

OHIO'S VEHICLE EMISSIONS TESTING PROGRAM

Year 2000 Annual Report



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Acronym List

CAA..... Clean Air Act
CO..... carbon monoxide
EPA Environmental Protection Agency
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 all the information provided in this Ohio E-Check annual report, Ohioans can see that there are measurable air quality benefits from the automobile emissions testing program in Ohio. Ohio EPA believes motorists are getting a fair and accurate emissions test. Now, the program is concentrating on making the test as convenient as possible for Ohio's motorists. The Ohio E-Check program made great strides toward this goal in the year 2000. With the switch to the ASM 2525 enhanced test, the program minimized the potential damage to vehicles, and wait times are shorter. Ohio EPA improved its response time to motorists' questions and concerns. Envirotest added additional customer service operators, to help ensure they answer motorists' questions quickly and accurately. However, based on the results of the customer opinion survey, additional improvements need to be made so the E-Check program can provide Ohio's motorists with as convenient an emissions test as possible.

I. 2000 Test Results

The following tables show the test volume and the pass/fail statistics for the year 2000. Table 1 shows the total initial tests that were performed, categorized by initial passing and initial failing tests. The percentages are a percentage of the total tests. Table 2 shows the total number of all tests in 2000, including retests and subsequent tests needed for a vehicle to pass E-Check.

Table 1: Idle and ASM Test Results for Vehicle's Initial Test from 2000

Total Tests	Total Pass	Total Fail	Fail HC	Fail CO	Fail HC & CO
1,770,260	1,671,739	98,521	63,745	34,276	38,102
N/A	94.4%	5.6%	3.6%	1.9%	2.2%

Table 2: Total Idle and ASM Test Results from 2000 (includes all retests)

Total Tests	Total Pass	Total Fail	Fail HC	Fail CO	Fail HC & CO
1,881,165	1,706,801	174,364	98,451	84,686	52,563
N/A	90.30%	9.20%	5.2%	4.5%	2.8%

The following graph shows how the fail rate varies depending on model year. Model years from the early to middle 1980s compose 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.

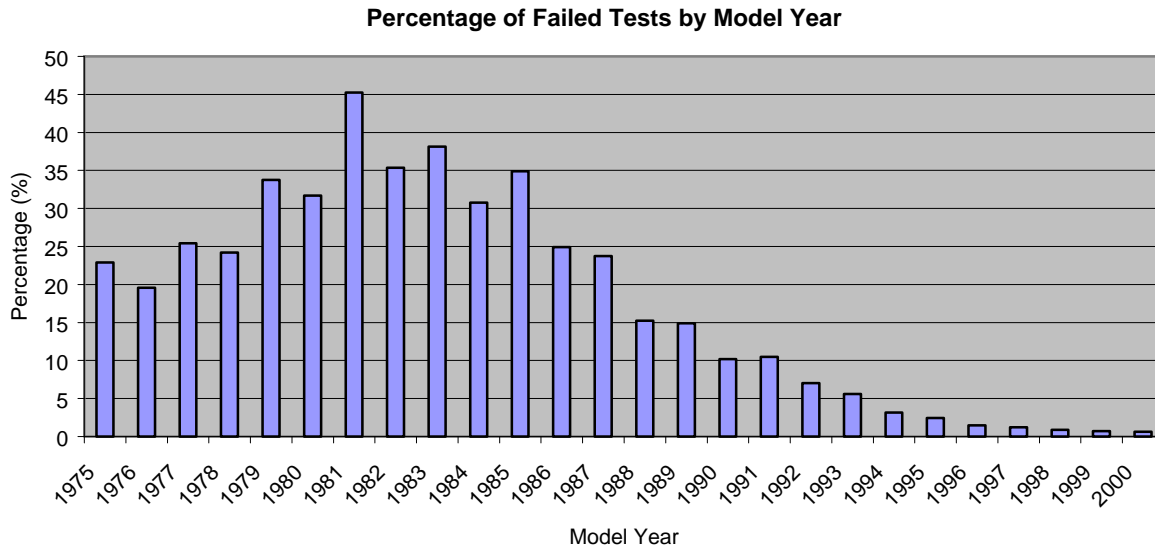


Figure 1: Percentage of Failed Tests by Model Year.

The following two graphs show the average hydrocarbon and carbon monoxide readings for each model year. There is an average reading for vehicles that passed E-Check during the first test (initial pass), vehicles that failed E-Check during the first test (initial fail), and vehicles that failed their initial test but passed a later test after repairs. The graphs show that repaired vehicles achieve a large reduction in emissions levels between an initial fail and a subsequent, passing re-test.

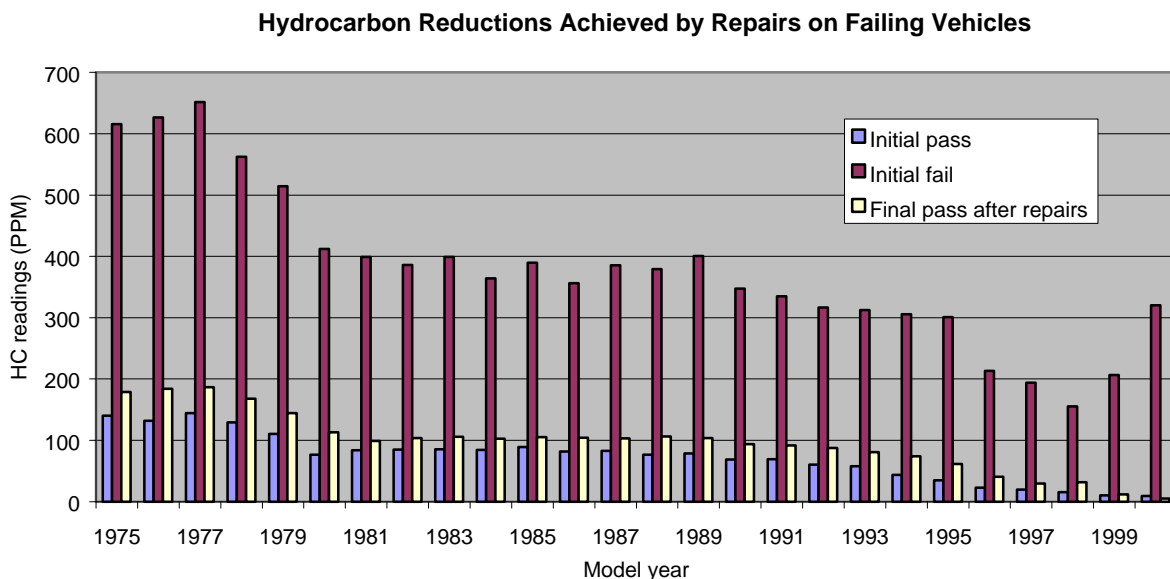


Figure 2: Hydrocarbon Reductions Achieved by Repairs on Failing Vehicles

Vehicles that have failed and pass at a later date show an average emission improvement of **69 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. Consequently, it is more difficult to repair older vehicles and get them to the emissions levels of vehicles that passed their initial test.

Carbon Monoxide Reductions Achieved by Repairs on Failing Vehicles

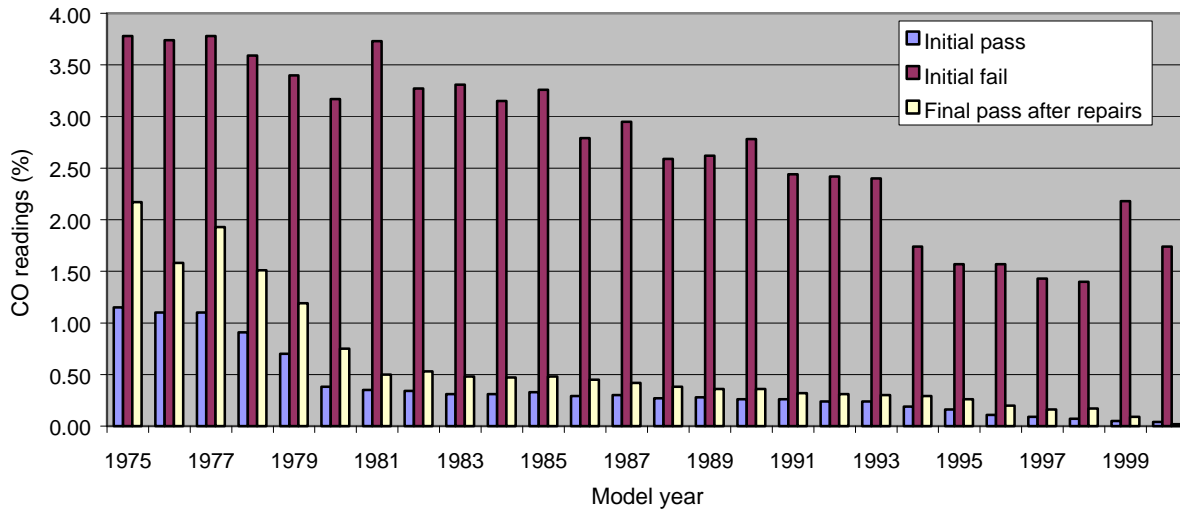


Figure 3: Carbon Monoxide Reductions Achieved by Repairs on Failing Vehicles.

Vehicles that have failed and passed at a later date show an average emission improvement of **77 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. Again, it is more difficult to repair older vehicles and get them to the emissions levels of vehicles that passed their initial test.

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.

The remaining part of the section details to specific subjects regarding air quality benefits. The areas are presented from the most quantitative to qualitative.

What do the actual test results indicate?

Vehicles that participated in the E-Check program in 2000 achieved substantial emission reductions. The vast majority of these reductions last a full two years for vehicles that fail an initial E-check then pass on a retest. Vehicles that failed their initial test and eventually passed a subsequent test showed an average improvement of 68.6 percent for HC, and an average improvement of 77 percent for CO. Please refer to Figures 2 and 3 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/Maintenance 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.

What do the air monitors indicate?

The following graph shows ozone trends using the second highest hourly average for the year in order to avoid misrepresentation by outliers.

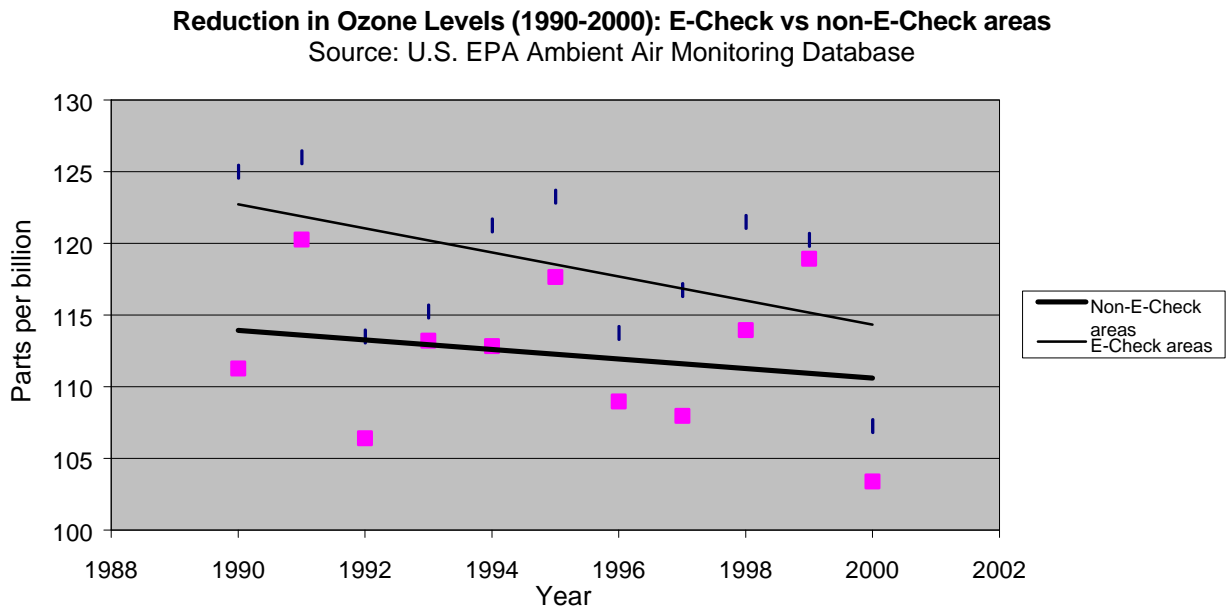


Figure 4: Reduction in Ozone Levels (1990-2000): E-Check vs non-E-Check areas

This graph compares average ozone reductions since 1990 between the 14 E-Check counties and the remainder of the state. There is a greater decrease in ozone levels in the areas that had emissions testing as compared to the remainder of the state. Some of these reductions are due to the vehicle emissions testing program. Other air quality programs adopted as part of a comprehensive air quality plan helped improve air quality in the entire state.

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 February 2001. One objective of this survey of motorists who visited Ohio E-Check stations in the last three months of 2000 was to determine whether the emissions testing requirement helped motivate motorists to have vehicle repairs done prior to testing. Over 9 percent of the survey respondents, or 171,000 vehicles, replied "yes" to that question, a higher percentage than motorists failing the test during the survey period. However, only 3.5 percent of all motorists had major emissions systems repairs performed prior to the test. An extensive evaluation of the Arizona I/M 240 program found that approximately three weeks prior to the initial phase of testing, a vehicle's average emissions decreased an average of approximately 12 percent (Wenzel, 1999). This decrease was most likely due to pre-test repairs and adjustments to vehicles in anticipation of testing. When looking at the Ohio survey and the Arizona study together, a conclusion can be drawn that the repairs done just prior to initial testing account for significant emissions reductions.

Are polluting vehicles being removed from ozone problem areas?

In addition, the Arizona study found that 30 percent of all vehicles that failed initial testing never received a final passing test. Approximately two-thirds of these vehicles were no longer driving in the area one year after the last failing test. The other third of vehicles that were still driving in a testing area showed an HC reduction of 8.7 percent and a CO reduction of 8.9 percent, probably due to partial repairs. Vehicles that failed the initial test but received a passing test showed an HC reduction of 61.7 percent and a CO reduction of 64.8 percent (Wenzel, 1999).

California's Smog Check program also was evaluated for effectiveness and their study found that 10 percent of vehicles failing the initial test never received a passing test. Again, similar to Arizona's program, approximately two-thirds of these vehicles are no longer driving in the area one year after testing. The vehicles in question had HC emissions approximately 81 percent higher than vehicles that eventually receive a passing test. These high-polluting vehicles were either taken out of service or moved to an area less sensitive for ozone pollution (Schwartz, 2000).

We can take the principles found in these two state studies and apply them to help identify the unknowns in the Ohio E-Check program. We know that a minimum of 11,490 vehicles receive an initial failing test and do not return for a passing test. According to the previously mentioned studies, two-thirds of these vehicles may no longer be driven in Ohio's E-Check counties. Therefore, approximately 7,660 vehicles that never received a passing test, at best, are removed from the roadways. At worst, these vehicles have been removed from the E-Check counties to an area less sensitive to ozone pollution. These are all vehicles prone to emit high levels of pollution as demonstrated by Figures 2 and 3, and the California study. The average emissions reading for a vehicle that initially fails E-Check is 231 ppm for HC and 2.42 percent concentration for CO. On average, these HC readings are 318 percent higher and the CO readings are 432 percent higher than those vehicles that are repaired and eventually pass Ohio E-Check. These percentages are much higher than those shown by vehicles in California. This difference could be explained by the fact that California has had an emissions program in place for a longer period of time.

III. The Ohio E-Check Program

ASM 2525 Test Method

The current test method, called Acceleration Simulation Mode (ASM 2525), began on August 7, 2000, in the Akron/Cleveland and Dayton/Springfield areas and on October 2, 2000, in the Cincinnati area. The switchover to ASM in the middle of 2000 was a large endeavor that required many changes in the overall program structure. The ASM 2525 test is a steady-state test similar to the loaded mode test, with the addition of equipment that collects and measures NOx. The vehicles are driven on the dynamometer with a load at a maximum speed of 25 mph. Vehicles that cannot be driven on the dynamometer are given the two-speed idle test.

The benefits of ASM 2525 over the old I/M 240 test include reduced perception of vehicle damage which translates to fewer damage claims, less noise and disturbance and easier repair verification. In addition, it allows the current contractor (Envirotest Systems Corp.) to test more cars each hour because the test cycle is shorter, which also improves customer service by lowering wait times.

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 5). Vehicles with odd model years are tested in odd-numbered years and even model years are tested in even-numbered years. For example, a 1996 vehicle is tested in 2002, 2004, etc., and a 1997 vehicle is tested in 2001, 2003, etc. Vehicles exempt from testing are those less than two years old from the original title date, or those with a gross vehicle weight (GVW) 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.

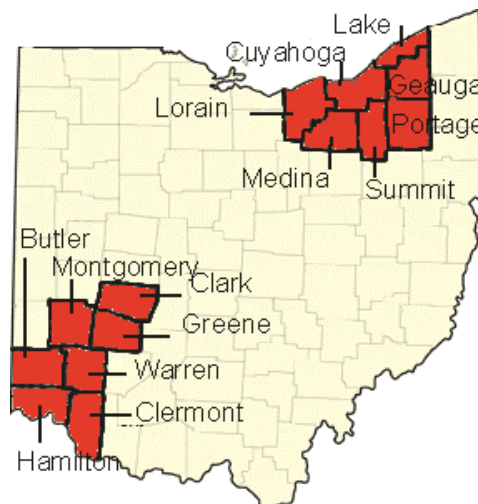


Figure 5: Ohio's 14 E-Check counties

Redesignation actions

The federal 1990 Clean Air Act Amendments required all moderate non-attainment areas to reach attainment by November 1996. The only area in Ohio that did not meet this deadline was Cincinnati. However, in June 2000, the Cincinnati metropolitan area was officially redesignated as attaining the one-hour federal air quality standard for ozone. In order to be redesignated, the state had to submit a plan to U.S. EPA outlining how the air quality would be maintained. The E-Check program is part of that plan, which means that redesignation does not relax any existing air pollution controls. It does, however, eliminate the extra costs imposed on businesses that want to expand or locate new facilities in an area formerly designated non-attainment. However, U.S. EPA is considering a more stringent eight-hour ozone standard that 32 Ohio counties would not meet. If a more stringent standard is implemented, additional air pollution control measures may be necessary to meet the new requirements. This means it is important to maintain and continue to improve Ohio's air quality so that all counties can continue to meet federal standards in the future.

Test fee

The Ohio E-Check emissions inspection costs \$19.50, one of the nation's lowest 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, to cover program-operating costs and for profit. An average of \$1.00 from each test fee across the state goes to Ohio EPA to cover the administrative costs of the program. The following table shows the breakdown of the test fees across the state.

Table 3: E-Check test fee breakdown by zone

Zone	Amount to Ohio EPA	Amount to Contractor
Zone 1 (Akron/East Cleveland)	\$2.52	\$16.98
Zone 2 (Dayton)	\$0.57	\$18.93
Zone 3 (Cincinnati)	\$0.51	\$18.99
Zone 4 (West/Central Cleveland)	\$0.59	\$18.91

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. Envirotest employs 700 Ohioans under a 10-year contract with Ohio EPA to conduct the State's vehicle emissions inspection program. Envirotest is an operating unit of Environmental Systems Products Holdings, Inc. 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 6).

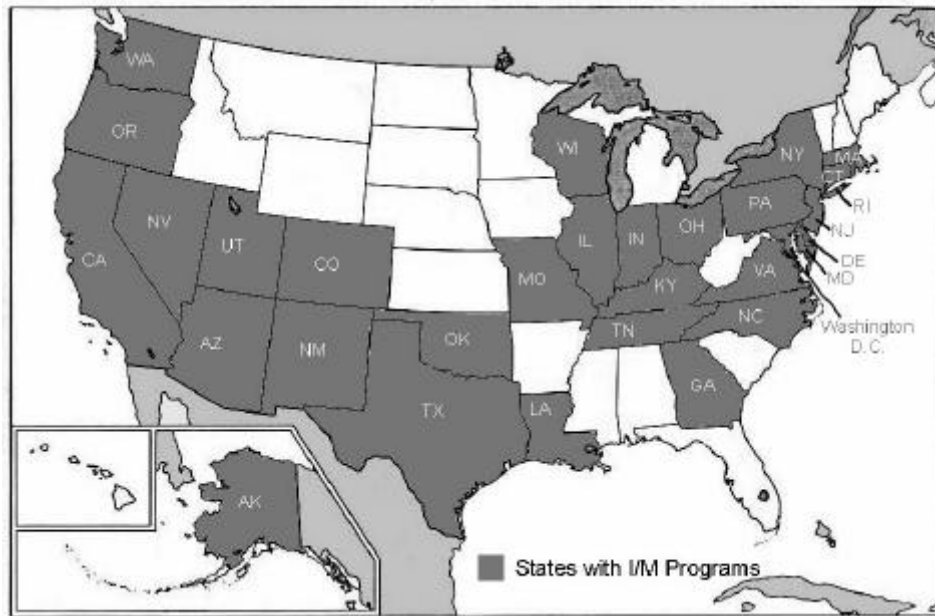


Figure 6: States with Inspection/Maintenance Programs

Test Procedures

There are three stages to the current emissions testing process. First, each vehicle is examined upon arrival at the station. If the vehicle appears to have problems that might pose a hazard (e.g. bald tires, obvious fluid leaks, etc.), it will be turned away from testing. The vehicle also is given a tampering inspection to be sure 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 (rolling wheel) or while the vehicle idles, depending on the vehicle specifications. An exhaust analyzer measures the emission concentrations (See Figure 7). The analyzer emits two beams of energy toward a mirror. The beams are reflected into two separate chambers containing vehicle exhaust, then through a filter that separates and identifies each specific gas. 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.

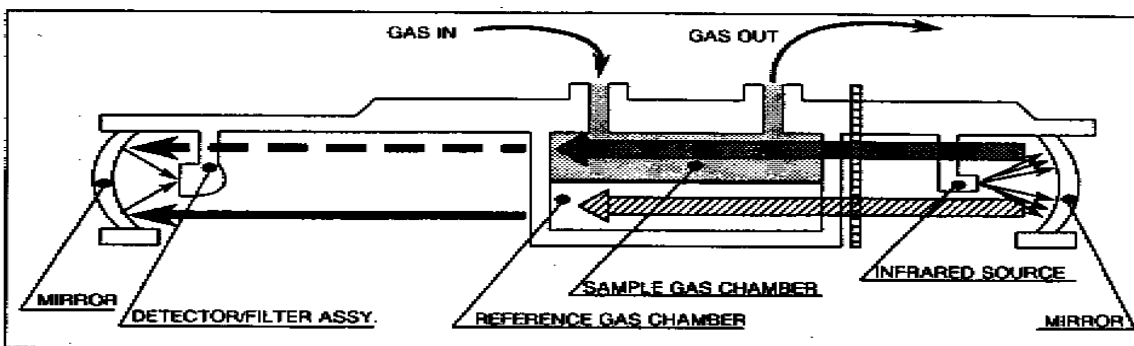


Figure 7: Diagram of Exhaust Analyzer

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. However, Envirotest does offer 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 IV 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

Envirotest offers waivers to individuals who make an effort to repair their vehicle but still cannot get the vehicle to pass E-Check. 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 from Envirotest. 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 \$300 repair cap waiver that allows the motorist to register their vehicle if he or she spends at least that much in emissions-related repairs, regardless of vehicle improvement. Both waivers completely exempt the motorist from testing and the vehicle does not need to pass E-Check until the next testing cycle.

Total Waivers Issued by Station in 2000

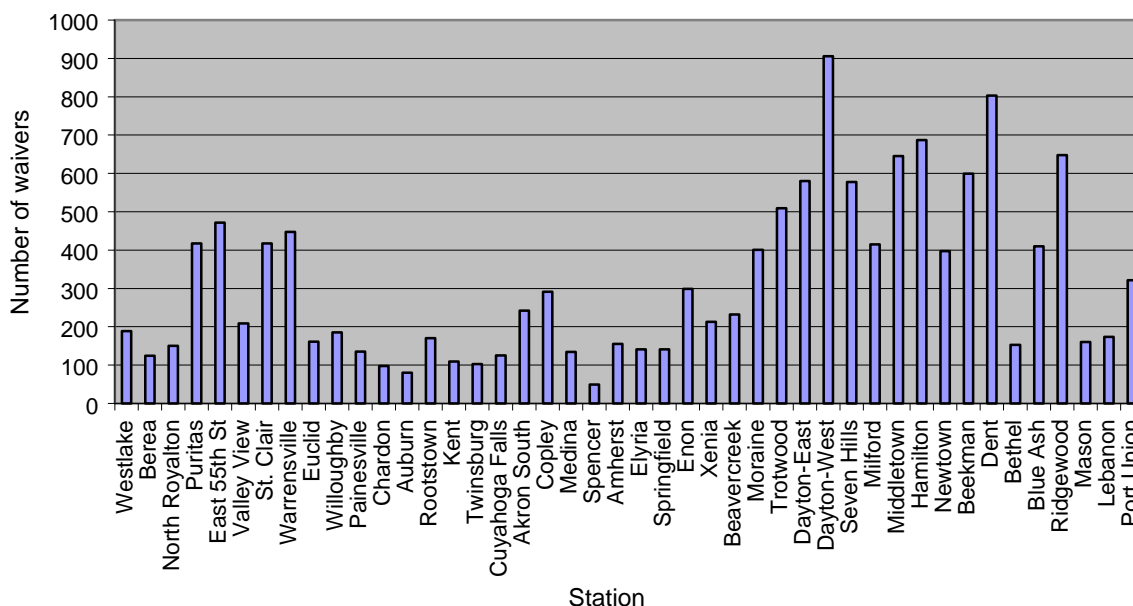


Figure 8: Total Waivers Issued by Station in 2000

This graph shows the number of waivers issued at each of the 44 testing facilities for the year 2000. The number of waivers issued per station range from 50 to 900 for the year.

Ohio EPA offers a variety of extensions and exemptions to individuals who need more time to repair their vehicle or cannot have their 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 her vehicle to pass E-Check after receiving an extension in order to comply with the current testing cycle.
- Permanent exemptions also may be issued to hybrid and alternative fueled vehicles, such as those that operate on natural gas, butane, propane, alcohol or electric power.

Extensions and Exemptions Issued in 2000

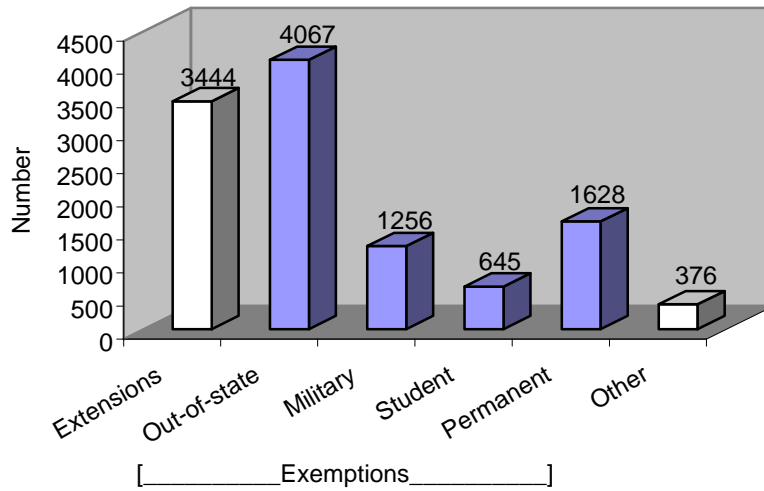


Figure 9: Extensions and Exemptions Issued in 2000

This graph shows the number of extensions and exemptions issued by type for the year 2000. The out-of-state exemptions, which require the motorist to have their vehicle tested in another state's testing program, account for the highest number issued. The remaining exemptions allow the motorist to renew their registration without ever receiving a test. The extensions account for the second highest number and they require that an individual still receive a test, but they are given more time to have it completed.

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 the employees are meeting expectations and the 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 a minimum of inconvenience.

Envirotest Quality Control

Quality control is defined as the checks or procedures performed by the party producing a product or a service to demonstrate quality. Envirotest's quality control consists of hourly, daily and monthly checks performed on the dynamometer, the sampler and the 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, the calibration audit, the lane status audit, the performance audit and the covert audit. The E-Check audit program was restructured in 2000 to meet the needs of the new ASM 2525 testing procedure. Due to this restructuring process, there were no calibration or covert audits performed in 2000. The following table shows the planned frequency of each audit in 2001 according to the new audit program structure.

Table 4: Ohio EPA Planned Audit Frequency in 2001

Type of Audit	Planned Frequency of Audit
Equipment	Twice a year on all 157 lanes assuming passing results
Calibration	Records once per month per lane; observations twice per year per lane
Lane Status	Daily on all high-volume stations and twice per week on low-volume
Performance	Five times per station each month
Covert	As necessary in response to complaints, poor audit results, etc.

The following graph depicts the number of lane status, performance, and equipment audits performed by Ohio EPA staff in 2000.

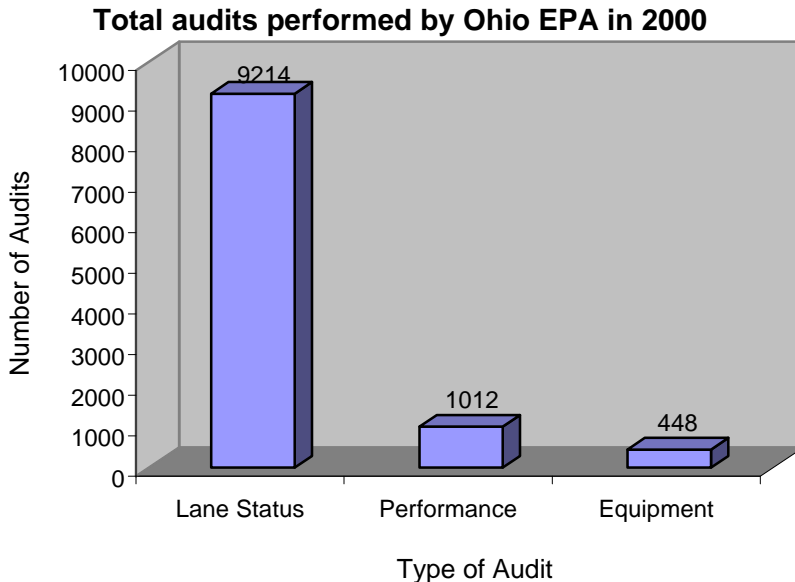


Figure 10: Total audits performed by Ohio EPA in 2000

This graph shows the total number of audits by type performed in 2000. The majority of auditors' time is spent performing lane status audits because they are less time-consuming and can be done almost daily. These audits ensure that enough lanes are open to accommodate the number of vehicles and that staffing levels are adequate. Performance and equipment audits are done less frequently because of the time it takes to complete one audit, and the type of information that is gathered. There were no covert or calibration audits performed in 2000 due to changes in the audit structure and database.

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. The Ohio EPA auditor conducting lane equipment audits compares actual equipment readings with allowable readings and verifies that lane equipment is operating properly. The auditor closes any lane that is found out of compliance with federal and contractual guidelines.

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. Ohio EPA auditors conduct calibration audits to review station calibration procedures and ensure adherence to frequency standards. The calibration audit consists of both a records and an observation audit. The calibration records audit requires that all calibrations are done on time, and that failed calibrations are handled properly. If a calibration fails, the lane is taken out of service until repaired. The calibration observation audit follows the Envirotest calibration schedule. During this audit, the Envirotest representative performs their scheduled calibrations while an auditor verifies that the proper calibration procedure is followed.

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. The lane status audit is important to ensure that each station is able to keep up with demand by moving vehicles quickly through testing. Ohio EPA auditors conducting lane status audits observe and record station conditions that affect motorist wait times. The main areas monitored are the station staffing levels, the number of cars in line, and the operational status of the station's lanes. The Envirotest computer calculates wait times by multiplying the number of vehicles waiting in line outside the station by the current vehicle's test time. Therefore, it is important that the station personnel enter the correct number of vehicles in line so that the calculated wait times reflect the actual experience of the motorist.

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. The performance audit ensures good customer service as well as a pleasant testing environment for the motorist.

The audit is split into three sections. The first section is *Test Procedures*, designed to evaluate how well the inspectors perform the emissions test procedures and interact with the motorists. The second section is *Safety Conditions*, designed to evaluate if Envirotest provides motorists with a safe testing environment. The third section is *Station Appearance*, designed to evaluate if the stations are being kept in a customer-friendly condition.

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. Ohio EPA auditors conducting covert audits observe and record the performance of the lane inspectors working in the lane being audited. The covert audit is an exact reproduction of the *Test Procedures* Section of the Performance Audit. The purpose of the audit is to gauge inspector performance when they believe Ohio EPA personnel are not present.

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 2000, the ratio of paid claims to total tests was 1:6,767, or .015 percent of all vehicles tested.

Total Damage Claims per Station in 2000

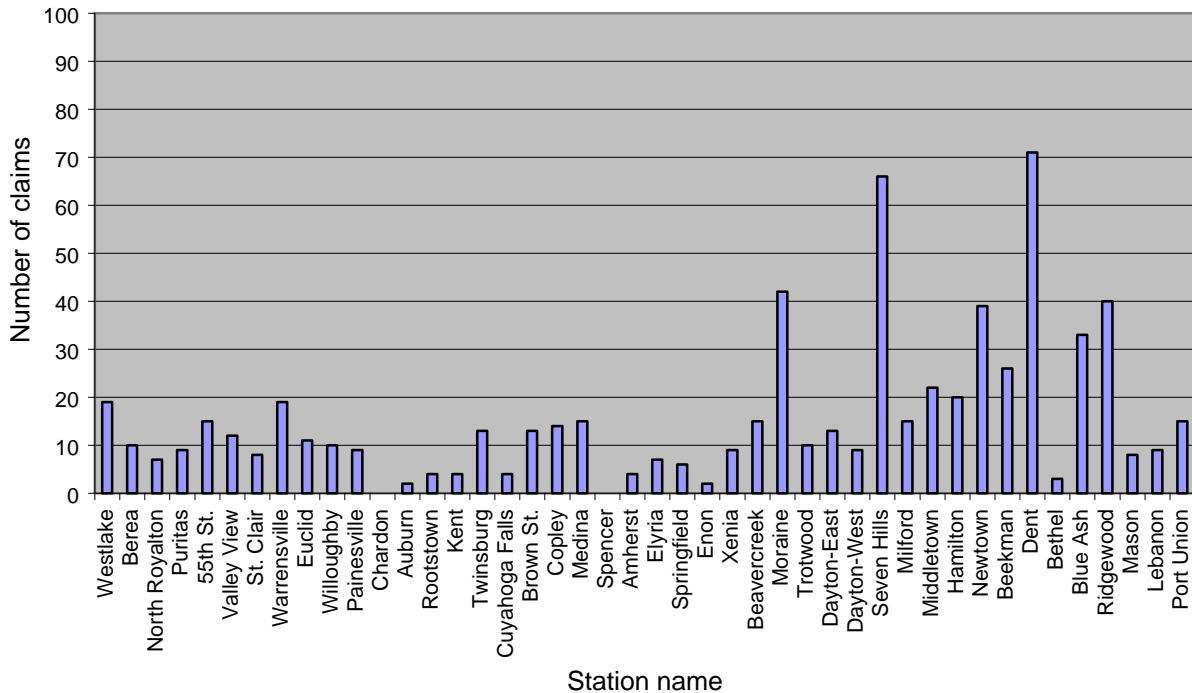


Figure 11: Total damage claims per station in 2000

This graph shows the total number of damage claims reported at each station during the year 2000. The number of claims ranged from zero at the Chardon and Spencer stations in Cleveland and Akron to just over 70 claims at the Dent station in Cincinnati.

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. The majority of all complaints received are related to service received at the station, and general program issues. The majority of service complaints received are alleging rude treatment, long wait times, and inattentive employees. The majority of program-related complaints received allege that the program is unfair, that the public does not like the program rules, and that E-Check does not clean the air. The following graph shows the total number of customer complaints received by Envirotest via the comment card collection system at the stations.

Total service complaints received by Envirotest in 2000

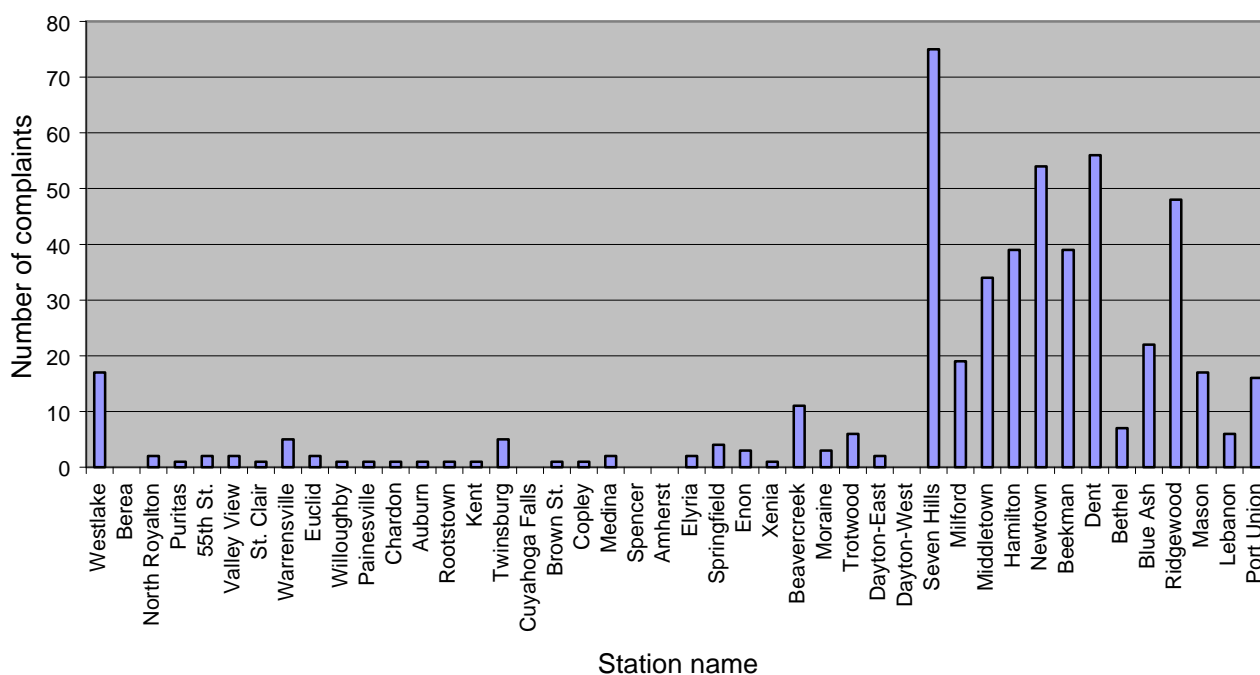


Figure 12: Total service complaints received by Envirotest in 2000

This graph shows the total number of service-related complaints received by Envirotest about each station in 2000. This does not include any complaints regarding the program in general. Overall the numbers were low with an average of fewer than 10 complaints per station for the entire state.

Ohio E-Check Public Opinion Survey 2000

In Fall 2000, Ohio EPA and Envirotest Systems contracted with The Ohio State University Center for Survey Research to gauge motorist opinions of the Ohio E-Check program. The research was contracted to an independent third party in order to keep all answers completely confidential and ensure public confidence in the integrity of the results.

In February 2001, the survey was mailed to 1,199 motorists (out of 317,203) who had tested vehicles during the last three months of 2000. Survey recipients were selected using random sampling techniques, which accounted for normal percentages of county location, fleet make-up, and whether the vehicle passed or failed. Response to the survey exceeded 65 percent and was evenly split between Northeast Ohio and Southwest Ohio counties.

The survey questions were divided among three main areas:

1) general attitudes toward air pollution, 2) behavior alterations by motorists because of E-Check, and 3) motorists' opinions of their testing experience. For each of these sections, the highlights are as follows:

General attitudes of air pollution and vehicle emissions programs

- \$ 66% agreed air pollution has a negative affect on their health vs. 9% that disagree
- \$ 81% agreed individuals need to do their part to help clean the environment vs. 2% that disagree

- \$ 49% agree that vehicle emissions testing can help reduce air pollution vs. 28% that disagree
- \$ 29% agree E-Check is helping to reduce air pollution vs. 44% that disagree
- \$ 88% believe the E-Check program should be in all Ohio counties vs. 7% that disagree (52% strongly agree)
- \$ 44% believe people are illegally avoiding the E-Check test vs. 15% that disagree
- \$ 45% disagreed that vehicles pollute more than industry vs. 24% that agree

Public behavior modifications as a result of E-Check

- \$ 9.3% reported having a Atune-up@, in anticipation of testing
- \$ 3.5% reported having Amajor repairs@ to the emission system in anticipation of testing
- \$ Before participating in the survey, only 15.6% were aware of the 1-800-CAR-TEST hotline number
- \$ Only 4.6% of the respondents reported having used the 1-800-CAR-TEST hotline number for information
- \$ Before going to test, only 17% worried their vehicle would fail the test

Opinions of testing experience

- \$ 56% did not feel that the wait was too long (Atoo long@ was not defined), vs. 24% that felt that it was
- \$ 74% felt that the E-Check employees were polite vs. 9% that disagreed
- \$ 62% felt that the E-Check employees knew how to do their jobs vs. 9% that disagreed
- \$ 74% felt they were treated well by the E-Check employees vs. 6% that disagreed
- \$ 54% wanted a better explanation of what was happening to their vehicle during the testing process
- \$ 46% didn't believe their test results were explained well
- \$ 53% agreed they had a pleasant test experience vs. 19% that disagreed

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 being conducted only in certain counties. Motorists believe in the concept that vehicle emissions testing can help reduce air pollution, but they are uncertain whether the E-Check program is helping to reduce air pollution.

The E-Check program administrators believe that this type of research is helpful in determining which areas of customer service and education need improvement, and plans to conduct a similar study in Fall 2001. The E-Check program intends to use the survey results to plan future activities that will concentrate on increasing public awareness of the hotline, test 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. In 2000, TRIAG met quarterly and covered the following key topics:

- ASM start-up dates for Dayton/Springfield, Cleveland/Akron, and Cincinnati;
- House Bills 482 and 450 exempting vehicles up to five years old (not enacted);
- Improving the repair industry image;
- Placement testing criteria concerning ASE L1 certification (National Institute for Automotive Service Excellence's advanced engine performance);
- Questions about E-Check data;
- Phase-in standards for oxides of nitrogen (NOx);
- Senate Bill 305 exempting new vehicles for six years (not enacted);
- The ASM 2525 training seminars and content;
- On Board Diagnostics (OBD) federal initiative and educational materials; and
- "Tech Talk" newsletter distribution approach to maximize coverage.

Shop Licensing

To be "licensed" as an Ohio EPA 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 the following equipment to guarantee that the emissions failure can be properly diagnosed and repaired:

- reference materials;
- DVOM or digital multi meter;
- vacuum gauge;
- fuel pressure test kit;
- carbon cleaner system;
- (3, 4, or 5) gas analyzer;
- scan tool; and
- a basic ignition scope with DIS capabilities.

Fifty repair shops were re-licensed in December. A license is good for three years. The majority of the year was spent resolving various legal issues related to shop licensing by Ohio EPA. Licensing will be continued into 2001 until all 594 repair shops are re-licensed. A mass mailing, "Start-up Notification", was mailed to all licensed E-Check repair shops from Ohio EPA concerning the start-up of the ASM 2525 test.

ASM Training Seminars

Ohio EPA and Envirotest informed 160 repair shop technicians about the ASM 2525 test and how it will impact their industry at three seminars in the Akron, Cleveland, and Dayton areas. Two seminars were held in the Cincinnati area, where 61 repair shop technicians attended. Seminars covered new testing procedures and how acceleration is simulated in the ASM 2525 test. NOx issues and evaluation methodologies also were discussed. Representatives from Envirotest and Ohio EPA fielded questions at the end of each seminar.

Tech Talk

Tech Talk is a joint publication of Envirotest and Ohio EPA to educate and inform automotive repair technicians about the vehicle emissions inspections program in Ohio. *Tech Talk* is published by Kerezy Communications, Inc., and paid for by Envirotest. Ohio EPA has editorial oversight prior to publication. Three issues of *Tech Talk* were published and covered topics ranging from current industry news, "Tech Tips," "Technician Profiles," "Repair Facility Spotlights," announcements, program data and other program issues.

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 Envirotec Systems range from direct mailings to building alliances with community health and environmental groups. 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 pages and yellow pages.

Public Relations

An essential component of Ohio E-Check's public education initiatives involve 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.

Direct Mail

Ohio motorists with vehicles subject to emissions inspections receive a notice in the mail 60-90 days prior to registration renewal. Between 120,000 and 175,000 notices are sent each month. These mailings contain helpful information for motorists, including: "Tips for a Smoother E-Check," station locations, operating hours and an explanation of the test procedure.

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 site receives an average of 39,522 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 for feedback from motorists. Operators handled approximately 170,000 calls in 2000. 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 2001

Ohio EPA and Envirotest have made strides in 2000 to make the E-Check testing experience as convenient as possible for Ohio's motorists. However there are still improvements to be made. Ohio EPA and Envirotest are committed to listening, and using, all customer feedback to improve the motorist testing experience. In 2001, Envirotest and Ohio EPA committed to the following goals to improve testing and customer service:

1. **Install Customer Comment Stations in all customer-waiting areas.** The stations will provide customer comment cards, pencils and a secure drop box for the cards.
2. **Improve customer service in the Cincinnati area.** The program wants to reduce the complaints received from the thirteen stations in that area.
3. **Conduct regular program-wide customer opinion research.** The purpose is to get a true understanding of motorists' opinions about the E-Check program, and gauge motorist satisfaction with the service provided.
4. **Develop a public education program based on the annual report material.** The program can be adapted for any group setting.
5. **Change field office hours to serve the public's needs more effectively.** Field offices will be open to the public from 8 a.m. to 5 p.m., instead of the current 9 a.m. to 3 p.m. Motorists are not required to make an appointment.
6. **Make improvements to printed educational materials based on complaint and survey data.** To reduce the amount of phone calls received by both Envirotest and Ohio EPA, information will be updated.
7. **Create "Point of Sale" signs to be placed in each waiting booth.** Signs will be placed in the waiting booths to explain the testing process and provide information to the public while their vehicle is tested.
8. **Make the exemption/extension process more efficient for motorists.** This includes posting applications on the Web site for downloading and making procedural changes to better serve the motorist.
9. **Meet the 2001 audit frequency schedule.**

The above list is ambitious, however, the E-Check program is dedicated to serving Ohio's motoring community.

Appendix I: 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 sixteen 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 governmental 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 carbon monoxide. 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 requested 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 at 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 2000.

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