarket injectors and performance chips or systems.

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Chapter 10: On Board Diagnosis (OBDII)

A short history of OBDII

The origins of OBDII actually date back to 1982 in California, when CARB began developing regulations that would require all vehicles sold in that state starting in 1988 to have an on board diagnostic system to detect emission failures. The early onboard diagnostic system (OBDI) was relatively simple and only monitored the oxygen sensor, EGR system, fuel delivery system, and engine control module.

OBDI was a step in the right direction, but lacked any requirement for standardization between different makes and models of vehicles. You still had to have different adapters to work on different vehicles, and some systems could only be accessed with costly "dealer" scan tools. So when CARB set about to develop standards for the current OBDII system, standardization was a priority: a standardized 16-pin data link connector (DLC) with specific pins assigned specific functions, standardized electronic protocols; standardized diagnostic trouble codes (DTCs), and standardized terminology.

Another limitation of OBDI was that it could not detect certain kinds of problems such as a dead catalytic converter or one that had been removed. Nor could it detect ignition misfires or evaporative emission problems. Furthermore, OBD systems would only illuminate the MIL after a failure had occurred. It had no way of monitoring progressive deterioration of emissions-related components. So it became apparent that a more sophisticated system would be required. CARB eventually developed standards for the next generation OBD system, which were proposed in 1989 and became known as OBDII. The new standards required a phase-in starting in 1994. The automakers were given until the 1996 model year to complete the phase-in for their California vehicles.

Similar standards were incorporated into the federal Clean Air Act in 1990, which also required all 49-state vehicles to be OBDII equipped by 1996—with one loophole. The OBDII systems would not have to be fully compliant until 1999. Therefore, some 1996 OBDII systems may lack one of the features normally required to meet the OBDII specs, such as the evaporative emissions purge test.

What is the MIL?

The automotive industry calls the check engine light a “malfunction indicator lamp” or MIL. It shows three different types of signals. Occasional flashes show momentary malfunctions. It stays on if the problem is of a more serious nature, affecting the emissions output or safety of the vehicle. A constantly flashing MIL is a sign of a major problem which can cause serious damage to the catalytic converter if the engine is not stopped immediately. In all cases a "freeze frame" of all sensor readings at the time is recorded in the central computer of the vehicle.

Hard failure signals are caused when the vehicle is producing more than 1.5 times the federal maximum for that car. These serious problems will cause the MIL to stay on any time the car is running until the problem is repaired and the MIL reset. Intermittent failures cause the MIL to light momentarily and they often go out before the problem is located. The freeze frame of the car's condition captured in the computer at the time of the malfunction can be very valuable in diagnosing these intermittent problems. However, in some cases if the car completes three

driving cycles without a re-occurrence of the problem, the MIL will turn off after 40 drive cycles and the freeze frame and DTC will be erased.

Is OBDII the answer?

The OBDII system may tell the technician that certain components are "not ready" for testing. The vehicle owner may need to drive the vehicle under a variety of conditions for a few days to complete the "drive cycle," then return for testing. The "drive cycle" is different for each vehicle, but generally can be completed by operating the vehicle in a combination of in-town and highway driving. Unless there is a serious emission problem, a drive cycle puts a vehicle through enough different situations to allow the OBDII system to adequately evaluate the various components. A vehicle may not be ready for a number of reasons, including a recently disconnected battery, or recent clearing of diagnostic codes using an OBDII scan tool.

The primary goal of OBDII is to prevent catalytic converter failures

The key steps are:

- Understand the conditions under which a vehicle will fail an OBDII test. Understanding how the OBDII test is performed at the test facility is very important. What will a vehicle fail an OBDII test for? Knowing the answers to these questions is important in providing the best service to your customer.
- Diagnose the cause or causes of the emission test failure.
- Correct the problem by aiming the repairs at the cause or causes of the failure based on complete diagnoses.
- Verify that the repairs performed are correct by recreating the conditions under which the vehicle set a DTC(s) and commanded the MIL to illuminate, which resulted in the vehicle failing an OBDII emission test.
- Readiness: is the vehicle ready for an OBDII test? This is an integral part of the repairs performed and if not included in the repair process will result in the repairs being incomplete.

Will an OBDII not ready fail the test? Yes

1996-2000 model year vehicles that have three or more Non Continuous Monitors with the Readiness Flags set to "not completed" will fail the emission test. 2001 and newer vehicles that have two or more Non Continuous Monitors with the Readiness Flags set to "not completed" will also fail. Even if there are no DTC's that have commanded the MIL on, the vehicle will fail for not being ready for testing. Ignore the evaporative monitor if there are no codes present. Model year 1996 – 2000 two monitors may be not ready, and 2001 – 2008 one monitor may be not ready.

What DTC(s) will cause a vehicle to fail? Any generic SAE controlled DTC(s) that have commanded the MIL to illuminate will result in an OBDII emission test failure.

Diagnostic Trouble Code (DTC): An alphanumeric format that defines a fault associated with a specific diagnostic test. Following is a simplified chart showing the structure of a diagnostic trouble code (DTC).

DTC STRUCTURE

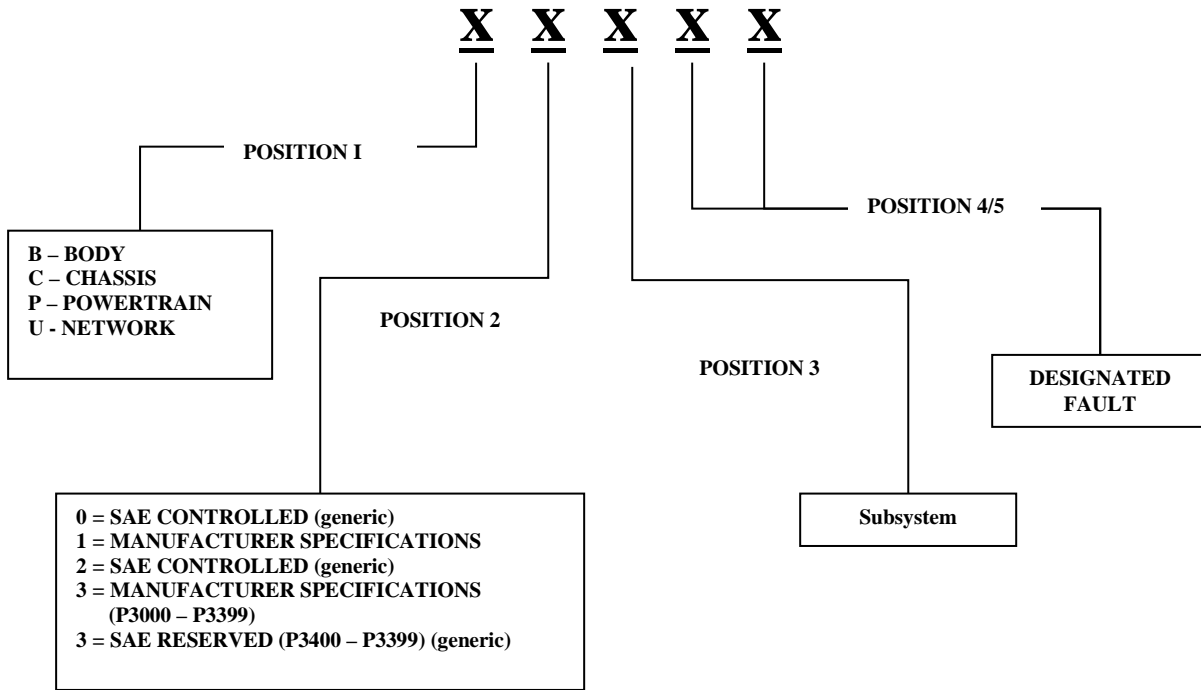


Figure 2. DTC Structure

See Appendix L for additional detail on generic fail codes

Position 1: Used to identify the On Board Diagnostic system that is involved.

Position 2: Used to identify the code as a generic (SAE controlled) or manufacture specific. The generic code (SAE) controlled is a common code used by all manufacturers in describing a fault in the system.

Position 3: Used to indicate which part of the subsystem is involved.

Position 4/5: Used to identify which components or section of the system that has a fault.

Diagnose the problem

OBDII testing is unique, in that it levels the playing field between the test facility and the repair shop. No longer are we testing using different technology. The technology available to the test facility is no different from what is available to the repair industry. The difference is between the exhaust gas analyzer and OBDII test equipment. There is very little correlation between an OBDII test and an exhaust gas analyzer test.

How is this possible? There is a logical explanation for the lack of correlation between the test using an exhaust gas analyzer and an OBDII test. A tail pipe test using an exhaust gas analyzer takes a snapshot of the vehicle emission levels based upon the conditions that exist during the test. The OBDII test looks at the diagnostic history recorded by the vehicles On Board Diagnostic System to determine if any emission related failures exist that would set a DTC(s) and command the MIL to illuminate. Because of this, it is very possible to connect a gas analyzer to the tail pipe of a vehicle that failed an OBDII test and see good readings. In most cases, in order to duplicate a failure with an exhaust gas analyzer the vehicle would have to receive a test using the Federal Test Procedure (FTP) during the time the OBDII failure occurred. Many DTCs relate to evaporative emission and will not show up during a tail pipe test using an exhaust analyzer, such as a DTC (P0455) for fuel evaporative emission control system leak detected (gross leak). This code will never generate a failure measured at the tail pipe due to the DTC being set was for a gross leak in evaporative emissions. Using an exhaust gas analyzer to demonstrate to the customer that a vehicle is passing an OBDII test is like using an exhaust gas analyzer that is not turned on to demonstrate that a vehicle is passing an exhaust gas analyzer test. Bottom line here, do not use an exhaust gas analyzer to demonstrate a passing OBDII test.

OBDII technology was designed to identify when a component or system failure could result in the vehicle failing the Federal Test Procedure (FTP) by 1.5 times the standard or the system has been compromised in such a manner that the On Board Diagnostics are not able to monitor the system for compliance to the FTP and/or if conditions exist that would result in the failure of a component critical in controlling emission levels such as a catalytic converter.

Ask questions. Whoever has contact with the customer technician, manager, or service writer should ask these questions of the customer:

What was the customer doing before, during, and after the MIL illuminated? Asking these questions may not provide the information needed, but instead will provide some information that will lead into other questions that do. You can never get enough information from the customer.

Read the test report. This is an important step in diagnosing the failure, knowing what the vehicle failed for. If there are any questions regarding the test please give Ecology a call before proceeding.

Duplicate the test. Connect the OBDII scanner to the vehicles DLC and verify the failure. It is very possible for a vehicle to fail an OBDII test at the test facility and not fail at the repair shop.

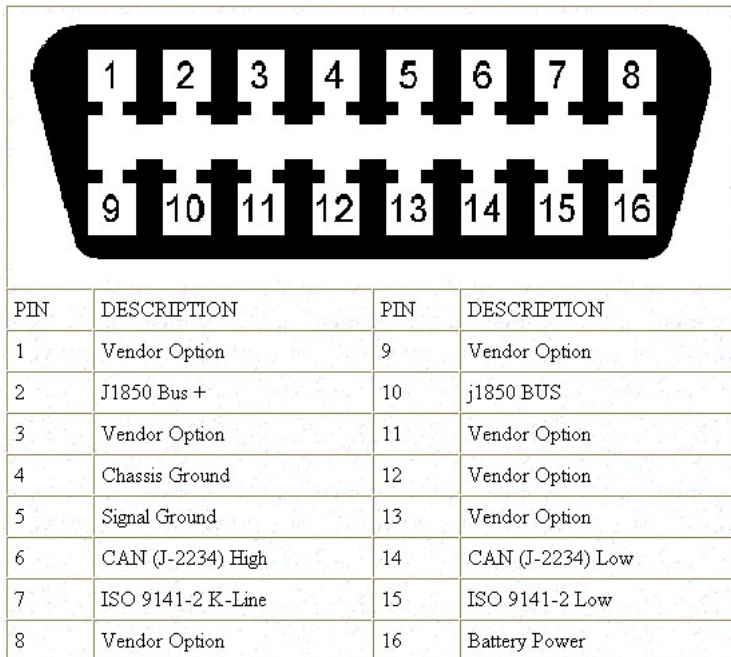
DLC and location

The Diagnostic Link Connector (DLC) is common to all OBDII vehicles. The OBDII Diagnostic Link Connector has 16 pins. Seven pins are used at the discretion of the vehicle manufacturer and nine pins are reserved for data transfer by any OBDII scan tool. Pins 2, 4, 5, 7, 10, 15, and 16 are the generic pins mandated by SAE J-1962. They allow the generic scan tool to access the Diagnostic Trouble Codes (DTC) and generic OBDII data that could be related to an emission fault, PCM inputs and outputs, etc.

OBDII specifies that the DLC is to be located inside the passenger compartment of the vehicle. The DLC is generally located somewhere between the left side of the dash and approximately 12" to the right of the vehicle centerline. It is located out of view of the passengers, but with the

passenger door open, it can be easily viewed and is accessible to a kneeling technician that is outside the vehicle.

No Communication: A vehicle that was rejected for an OBDII test for no communication may be a minor repair. When diagnosing a vehicle that was rejected for no communication, ensure that pins 4, 5 and 16 are in good physical condition at the data link connector (DLC) and no fuses are blown that may affect communications. Pins 4 (chassis ground for the scan tool) and 16 (battery + voltage for the scan tool) are needed for the scan tool to power up and terminal 5 for signal ground for communication. There are four OBDII protocols used. Below is a list and diagram.



OBD-II Connector and Pinout

Figure 3. OBD-II Connector and Pinout

Will a transmission code (DTC) that has illuminated the MIL be a valid OBDII failure?

Yes: The manufacturer has been given some leeway on what constitutes a failure that will result in a DTC being set and the MIL commanded to illuminate. Diagnose the failure before determining that the transmission is at fault. It is possible to have a DTC set that is related to another part of the system as well as a DTC for the transmission. In this case, the DTC set by another system may be the reason the transmission DTC is present.

Readiness Monitors (non-continuous). A customer complains that their vehicle was not able to pass an OBDII emission test due to the vehicle not being ready.

What's next?

Ask the questions. Has the battery on the vehicle been replaced or found low on voltage due to lights being left on or has it been in a repair shop recently? If the answer is yes then it is possible that just driving the vehicle will fix the problem. If not, then the possibility exists that an unknown problem may be the reason the vehicle is not ready. In either case, the customer should be provided with the option of a diagnosis to ensure no problems exist. In some cases, a pending code can prevent readiness monitors from setting to ready. If this is the case, driving the vehicle

until the DTC either is cleared from the pending area or matures to a DTC that commands the MIL to illuminate may be necessary. If after completing diagnosis it is determined that the vehicle has a problem preventing the readiness monitors from completing and the problem cannot be found, give Ecology a call for assistance in completing the emission testing process. If a DTC is set that commands the MIL to illuminate while driving the vehicle then instruct the customer to take the vehicle in for a test before performing any repairs.

In some cases, the customer may request that the technician drive the vehicle until it is ready for an OBDII emission test. Although this option is acceptable, the shop needs to explain to the customer that Ecology does not require it and that a customer's regular driving habits may be sufficient to bring a vehicle ready for an OBDII emission test.

Freeze frame data: When an emission related failure occurs and a DTC is set, the vehicle's operating parameters at the time the fault was recorded will be stored in memory. This information can be very valuable when diagnosing a vehicle that failed an OBDII test. The information available varies from manufacturer to manufacturer. Here is a list of information that could be available in freeze frame data. This is not a complete list.

Engine RPM, A / F ratio, Fuel pressure, Loop status opened or closed, Coolant temperature, Vehicle speed, Fuel trim, Intake manifold pressure

Equipment. Some of the same equipment used in diagnosing vehicles that fail a tail pipe emission test will be used to diagnose an OBDII test failure. The scanner provides information on what system or systems failed the test and a starting point for further diagnosis.

Correct the problem/Effective repairs.

Ecology's main concern is that technicians perform appropriate repairs. An appropriate repair includes diagnoses and/or repairs that address the cause or causes of a failure. A complete diagnosis results in the cause or properly identifies causes of the problem. This will allow for effective repairs that correct the problem. Perform repairs based on a complete diagnosis of the failure. Be sure to educate your customer about the causes of the failure. Actually, verify the DTC. Simply copying the DTCs from the test report is not an appropriate diagnosis.

Will a DTC that is set that has commanded the MIL to illuminate indicate the exact repair necessary?

No. There are conditional and non-conditional codes. You need to differentiate between two. *Do not rely* on the DTC to describe the exact repair.

Will the repair of one problem result in clearing of more than one DTC?

Usually, you will need to perform more diagnostics.

A possible scenario could be where a vehicle failed with a P0172 (system too rich bank 1), P0175 (system too rich bank 2), P0420 (main catalyst efficiency below threshold Bank 1) and P0430 (main catalyst efficiency below threshold Bank 2). After repairing the vacuum leak and driving the vehicle, the DTC related to the catalyst cleared itself. The P0172 and P0175 were set first, which illuminated the MIL. The continued operation of the vehicle with the system too rich caused by a vacuum leak eventually resulted in the catalyst unable to maintain efficiency setting P0420 and P0431.

After performing repairs, the original DTC is no longer present and a new DTC has been set.

Why? Some manufacturers may chose not to continue running the readiness monitor past the point of detecting a failure in the system. This will result in a MIL commanded to illuminate and a DTC that has been set. The readiness monitor will run each time the criteria for the drive cycle is met for that monitor and will stop each time the test detects the failure is still present. Until the failure detected by the readiness monitor meets the criteria for clearing the DTC and turning the MIL off then the monitor will complete its full test of the system.

The days of opening a hood on vehicles and performing repairs without any firsthand knowledge of the vehicle are gone. Up-to-date repair technical manuals and manufacture specific manuals will be needed and should be in every shop. Training will become a part of your everyday operation in order to keep up with the changing technology. The bottom line, step up and buy the manuals, equipment, and attend the training needed or technology will leave you behind resulting in incomplete diagnosis and ineffective repairs.

Verify repairs performed:

Verify that the repairs performed are correct by recreating the conditions that the vehicle sets a DTC(s), which resulted in the vehicle failing an OBDII emission test.

DO NOT CLEAR ALL CODES USING AN OBDII SCANNER OR DISCONNECTING THE BATTERY UNLESS IT IS YOUR ONLY OPTION.

In some cases, verification of repairs is just a matter of installing a functional part and testing to see if it works after installation. In other cases, it will require that the vehicle be driven under the same conditions in which the DTC(s) was set, a drive cycle.

Freeze frame data becomes very important at this point. It provides the vehicle operating parameters that existed during the same time the fault DTC was detected. Freeze frame data also provides the conditions necessary to recreate the fault code to verify that the repairs were effective.

Drive cycle: The purpose of an OBDII drive cycle is to run all the on board diagnostics so the non-continuous readiness monitors are set to complete. Performing a drive cycle requires strict adherence to manufacture specifications per make, model, and year of vehicle and is not the same as a successful trip.

Trip: The definition of a successful trip is where a key-off, key on cycle occurred allowing the vehicle to operate under the same conditions that detected the original fault DTC and a diagnostic was performed that determined if the fault DTC was still present.

Will the completion of a drive cycle per manufacturers' specifications be necessary after every repair?

No. Familiarity with how the fault DTC was detected is needed. Did a continuous monitor or a non-continuous monitor detect it? What were the vehicle operating parameters (freeze frame data) at the time the fault DTC was detected? A fault DTC that was detected by a continuous monitor may clear the DTC and turn the MIL off immediately upon no detection of the problem being present during the next trip. A fault DTC detected during the running of a non-continuous monitor will need a drive cycle to clear the DTC and turn the MIL off.

After a DTC is detected, will the MIL turn off after just one drive cycle or trip?

No. There are two different types of DTCs, single trip continuous and a two trip non-continuous DTC. Because of this, a DTC that has commanded the MIL to illuminate after two successful trips will also require two successful trips to clear the DTC and turn the MIL off. This does not hold true to all manufacturers. Some will clear the DTC after one successful trip or drive cycle and turn the MIL off but maintain the DTC as pending for up to 80 drive cycles. Another important part is the enabling criteria. The vehicle operating parameters (freeze frame data) at the time the fault DTC was detected such as engine load and RPM are part of the enabling criteria for clearing a DTC and turning the MIL off. In some cases the vehicle's speed, RPM and load (but are not limited to) need to be similar to the original conditions within a set percentage. Therefore, if vehicle load was heavy and speed was 45 MPH at 4000 RPM when the fault DTC was detected, similar conditions would need to be recreated during the drive cycle or trip.

Readiness

Is the vehicle ready for an OBDII emission test?

This is an integral part of the repairs performed and if not included in the repair process, will result in the repairs being incomplete.

The setting of a non-continuous monitor from not ready-to-ready does not indicate the vehicle will pass an OBDII emission test. Instead, it indicates that the vehicle is ready for an OBDII emission test. If during the test a fault is detected, the readiness monitor will be set to ready to indicate operational status has been verified and a DTC will be recorded in pending if it is a two trip DTC. If it is a single trip DTC, the DTC will be recorded as a fault and the MIL commanded on. There are numerous reasons why a vehicle may not set to "ready." A pending code will usually prevent a readiness monitor from being set to ready as long as it is present in the pending area. In some cases, manufacturer's software will make it virtually impossible to set a readiness monitor to ready.

What if the operating parameters that existed during the time the DTC was set and the MIL commanded on cannot be recreated?

Remember, if the driving habits of the customer are not consistent with the parameters necessary to complete a drive cycle, the vehicle will never be ready for an OBDII emission test.

After clearing the codes using an OBDII scanner or disconnecting the battery, a pending code is set while completing an OBDII drive cycle and the readiness monitors will not set to ready. Why?

Until the pending code set either matures to a DTC that will command the MIL to illuminate or is cleared from the pending area as no longer being a possible fault DTC detected, the readiness monitor will never set to ready. This is not a fault of the system, it is by design that it functions. This may also indicate that the repairs performed were not effective in fixing the detected fault DTC. Remember it is possible for a new fault DTC to be detected by design of the OBDII system during a drive cycle after repairs.

After clearing the codes using an OBDII scanner or disconnecting the battery and completing the drive cycle for a vehicle numerous times, none of the readiness monitors will set to ready and no pending code will be present. Why?

This is a problem with some manufacturers' software design per make, model, and year. This was caused by some manufacturers coming to a different understanding of how a readiness

monitor will be set to ready and not a design flaw in OBDII. This problem has been addressed and all manufacturers beginning in the year 2001 run readiness monitors using simpler standardized methods.

After the repair and a test, you can look at Mode 6 data to find out if the component in question passed or failed. If it failed, the code will set again.

Some Canadian vehicles manufactured for sale in Canada from 1996 – 1998 may not be able to set readiness monitors to ready. Call Ecology for assistance with Canadian vehicles that might meet these criteria.

Certificate of Acceptance (Waiver)

In some cases, the only option is a waiver. A waiver is not a bad repair, it is merely a continued failure after diagnostics, and repairs were performed. If the customer limited or declined the repairs performed under the waiver provisions, explain recommended repairs and approximate costs.

If further diagnosis is needed to determine the cause or causes of the failure then state, “further diagnosis needed to determine cause or causes of the failure,” with an explanation of why the diagnosis was not performed.

What are the criteria a vehicle needs to meet to receive an OBDII waiver?

- Failed at least two tests.
- Repairs performed between the first and the last test.
- The minimum amount spent at an authorized repair facility is \$150.
- The repair facility is authorized by the Department of Ecology.
- The certified technician is listed at the authorized repair facility.
- The vehicle has no emission control devices that are missing, or inoperative. This includes the Data Link Connector (DLC) on the vehicle for OBDII.
- The diagnosis and/or repairs are aimed at the cause or causes of the failure.

I have performed repairs that I know fixed the problem but there is not enough time to perform the drive cycles to set the readiness monitors to ready. If I clear the code, the vehicle will not be ready for an emission test. Should I clear the codes?

No. If steps 1-7 above are met then DO NOT CLEAR THE CODES. Send the customer to the test facility with the code(s) present and the MIL on. Explain to the customer why the MIL is on and that the MIL may turn off after some driving time. Also, at this time explain to the customer why the MIL might not turn off and provide a set time for the customer to return if the MIL does not turn off so further diagnosis and/or completion of a drive cycle can be accomplished.

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Appendix A: Glossary / Index

Actuators: Engine components controlled by the computer in response to inputs and sensors. (See computer, feedback system, sensors).

Advertising: All promotions and publicity that describe an establishment as an authorized Emission Check facility must be changeable and not permanent.

A. I. R.: Air injection reactor. Enhances catalytic converter performance by inserting fresh air into the exhaust ahead of the converter, or into the converter itself.

AIR/FUEL ratio (AFR): The mixture of air and fuel entering the engine's cylinders, produced by the carburetor or fuel injection system. The ideal AFR for gasoline is 14.7 parts of air to one part of fuel by weight. A mixture is called "lean" if it has more air, "rich" if it has more fuel. Other fuels require different AFRs to achieve stoichiometric combustion. For example;

Diesel	14.6:1
Methanol	6.4:1
Ethanol	9:1
Propane	15.5:1
Hydrogen	34:1
CNG	17.2:1

Air pollution: The release of foreign matter into the air by natural events and human activity. Human caused emissions can be controlled by people.

Air pump: Supplies air needed for air injection systems.

Analyzer: A device for measuring emissions from the tailpipe.

Appropriate repair: To diagnose the cause or causes of an Emission Check failure and to repair one or more of these causes. An appropriate repair should reduce at least one emission test reading, without a major increase in the other or have proper diagnosis if no improvement is expected. OBDII codes should be verified, and components checked for functionality as to the cause of the fault code.

ASE: National Institute for Automotive Service Excellence. Certifies professional automotive technicians in emission repair and other specialties.

Authorized Emission Check repair facility: An automotive repair establishment whose owner or manager agrees in writing to: 1) employ at least one Authorized Emission Specialist; 2) own and properly maintain an Ecology-approved OBDII compliant scanner 3) allow Ecology Emission Check field staff to visit and inspect; and 4) abide by Emission Check requirements and policies.

Authorized Test Facility (ATF): Retail businesses authorized by the Department of Ecology to perform vehicle emission tests. Charges for the tests are set by the business and may be different from the standard charge. Vehicles that fail the emission test will NOT get a free re-test at an Applus Test Station or Authorized Test Facility.

Authorized Emission Specialist (AES): A person who has received an AES certificate from Ecology after having: 1) demonstrated "...by completing an approved course or passing an approved examination..." and understanding the requirements of the Emission Check Program and of motor vehicle emission repair and 2) agreed in writing to abide by the requirements of the Emission Check Program.

CARB: California Air Resources Board.

Carbon dioxide (CO₂): A gas produced by burning carbon based fuel, including gasoline and diesel. Not controlled under I/M programs, but associated with global warming.

Carbon monoxide (CO): A colorless, odorless gas produced by burning carbon based fuel. Interferes with the blood's ability to carry and deliver oxygen.

Catalyst: A substance that accelerates or enhances a chemical reaction, but is not changed itself. The main component of a catalytic converter. See Catalytic converter.

Catalytic converter: Reacts with exhaust gases to change CO, HC, and NO_x to carbon dioxide and water.

Certificate of Acceptance (waiver): A document, issued at the test facility or by Ecology staff, allowing a vehicle that fails an Emission Check retest to complete the registration or re-registration process, so long as the requirements for appropriate repairs and intact emission controls are met. Commonly known as a waiver. Usually printed on a Vehicle Emission Test Report form.

Certificate of Compliance: A document issued at the test facility certifying that a vehicle has passed an Emission Check inspection. Printed on a Vehicle Emission Test Report form. See Vehicle Emission Test Report.

Clean Air Act: 1) A federal law that sets standards for the nation's air quality and outlines the strategy to clean up dirty air or maintain clean air. 2) A state law that enables Washington State to assume delegated authority from the EPA to protect air quality at the state and local level. Authorizes Ecology to conduct an Inspection/Maintenance Program where required under the federal Clean Air Act.

Computer: Uses electronic information provided by sensors to control actuators. (See Actuators, Feedback system, Sensors).

Continuous monitor: Misfire, comprehensive component, heated catalyst, secondary air system.

Diesel technicians: AES technicians who do Emission Check repairs on diesel vehicles must have a diesel AES certificate.

D.P.F. Diesel Particulate Filter

D.O.C. Diesel Oxidation Catalyst

D. T. C. Diagnostic Trouble Code

Drive cycle: The OBDII diagnostic system continually monitors for misfire and fuel system faults. It also performs non-continuous functional tests on the catalyst, EGR system, and oxygen sensors once during every time the car is driven. (Drive cycle or trip)

The OBDII drive cycle is used to run onboard diagnostic routines to set readiness flags for the Inspection and Maintenance (I/M) Readiness Test. Flags indicate that certain required diagnostic routines have been successfully completed, and the vehicle system or component has been diagnosed. I/M Readiness Tests are not concerned with whether the emissions system passed or failed the test, only that the on board diagnosis is completed.

Certain driving conditions must be encountered before these systems can be confirmed as operating. Under most circumstances, the flags will be set through normal driving conditions. There will be times when the vehicle may be driven, but some flags are not set.

Ecology: Short for Washington State Department of Ecology. Responsible for implementing the state clean air act, in coordination with EPA and local air quality agencies. Alternatively, the science of the relationship between living things and their environment.

EGR: (See Exhaust Gas Recirculation Valve Chapter 9).

Emission Check: Promotional name for the Inspection / Maintenance (I/M) Program administered by the Washington State Department of Ecology. (See Inspection / Maintenance).

EPA: U. S. Environmental Protection Agency. Responsible for implementation of the federal Clean Air Act, including supervision and approval of state Inspection / Maintenance Programs.

Emission check: Hydrocarbon fumes from fuel, which evaporates from the fuel tank and carburetor. Controlled by sealing the fuel system and using a charcoal canister to trap vapors. Many western Washington filling facilities use special nozzles to catch gasoline fumes when fuel tanks are being filled.

Exhaust gas recirculation valve (EGR): Uses exhaust gases to control combustion chamber temperature and reduce NOx emissions.

Feedback system: oxygen sensor measures oxygen in the exhaust. A computer uses this information to adjust fuel delivery. Also known as a closed loop system. See Actuators, Computer, Sensor.

Fine particles: Extremely small pieces of solid or liquid matter emitted from burning various fuels. Also, released into the air as fine dust from roads, farms, and industrial operations. Can cause lung damage.

Freeze frame: Data is retained in memory and can be retrieved by the technician using a generic scan tool and OBDII cartridge. The freeze frame data will not be erased unless the history DTC is cleared for the malfunction recorded in freeze frame.

FTP: Federal Test Procedure

GVWR: Gross Vehicle Weight Rating.

Hydrocarbons (HC): A family of toxic and cancer causing vapors that evaporate from gasoline and other oil-based products.

Inspection/Maintenance (I/M): In a federally mandated program, motor vehicles registered in and around non-attainment, areas are inspected. Those with excessive emissions must be repaired.

MIL: Malfunction indicator lamp

Non-attainment area: A geographic region designated by the U.S. Environmental Protection Agency as having excessive outdoor air pollution and requiring special measures to control emissions.

Opacity: A measurement of light blockage, ranging from 0% to 100%, where zero is transparent and 100% is full blockage.

Opacity meter: A device for measuring light blockage, used to gauge the concentration of fine particles in diesel exhaust smoke.

PCV: Positive crankcase ventilation valve. Re-circulates crankcase vapors.

PM10: Particulate matter less than ten microns in diameter (1 micron = .001 millimeter).

Performance parts: May be installed on a vehicle if emission controls are not removed or made inoperative and the parts are EPA or CARB approved. The SEMA “green diamond” is another sign the part may be used. Can lead to tampering if used on a vehicle not intended for the part.

Pollution Control Hearings Board (PCHB): A state panel of three administrative law judges, appointed by the Governor and confirmed by the Senate. The Board hears citizen appeals of penalties and/orders issued by state and local environmental agencies. Citizens penalized by such agencies may appeal to the Board within 30 days. Its rulings may be appealed to Superior Court.

Preconditioning: Steps recommended or required prior to testing a vehicle’s emissions, to avoid a pattern failure, damage to the vehicle, or a hazardous condition.

RCW: Revised Code of Washington. The state laws, arranged by subject.

Recall: An after sale repair campaign conducted by an automaker in which vehicles may be brought to a dealer for free repair of a specific problem.

Regulations: (See 173-421 WAC and 173-422A WAC).

Sensor: Devices that collect information on various engine-operating conditions.

Snap-idle test: A diesel emission test procedure.

Stoichiometric: The ideal air/fuel ratio by weight, in which all the oxygen is consumed in the burning of all the fuel. Burning fuels is a chemical reaction, and has to abide by a number of rules. Gasoline is a hydrocarbon, which is made of hydrogen and carbon. Air is a mixture of gasses, mostly Nitrogen that is quite non-reactive under normal conditions, and there is about 21% Oxygen. The Oxygen reacts with the hydrocarbons when burnt to produce Carbon Monoxide (CO), Carbon Dioxide (CO₂) and Water (H₂O). Under the temperatures and pressures involved, Nitrogen also forms some oxides, collectively referred to as NO_x.

Tampering: The removal, alteration, or disabling of an emission control device or system, or making an adjustment outside the manufacturer's specifications. This includes replacing the engine or part of the running gear, with one from another vehicle manufacturer or one other than an original configuration. Tampering is a violation of both state and federal laws. Performance chips and full flow air cleaner modifications can be considered tampering.

TRIP: Key on, engine run, key off cycle that meets specific criteria.

Vehicle Emission Test Report (VIR): A document showing the results of an inspection at an Emission Check facility. Given to the driver after each test. Also called VIR, vehicle inspection report, test report, test facility printout. Contains a section that must be filled out and signed by an Authorized Emission Specialist as part of the waiver process.

Vehicle Identification number (VIN): A number and letter code unique to each individual vehicle. Stamped on a steel plate on the driver's side of the dashboard on most vehicles, on the door column or door on older models. Contains the serial number and information on vehicle class, engine size and type, etc.

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Appendix B: Chapter 70.120 RCW

Motor Vehicle Emission Control

Sections

- [70.120.010](#) Definitions.
- [70.120.020](#) Programs.
- [70.120.070](#) Vehicle inspections -- Failed -- Certificate of acceptance.
- [70.120.080](#) Vehicle inspections -- Fleets.
- [70.120.100](#) Vehicle inspections -- Complaints.
- [70.120.120](#) Rules.
- [70.120.130](#) Authority.
- [70.120.150](#) Vehicle emission and equipment standards -- Designation of noncompliance areas and emission contributing areas.
- [70.120.160](#) Noncompliance areas -- Annual review.
- [70.120.170](#) Motor vehicle emission inspections -- Fees -- Certificate of compliance -- State and local agency vehicles.
- [70.120.190](#) Used vehicles.
- [70.120.210](#) Clean-fuel performance and clean-fuel vehicle emissions specifications.
- [70.120.230](#) Scientific advisory board -- Composition of board -- Duties.

70.120.010 Definitions.

Unless the context clearly requires otherwise, the definitions in this section apply throughout this chapter.

- (1) "Department" means the department of ecology.
- (2) "Director" means the director of the department of ecology.
- (3) "Fleet" means a group of fifteen or more motor vehicles registered in the same name and whose owner has been assigned a fleet identifier code by the department of licensing.
- (4) "Motor vehicle" means any self-propelled vehicle required to be licensed pursuant to chapter [46.16A](#) RCW.
- (5) "Motor vehicle dealer" means a motor vehicle dealer, as defined in RCW [46.70.011](#), that is licensed pursuant to chapter [46.70](#) RCW.
- (6) "Person" means an individual, firm, public, or private corporation, association, partnership, political subdivision of the state, municipality, or governmental agency.
- (7) The terms "air contaminant," "air pollution," "air quality standard," "ambient air," "emission," and "emission standard" have the meanings given them in RCW [70.94.030](#).

70.120.020 Programs.

(1) The department shall conduct a public educational program regarding the health effects of air pollution emitted by motor vehicles; the purpose, operation, and effect of emission control devices and systems; and the effect that proper maintenance of motor vehicle engines has on fuel economy and air pollution emission and a public notification program identifying the geographic areas of the state that are designated as being noncompliance areas and emission contributing areas and describing the requirements imposed under this chapter for those areas.

(2)(a) The department shall grant certificates of instruction to persons who successfully complete a course of study, under general requirements established by the director, in the maintenance of motor vehicle engines, the use of engine and exhaust analysis equipment, and the repair and maintenance of emission control devices. The director may establish and implement procedures for granting certification to persons who successfully complete other training programs or who have received certification from public and private organizations, which meet the requirements established in this subsection, including programs on clean fuel technology and maintenance.

(b) The department shall make available to the public a list of those persons who have received certificates of instruction under subsection (2) (a) of this section.

70.120.070 Vehicle inspections—Failed—Certificate of acceptance.

(1) Any person:

(a) Whose motor vehicle is tested pursuant to this chapter and fails to comply with the emission standards established for the vehicle; and

(b) Who, following such a test, expends more than one hundred dollars on a 1980 or earlier model year motor vehicle or expends more than one hundred fifty dollars on a 1981 or later model year motor vehicle for repairs solely devoted to meeting the emission standards and that are performed by a certified emission specialist authorized by RCW [70.120.020\(2\)\(a\)](#); and

(c) Whose vehicle fails a retest, may be issued a certificate of acceptance if (i) the vehicle has been in use for more than five years or fifty thousand miles, and (ii) any component of the vehicle installed by the manufacturer for the purpose of reducing emissions, or its appropriate replacement, is installed and operative.

To receive the certificate, the person must document compliance with (b) and (c) of this subsection to the satisfaction of the department.

Should any provision of (b) of this subsection be disapproved by the administrator of the United States environmental protection agency, all vehicles shall be required to expend at least four hundred fifty dollars to qualify for a certificate of acceptance.

(2) Persons who fail the initial tests shall be provided with:

(a) Information regarding the availability of federal warranties and certified emission specialists;

(b) Information on the availability and procedure for acquiring license trip-permits;

(c) Information on the availability and procedure for receiving a certificate of acceptance; and

(d) The local phone number of the department's local vehicle specialist.

70.120.080 Vehicle inspections—Fleets.

The director may authorize an owner or lessee of a fleet of motor vehicles, or the owner's or lessee's agent, to inspect the vehicles in the fleet and issue certificates of compliance for the

vehicles in the fleet if the director determines that: (1) The director's inspection procedures will be complied with; and (2) certificates will be issued only to vehicles in the fleet that meet emission and equipment standards adopted under RCW [70.120.150](#) and only when appropriate.

In addition, the director may authorize an owner or lessee of one or more diesel motor vehicles with a gross vehicle weight rating in excess of eight thousand five hundred pounds, or the owner or lessee's agent, to inspect the vehicles and issue certificates of compliance for the vehicles. The inspections shall be conducted in compliance with inspection procedures adopted by the department and certificates of compliance shall only be issued to vehicles that meet emission and equipment standards adopted under RCW [70.120.150](#).

The director shall establish by rule the fee for fleet or diesel inspections provided for in this section. The fee shall be set at an amount necessary to offset the department's cost to administer the fleet and diesel inspection program authorized by this section.

Owners, leaseholders, or their agents conducting inspections under this section shall pay only the fee established in this section and not be subject to fees under RCW [70.120.170](#)(4).

70.120.100 Vehicle inspections—Complaints.

The department shall investigate complaints received regarding the operation of emission testing stations and shall require corrections or modifications in those operations when deemed necessary.

The department shall also review complaints received regarding the maintenance or repairs secured by owners of motor vehicles for the purpose of complying with the requirements of this chapter. When possible, the department shall assist such owners in determining the merits of the complaints.

The department shall keep a copy of all complaints received, and on request, make copies available to the public. This is not intended to require disclosure of any information that is exempt from public disclosure under chapter [42.56](#) RCW.

70.120.120 Rules.

The director shall adopt rules implementing and enforcing this chapter in accordance with chapter [34.05](#) RCW. The department shall take into account when considering proposed modifications of emission contributing boundaries, as provided for in RCW [70.120.150](#)(6), alternative transportation control and motor vehicle emission reduction measures that are required by local municipal corporations for the purpose of satisfying federal emission guidelines.

70.120.130 Authority.

The authority granted by this chapter to the director and the department for controlling vehicle emissions is supplementary to the department's authority to control air pollution pursuant to chapter [70.94](#) RCW.

70.120.150 Vehicle emission and equipment standards — Designation of noncompliance areas and emission contributing areas.

The director:

(1) Shall adopt motor vehicle emission and equipment standards to: Ensure that no less than seventy percent of the vehicles tested comply with the standards on the first inspection

conducted, meet federal clean air act requirements, and protect human health and the environment.

(2) Shall adopt rules implementing the smoke opacity testing requirement for diesel vehicles that ensure that such test is objective and repeatable and that properly maintained engines that otherwise would meet the applicable federal emission standards, as measured by the new engine certification test, would not fail the smoke opacity test.

(3) Shall designate a geographic area as being a "noncompliance area" for motor vehicle emissions if (a) the department's analysis of emission and ambient air quality data, covering a period of no less than one year, indicates that the standard has or will probably be exceeded, and (b) the department determines that the primary source of the air contaminant is motor vehicle emissions.

(4) Shall reevaluate noncompliance areas if the United States environmental protection agency modifies the relevant air quality standards, and shall discontinue the program if compliance is indicated and if the department determines that the area would continue to be in compliance after the program is discontinued. The director shall notify persons residing in noncompliance areas of the reevaluation.

(5) Shall analyze information regarding the motor vehicle traffic in a noncompliance area to determine the smallest land area within whose boundaries are present registered motor vehicles that contribute significantly to the violation of motor vehicle-related air quality standards in the noncompliance area. The director shall declare the area to be an "emission contributing area." An emission contributing area established for a carbon monoxide or oxides of nitrogen noncompliance area must contain the noncompliance area within its boundaries. An emission contributing area established for an ozone noncompliance area located in this state need not contain the ozone noncompliance area within its boundaries if it can be proven that vehicles registered in the area contribute significantly to violations of the ozone air quality standard in the noncompliance area. An emission contributing area may be established in this state for violations of federal air quality standards for ozone in an adjacent state if (a) the United States environmental protection agency designates an area to be a "nonattainment area for ozone" under the provisions of the federal Clean Air Act (42 U.S.C. 7401 et seq.), and (b) it can be proven that vehicles registered in this state contribute significantly to the violation of the federal air quality standards for ozone in the adjacent state's nonattainment area.

(6) Shall, after consultation with the appropriate local government entities, designate areas as being noncompliance areas or emission contributing areas, and shall establish the boundaries of such areas by rule. The director may also modify boundaries. In establishing the external boundaries of an emission contributing area, the director shall use the boundaries established for ZIP code service areas by the United States postal service.

(7) May make grants to units of government in support of planning efforts to reduce motor vehicle emissions.

70.120.160 Noncompliance areas—Annual review.

(1) The director shall review annually the air quality and forecasted air quality of each area in the state designated as a noncompliance area for motor vehicle emissions.

(2) An area shall no longer be designated as a noncompliance area if the director determines that:

(a) Air quality standards for contaminants derived from motor vehicle emissions are no longer being violated in the noncompliance area; and

(b) The standards would not be violated if the emission inspection system in the emission contributing area was discontinued and the requirements of *RCW 46.16.015 no longer applied.

70.120.170 Motor vehicle emission inspections—Fees—Certificate of compliance—State and local agency vehicles. (Expires January 1, 2020.)

(1) The department shall administer a system for emission inspections of all motor vehicles, except those described in *RCW 46.16.015(2), that are registered within the boundaries of each emission contributing area. Under such system, a motor vehicle shall be inspected biennially except where an annual program would be required to meet federal law and prevent federal sanctions. In addition, motor vehicles shall be inspected at each change of registered owner of a licensed vehicle as provided under *RCW 46.16.015.

(2) The director shall:

(a) Adopt procedures for conducting emission inspections of motor vehicles. The inspections may include idle and high revolution per minute emission tests. The emission test for diesel vehicles shall consist solely of a smoke opacity test.

(b) Adopt criteria for calibrating emission testing equipment. Electronic equipment used to test for emissions standards provided for in this chapter shall be properly calibrated. The department shall examine frequently the calibration of the emission testing equipment used at the stations.

(c) Authorize, through contracts, the establishment, and operation of inspection stations for conducting vehicle emission inspections authorized in this chapter. No person contracted to inspect motor vehicles may perform for compensation repairs on any vehicles. No public body may establish or operate contracted inspection stations. Any contracts [must] comply with the procedures established for competitive bids in chapter 43.19 RCW.

(d) Beginning in 2012, authorize businesses other than those contracted to operate inspection stations under (c) of this subsection to conduct vehicle emission inspections. Businesses authorized under this subsection may also inspect and perform, for compensation, repairs on vehicles. The fee limitations under subsection (4) of this section do not apply to the fee charged for a vehicle emissions inspection by a business authorized to conduct vehicle emission inspections under this subsection. The director may establish by rule a fee to be paid to the department for the oversight costs for each vehicle emission inspection performed by a business authorized under this subsection (2)(d).

(3) Subsection (2)(c) of this section does not apply to volunteer motor vehicle inspections under RCW 70.120.020(1) if the inspections are conducted for the following purposes:

- (a) Auditing;
- (b) Contractor evaluation;
- (c) Collection of data for establishing calibration and performance standards; or
- (d) Public information and education.

(4)(a) The director shall establish by rule the fee to be charged for emission inspections. The inspection fee shall be a standard fee applicable statewide or throughout an emission contributing area and shall be no greater than fifteen dollars. Surplus moneys collected from fees over the amount due the contractor shall be paid to the state and deposited in the general fund. Fees shall be set at the minimum whole dollar amount required to (i) compensate the contractor or inspection facility owner, and (ii) offset the general fund appropriation to the department to cover the administrative costs of the motor vehicle emission inspection program.

(b) Before each inspection, a person whose motor vehicle is to be inspected shall pay to the inspection station the fee established under this section. The person whose motor vehicle is inspected shall receive the results of the inspection. If the inspected vehicle complies with the standards established by the director, the person shall receive a dated certificate of compliance. If the inspected vehicle does not comply with those standards, one re-inspection of the vehicle shall be afforded without charge.

(5) All units of local government and agencies of the state with motor vehicles garaged or regularly operated in an emission contributing area shall test the emissions of those vehicles annually to ensure that the vehicle's emissions comply with the emission standards established by the director. All state agencies outside of emission contributing areas with more than twenty motor vehicles housed at a single facility or contiguous facilities shall test the emissions of those vehicles annually to ensure that the vehicles' emissions comply with standards established by the director. A report of the results of the tests shall be submitted to the department.

(6) This section expires January 1, 2020.

70.120.190 Used vehicles.

(1) Motor vehicle dealers selling a used vehicle not under a new vehicle warranty shall include a notice in each vehicle purchase order form that reads as follows: "The owner of a vehicle may be required to spend up to (a dollar amount established under RCW [70.120.070](#)) for repairs if the vehicle does not meet the vehicle emission standards under this chapter. Unless expressly warranted by the motor vehicle dealer, the dealer is not warranting that this vehicle will pass any emission tests required by federal or state law."

(2) The signature of the purchaser on the notice required under subsection (1) of this section shall constitute a valid disclaimer of any implied warranty by the dealer as to a vehicle's compliance with any emission standards.

(3) The disclosure requirement of subsection (1) of this section applies to all motor vehicle dealers located in counties where state emission inspections are required.

70.120.210 Clean-fuel performance and clean-fuel vehicle emissions specifications.

By July 1, 1992, the department shall develop, in cooperation with the departments of general administration and transportation, and Washington State University, aggressive clean-fuel performance and clean-fuel vehicle emissions specifications including clean-fuel vehicle conversion equipment. To the extent possible, such specifications shall be equivalent for all fuel types. In developing such specifications, the department shall consider the requirements of the clean air act and the findings of the environmental protection agency, other states, the American petroleum institute, the gas research institute, and the motor vehicles manufacturers association.

70.120.230 Scientific advisory board—Composition of board—Duties.

The department shall establish a scientific advisory board to review plans to establish or expand the geographic area where an inspection and maintenance system for motor vehicle emissions is required. The board shall consist of three to five members. All members shall have at least a master's degree in physics, chemistry, or engineering, or a closely related field. No member may be a current employee of a local air pollution control authority, the department, the United States environmental protection agency, or a company that may benefit from a review by the board.

The board shall review an inspection and maintenance plan at the request of a local air pollution control authority, the department, or by a petition of at least fifty people living within the proposed boundaries of a vehicle emission inspection and maintenance system. The entity or entities requesting a scientific review may include specific issues for the board to consider in its review. The board shall limit its review to matters of science and shall not provide advice on penalties or issues that are strictly legal in nature.

The board shall provide a complete written review to the department. If the board members are not in agreement as to the scientific merit of any issue under review, the board may include a dissenting opinion in its report to the department. The department shall immediately make copies available to the local air pollution control authority and to the public.

The department shall conduct a public hearing, within the area affected by the proposed rule, if any significant aspect of the rule is in conflict with a majority opinion of the board. The department shall include in its responsiveness summary the rationale for including a rule that is not consistent with the review of the board, including a response to the issues raised at the public hearing.

Members shall be reimbursed for travel expenses as provided in RCW [43.03.050](#) and [43.03.060](#).

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Appendix C: [Chapter 173-421 WAC](#) Motor Vehicle Emission Control Systems

- 173-421-010 Purpose.
- 173-421-020 Assumption of jurisdiction and applicability.
- 173-421-030 Definitions.
- 173-421-100 Emission control systems.

WAC 173-421-010 Purpose. This chapter promulgated under RCW 70.94.305 and 70.94.331 establishes requirements to preserve emission control equipment installed on motor vehicles.

[Statutory Authority: Chapter 70.94 RCW. 87-19-078 (Order 87-17), 173-421-010, filed 9/16/87.]

WAC 173-421-020 Assumption of jurisdiction and applicability. The department finds that the prevention and control of air pollution from motor vehicles should be regulated on the statewide basis and, hereby assumes jurisdiction over motor vehicles for the purpose of controlling air contaminant emissions from the operation of such motor vehicles.

[Statutory Authority: Chapter 70.94 RCW. 87-19-078 (Order 87-17), 173-421-020, filed 9/16/87]

WAC 173-421-030 Definitions. Unless a different meaning is clearly required by context, words and phrases used in this chapter shall have the following meanings; general terms common with other chapters of Title 173 WAC as defined in chapter 173-403 WAC, and terms specific to motor vehicle emission control systems as follows:

“Motor vehicle” means a self-powered operating vehicle or one capable of operating, designed to transport people or property, and of a type required to be licensed for operation on public highways.

[Statutory Authority: Chapter 70.94 RCW. 87-19-078 (Order 87-17), 173-421-030, filed 9/16/87.]

WAC 173-421-100 Emission control systems. A person shall not remove or render inoperable any component or change any element of design of a motor vehicle including adjustments outside the range of manufacturer’s specifications that could affect the amount of air contaminants emitted from the vehicle subject to the following conditions:

1) Components of emission control systems may be disassembled and assembled for the purpose of repair and maintenance. These components or elements of design shall be restored to (proper working order when they are repaired or maintained.

(2) When components of emission control systems require replacement they may be removed and replaced with a part intended by the vehicle manufacturer as a replacement part for that specific vehicle. Under circumstances established by the United States Environmental Protection Agency and aftermarket replacement part may be used. A replaced part shall be installed and adjusted so that it is in proper working order.

[Statutory Authority: Chapter 70.94 RCW. 87-19-078 (Order 87-17), 173-421-100, filed 9/16/87.]

Appendix D: RCW 46.16A.060 Registration — Emission control inspections required —
Exemptions — Educational information

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Appendix D: Chapter [173-422A WAC](#) Motor Vehicle Emission Inspection

WAC 173-422A-010 Purpose.

These rules implement the motor vehicle emission test program required by state law (chapter 70.120 RCW Motor vehicle emission control). They are intended to encourage appropriate emission repairs of vehicles to reduce air pollution.

WAC 173-422A-020 Definitions.

Unless the context clearly indicates otherwise, the following definitions will apply:

"Appropriate repair" means the diagnosis or repair of the cause(s) of an emission test failure.

"Authorized tester" means a vehicle owner or business authorized by ecology to conduct testing other than ecology's contractor.

"Ecology" means the department of ecology.

"OBD" means the standardized on-board diagnostic system required to be installed on all 1996, newer model year gasoline cars, and light trucks sold in the United States. This system monitors the operation of the vehicle's emission control systems to detect possible problems. If problems are found a check engine light, alerts the driver and trouble codes are stored to help an automotive repair technician diagnose the problem.

"On-line" means to electronically communicate during the emission test as directed by ecology.

"Waiver" is an exemption from further testing for twelve months when all the following conditions apply:

- (a) The vehicle failed an emission test;
- (b) The vehicle failed a retest or is unable to be retested;
- (c) All primary emission control components (or appropriate replacements) are installed and operative;
- (d) An ecology authorized emission specialist has performed at least one hundred fifty dollars of appropriate repairs;
- (e) The appropriate repairs were performed between the initial and last test; and
- (f) Ecology or its designee has received original receipts listing and providing the cost of each appropriate diagnosis or repair of the cause(s) of an emission test failure.

WAC 173-422A-030 Vehicle emission test requirements and testing schedule for private and United States government vehicles.

The department of licensing, county auditors and their subagents shall issue or renew a vehicle license or change the registered owner only if the vehicle meets emission test requirements.

Privately owned and United States government vehicles must obtain a passing test or waiver within the twelve months before the department of licensing renewal date for the vehicle. See the following table for the testing schedule.

Table D-1. Testing Schedule for Private and United States Government Vehicles

Year License Expires	Model Years
2012	1988, 1990, 1992, 1994, 1997, 1999, 2001, 2003, 2005, 2007
2013	1989, 1991, 1993, 1995, 1996, 1998, 2000, 2002, 2004, 2006, 2008
2014	1990, 1992, 1994, 1997, 1999, 2001, 2003, 2005, 2007
2015	1991, 1993, 1995, 1996, 1998, 2000, 2002, 2004, 2006, 2008
2016	1992, 1994, 1997, 1999, 2001, 2003, 2005, 2007
2017	1993, 1995, 1996, 1998, 2000, 2002, 2004, 2006, 2008
2018	1994, 1997, 1999, 2001, 2003, 2005, 2007
2019	1995, 1996, 1998, 2000, 2002, 2004, 2006, 2008

WAC 173-422A-040 Emission test schedule for state and local government vehicles.

State and local government vehicles must be tested according to the following table.

Table D-2. Testing Schedule for State and Local Government Vehicles

Year	Model Years
2012	1987 through 2007
2013	1988 through 2008
2014	1989 through 2008
2015	1990 through 2008
2016	1991 through 2008
2017	1992 through 2008
2018	1993 through 2008
2019	1994 through 2008

WAC 173-422A-050 Emission test areas.

Vehicles registered within the following United States Postal Service zip codes (as of September 1, 1994) require emission tests. Zip code changes by the United States Postal Service after September 1, 1994, do not change emission test area designations.

Table D-3. Emission Test Areas

Puget Sound Region				
98001-98009	98011	98012	98015	98020
98021	98023	98025-98028	98031-98043	98046
98047	98052-98059	98062-98064	98071-98073	98083
98092	90893	98101-98109	98111-98199	98201-98208
98258	98270	98271	98275	98290
98291	98327	98332	98335	98338
98344	98352	98354	98371-98374	98387
98388	98390	98401-98499		
Spokane Region				
99001	99005	99014	99016	99019
99021	99025	99027	99037	99201-99209
Vancouver Region				
98604 except north of N.E. 279th Street	98606	98607	98629 except east of N.E. 50th Avenue	98642
98660-98668	98671 except Skamania County	98682-98686		

WAC 173-422A-060 Exemptions.

The following vehicles are exempt from emission testing:

- (1) Newer vehicles. Vehicles less than five years old and 2009 or newer model year vehicles.
- (2) Older vehicles. Vehicles more than twenty-five years old.
- (3) Motorcycles and mopeds as defined in chapter 46.04 RCW.
- (4) Prorated vehicles as defined in chapter 46.85 RCW.
- (5) Vehicles garaged and operated outside a test area.
- (6) Farm vehicles as defined in chapter 46.04 RCW.
- (7) Vehicles not intended for highway use.
- (8) Vehicles registered as powered by electricity, propane, compressed natural gas, or liquid petroleum gas.
- (9) Honda Insight and Toyota Prius model vehicles.
- (10) Diesel powered vehicles weighing less than 6001 pounds or with an engine that was certified by its manufacturer as meeting the EPA 2007 exhaust emission standards or equipped with an exhaust particle filter acceptable to ecology.
- (11) Vehicles being sold or being offered for sale by a Washington licensed motor vehicle dealer.
- (12) An emission test is not required to transfer the registered ownership between parents, siblings, grandparents, grandchildren, spouses, legal domestic partners, or present co-owners or to a public agency and for all changes of the legal owner.

WAC 173-422A-100 Gasoline vehicle emission test standards.

Gasoline motor vehicles are tested to determine if they meet one of the following requirements:

- (1) Two-speed idle exhaust emission test standards:

Table D-4. Two-speed Idle Exhaust Emission Test Standards

Model Year	Carbon Monoxide (CO) (%)	Hydrocarbons (HC) (ppm)
1995 and older	3.0	400
1996-2008 (8500 or less GVWR)	1.2	220
1996-2008 (greater than 8500 GVWR)	3.0	400

(2) Instead of a two-speed idle exhaust emission test, ecology may require a 1996 or newer model vehicle be tested using the vehicle's on-board diagnostic (OBD) system. To pass the OBD test:

- (a) The check engine light must not be commanded on while the engine is operating.
- (b) The emission related monitors must have completed their checks and be ready to report potential problems, except:
 - (i) A 2001 or newer model year vehicle may have one monitor not ready to report.
 - (ii) A 2000 or older model year vehicle may have up to two monitors not ready to report.
- (c) For the vehicle to pass a retest, the monitor(s) that commanded the check engine light on during the initial test must be ready to report.

WAC 173-422A-110 Gasoline vehicle emission testing procedures.

- (1) All persons testing gasoline vehicles shall, as directed by ecology, either:
 - (a) Connect the OBD testing equipment to determine what diagnostic codes may be commanding the check engine light on and whether each emission related monitor is ready to report; or
 - (b) Follow the two-speed idle exhaust emission testing procedures described in Appendix B-Test Procedures of Subpart S-Inspection/Maintenance Program Requirements of Part 51 of chapter 1, Title 40 of the Code of Federal Regulations adopted November 1, 1992.
- (2) Ecology may require variations to the testing procedures to accommodate the design of certain vehicles.

WAC 173-422A-120 Gasoline vehicle emission testing equipment specifications.

- (1) Exhaust gas analyzers must meet the specifications in (I) Steady-State Exhaust Analysis System of Appendix D-Steady-State Short Test Equipment of Subpart S-Inspection/Maintenance Program Requirements of Part 51 of chapter 1, Title 40 of the Code of Federal Regulations adopted November 1, 1992.
- (2) OBD testing equipment must be capable of:

- (a) Communicating with all OBD systems used on 1996 through 2008 model year gasoline vehicles approved to be sold in the United States;
 - (b) Recording the readiness status of each emission-related OBD monitor; and
 - (c) Recording the diagnostic trouble code(s) that could command the check engine light on.
- (3) The testing equipment must be able to perform the test on-line unless ecology grants prior approval

WAC 173-422A-200 Exhaust emission test standards for diesel vehicles.

Table D-5. Exhaust Emission Test Standards for Diesel Vehicles

Model Year	Opacity (%)
1991 and older	50
1992-1996	40
1997-2008	30

WAC 173-422A-210 Test procedure for diesel vehicles.

- (1) Before beginning the test, the tester shall verify all of the following:
 - (a) The engine is within its normal operating temperature range;
 - (b) All vehicle accessories including air conditioning are off;
 - (c) The parking brake and an engine brake or retarder is off; and
 - (d) The transmission is in neutral (and clutch released if manual transmission).
- (2) During the snap-acceleration test the tester shall do all of the following:
 - (a) Perform at least three preliminary snap-accelerations until the engine achieves consistent operation.
 - (i) A snap-acceleration consists of moving the accelerator pedal from normal idle as rapidly as possible to the full power position, then fully releasing the throttle so the engine returns to idle. Allow the engine to remain at idle for at least ten seconds between snap-accelerations.
 - (ii) Insert the opacity meter into an exhaust pipe.
 - (b) Perform additional snap-accelerations while measuring the smoke opacity.
 - (i) The tester must either begin a subsequent snap-acceleration within forty-five seconds or restart the test without removing the opacity meter.
 - (ii) The tester need not repeat the three preliminary snap-accelerations.
 - (c) Perform snap-accelerations (up to nine times if necessary) to obtain three consecutive peak opacity readings that meet ecology's standards. If this does not occur, the vehicle fails the test. Record the three final opacity readings.
 - (d) If the vehicle passes the first series of snap-accelerations, repeat these procedures for each additional exhaust pipe.
- (3) Ecology may require variations to the testing procedures to accommodate the design of certain vehicles.

WAC 173-422A-220 Diesel vehicle testing equipment specifications.

- (1) An opacity meter that:
 - (a) Automatically recalibrates before each test.
 - (b) Provides for continuous measurement of exhaust opacity unaffected by rain or wind.

(2) The testing equipment must be able to perform the test on-line unless ecology grants prior approval.

WAC 173-422A-300 Testing equipment maintenance and calibration.

(1) The tester must:

(a) Calibrate and maintain all test equipment according to the manufacturer's specifications and recommendations.

(b) Maintain logs approved by ecology of maintenance, repair, and calibration of testing equipment.

(c) Use, for exhaust gas analyzer calibration, the procedures in the following document: (I) Steady-State Test Equipment of Appendix A-Calibrations, Adjustments, and Quality Control of Subpart S-Inspection/Maintenance Program Requirements of Part 51 of chapter 1, Title 40 of the Code of Federal Regulations adopted November 1, 1992.

(2) Ecology may require additional maintenance and calibration procedures if they are needed to ensure the accuracy of the testing equipment.

WAC 173-422A-310 Quality assurance.

Ecology (or its designee) may:

(1) Monitor (remotely or on location) ecology's contractor and authorized testers' operations.

(2) Access the testing/reporting equipment and records.

(3) Stop or limit emission testing due to this monitoring.

WAC 173-422A-320 Test fees.

(1) An ecology contractor shall charge fifteen or less dollars for a test. The first retest will be free for up to twelve months after a vehicle fails the initial test.

(2) Authorized testers may set their own fees.

WAC 173-422A-340 Authorized testers.

(1) Authorized testers must meet the following conditions:

(a) Use ecology approved testing equipment. The test must be done on-line unless ecology grants prior approval.

(b) Follow the testing procedure described in section 110 for gasoline vehicles and section 210 for diesel vehicles.

(c) As directed by ecology, provide information to vehicle owners and obtain their approval for emission-related repairs.

(d) Properly maintain testing equipment.

(e) Maintain logs approved by ecology of maintenance, repair, and calibration of testing equipment.

(f) Allow ecology to conduct performance audits and compliance inspections.

(g) Take corrective actions required by ecology.

(2) Violations of this rule by an authorized tester will result in their authorization being permanently or temporarily revoked unless it is the first lesser rule violation such as an administrative or recordkeeping error:

(a) For the first lesser rule violation, the authorized tester will receive a written warning that further rule violations of this type will result in their authorization being temporarily revoked for thirty to ninety days.

(b) For the first major, deliberate rule violation, such as fraudulent testing or reporting, their authorization will be temporarily revoked for six months.

(c) A second major violation will result in their authorization being permanently revoked.

(d) Reauthorization of a temporarily revoked authorization requires a new application for authorization.

(3) Notifications of violations will be documented in writing.

(4) An authorized tester whose authorization has been revoked may appeal this decision to the pollution control hearings board as provided for in RCW 43.21B.310.

WAC 173-422A-400 Emission specialist authorization.

(1) To become an authorized emission specialist an individual shall:

(a) Successfully complete an ecology-approved course on emission repair every two years.

(b) Agree in writing to meet all requirements of this rule and all Washington state and federal laws and regulations regarding emission control systems.

(2) To maintain authorization, an authorized emission specialist shall:

(a) Complete required training within ninety days of notification by ecology. Ecology may grant written extensions,

(b) Sign and include their specialist identification number on all receipts for appropriate diagnoses and repairs of vehicles that have failed an emission test. These receipts must:

(i) Be numbered and printed with the business's name and address;

(ii) Include the customer's name, telephone number, and address;

(iii) Include the vehicle's make, model, license number, and vehicle identification number (VIN);

(iv) Itemize all appropriate diagnoses and repairs performed by the specialist;

(v) Include any missing or inoperative primary emission control components; and

(vi) Include any further recommended appropriate repairs and diagnoses.

(3) To maintain authorization, an authorized emission specialist may not:

(a) Tamper with emission control systems (a violation of chapter 173-421 WAC), including adjusting an engine outside of the manufacturer's specifications; or

(b) Obtain or attempt to obtain a passing test, waiver, or an exemption from the test requirements by providing false information or by any other fraudulent means that violate this rule; or

(c) Assist any individual in committing a violation of this rule or chapter 173-421 WAC.

(4) Violations of this rule by an authorized emission specialist will result in their authorization being permanently or temporarily revoked unless it is the first lesser (not sure of this) rule violation such as an administrative or recordkeeping error.

(a) For the first lesser rule (here too) violation, the authorized emission specialist will receive a written warning that further rule violations of this type will result in their authorization being temporarily revoked for thirty to ninety days.

(b) For the first major, deliberate rule violation, such as fraudulent testing or reporting, their authorization will be temporarily revoked for six months.

(c) A second major violation will result in their authorization being permanently revoked.

(d) Reauthorization of a temporarily revoked authorization requires a new application for authorization.

- (5) Notifications of violations will be documented in writing.
- (6) An authorized emission specialist whose authorization is revoked may appeal to the pollution control hearings board as provided for in RCW 43.21B.310.

WAC 173-422A-410 Requirements for listing businesses with authorized emission specialists.

- (1) Ecology will maintain a list of businesses where a vehicle owner can have an authorized emission specialist diagnose and repair the causes of an emission test failure.
- (2) Ecology will include the business's name, address, and telephone number on the list when the business agrees in writing to require all of the following:
 - (a) The authorized emission specialist use an ecology-approved OBD scan tool to diagnose an emission test failure of a 1996 or newer gasoline vehicle equipped with an OBD system. For an OBD scan tool to be approved by ecology it will need:
 - (i) To provide mode 1 through mode 9 diagnostic data requests.
 - (ii) Support all communication protocols used by the vehicle manufacturers for 1996 through 2008 model year gasoline vehicles sold in the United States.
 - (b) That the diagnosis of the cause(s) of an emission tests failure and the repairs or adjustments to correct the cause(s) of an emission test failure are performed by an authorized emission specialist.
 - (c) That the authorized emission specialist:
 - (i) Sign the customer's receipt for emission repairs or adjustments; and
 - (ii) List on the receipt, the emission diagnosis or repairs done and those that are still needed.
 - (d) All employees not to tamper or assist anyone in tampering with emission control systems, including adjusting a vehicle outside the manufacturer's specifications.
 - (e) All employees to obtain or assist anyone in obtaining a fraudulent passing test, waiver, or an exemption from the test requirement.
 - (f) Notification of ecology when an authorized emission specialist begins or ends employment.
- (3) When a business no longer meets the requirements for listing, it must discontinue any representation of listing immediately.
- (4) Violations of this rule by a listed business will result in their listing being permanently or temporarily revoked unless it is the first lesser what about this rule violation such as an administrative or recordkeeping error.
 - (a) For the first lesser rule violation, the listed business will receive a written warning that further rule violations of this type will result in their listing being temporarily revoked for thirty to ninety days.
 - (b) For the first major, deliberate rule violation, such as fraudulent testing or reporting, their listing will be temporarily revoked for six months.
 - (c) A second major violation will result in their listing being permanently revoked.
 - (d) Relisting of a temporarily revoked listing requires a new application for listing.
 - (5) Notifications of violations will be documented in writing.
 - (6) A business whose listing has been revoked may be appealed to the pollution control hearings board as provided for in RCW 43.21B.310.

WAC 173-422A-500 Civil penalty.

Except for a lesser violation of this rule, such as an administrative or recordkeeping error, ecology may impose a civil penalty not to exceed two hundred fifty dollars on anyone who violates any requirement of this rule. This penalty may be appealed to the pollution control hearings board as provided for in RCW 43.21B.310.]

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Appendix E: Applus Test Station Locations

Clark County

East Vancouver (360-254-2173)	1121 NE 136th Ave
West Vancouver (360-574-3731)	14110 NW 3rd Ct

King County

Auburn (253-939-1225)	3008 A St SE
Bellevue (425-644-1803)	15313 SE 37th St
Redmond (425-882-3317)	18610 NE 67th Ct
Renton (425-228-6453)	805 SW 10th St
Seattle, North (206-362-5173)	12040 Aurora Ave N
Seattle, South (206-624-1254)	3820 Sixth Ave S

Pierce County

Fife (253-926-3277)	4912 Pacific Hwy E
Puyallup (253-848-6399)	10320 122nd St E
Lakewood (253-581-5243)	3003 107th St S

Snohomish County

Everett (425-347-5711)	1505 112th St SW
Lynnwood (425-771-7614)	19726 64th Ave W
Marysville (360-658-1137)	117 Beach Ave

Spokane County

East Spokane (509-535-1326)	16309 E Marietta St
West Spokane (509-482-7724)	920 N Hamilton St

Test Station Hours

Monday, Tuesday, Wednesday, Friday	8:30 am – 5:00 pm
Thursday	8:30 am – 6:00 pm
Saturday	8:30 am – 2:00 pm
Closed Sundays and most state holidays	

Public Information Telephone Lines

Pierce, Clark, King & Snohomish Counties	1-800 272-3780
Spokane County	509-329-3491
Phone Hours	8:00 am to 5:00 pm weekdays
Closed Saturday, Sunday and state holidays	

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Appendix F: Resources for AES Shops

Ecology provides this list for information only.

The information and parts resources may be of use to you.

Ecology does not approve, recommend, or endorse any of these resources.

This list is subject to change.

New & re-manufactured catalytic converters

Cotaco Creek Converters
(800) 275-5116
www.cotacocreekconverters.com

MillerCat
(888) 744-6006
www.millercat.com

Eastern Catalytic
(800) 553-7199
www.easterncatalytic.com

Full Line Exhaust
(800) 482-7259
www.fulllineexhaust.com

Bear River Converters
(888) 782-8825
www.bearriverconverters.com

Discount Converters
(888) 651-0770
www.discountconverter.com

EPA 609 CFC Certification

ASE - Toll-Free Automated Info Line:
(888) 273-8378

Mobile Air Conditioning Society (MACS)
(215) 631-7021 or
info@macsw.org

AC & Refrigeration certification tests at
www.epatest.com

Emission control parts (misc.)

Pollution Control Industries
(800) 447-8760
www.PCIINC.com

Analyzer parts & repair

Dr. Smog Test (Mesa Arizona)
(480) 580-2014
www.drsmogtest.com/

Calibration gas & gauges

Allview Services (206) 755-9611

BAR 97 Smog Supply 1 (800) 439-5099

Airgas USA
Stan Andrews (509) 762-3011
940 E. Broadway Ave
Moses Lake, WA 98837-9800

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Appendix G: Emission Check Posters



Figure G-1. Authorized Repair Facility Poster (ECY 12-02-006)

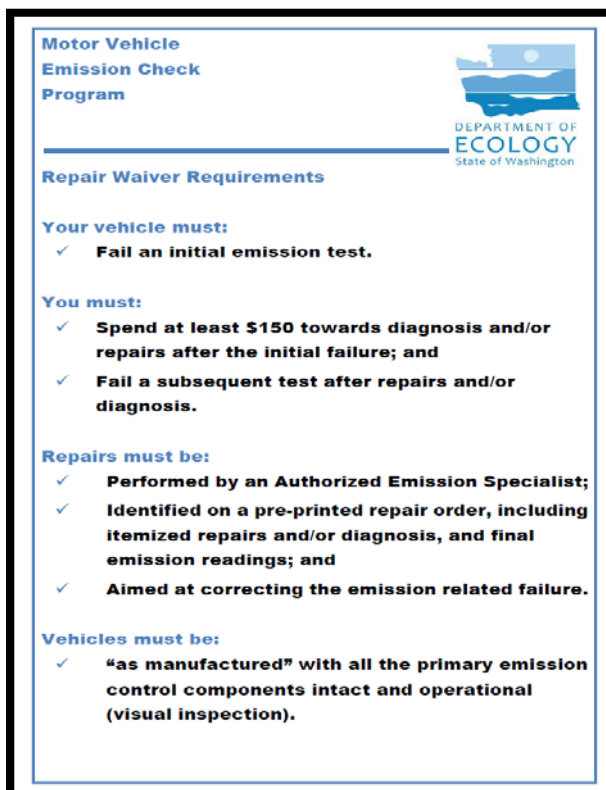


Figure G-2. Emission Check Waiver Poster

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Appendix H: Air/Fuel Information

Exhaust gas relationship chart

This chart shows how changes in the air/fuel mixture affect the levels of gases in gasoline engine emissions. The ideal, or “Stoichiometric,” air/fuel ratio for gasoline is 14.7 to 1.

Manufacturer-recommended engine settings are designed to achieve this balance.

The Stoichiometric air/fuel ratio produces these benefits:

- Highest fuel efficiency; all the fuel is used.
- Lowest CO and HC Emissions.
- Maximum conversion of CO, HC, and NO_x by the catalyst.

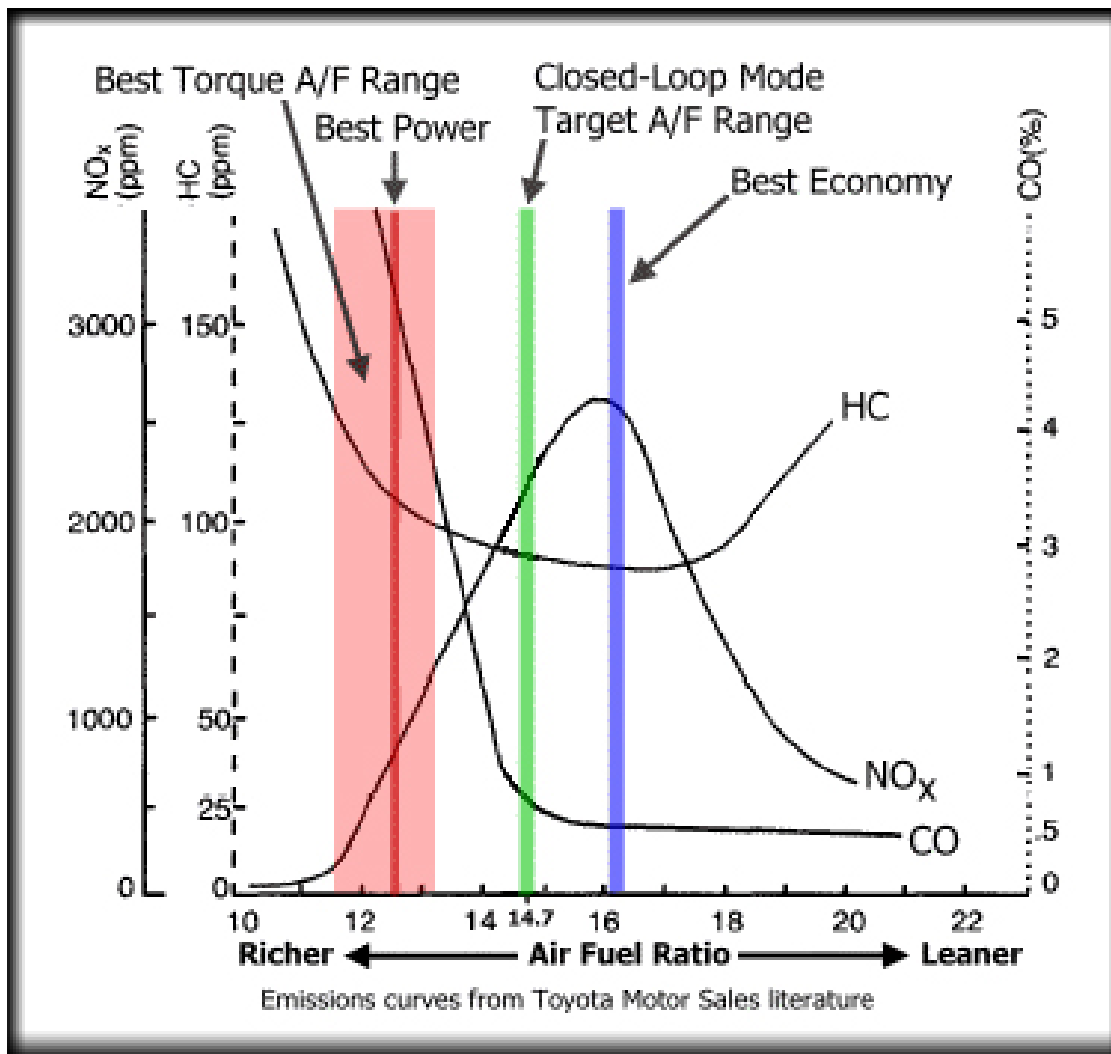


Figure H-1. Emissions Curves

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Appendix I: Common Causes of High Emission Readings

The most common causes of failures for non-OBD gasoline vehicles.

High HC Emissions

- Inoperative/missing catalytic converter
- O2 sensor malfunction
- Internal engine problem
- Vacuum leaks (hoses, vacuum operated devices, intake manifold, carburetor)
- Ignition system malfunction (plugs, plug wires, points, dwell, etc.)
- Improper fuel injector operation
- Incorrect ignition timing and/or idle speed
- Incorrect carburetor air/fuel mixture
- Defective EGR valve or air injection system failure

High CO Emissions

- Excessively rich air/fuel mixture
- O2 sensor malfunction
- Faulty computer control(s)
- Malfunctioning fuel injection system
- Inoperative/missing catalytic converter
- Carburetor float level maladjusted
- Air cleaner, choke or carburetor
- Defective canister purge system

The most common causes of failures for OBD gasoline vehicles.

The cause(s) of an OBD failure is dependent upon the diagnostic trouble code(s) stored in the vehicle's on-board computer. The most common causes are:

- Air/fuel mixture out of control range
- Catalytic converter efficiency too low
- EGR system malfunction
- Misfire
- Evaporative control system malfunction

The most common causes of failures for diesel vehicles.

- Injection timing/pump timing maladjusted
- Incorrect fuel pump pressure
- Injectors fouled, leaking or mismatched
- Restricted air intake system
- Dirty air cleaner
- Engine mechanical defect

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Appendix J: Customer Waiver Checklist

- **Vehicle fails an emission check.**
- **Repairs are not covered under warranty** (gasoline vehicles only). You may be entitled to free repairs at a dealership or other authorized warranty repair facility. Most warranties cover only normal use and wear. Some damaged parts may not be covered under warranty.

Most emission controls are covered under the standard performance warranty for two years or 24,000 miles, whichever comes first. Major emission control components such as the computer and catalytic converter are covered for eight years or 80,000 miles, whichever comes first. For details, check your vehicle's warranty documents.
- **Further diagnosis and repairs are attempted.**
 - An Ecology Authorized Emission Specialist performs the work at an Ecology authorized repair facility.
 - You give your Vehicle Emission Test Report to your specialist who fills it out and returns it to you after doing the diagnosis/repair work.
 - The specialist signs, numbers and records final emission readings on a pre-printed, itemized repair invoice/receipt that identifies your vehicle.
 - Your diagnosis/repair costs reach: \$150.00
 - All work is directed at diagnosis and repair on your vehicle's initial emission check failure.
- **Vehicle is re-checked** at an Emission Check facility after the work is attempted. Bring your Vehicle Emission Test Report completed and signed by your specialist and the invoice/receipt.

Vehicle passes the recheck. The Emission Check facility staff will issue a Vehicle Emission Test Report, which certifies your vehicle has passed. Present or send it to your vehicle-licensing agent when registering your vehicle. Disregard the rest of this checklist!

Vehicle fails the re-check. Continue through this checklist.

Vehicle passes a visual inspection. To obtain a waiver your vehicle must have:

- ✓ An engine that is correct for your vehicle. (Contact Ecology for details).
- ✓ All required emission control components are in place and operational.

Note: There is no cost limit for replacing removed, altered, or tampered emission control components. The cost limit applies only to diagnosis/repairs to otherwise intact engines and their pollution control systems.

- Repairs were appropriate. Facility staff reviews and verifies these documents.
- Certificate of Acceptance (repair waiver) is issued by the Applus Emission Check facility staff. Your licensing agent will accept it in place of a passing Vehicle Emission Test Report when you register your vehicle. Waivers are only issued at an Applus Test Station. An ATF may perform the second test and then direct the customer to Applus to complete the process.

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Appendix K: OBDII Diagnostic Powertrain Codes

Any Powertrain Code that sets the MIL will cause the vehicle to fail an emission test.

Powertrain codes can be either generic or manufacturer specific.

Generic codes are:

P0001-P0299 – Fuel and Air Metering
P0300-P0399 – Ignition System or Misfire
P0400-P0499 – Auxiliary Emissions Controls
P0500-P0599 – Vehicle Speed Controls and Idle Control System
P0600-P0699 – Computer Output Circuit
P0700-P0999 – Transmission
P2000-P2999 – Similar to the previous group by section.
P3400-P3899 – Are individual cylinder codes.
U0000-U2500 – Refer to invalid or missing data points

Manufacturer codes are P1000 – P1999 and P3000 – P3399. These codes will also cause a vehicle to fail the test. The primary difference with these codes is that each manufacturer has their own definition of these codes. They also may both numbers and letters. For example P163C - Voltage Monitoring Control Module Overload

P0A00 – P0A29 are electric motor codes related to Hybrids. Some hybrids are exempt from emission testing.

A trouble code by itself does NOT tell you which part to replace. You must diagnose the system, sensor and/or circuit to determine the fault before repairs are made, or any parts are replaced.

Some OBDII codes may be easier than others to diagnose or explain to customers. Remember the code is there for a reason. They all matter. From a misfire code to an engine load issue caused by a transmission or air conditioning.

There are two categories of DTC's that apply to OBDII.

Type A

1. Requests illumination of the MIL after one failed driving cycle.
2. Stores a freeze frame DTC after one failed driving cycle.

Type B

1. Sets a Pending Trouble Code after one failed driving cycle.
2. Clears a Pending Trouble Code after one successful driving cycle.
3. Turns on the MIL after two consecutive failed driving cycles.
4. Stores a freeze frame after two consecutive failed driving cycles.

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Appendix L: Examples of CARB EO Stickers



Figure L-1. Examples of CARB EO Stickers