

OHIO'S  
VEHICLE  
EMISSIONS  
TESTING  
PROGRAM



A PUBLICATION OF THE  
OHIO ENVIRONMENTAL PROTECTION AGENCY



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*Annual Report*  
YEAR 2001

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## Acronym List

<b>CAA</b> .....	Clean Air Act
<b>CO</b> .....	Carbon Monoxide
<b>EPA</b> .....	Environmental Protection Agency
<b>HC</b> .....	Hydrocarbon
<b>I/M</b> .....	Inspection and Maintenance
<b>NAAQS</b> .....	National Ambient Air Quality Standards
<b>NOx</b> .....	Oxides of Nitrogen
<b>OBD</b> .....	On-board Diagnostics
<b>Ohio EPA</b> .....	Ohio Environmental Protection Agency
<b>RSD</b> .....	Remote Sensing Device
<b>SIP</b> .....	State Implementation Plan
<b>VOC</b> .....	Volatile Organic Compound

## Introduction

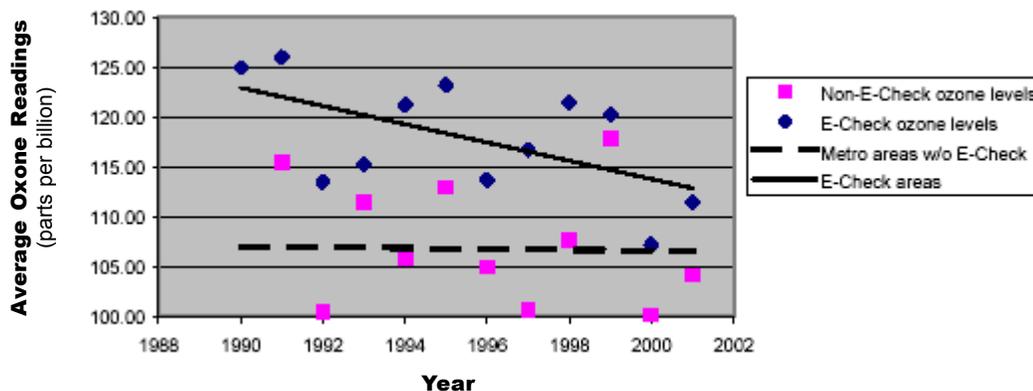
A report on the effectiveness of vehicle inspection and maintenance (I/M) programs by the National Research Council of the National Academy of Science attracted attention in 2001. The report, requested by Congress, concluded that although I/M programs have been less effective than anticipated, they remain 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.

Based on the information provided in this Ohio E-Check annual report, Ohioans can see that there are measurable air quality benefits from the State's vehicle emissions testing program. In 2001, vehicles that failed their initial test and eventually passed a subsequent test showed an average improvement of 77 percent for HC, and an average improvement of 78 percent for CO. Ohio EPA also 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.

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 a decrease in ozone levels in the areas that had emissions testing compared to the remainder of the state. It also shows that ozone levels were much higher, and continue to be slightly higher in the 14 E-Check counties than in other parts of Ohio. The reductions are due in part to the vehicle emissions testing program. Other air quality programs adopted as part of a comprehensive air quality plan also helped improve air quality in these areas.

**Figure 1:  
Reduction in Ozone Levels (1990-2001)  
E-Check vs non-E-Check Areas**



Source: U.S. EPA Ambient Air Monitoring Database

This graph compares average ozone reductions since 1990 between the 14 E-Check counties and the remainder of the suburban and industrial areas in the state that do not have emissions testing.

## I. 2001 Test Results

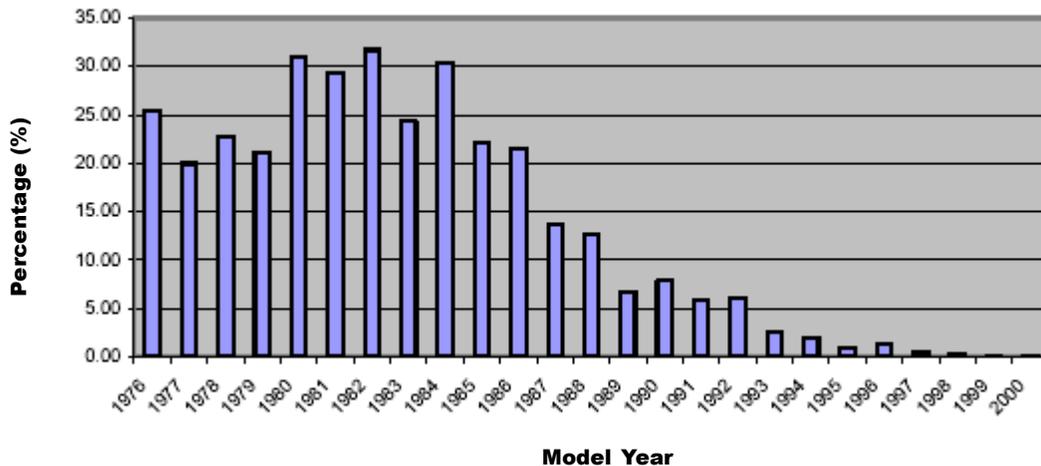
The following table shows the test volume and the pass/fail statistics for all tests, including retests. The total fails include all vehicles which failed for either one, or a combination of emissions, gas cap, or missing catalytic converter. The HC, CO, gas cap, and catalytic converter fails show how 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 2001**

Total Vehicles Tested	Total Pass	Total Fail	HC Fails	CO Fails	Gas Cap Fails	Catalytic Converter Fails
1,905,059	1,728,902	176,157	119,988	137,858	27,865	1,182
N/A	90.8%	9.2%	6.3%	7.2%	1.5%	.06%

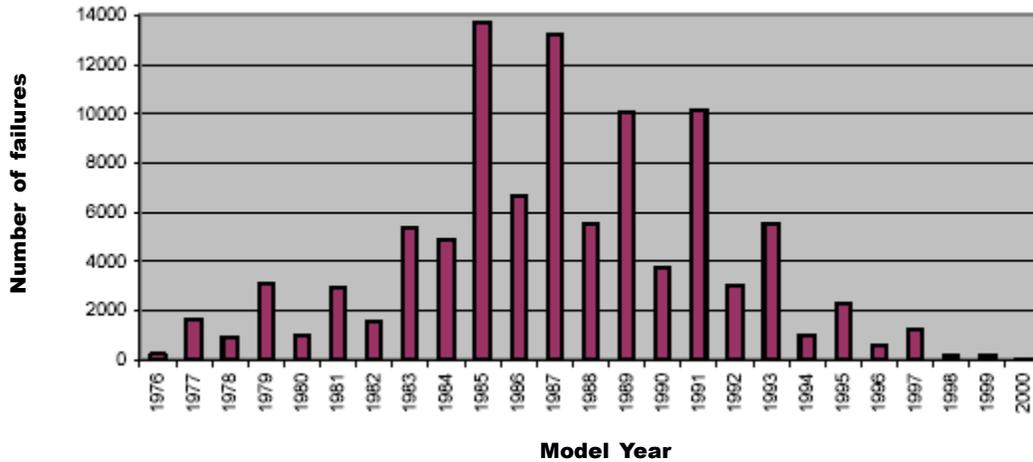
The following graph shows how the fail rate varies depending on model year. Model years from the early to mid-1980s comprise the highest percentage of failures. Once vehicles reach 10 to 15 years old, they begin to need more than normal maintenance to keep them in good working order.

**Figure 2: Percentage of Failed Tests by Model Year**



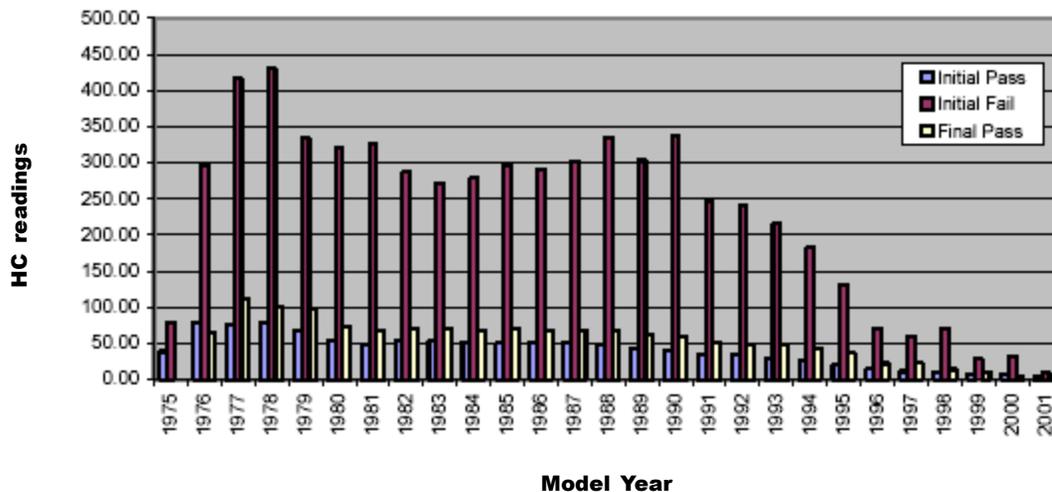
The following graph shows how the actual number of failures varies depending on model year. Model years from the mid-1980s to the early 1990s comprise the highest number of failures in the E-Check program. This is primarily due to the large number of vehicles that are tested in this age group. Newer vehicles are less likely to fail due to poor maintenance.

**Figure 3: Number of Failures by Model Year**



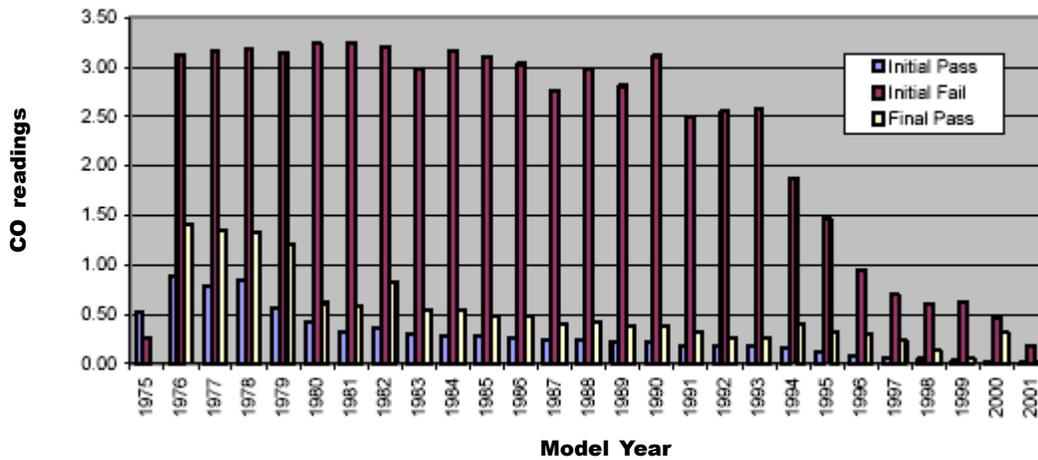
The following two graphs show the average hydrocarbon (HC) and carbon monoxide (CO) readings for each model year. There is an average reading for vehicles that passed E-Check during the first test (initial pass), failed E-Check during the first test (initial fail), and failed their initial test but passed a later test after repairs. The graphs show that repaired vehicles achieve a large reduction (nearly 80 percent) in emissions levels between an initial fail and a subsequent, passing re-test.

**Figure 4: Hydrocarbon Reductions Achieved by Repairs on Failing Vehicles**



Vehicles that have failed their first test and passed at a later date show an average emission improvement of 77 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.

**Figure 5: Carbon Monoxide Reductions Achieved by Repairs on Failing Vehicles**



Vehicles that have failed their first test and passed at a later date show an average emission improvement of **78 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.

## 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 2001 achieved substantial emission reductions. Vehicles that failed their initial test and eventually

passed a subsequent test showed an average improvement of 77 percent for HC, and an average improvement of 78 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/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 two motorist opinion surveys conducted for Ohio EPA by The Ohio State University Center for Survey Research in Winter 2000 and Summer 2001. One objective of the surveys was to determine whether the emissions testing requirement helped motivate motorists to have vehicle repairs done prior to testing. More than nine percent of the survey respondents in 2000, or 171,000 vehicles, replied "yes" to that question. In the Summer 2001 survey, this response rate increased to 11.6 percent. This means that potentially 40,000 more vehicles had their emissions lowered prior to testing in 2001. 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, 2001).

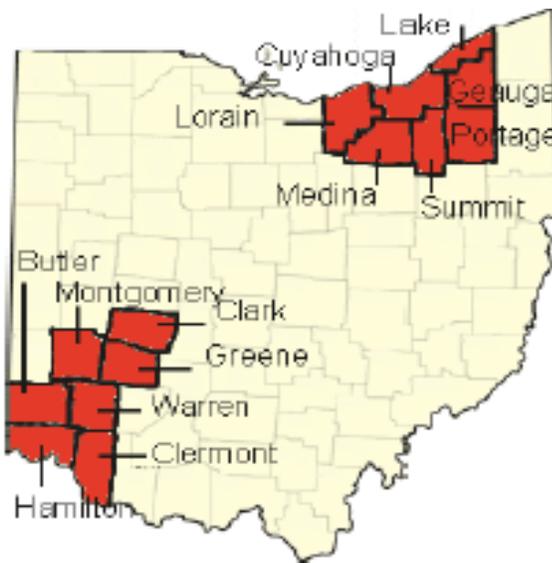
The principles found in these two state studies were used to help identify the unknowns in the Ohio E-Check program. A minimum of 11,490 vehicles in Ohio's 14 E-Check counties receive an initial failing test and do not return for a passing test. According to the previously mentioned studies, two-thirds 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 3 and 4, and the California study. 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. 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

#### 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 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 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 32 Ohio counties would not meet. When the 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 improve Ohio's air quality so that all counties can continue to meet federal standards in the future.

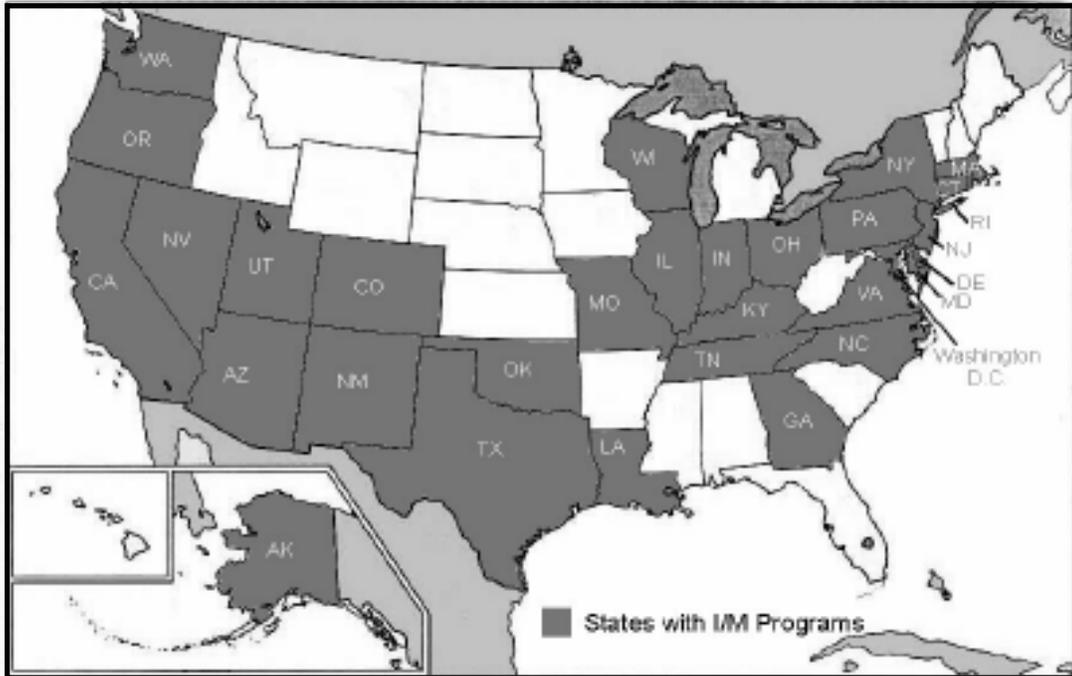
#### Test fee

The Ohio E-Check emissions inspection costs \$19.50, one of the nation's lowest 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, to cover program operating costs. An average of \$1.00 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. Envirotest Systems Corporation employs 700 Ohioans under a 10-year contract with Ohio EPA to conduct the State's vehicle emissions inspection.

**Figure 7: States with Inspection/Maintenance Programs**



tion program. Envirotest 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).

### **Test Procedures**

The current test method, called Acceleration Simulation Mode (ASM 2525) is a steady-state test similar to the loaded mode test, with the addition of equipment that collects and measures nitrogen oxide (NO<sub>x</sub>). The vehicles are driven on the dynamometer 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, less noise and easier repair verification. In addition, it allows the current contractor to test more cars each

hour because the test cycle is shorter, which also improves customer service by lowering wait times.

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. 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

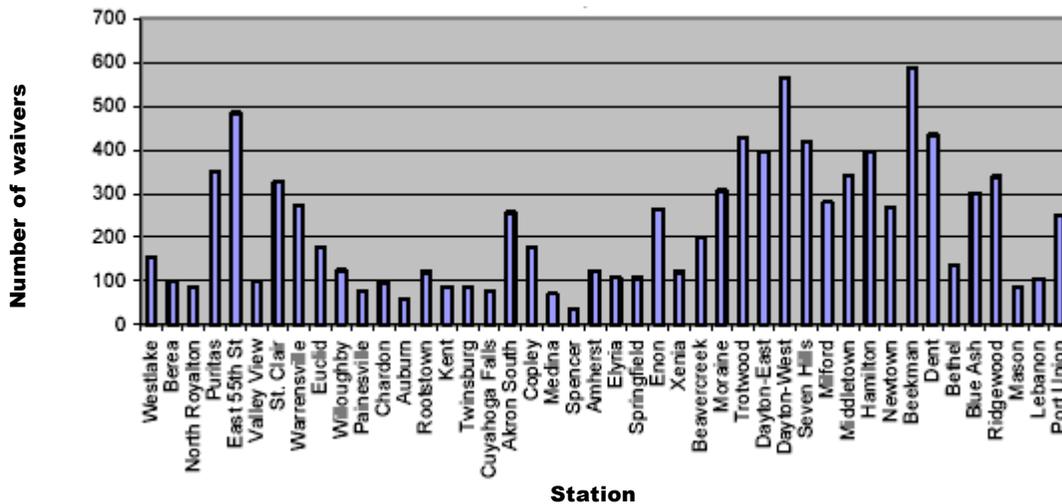
The E-Check program offers waivers to individuals who make an effort to repair their vehicle but still cannot get the vehicle to pass E-Check. In most cases, a waiver will allow the vehicle to be registered with the State and allow the motorist two years to make emissions repairs. If an individual spends 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.

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

**Figure 8: Total Waivers Issued per Station in 2001**

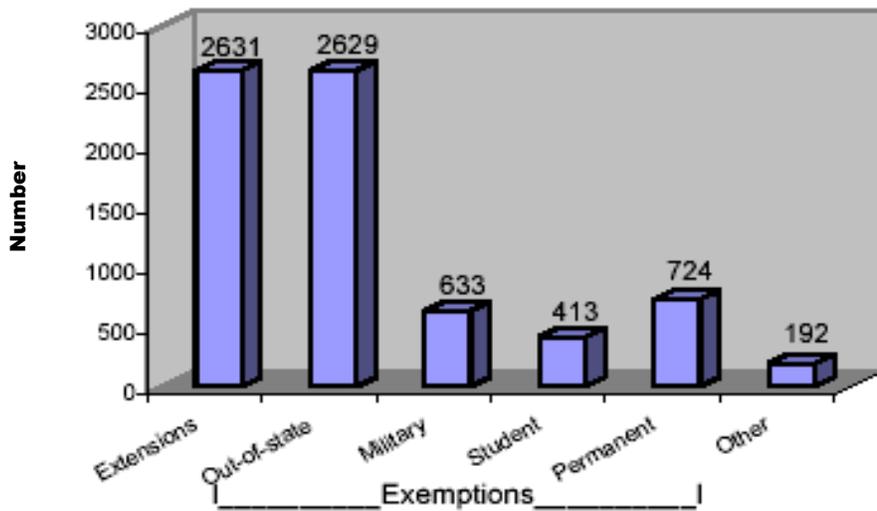


This graph shows the number of waivers issued at each of the 44 testing facilities for the year 2001. The number of waivers issued per station range from 36 to 588 for the year.

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.

**Figure 9: Extensions and Exemptions Issued in 2001**



This graph shows the number of extensions and exemptions issued by type for the year 2001. 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.

#### **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 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, equip-

ment 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. The following table shows the planned frequency of each audit in 2002. Equipment audits will now be performed quarterly, or twice as often as was required in 2001. Lane status audits will be performed as needed, while performance audits will be reduced to three times per station per month to account for the decrease in field staff. Covert audits now will be performed more often, at a minimum of six per week in the northern stations, and six per week in the southern stations. Calibration records audits will continue as scheduled, but the calibration observations audits will be reduced to a minimal number. This reduction is due to the fact that the federally required portion of the audit is now being included in the records audit.

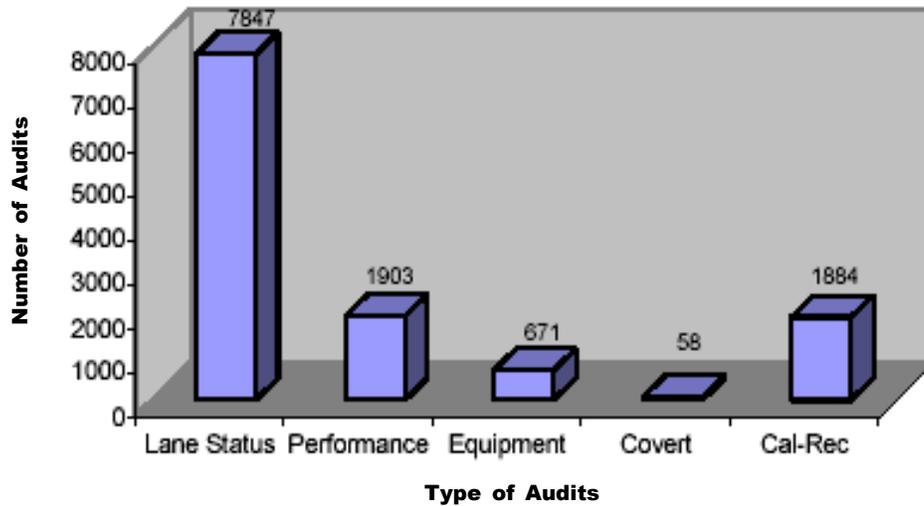
**Table 2: Ohio EPA Planned Audit Frequency in 2002**

<b>Type of Audit</b>	<b>Planned Frequency of Audit</b>
Equipment	Quarterly on all 157 lanes assuming passing results
Calibration	Records once per month per lane; observations half the lanes once a year
Lane Status	As needed
Performance	Three times per station each month
Covert	Six per week in Cleveland/Akron, and six per week in Dayton/Cincinnati

The following graph depicts the number of lane status, performance, equipment, covert and calibration audits performed by Ohio EPA staff in 2001. Ohio EPA was able to meet the 2001 audit schedule for the lane status, equipment, covert and calibration records audits. However, due to staffing changes

there were fewer performance audits completed than originally planned. There were minimal calibration observation audits performed due to changes in the audit structure, and the inclusion of the most important portion of the audit into the records audit.

**Figure 10: Total 2001 Audit Totals by Ohio EPA**



This graph shows the total number of audits by type performed in 2001. The majority of auditors' time is spent performing lane status audits because they are less time-consuming and can be done almost daily. 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. Calibration observation audits were not included in the graph due to the relatively small number that was performed in 2001 for reasons mentioned above.

#### *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

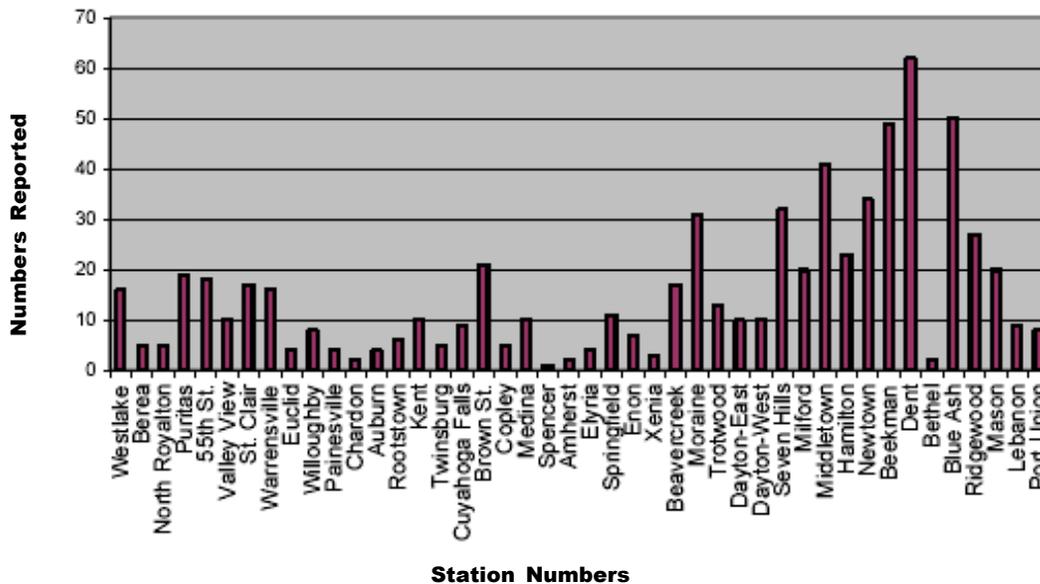
The objective of the covert audit is to verify that Envirotest personnel are performing the emissions test in the proper manner, while providing adequate customer service to Ohio's motorists, when they believe Ohio EPA personnel are not present.

### 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 er-

ror 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 2001, the ratio of paid claims to total tests was 1:6,070 or .017 percent of all vehicles tested.

**Figure 11: Envirotest Damage Claim Totals in 2001**



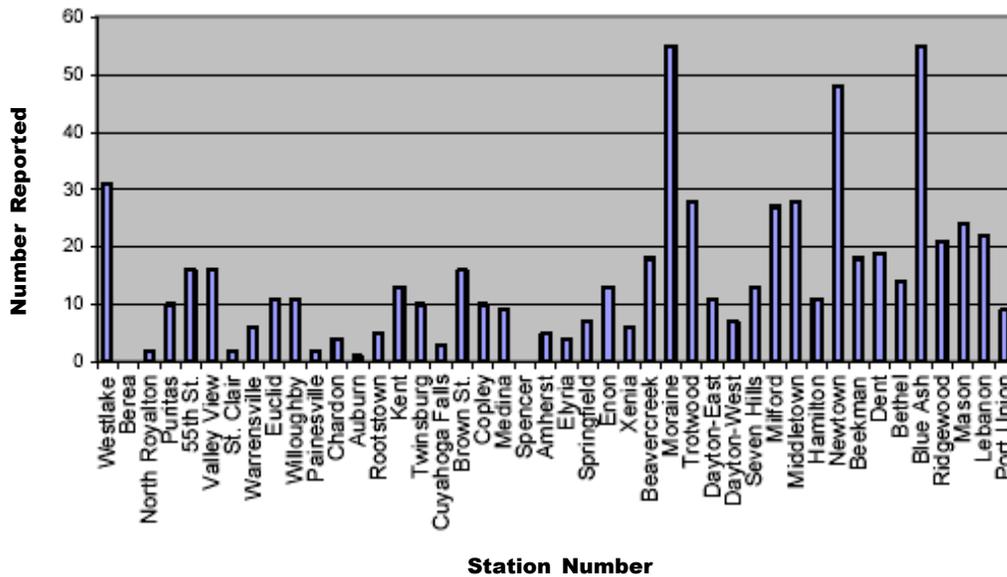
This graph shows the total number of damage claims reported by each station during 2001. Only one-third of reported claims prove valid. The number of claims reported ranged from one at the Spencer station in Medina County to just over 60 claims at the Dent station in Cincinnati.

### 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. Customer complaints tend to be related to service received at the station, and general program issues. The majority of service-related complaints allege rude treatment,

long wait times, and inattentive station employees. The majority of program-related complaints allege that the program is unfair, that the rules are not effective, and that the program is not cleaning the air. The following graph shows the total number of customer complaints received by Envirotest via the comment card collection system at the stations. There was an average of about 14 complaints per station during 2001.

**Figure 12: Envirotest Service Complaint Totals in 2001**



This graph shows the total number of service-related complaints received by Envirotest about each station in 2001. This does not include any complaints regarding the program in general.

**Ohio E-Check Public Opinion Survey 2001**

Ohio EPA and Envirotest Systems conduct survey research to gauge motorists’ opinions of the Ohio E-Check program. Two surveys have been performed by The Ohio State University Center for Survey Research to measure customer satisfaction with the emissions inspection and opinions on related subjects. Results of the initial survey were reported in the 2000 Annual Report and appear on the E-Check Web site.

In November 2001, a survey was mailed to 1,200 motorists who had vehicles tested between July and September of 2001. 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 dropped from 65 percent in 2000 to 55 percent in 2001. The reason for the decline is most likely because the survey ran through the Thanksgiving holiday season in 2001. Another reason for the drop-off could be a residual effect from the September 11, 2001, terrorist attacks.

The Summer 2001 survey questionnaire was the same as the Winter 2000 survey except that three

questions were further clarified. For example the first survey asked, “Do you think the \$19.50 test fee is fair?” The intent of the question was to gauge motorists’ sensitivity to test price. The respondents gave a very negative response. Ohio State believes the response was a result of the respondents’ overwhelming belief that it is not fair that only 14 counties are required to test. Therefore, in the second survey, we clarified the question by stating, “\$19.50 is a reasonable price for the E-Check test.” When conducting comparisons between surveys it is not appropriate to make direct comparisons between the altered questions.

**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 question 46, which gauged the customer’s overall satisfaction with the testing experience. The results indicated that the motorists overall satisfaction with the testing experience was most affected by their interaction with the inspectors.

## **The Results**

Full results of each question can be found on the E-Check Web site. This summary will not contain the results because overall the results were statistically identical to the Winter 2000 survey. This result was expected since there were not any major changes to the program since Summer 2000. The program would only expect to see changes in the survey results if significant changes were made to the way the E-Check program does business. Because no major changes occurred, the program was able to test the hypothesis that motorists testing during the winter tend to have a more negative opinion of their experience than motorists testing during the summer. This study would indicate that the hypothesis is false. As a result, the program will conduct one study per year covering a larger testing time frame. The other advantage is that Ohio EPA and Envirotest now have solid baseline data from which to make program improvements.

The results of five of the questions did have a statistical difference from the results of the same question on the first survey. They are as follows:

**Question 15** Have you had repairs done to your vehicle because your vehicle failed an E-Check test?

More individuals answered no to this question than they did on the first survey.

**Question 24** I would be willing to pay a higher test fee if it meant cleaner air.

The respondents indicated a slightly stronger agreement with this question on the second survey.

**Question 44** The test results were accurate.

The respondents of the second survey agreed less strongly with this question than respondents in the first survey.

**Question 48** Your age.

The respondents of the second survey were significantly younger than the respondents of the first survey.

**Question 52** The adult in your home with the highest education has. . .

The respondents in the second survey indicated that the highest education level in their home was less than the first survey.

One can assume that the reason for the age difference in the respondents is due to the fact that students tend to get their emissions tests performed prior to returning to college. When analyzing the differences in the survey results, the significant difference would lead a researcher to say the following:

- As the overall age of the population drops, the population would be more willing to pay more for environmental improvements.
- As the age of the population drops, the education level of the population drops.
- The higher educated an individual is, the less skeptical they are about the accuracy of emissions testing.

All of these conclusions are supported by the cross tabulations of the demographic materials.

There was one question that can be looked upon as a raw improvement in regard to the effectiveness of the program: Question 1, "In anticipation of having your vehicle E-Checked, did you get your vehicle tuned-up?" The Winter 2000 survey reported a yes response 9.3 percent of the time. The Summer 2001 survey reported a yes response 11.6 percent of the time. This increase indicates that approximately 40,000 more vehicles than reported in the Winter 2000 survey could have lowered their emissions levels prior to testing.

## **Conclusions**

As reported after the Winter 2000 survey, 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, and plans to conduct another study in the fourth quarter of 2002. The E-Check program is using 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 2001, 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 cer-

tified 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 250 shops. A license is good for three years. Licensing will be continued into 2002 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. Two issues of *Tech Talk* were published, 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 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 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.

## 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," 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](http://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 316,367 calls in 2001. 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

Last year's E-Check annual report contained the program's goals and initiatives for 2001. 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 program 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 2001 with a brief explanation of whether or not the E-Check program achieved the goal:

1. **Install customer comment stations in all customer-waiting areas.** Customer comment stations were installed in all customer waiting areas in 2001. These boxes are only accessible by Ohio EPA auditors.

2. **Improve customer service in the Cincinnati area.** There was an improvement in the service provided at the Cincinnati E-Check stations. However, that area still lags behind the rest of the program areas.

3. **Conduct regular program-wide customer opinion research.** The Ohio E-Check program is committed to use customer opinion research annually to gauge the program performance in meeting goals. Ohio E-Check performed opinion research for motorists testing from July through September 2001.

4. **Develop a public education program based on the annual report material.** The report was posted on the Ohio E-Check Web site and was the subject of an Ohio EPA news release. Ohio EPA also developed a Powerpoint presentation which is available to be presented on request. Ohio EPA believes that an earlier release of the report in 2002 will allow for additional public education opportunities.

5. **Change field office hours to serve the public's needs more effectively.** Field office hours were extended from the former 9 a.m. to 3 p.m. hours. Offices are now open to the public from 8 a.m. to 5 p.m. Motorists are not required to make an appointment.
6. **Make improvements to printed educational materials based on complaint and survey data.** The E-Check program provided motorists with public service brochures such as how to winterize vehicles and how to evaluate the economics of repairing or replacing older vehicles.
7. **Create testing procedure signs for waiting booths.** The E-Check program has committed to placing the signs in each testing lane. The signs are in the late design phase.
8. **Make the exemption/extension process more efficient for motorists.** Ohio EPA went through an extensive evaluation of the exemption/extension process. Ohio EPA made changes that make the process more streamlined for the motorist. The applications needed by motorists are now available on the Internet. Motorists are encouraged to send their application directly to the field office in his/her area for a faster response.
9. **Meet the 2001 audit frequency schedule.** Ohio EPA did not meet the audit frequency schedule for 2001. However, the amount and effectiveness of audits completed is greater than in previous years. A large part of the shortfall is because of staffing shortages, and a misunderstanding of the audit frequency schedule overall.

## **VIII. Goals and Initiatives for 2002**

Building on the successes of the past year, the following is the list of goals for 2002:

1. **Meet the 2002 audit frequency schedule.** Ohio EPA needs to work better with the field offices and make sure Central Office clearly communicates the auditing goals to the field staff. The audit frequency schedule should also allow for staffing shortages.
2. **Place the Interpretive Signs in the testing lanes.** The E-Check program intends to determine the effectiveness of the signs through customer feedback.
3. **Continue to make the educational materials more effective.** Educational materials are the E-Check program's main communication tool with the public. They need to reflect the positives of the program, and provide timely information.
4. **Improve Cincinnati area customer service.** As discussed previously, Cincinnati's customer service improved in 2001, but still lagged the rest of the State. In 2002, the E-Check program's goal is to improve customer service in Southwest Ohio to be in line with the rest of the program.

## 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 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 (NO<sub>x</sub>) — 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, NO<sub>x</sub>, and CO. The program reduces air pollution from vehicles by encouraging better ongoing maintenance of vehicles, and ensuring the repair of vehicles with exces-

sive 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.

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