

OHIO'S VEHICLE EMISSIONS TESTING PROGRAM

Year 2002 Annual Report

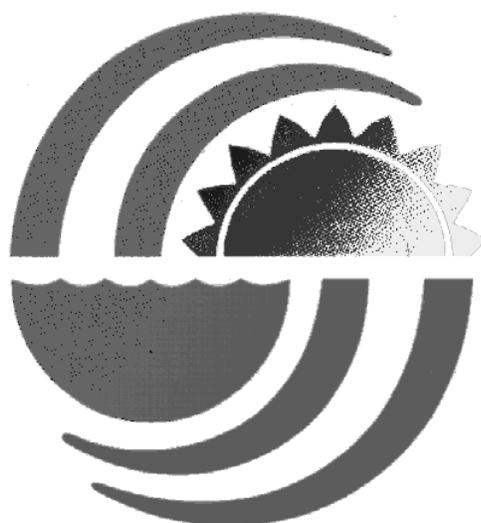


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Acronym List

CAA	Clean Air Act
CO	carbon monoxide
EPA	Environmental Protection Agency
HC	hydrocarbon
I/M.....	inspection and maintenance
NAAQS	national ambient air quality standards
NOx	oxides of nitrogen
OBD.....	on-board diagnostics
Ohio EPA.....	Ohio Environmental Protection Agency
RSD	remote sensing device
SIP	state implementation plan
VOC	volatile organic compound

Introduction

Based on the information provided in this Ohio E-Check annual report, there are measurable air quality benefits from the State's vehicle emissions testing program. In 2002, vehicles that failed their initial test and eventually passed a subsequent test showed an average improvement of 85 percent for hydrocarbon (HC), and an average improvement of 91 percent for carbon monoxide (CO).

Air monitors in Ohio also indicate that air quality is improving in the E-Check counties. The following graph shows ozone trends using the second highest hourly average for the year. The second highest hourly average was selected to avoid having one unusually hot day skew the results. The graph shows that ozone levels were much higher in the E-check counties than in the rest of the state before automobile emissions testing began. Since E-Check was initiated in these counties, ozone levels have decreased, although they remain slightly higher than in the rest of the state. E-Check is part of a comprehensive air quality plan that is helping to improve air quality in these areas.

A report requested by Congress on the effectiveness of vehicle inspection and maintenance (I/M) programs by the National Research Council of the National Academy of Science, concluded that although I/M programs have been less effective than anticipated, they remain one of the most significant control strategies states use in reducing pollution (National Research Council, 2001). The report did not specifically mention Ohio's testing program.

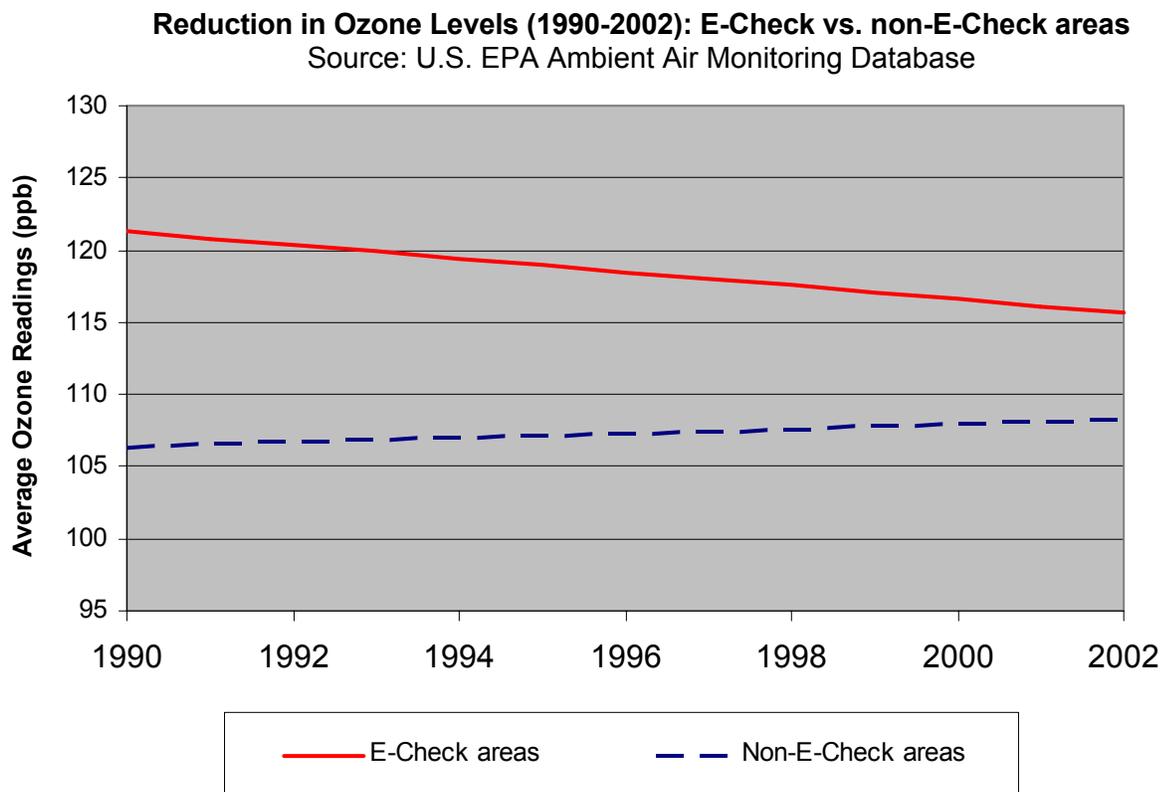


Figure 1: Reduction in Ozone Levels (1990-2002): E-Check vs. non-E-Check areas

I. 2002 Test Results

The following table shows the test volume and the pass/fail statistics for all tests, including retests. The total fails include all vehicles that failed for either one, or a combination of emissions, gas cap, or missing catalytic converter. The HC, CO, gas cap, and catalytic converter fails show how many times such a failure occurred. These totals equal more than the total fails because one vehicle can fail for multiple reasons. The percentages are calculated for total tests conducted.

Table 1: Total Test Results from 2002

Total Vehicles Tested	Total Pass	Total Fail	HC Fails	CO Fails	Gas Cap Fails	Catalytic Converter Fails
1,875,112	1,756,178	118,934	60,984	6,8437	31,091	1,867
N/A	93.7%	6.3%	3.3%	3.6%	1.7%	0.1%

The following graph shows how the fail rate varies depending on model year. Model years from the early to mid-1980s comprise the highest percentage of failures. Once vehicles reach 10 to 15 years old, they begin to need more than normal maintenance to keep them in good working order.

Percentage of Failed Tests by Model Year

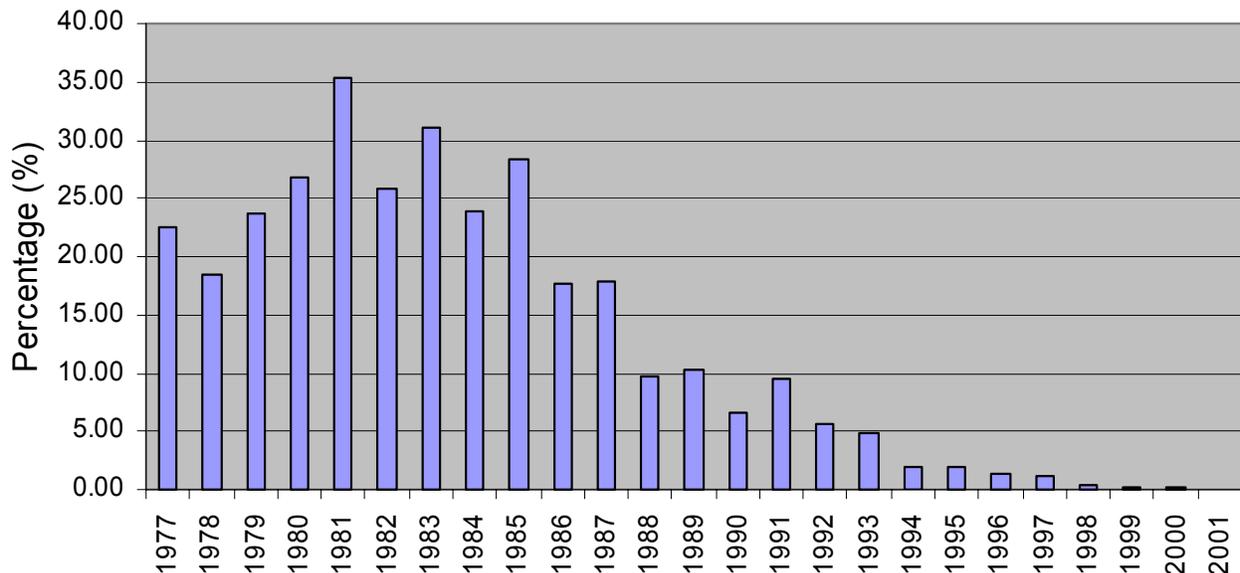


Figure 2: Percentage of Failed Tests by Model Year

The following graph shows how the actual number of failures varies depending on model year. Model years from the late 1970s to the late 1980s comprise the highest number of failures in the E-Check program. This is primarily due to the large number of vehicles that are tested in this age group. Newer vehicles are less likely to fail due to poor maintenance.

Number of Failed Tests by Model Year

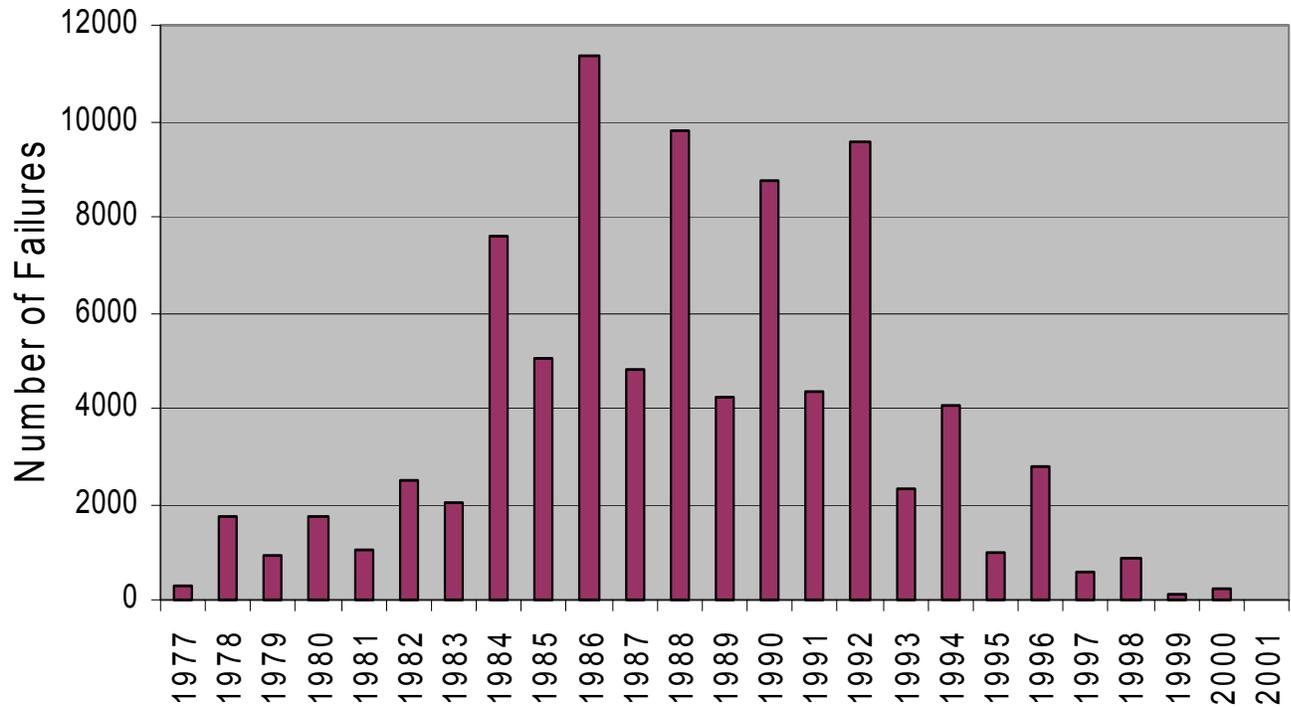


Figure 3: Number of Failed Tests by Model Year

The following two graphs show the average hydrocarbon (HC) and carbon monoxide (CO) readings for each model year. There is an average reading for vehicles that passed E-Check during the first test (initial pass), failed E-Check during the first test (initial fail), and failed their initial test but passed a later test after repairs.

Hydrocarbon Reductions Achieved by Repairs on Failing Vehicles

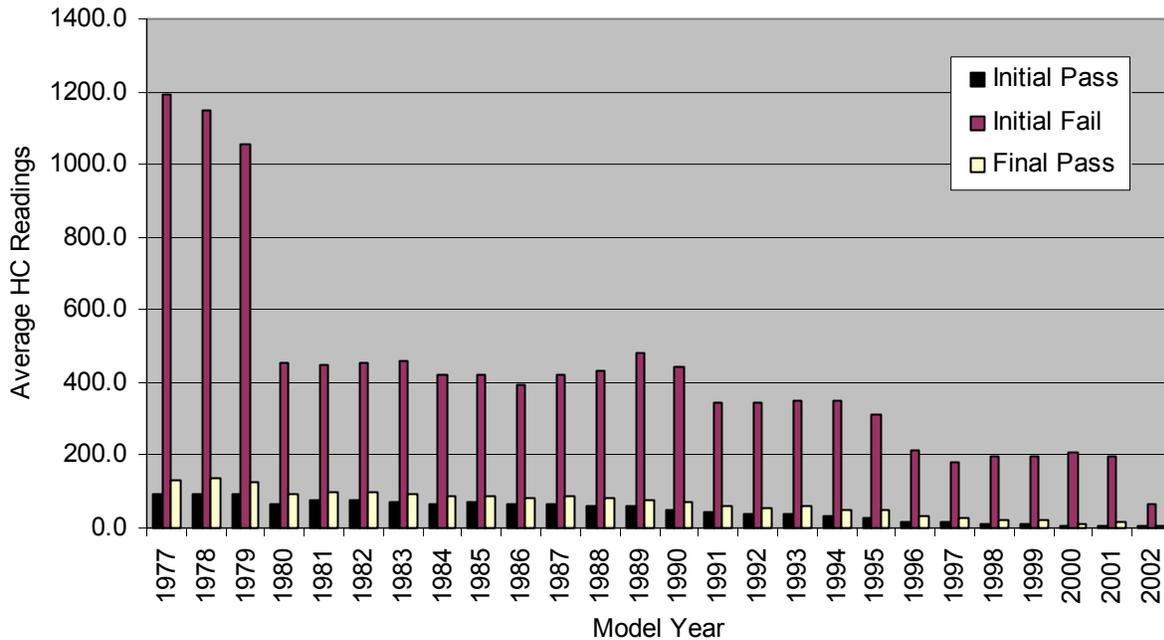


Figure 4: Hydrocarbon Reductions Achieved by Repairs on Failing Vehicles. * The high HC reading for 2002 model year vehicles is a result of one failed test that had an extremely high test value throwing the average off by a wide margin.

Vehicles that have failed their first test and passed at a later date show an average emission improvement of **85 percent** for hydrocarbon. The newer the vehicle, the greater the likelihood the vehicle can be repaired and brought back to an emissions level close to that of a vehicle that passed its initial test. It is more difficult to repair older vehicles and get them to the emissions levels of vehicles that passed their initial test. *Note: This is not a trends chart. The average hydrocarbon readings for each model year are unique to that particular year and are not intended to be compared to earlier or later model years. A high average in a particular year could be the result of a small number of extremely high-polluting vehicles or a problem originating at the manufacturing level.*

Carbon Monoxide Reductions Achieved by Repairs on Failing Vehicles

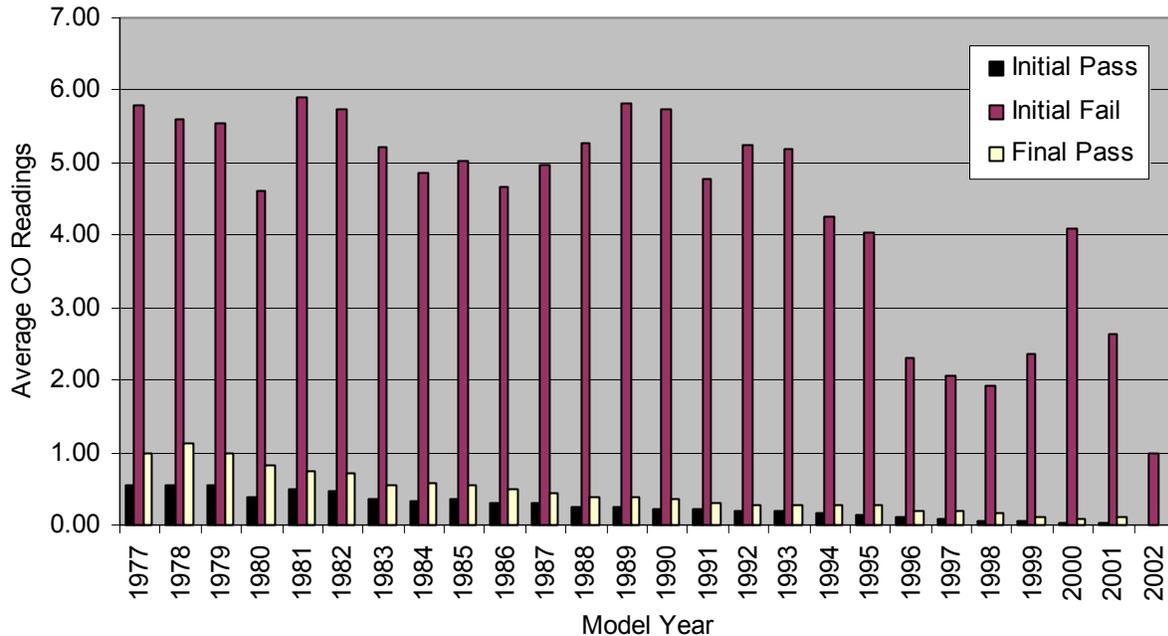


Figure 5: Carbon Monoxide Reductions Achieved by Repairs on Failing Vehicles. *The high CO reading for 2002 model year vehicles is a result of one failed test that had an extremely high test value throwing the average off by a wide margin.

Vehicles that have failed their first test and passed at a later date show an average emission improvement of **91 percent** for carbon monoxide. As seen with hydrocarbons, the newer the vehicle, the greater the likelihood the vehicle can be repaired and brought back to an emissions level close to that of a vehicle that passed its initial test. It is more difficult to repair older vehicles and get them to the emissions levels of vehicles that passed their initial test. *Note: This is not a trends chart. The average carbon monoxide readings for each model year are unique to that particular year and are not intended to be compared to earlier or later model years. A high average in a particular year could be the result of a small number of extremely high-polluting vehicles or a problem originating at the manufacturing level.*

II. Air Quality Benefits from Ohio E-Check

An objective of this report is to indicate the program's overall effectiveness in reducing Ohio's ozone problem. It is difficult to obtain a tons-per-day reduction figure for each pollutant without using computer modeling. However, modeling has its limitations, posing problems for accurate results. This report concentrates on a more qualitative assessment based on a logical examination of how the E-Check program affects the decrease of automobile emissions in the E-Check counties.

What do the actual test results indicate?

Vehicles that participated in the E-Check program in 2002 achieved substantial emission reductions. Vehicles that failed their initial test and eventually passed a subsequent test showed an average improvement of 85 percent for HC, and an average improvement of 91 percent for CO. Please refer to Figures 4 and 5 for a more detailed illustration of the data used in the calculations. The data shows that as long as vehicles are being tested, improvements are being made to air quality. However, two challenges are inherent to maintaining successful inspection and maintenance (I/M) testing programs. First, some vehicle owners fail to achieve the expected emissions reductions because they do not submit to testing or neglect to perform the required repairs. Second, some vehicle owners may tamper with emissions control systems after testing; therefore, those vehicles will emit higher levels of pollutants than they would because of normal wear and tear. To address these problems, Ohio EPA works with the Bureau of Motor Vehicles to follow up on reports of motorists trying to circumvent the testing requirement by registering their car illegally in a non-testing area. In addition, Ohio EPA oversees a statewide anti-tampering program to prevent dealers and motorists from tampering with a vehicle's emission controls.

Has E-Check caused Ohio's motorists to better maintain their vehicles?

A further indication of the program's effectiveness comes from a motorist opinion survey conducted for Ohio EPA by The Ohio State University Center for Survey Research in Winter 2002. One objective of the survey was to determine whether the emissions testing requirement helped motivate motorists to have vehicle repairs or maintenance performed prior to testing. Eight percent (48 out of 604 motorists) of the survey respondents in 2002 replied "yes" to that question.

Are polluting vehicles being removed from ozone problem areas?

A minimum of 11,490 vehicles in Ohio's 14 E-Check counties received an initial failing test and did not return for a passing test. The average emissions reading for a vehicle that initially fails E-Check is 231 parts per million (ppm) for HC and 2.42 percent concentration for CO. On average, these HC readings are 437 percent higher and the CO readings are 452 percent higher than those vehicles that are repaired and eventually pass Ohio E-Check. Although it is difficult to track what happens to all these vehicles, some are taken out of service entirely, and others are sold to new owners residing in non-E-Check counties where ground level ozone has historically been less of a problem. Some owners may attempt to illegally register their failing vehicle in a non-E-Check county, but Ohio EPA and BMV work together to detect these illegal registrations.

III. The Ohio E-Check Program

Which vehicles must be tested?

An emission inspection is required every two years on all gasoline and diesel-powered vehicles, 25-years-old and newer and registered in the 14 E-Check counties (See Figure 6). Vehicles with odd-model years are tested in odd-numbered years and even-model years are tested in even-numbered years. For example, a 1998 vehicle is tested in 2002, 2004, etc., and a 1999 vehicle is tested in 2003, 2005, etc. Vehicles exempt from testing are those less than two years old from the original title date, or those with a gross vehicle weight greater than 10,000 pounds. Motorists purchasing a used vehicle must obtain a valid passing certificate prior to registration. However, passing certificates are transferable to a new owner and may be used prior to their expiration date.

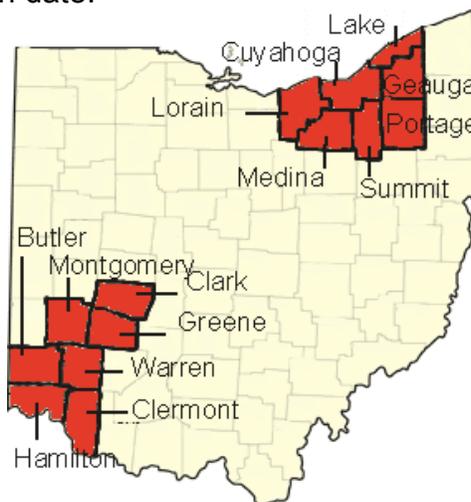


Figure 6: Ohio's 14 E-Check counties

Redesignation actions

The federal 1990 Clean Air Act Amendments required all moderate nonattainment areas to reach attainment with the national ozone standard by November 1996. The only area in Ohio that did not meet this deadline was Cincinnati. The Cincinnati metropolitan area has now reached acceptable air quality levels. However, U.S. EPA has finalized a more stringent eight-hour ozone standard that 33 counties in Ohio do not meet. Beginning in 2004, the State will decide which strategies to use in these counties to comply with the new standard.

Test fee

The Ohio E-Check vehicle emissions inspection costs \$19.50, one of the nation's lowest fees for enhanced emissions testing. This fee is not assessed on vehicles that fail the inspection on the first or second try. Duplicate certificates for passing tests within the previous 12 months are available for \$4.85. The majority of the test fee goes to the contractor, Envirotest Systems, to cover program operating costs. An average of 81 cents from each test fee across the state goes to Ohio EPA to cover the administrative costs of the program.

Testing network and provider

The 14-county E-Check program has 44 testing stations and 157 testing lanes. This inspection network supports an annual testing volume of 1.9 million vehicles. Envirotech Systems Corporation employs 700 Ohioans under a 10-year contract with Ohio EPA to conduct the State's vehicle emissions inspection program. Envirotech is an operating unit of Environmental Systems Products Holdings, Inc. (ESP). ESP is the largest U.S. emissions testing service provider, performing more than 25 million vehicle tests worldwide each year. Emission testing is widespread across the United States with approximately 31 inspection/maintenance programs currently in existence (see Figure 7).

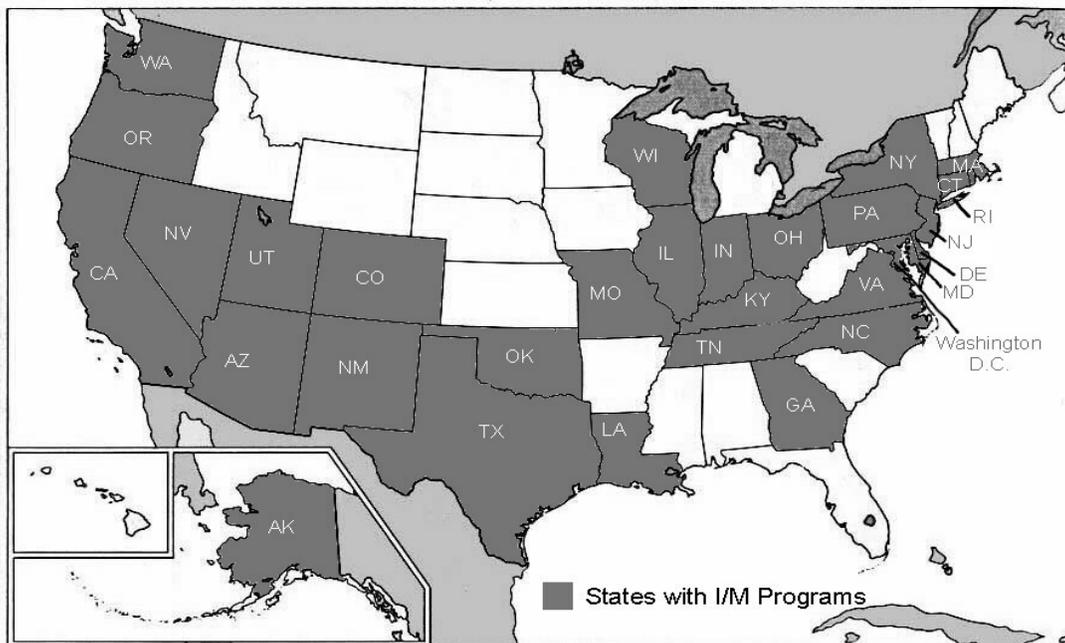


Figure 7: States with Inspection/Maintenance Programs

Test Procedures

The current test method, called Acceleration Simulation Mode (ASM 2525) is a steady-state test during which vehicles are driven on a dynamometer (rolling wheel) at a maximum speed of 25 mph. Vehicles that cannot be driven on the dynamometer are given the two-speed idle test.

There are three stages to the current emissions testing process. First, a visual inspection is conducted to determine if the vehicle may pose a hazard (e.g. bald tires, obvious fluid leaks, etc.). If problems are present, the vehicle will be turned away from testing. An anti-tampering inspection also is performed to ensure that a catalytic converter and gas cap are present. If either of these items is missing, the vehicle will not receive a complete test.

Second, each vehicle is given an emissions test. This may be done on the dynamometer or while the vehicle idles, depending on the vehicle specifications. An exhaust analyzer measures the emission concentrations. Gases are measured and concentrations are calculated so that a reading can be printed out on the Vehicle Inspection Report. Before each emissions test, the analyzer is calibrated back to a zero emissions concentration, any previous exhaust samples are removed, and the ambient (surrounding) air is measured to calculate concentrations for the next test.

Third, the pressure of each vehicle's gas cap is tested. If the gas cap is not maintaining the correct pressure, then gasoline vapor may be escaping from the tank, polluting the air and causing poor gas mileage.

Vehicles that fail for any portion of the test must be repaired and retested. Vehicles can be taken to a repair facility of the motorist's choice. Owners of failed vehicles are provided a list of repair facilities that have been licensed by the State to diagnose and correct emissions-related problems. The licensing process is described in Section V of this report, Repair and Maintenance. When a vehicle continues to fail after minimum repair expenditures, motorists may obtain a waiver allowing registration until the next inspection is required.

Waivers, extensions, and exemptions

The E-Check program offers waivers to individuals who make an effort to repair their vehicle but still cannot get the vehicle to pass E-Check. In most cases, a waiver will allow the vehicle to be registered with the State and allow the motorist two years to make emissions repairs. If an individual spends at least \$200 on emissions-related repairs on a 1981 or newer vehicle and shows a 30 percent improvement in emissions readings between two failed tests, he or she may qualify for a waiver. For vehicles with model year 1980 or older, the individual must spend at least \$100 in emissions-related repairs as well as show a 30 percent improvement. There is also a repair cap waiver that allows the motorist to register the vehicle if he or she spends at least \$300 on emissions-related repairs, regardless of emissions improvements. With both waivers, the vehicle does not need to pass E-Check for two years, or the next scheduled E-Check test, whichever comes first.

Figure 8 below shows the number of waivers issued at each of the 44 testing facilities for the year 2002. The number of waivers issued per station range from 31 to 485 for the year.

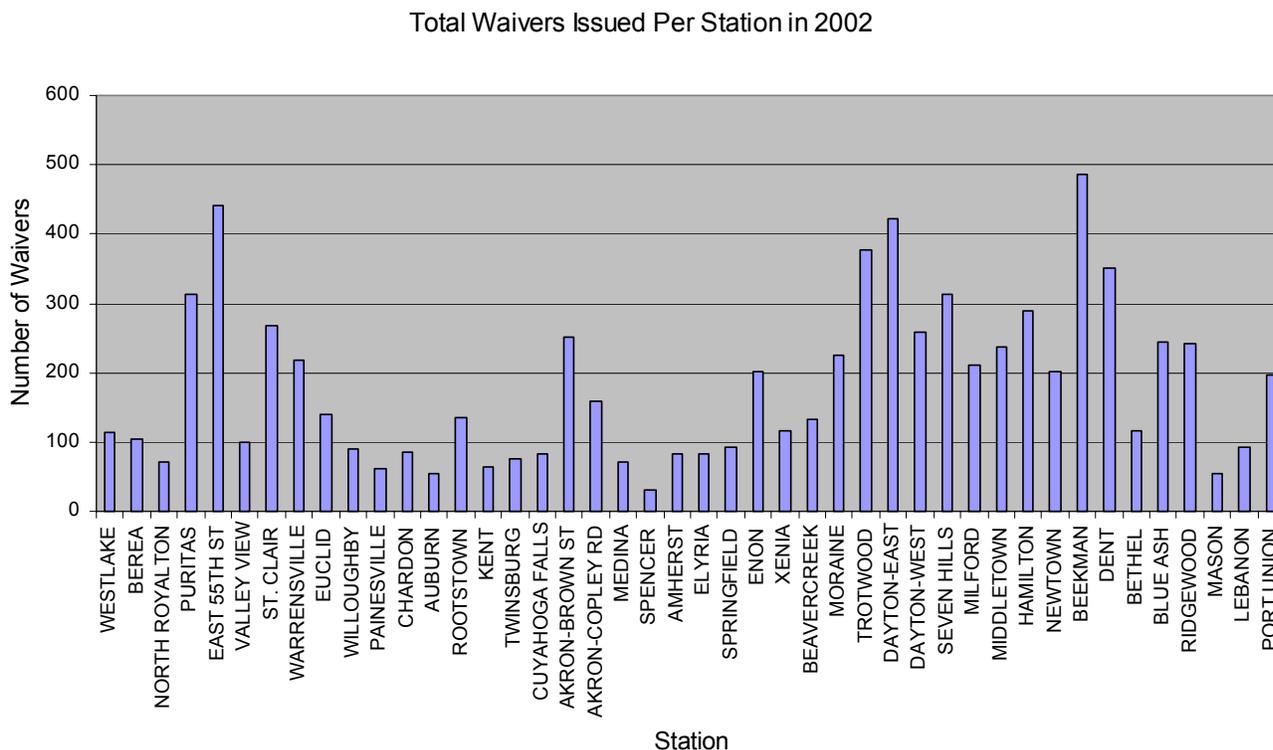


Figure 8: Total Waivers Issued per Station in 2002

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

- Exemptions only apply to those individuals who can have their vehicle tested out-of-state, are in the military, or are currently a student outside of Ohio. The exemption allows a motorist to register his vehicle without receiving an E-Check test.
- Extensions are only available to individuals who need more time to perform repairs, cannot afford repairs on their vehicle, or are temporarily located out-of-state in an area that does not have emissions testing. Extensions only extend the period of time that a vehicle has to comply with the program. A motorist has up to four months to get their vehicle to pass E-Check after receiving an extension in order to comply with the current testing cycle.
- Vehicles operating on an alternative fuel such as natural gas, butane, propane and 100 percent alcohol, or electric and hybrid power are permanently exempt from testing.

The graph below shows the number of extensions and exemptions issued by type for the year 2002. The out-of-state exemptions, which require the motorist to have the vehicle tested in another state’s testing program, account for the highest number of exemptions issued. The remaining exemptions allow the motorist to renew the vehicle’s registration without ever receiving a test. The extensions require that an individual still receive a test, but he or she is given more time to have it completed.

Extensions and Exemptions Issued in 2002

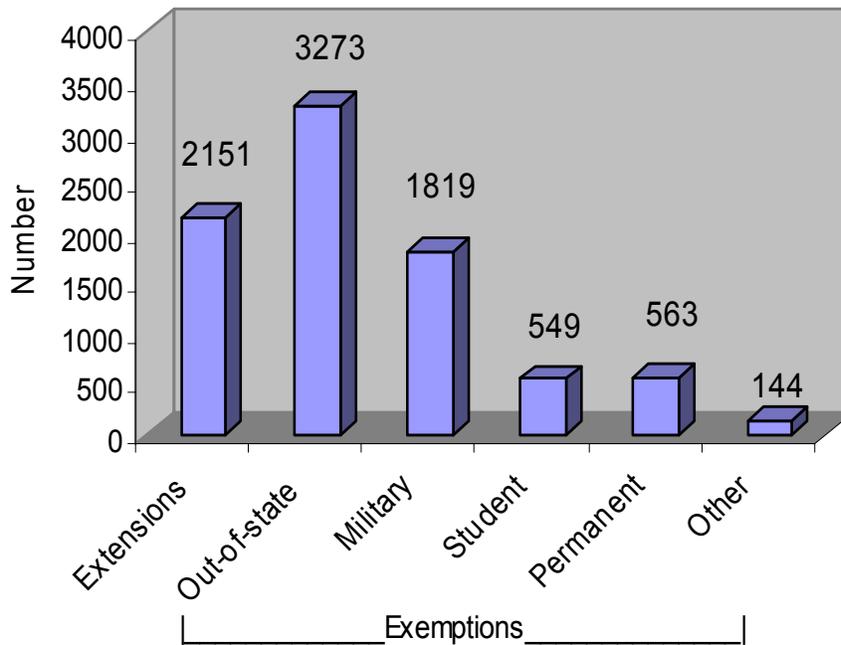


Figure 9: Extensions and Exemptions Issued in 2002

IV. Quality Assurance

A fair and accurate test is one in which the equipment functions properly and the correct test is performed. Inconveniences are avoided when both the equipment and employees are meeting expectations and motorists are able to move quickly through the testing process. It is the duty of Ohio EPA and Envirotest to provide the best customer service possible and to identify areas of the program that need improvement. This section describes the measures taken by Envirotest and Ohio EPA to make sure Ohio's motorists receive a fair and accurate test with the least inconvenience.

Envirotest Quality Control

Quality control is defined as the checks or procedures performed by the party producing a product or service to demonstrate quality. Envirotest's quality control consists of hourly, daily and monthly checks performed on the dynamometer, sampler and analyzer. The dynamometer quality control procedures ensure the proper speeds are reached. The sampler quality control checks for pressure leaks, and the analyzer quality control ensures the exhaust sample concentrations are read correctly. The computer system will automatically prohibit the testing of vehicles if the required quality control is not performed.

Ohio EPA Quality Assurance

Ohio EPA strives to provide a high quality test through an extensive auditing program. Staff at four field offices located throughout the 14 E-Check counties perform the audits. The auditors spend the majority of their time in the field, auditing station, equipment and inspector performance. This information is then provided to Envirotest to improve testing accuracy and customer service.

The five types of audits performed by field office staff are the equipment audit, calibration audit, lane status audit, performance audit and covert audit.

E-Check Equipment Audit

The objective of the equipment audit is to verify that lane equipment is operating within the tolerances specified by federal and state guidelines. This audit is extremely important to the goal of providing a fair and accurate test because faulty equipment can cause inaccurate emissions tests.

E-Check Calibration Audit

The objective of the calibration audit is to verify that emissions testing equipment is properly maintained in accordance with the quality control requirements specified in federal and state guidelines.

E-Check Lane Status Audit

The objective of the lane status audit is to verify that Envirotest's testing stations are operating efficiently in an effort to lower motorist wait times.

E-Check Performance Audit

The objective of the performance audit is to verify that Envirotest personnel are performing the emissions test in the proper manner, while providing adequate customer service to Ohio's motorists.

E-Check Covert Audit

The objective of the covert audit is to verify that Envirotest personnel are performing the emissions test in the proper manner, while providing adequate customer service to Ohio's motorists, when they believe Ohio EPA personnel are not present.

The following graph depicts the number of lane status, performance, equipment, covert and calibration audits performed by Ohio EPA staff in 2002. Ohio EPA met the 2002 audit schedule for the lane status, equipment and calibration records audits. Covert audits could not be performed during the second half of the year. Covert vehicles could not be purchased due to a state spending freeze.

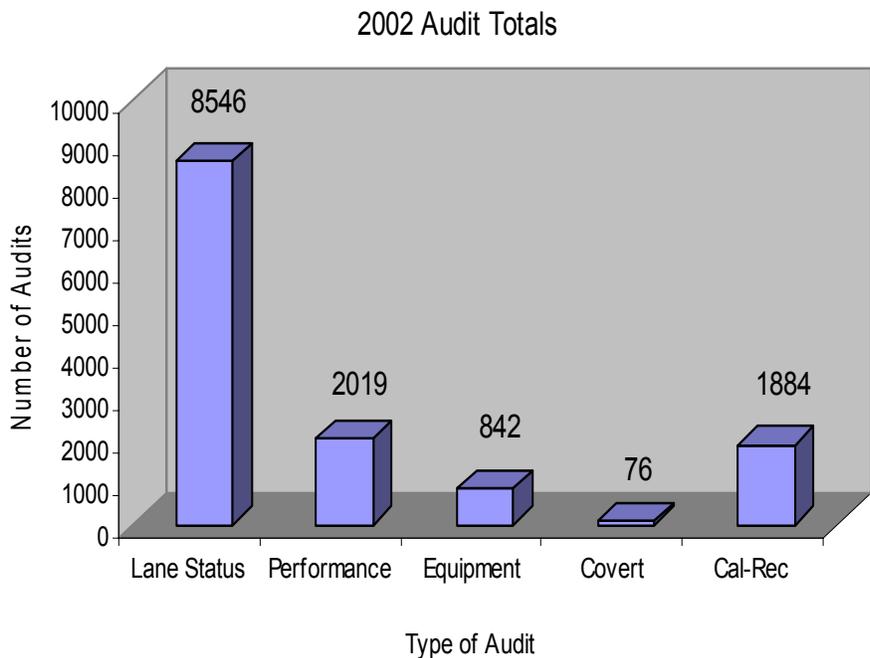


Figure 10: Total audits performed by Ohio EPA in 2002

Damage to Customer Vehicles

Ohio E-Check inspection procedures are prescribed by U.S. Environmental Protection Agency technical protocols and are detailed in Ohio EPA's contract with Envirotest. While occasional operator error can result in damage to vehicles, the ASM 2525 test procedure is not stressful to vehicles in normal operating condition. Customers who wish to submit a claim for damages are asked to submit a statement in writing. A qualified claims administrator promptly investigates each claim. Vehicles with apparent mechanical damage are often given an independent evaluation by a certified automotive technician at the testing contractor's expense. Customers who are not satisfied with the contractor's proposed resolution are offered no-cost arbitration through a local Better Business Bureau. Most paid damage claims are for minor damage. In 2002, 629 damage claims were filed with Envirotest; only one-third of reported claims prove valid. The ratio of paid claims to total tests was 1:8,154 or .012 percent of all vehicles tested. This represents a 34 percent reduction in damage claims reported in 2001.

Figure 11 below shows the total number of damage claims reported by each station during 2002. Only one-third of reported claims prove valid.

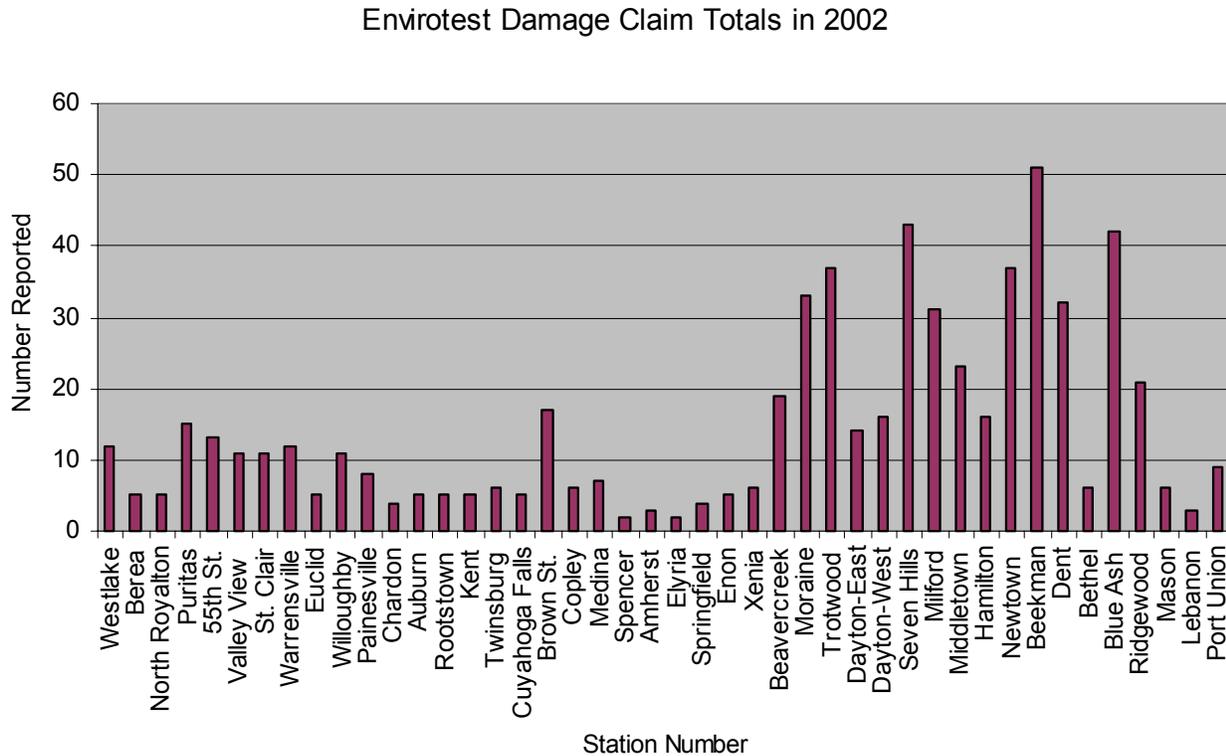


Figure 11: Total damage claims per station in 2002

Customer Complaints

Customer feedback plays an important role in enabling Ohio EPA and Envirotest to deliver both effective customer service and public information. Ohio EPA tracks all correspondence received regarding the E-Check program in a central database. Customer complaints tend to be related to service received at the station, and general program issues. The majority of service-related complaints (see Figure 13) allege rude treatment, long wait times, and inattentive station employees. The majority of program-related complaints (see Figure 13) allege that the program is unfair, that the rules are not effective, and that the program is not cleaning the air.

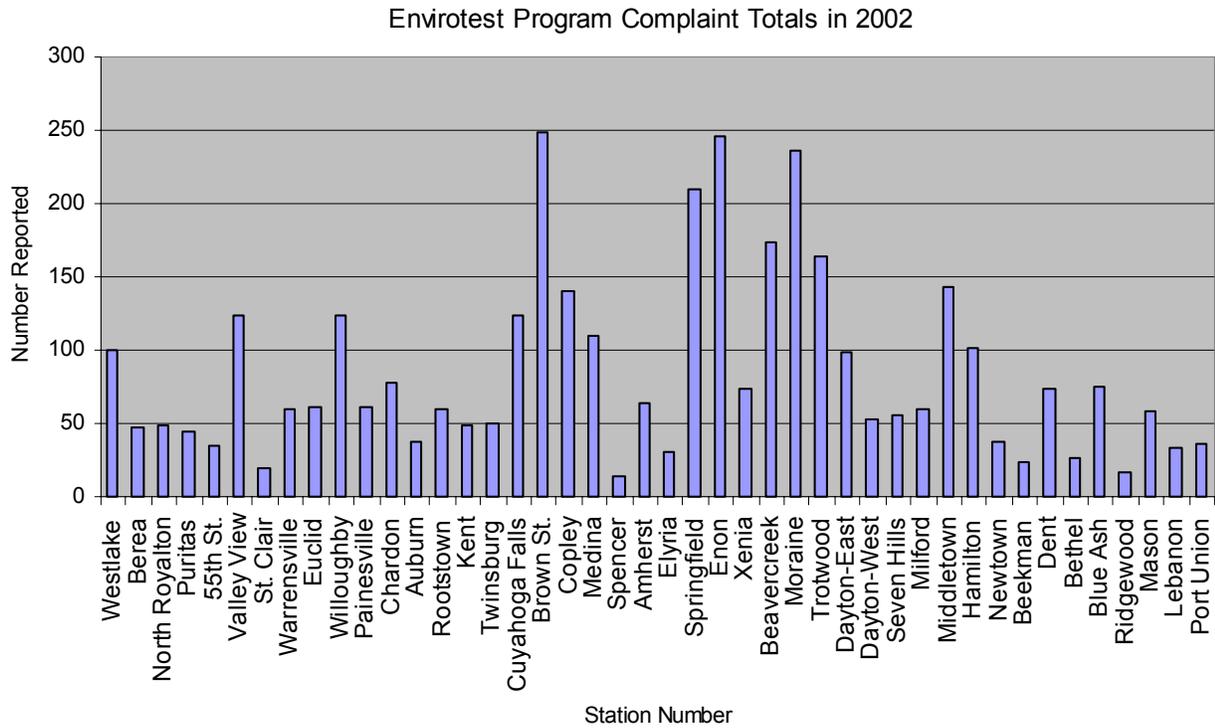


Figure 12: Total program complaints received by Envirotest in 2002

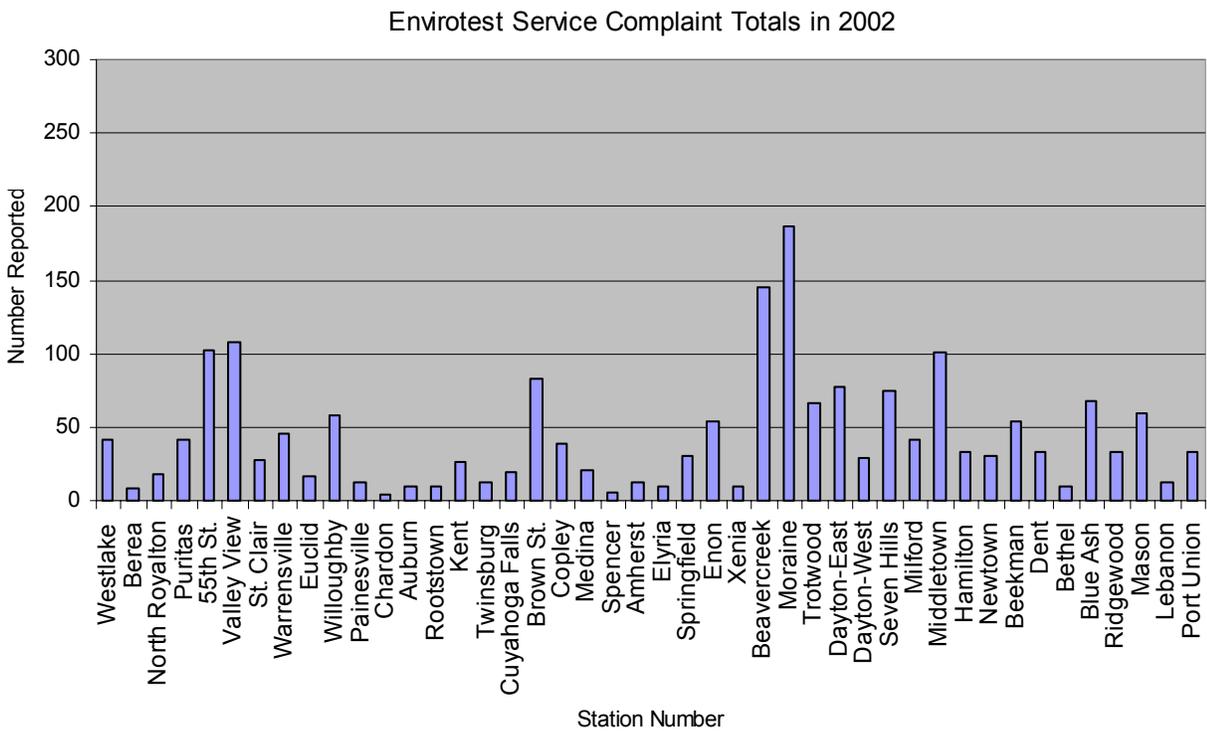


Figure 13: Total service complaints received by Envirotest in 2002

Ohio E-Check Public Opinion Survey 2002

During January and February 2003, the Ohio State University Center for Survey Research (CSR) conducted a mail survey on behalf of Envirotech Systems, Inc. and Ohio EPA. The survey focused on the attitudes and experiences of those who participated in the E-check program during fall 2002.

Envirotech Systems provided the CSR and the Ohio Bureau of Motor Vehicles with a database of the vehicles that had been tested during September, October and November 2002. The BMV matched owner information to the vehicles based on the license number and then provided that information to the CSR. The CSR drew a sample of 1,200 vehicles from the database.

Four mailings were used for data collection to maximize response. An advance letter explaining the survey and requesting the prospective respondents' participation was sent on January 23, 2003. The second mailing contained the questionnaire, a cover letter explaining the project and again soliciting the prospective respondent's cooperation, and a self-addressed stamped return envelope. This mailing was sent on January 27. A reminder postcard was sent on February 4. On February 19, a final mailing was sent to those who had not yet responded. This mailing contained a copy of the questionnaire, a cover letter again indicating the importance of the project and requesting the prospective respondent's cooperation, and another self-addressed, stamped return envelope.

Due to an error in the database information, 217 vehicles were dropped from the original 1,200. An analysis of the sample did not show any significant differences between the 217 cases and the rest of the sample. From the remaining sample of 983 vehicles, the CSR received 604 completed questionnaires. This is a response rate of 61.4 percent.

Factor Analysis

The five main factors addressed by the survey were inspector interaction, program attitudes, program reliability, health concerns and testing cost. These factors were compared to a question that gauged the customer's overall satisfaction with the testing experience. The results indicated that the motorists' overall satisfaction with the testing experience is most affected by their interaction with the inspectors.

Conclusions

Overall, motorists feel their visit to an E-Check station was a positive experience but wanted a better explanation of what was happening to their vehicle. However, they seriously question the fairness of the test (only in certain counties). Motorists believe in the concept that vehicle emissions testing can help reduce air pollution, but they question whether the E-Check program is helping to reduce air pollution.

The E-Check program administrators believe that this type of research is very helpful in determining which areas of customer service need improvement. The E-Check program uses the survey results to plan future activities that will concentrate on increasing public awareness of the hotline, testing process, and the test results.

V. Repair and Maintenance

Training Repair Industry Advisory Group (TRIAG)

TRIAG is made up of a cross section of industry leaders and emission repair technician trainers in addition to representatives from Envirotest and Ohio EPA. TRIAG provides critical feedback on how industry and repair technicians are being affected by various changes in the E-Check program. This communication also allows Ohio EPA and Envirotest to better provide strategic assistance and support to the repair industry. Air quality benefits are dependent on the ability of the repair industry to repair vehicles. In 2002, TRIAG met quarterly and worked on issues critical to both the repair industry and the E-Check program.

Shop Licensing

To be licensed as an Ohio E-Check repair facility, a repair shop must have at least one E-Check-certified repair technician working at the shop. A certified technician has to undergo numerous hours of training and certification programs. The shop also must have specific equipment to guarantee that the emissions failure can be properly diagnosed and repaired. Ohio EPA re-licensed 300 shops in 2002. A license is good for three years. Licensing will be continued into 2003 until all 594 repair shops are re-licensed.

Tech Talk

Tech Talk is a newsletter published by the E-Check program to educate and inform automotive repair technicians about the vehicle emissions inspection program in Ohio. Three issues of *Tech Talk* were published in 2002, covering topics such as current industry news, the new Ohio EPA program manager, anti-tampering, advisories and repair shop profiles.

VI. Public Education

An effective public education program is essential to the success of an inspection and maintenance (I/M) program. Public education activities conducted by Ohio EPA and Envirotest Systems range from direct mailings to informational materials at the E-Check testing stations and deputy registrar locations. The goal of these activities is to provide information to the motorist, and help the public understand the need for vehicle emissions testing.

Advertising

Currently, advertising is limited to listing the toll-free consumer hotline (1-800-CAR-TEST) in telephone business white and yellow pages.

Public Relations

An essential component of Ohio E-Check's public education initiatives involves the dissemination of program information through brochures, point-of-sale materials and the news media. Informational brochures with vehicle maintenance tips, waiver information and station

locations are available at testing facilities and Bureau of Motor Vehicles offices in the 14 testing counties. Signage and posters provide useful program information in customer waiting booths. Periodic news releases are sent to radio and TV stations and newspapers announcing Ohio E-Check developments. The Bureau of Motor Vehicles also has a video slide show, at license bureau offices, that explains program requirements.

Direct Mail

Ohio motorists with vehicles subject to emissions inspections received a notice in the mail 60-90 days before their registration expires. Between 119,977 and 193,438 notices are sent each month. These mailings contained helpful information for motorists, including: "Tips for a Smoother E-Check," operating hours, and an explanation of when a test is required.

Internet

The Ohio E-Check Web site provides information on testing, station locations, wait times, repair shops, and extensions and exemptions, among other topics. There is also a feedback form where the public can submit questions and concerns directly to Ohio EPA. The E-Check home page receives an average of 5,000 visits per month. The Web site is www.epa.state.oh.us/dapc/mobile.html.

Consumer Hotline

The 1-800-CAR-TEST toll-free consumer hotline serves as a two-way channel for information about Ohio E-Check and feedback from motorists. Operators handled 295,478 calls in 2002. The majority of these calls were from motorists seeking information about station hours of operation and testing requirements. In addition to assistance by operators during regular office hours, callers may access recorded information about the testing program 24 hours a day, seven days a week.

VII. Goals and Initiatives for 2002

Last year's E-Check annual report contained the program's goals and initiatives for 2002. This section examines the success of Envirotest and Ohio EPA at achieving those goals.

The goals of the E-Check program are to identify gross-polluting vehicles for repair, and to provide a fair and accurate test with minimum inconvenience to Ohio's motorists. Ohio EPA and Envirotest are committed to asking for customer feedback, and using the feedback to make substantial program improvements. The E-Check program takes the suggestions received from the customer comment cards and direct correspondence (phone calls, letters, etc.) and analyzes the information for any patterns. Survey research is used to determine motorists' opinions about the program and air quality issues in general.

Following is a list of the goals and initiatives for 2002 with a brief explanation of whether or not the E-Check program achieved the goal:

- 1. Meet the 2002 audit frequency schedule.**
The frequency schedule for lane status, performance, equipment and calibration audits was met in 2002. Covert audits could not be completed during the second half of the year due to a state spending freeze preventing the purchase of covert vehicles.
- 2. Place the Interpretive Signs in the testing lanes.**
Interpretive signs were placed in the customer waiting areas. Ohio EPA received positive feedback on the signs.
- 3. Continue to make the educational materials more effective.**
Educational materials remain the E-Check program's primary communication tool with the public.
- 4. Improve Cincinnati area customer service.**
In 2002, significant customer service improvements were achieved in the Southwest Ohio region. However, more improvement is needed in order for the Cincinnati area to be in line with the rest of the program areas.

IX. Goals and Initiatives for 2003

Building on the successes of the past year, the following goals were set for 2003:

- 1. Meet the 2003 audit frequency schedule.**
Audits are vital to ensure all areas of the program are in compliance and being operated to the highest standards. Therefore, every effort will be made to ensure the frequency schedule is met.
- 2. Continue to make improvements to customer service overall.**
Although improvements have been made, improvements must be made on an ongoing basis to ensure motorists receive consistent excellent customer service.
- 3. Improve customer service in the Cincinnati area.**
The Cincinnati area E-Check stations improved over the last year. However, that area still lags behind the rest of the program areas.
- 4. Begin the program development and preparation for On-Board Diagnostic (OBD) testing.**
A significant amount of planning and development will need to be accomplished prior to OBDII being implemented. In addition, operational specifications will need to be defined before testing begins.

5. Upgrade the Web site for the repair industry.

Upgrades to the repair industry Web site will include an online request form for repair shop audits and additional content describing the repair shop licensure and technician certification procedures.

6. Begin providing vehicle test results for NOx.

Training will need to be developed and provided to internal staff and to industry technicians. Applicable software will need to be upgraded and operational specifications will be defined before testing begins.

Appendix: History of the Ohio E-Check Program

In 1990, Congress amended the Clean Air Act (CAA) to require states with excessive air pollution to reduce emissions from industry, businesses and motor vehicles. Under this federal law, 16 counties in Ohio were found to have violated the federal health-based air quality standard for ozone at a frequency and magnitude that would classify these areas as moderate nonattainment. This classification carried with it a Clean Air Act mandate for basic vehicle emissions testing. In addition, the Clean Air Act mandated that each of these moderate ozone nonattainment areas develop a plan to reduce overall VOC emissions by 15 percent by 1996. (VOCs are volatile organic compounds, which interact with sunlight to form ground-level ozone or smog.) Ohio and 32 other states filed 10-year state implementation plans (SIPs) indicating the steps they would use to improve and maintain air quality. Two of the 16 counties were able to achieve the 15 percent reduction without implementing an emissions program. However, in consultation with regional and county governments, Ohio EPA and the Ohio General Assembly chose to make motor vehicle emissions inspections a key component of Ohio's actions to reduce air pollution in the remaining 14 counties.

Why were vehicle emissions inspections chosen? An abundance of government and private research concluded that motor vehicles are the largest single source of the pollutants that cause ground-level ozone (smog), which is a serious threat to public health. Ohio EPA estimates that passenger car and light truck emissions are responsible for as much as 45 percent of hydrocarbons and oxides of nitrogen (NOx) -- the main components of ozone. The Ohio E-Check program accounts for approximately 50 percent of the pollution reductions that Ohio is credited for under its SIP.

Ohio has had vehicle emissions testing in Hamilton, Butler, Lake, Lorain and Cuyahoga counties since 1988. This original automobile inspection and maintenance program was known as AIM. The Ohio E-Check program, a continuation and expansion of AIM, began in 1996. E-Check identifies motor vehicles emitting high levels of VOCs, NOx, and CO. The program reduces air pollution from vehicles by encouraging better ongoing maintenance of vehicles, and ensuring the repair of vehicles with excessive emissions resulting from malfunctioning or tampered emissions control systems.

Ohio E-Check was implemented in major metropolitan areas of Ohio that were not in compliance with federal CAA standards. Those areas, comprising 14 counties, are:

- Cleveland/Akron area: Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit;
- Dayton/Springfield area: Clark, Greene and Montgomery; and
- Cincinnati area: Butler, Clermont, Hamilton and Warren.

How Testing Areas Were Determined

Ohio EPA quickly realized that Ohio needed to target vehicle emissions. In Ohio's urban areas, vehicles represent the largest contribution to VOC emissions. In Northeast Ohio, vehicles contribute 45 percent of the problem, while industries are responsible for only 19 percent. The remainder of VOC emissions can be attributed to small sources such as dry cleaners, commercial painting, lawnmowers and outboard motors. Ohio EPA concluded that Ohio needed to choose between adding an alternative fuels program along with an annual

basic tailpipe test, or substitute a biennial enhanced vehicle emissions test which provides twice the emissions reduction as the basic test. According to U.S. EPA at the time, enhanced testing was the most cost effective way to reduce VOC emissions at \$879 per ton of emissions reduced. This cost was compared to \$5,410 per ton for the basic test and \$1,000-\$2,500 per ton for alternative fuels.

In 1993, Senate Bill 18 created an option for local elected officials to choose enhanced emissions testing as the way to make up the emissions reductions required under the Clean Air Act. As required by that law, the State went to the metropolitan planning organizations (MPO) in each county. These organizations represent the municipal corporations, counties, and townships in each nonattainment area. Each MPO voted on whether or not they wanted an enhanced motor vehicle inspection and maintenance program in their area. As long as the majority of counties in each Metropolitan Statistical Area (MSA) voted yes for the resolution, then the Ohio EPA director had the jurisdiction to implement and supervise an enhanced emissions inspection program in that MSA. Each of the three areas chose enhanced emissions testing, which we now call the E-Check program. The E-Check program accounts for more than half of the federal air improvement credits given to Ohio as a result of improving air quality. The rest of the credits come from initiatives involving industry and other types of ozone regulation.

Contract Description

In 1994, Ohio EPA sent out a Request for Proposal (RFP) to contract the emissions inspection program. The RFP contained detailed requirements that the contractor must meet to be considered. In response to Ohio EPA's RFP, potential contractors sent a response. This document included such items as station specifications, operation and management styles that would be incorporated, and the equipment that would be used to carry out the program. Once the contractors were chosen, Ohio EPA developed a contract, which was a combination of the RFP and the response. This new contract held the contractor to conditions such as keeping the hourly average wait time under 15 minutes, providing a minimum of 40 hours of training for their inspectors, etc.

When the program started, I/M 240 was the primary vehicle emission test used by Ohio EPA. Vehicles were tested with a two-speed idle test, a steady-state loaded mode test, or a transient dynamometer test (I/M 240). The two-speed idle test ran an engine at 2,500 rpm with no load on the engine and did not require use of a dynamometer. The steady-state test ran a vehicle on the dynamometer with a load at constant speed and was followed by an idle test. The transient test, which was considered superior to the other two forms, ran a vehicle on the dynamometer at varying speeds simulating normal driving conditions. The maximum speed reached with this type of test was 57 mph.

On May 18, 1998, the State Controlling Board approved a contract change to modify the current emissions testing program. The modifications allowed for the application of a new enhanced vehicle emissions test that runs vehicles at a lower, steady speed and on average, is less time consuming than the old test. This new test, ASM 2525, has been in use since the summer of 2001.

List of Works Cited

National Research Council. 2001. *Evaluating Vehicle Emissions Inspection and Maintenance Programs*. National Academy Press: Washington, D.C.