

## Year In Review—NOx & OBD Effects Upon the WIVIP in 2001

### NOx and OBDII

There were two new elements added to the Wisconsin Vehicle Inspection Program in 2001 which had an impact upon the repair industry.

The first, was the inclusion of NOx in the pass/fail criteria for IM240 tests. While NOx had been measured during the emission test since 1995, it had not been part of the result criteria. Nox was included because nitrogen oxides, like hydrocarbons, are precursors to the formation of ozone. They also contribute to the formation of acid rain.

As a result of the NOx testing, the program saw an increase in the number of vehicles failing the inspection. Figure 1 looks at the NOx only failure rate. This averages to 11.4% failure rate for NOx.

### NOx Training Initiated

Due to the higher failure rate for NOx, training sessions were developed by Steve Kukawka, in conjunction with the Waukesha County Technical College and the Wisconsin Vehicle Inspection Program. These free evening seminars were well attended, with over 450 repair technicians attending one of the 26 total seminars.

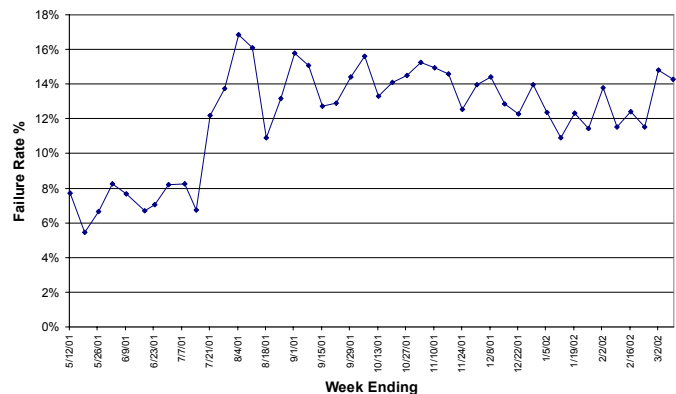
During these NOx training seminars, there was hands-on training and lively discussions on how to approach diagnosing and repairing a vehicle failing for NOx. The result of these sessions should help the participants expediently diagnose and repair NOx failures.

### OBD Testing

The second change to the program occurred on July 17th, when the "OBDII test," was adopted for newer vehicles. The OBDII check for 1996 and newer vehicles replaced the tailpipe emission test. This more efficient inspection for newer vehicles identifies emission problems before they effect drivability and reduce the test time. This benefits all motorists with an overall reduction in waiting times at the stations.

The OBD test consists of three inspections. The first determines if the Multifunction Indicator Light (MIL) is operating correctly during a Key On Engine Off check. The next inspection is to check the vehicles diagnostic link connector to see if it has been tampered. Lastly, communications with the vehicle's OBD system is established to see if there are any conditions which commanded on the vehicle's MIL light. Figure 2 below illustrates the test results for checking to see if the MIL is commanded on.

NOx Failure Rate (HC/CO Pass)



Vehicles failing for NOx only averaged an 11.4% failure rate since May. It is anticipated that the failure rate should stabilize once these vehicles complete one testing cycle.

| Model Year   | OBD II MIL results - ALL TESTS |              |             |
|--------------|--------------------------------|--------------|-------------|
|              | Pass                           | Fail         | Fail %      |
| 1996         | 36,926                         | 2,553        | 6.5%        |
| 1997         | 1,923                          | 84           | 4.2%        |
| 1998         | 37,681                         | 673          | 1.8%        |
| 1999         | 2,271                          | 18           | 0.8%        |
| 2000         | 45,542                         | 285          | 0.6%        |
| 2001         | 1,735                          | 8            | 0.5%        |
| <b>Total</b> | <b>126,078</b>                 | <b>3,621</b> | <b>2.8%</b> |

The OBDII inspection checks the function of the MIL bulb in a Key On Engine Off test, looks for tampering to the Diagnostic Link Connector and determines if the MIL light has been commanded on. The above chart illustrates the failure rate by model year for vehicles found with MIL light commanded on.

## The Wisconsin Emission Repair Facility Report – The Blue Book

Effective repairs are the key to achieving program goals. The state is required to take steps to ensure that the repair industry has the capability to repair the vehicles that fail the test. Technical assistance, repair technician training and The Blue Book are methods we have available to improve repair effectiveness.

### ***What's it for?***

**Consumers:** The report can be used to assist in the selection of a repair facility to fix vehicles that fail the test. The “score” of a shop is just one tool that a consumer might choose to use before making an appointment for service.

**Repair Facilities:** The report provides periodic feedback about your success in repairing failed vehicles. The hope is that shop owners would try to achieve a high score so that customers might choose their facility over one with a lower score. The score might also be a way to assess the need for more emission repair training.

The Report is not

A list of “certified” repair facilities

A recommendation from the program

### How are the scores computed?

The customer presents the Vehicle Inspection Report (VIR) from a failing vehicle to the shop.

The repair technician diagnoses the vehicle and fills out the back of the VIR.

When the vehicle returns to the test station for a retest, the inspector enters the repair facility phone number and cost of repairs.

The program’s computer system calculates the shop’s success rate based on the repair information and the result on the retest.

It sounds pretty simple, but there are some important steps to remember about the process.

**The score is based on the retests after first repair.** A failing vehicle that is repaired numerous times at different facilities would provide inputs for scoring the different facilities.

Marking the “**Recommended But Not Performed**”

**box for any item in the Repair Data Section** on the back of the VIR means that the result on the test will not be used to compute the score – even if the vehicle passes. While this provides an element of protection for those cases where a customer refuses repairs, checking this box for every vehicle means that the computer won’t have data to compute a score, and customers won’t have that piece of information to help them make their choice.

### What should you do?

Be accurate in filling out the back of the VIR. Remember the purpose of the Repair Data Section is to indicate what you’ve done and what may still need to be done to get the vehicle to pass.

Write legibly. This is especially true regarding your phone number since we use the phone number to credit your shop with the repair. Some shops use a stamp to make it easier for the inspectors at the test stations to enter the correct information.

Keep copies of VIRs for your records. If data entry errors occur, this helps to track the cause and correct them.

Call if you have questions. We send out a post card with the repair data before the Blue Book is published. We allow about two weeks for comment about the information. You can call me, Joe Paulick, at 414-266-1095 or 1-800-242-7500 ext.1095. Envirotest’s Public Relations Director, Sue Krueger, is also available to answer your questions. You can reach her at 414-358-3900 or 1-800-335-5088 ext. 117.

Effective and efficiently performed repairs are vital to the complete success of the Wisconsin Vehicle Inspection Program. While inspections are necessary to identify high emitting vehicles, it is only through the repairs that actual air quality benefits are achieved. Thank you for being part of our success.

## Emission Related Repairs For Waiver Consideration

The following list represents the current interpretation of those repairs that are emission related and those that are not. Vehicle manufacturers may use different terms for items that perform similar functions. Questions will still occur about the validity of using the cost for certain repairs toward waiver issuance. The waiver investigator makes the final decision about acceptability of any repairs for waiver purposes.

### Carburetor

Rebuilding  
Carb kit  
Base gasket  
Intake manifold  
Choke pull-offs  
Choke thermostats  
AC Idle compensators  
Mixture control solenoid  
ISC motor  
IAC motor  
EFE grids heated  
EFE vac actuator  
EFE valves

### Ignition

Distributor  
Cap  
Rotor  
Points  
Condenser  
Plugs  
Wires  
Pick up coil  
Coil or Coil pack  
Weather head  
Connectors  
Ignition module

### Computer System

Reprogram PCM (flash)  
PROM (calibration chip)  
Knock sensor  
Misc. solenoids (too numerous to list)

### Misc.

Chemical decarbonization of engine with specialized equipment (i.e. Motorvac, Sea foam)

### One time only

Manual removal of carbon deposits  
Timing adjustment  
Exhaust leak (before catalyst)  
Misc. sensors (too numerous to list)

### Throttlebody

Rebuilding  
Throttle shaft bushings  
Injector (s)  
Throttle base gasket  
Injector seals  
Wiring harness

### Port/Sequential fuel injection

Fuel rails  
Injector insulators  
Injector seals  
Plenums  
Fuel injection cleaning (done with specialized equipment)

### Engine

Head work  
Valve work  
Intake manifold  
Cam shaft  
Lifters  
Push rods  
Rocker arms  
Cam rollers/followers  
Cam bearings  
Rings  
Pistons  
Engine block prep  
Exhaust manifold (only with oxygen sensor or air injection system)  
Timing chain gears or belt

### Feedback systems

Electronic Control Module (ECM)  
Coolant temp sensor (CTS)  
Throttle position sensor (TPS)  
Mass air flow (MAF)  
Manifold absolute pressure (MAP)  
Oxygen sensor (O2)  
Air charge temp (ACT)

### Gaskets

Head  
Intake manifold  
EGR  
Carb  
Exhaust  
Valve cover

### Evaporative

Any part originally installed by the manufacturer for control of evaporative emissions

### Vacuum

Any vacuum actuated device which would alter the air fuel mixture; some examples include: brake booster, vacuum collector, or storage bulb

### Misc. Fuel

Fuel pressure regulator  
Fuel filter  
Fuel pump (note computer Controlled vehicles only)  
Fuel tank sending unit (with electric fuel pump)  
Fuel tank (all cars)

### Emission equipment

Catalytic Converter(s) and all items listed under the 9 point inspection criteria provided the item was not identified as tampered during the waiver inspection

## What Is An Acceptable Receipt?

When a motorist applies for a waiver, one of the steps to determine if the vehicle is eligible, is to review the repair receipts. Occasionally, a receipt does not meet the criteria and the motorist is asked to return to the repair facility to provide additional information on the repair receipt. We thought it might be helpful to review the “checklist” of what the waiver personnel at the inspection facility use to determine a valid receipt for waiver purposes.

Before granting a waiver, the investigator checks acceptable repair receipts to 1) identify the repairs as being emission related; 2) assure that the stated repairs have been performed, and 3) determine if possible warranty repairs have been included. Receipts are acceptable for emission repairs which have been performed within 90 days from the expiration date of registration for the vehicle failing the emission test, and anytime after the failed test. The emission repair costs are cumulative for the vehicle within the acceptable time period.

At a minimum, repair receipts must include the following:

1. Name, address and phone number of the repair facility
2. Make, model, year and plate/VIN of the vehicle
3. Itemized parts and labor
4. Total cost of repairs and indication that repairs were paid at time receipt was issued
5. Date of repairs

Any of the above items that are not met could be a reason that the motorist is asked to return to your repair facility to provide additional information regarding repairs. These requirements are part of ATCP 132 regulations which cover repair receipts also. You may call the Department of Agriculture and Consumer Protection if you have further questions regarding ATCP 132. You may speak to a representative or request a copy of the code, by calling the Milwaukee Regional Office at 414-266-1230.

### Just a reminder. . .

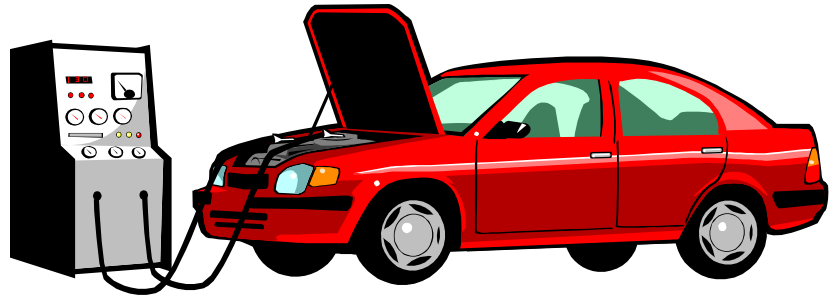
There is a WEB site with program information for the Wisconsin Vehicle Inspection Program. It contains general information, such as station locations (and directions), fail/retest information for motorists, and explanations of the testing procedures. It also contains an electronic version of the Blue Book, Links to other program related WEB sites and Feedback forms to communicate with program representatives via e-mail. The site location is:



[www.wivip.com](http://www.wivip.com)

## Most Common DTCs in OBDII Failures (2001)

Most 1996 and newer vehicles are now inspected utilizing the vehicles OBDII system. One of the Pass/Fail criterias for this inspection is determining whether the Multi-function Indicator Light has been commanded on. When this occurs, diagnostic trouble codes are also retrieved and given to the customer as part of the Vehicle Inspection Report. The following are the most common Diagnostic Trouble Codes retrieved from the OBDII test, when the MIL light has been commanded on.



| DTC   | Description  | # Times |
|-------|--|---------|
| P0133 | O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)                        | 91      |
| P0300 | Random/Multiple Cylinder Misfire Detected                                | 55      |
| P0401 | Exhaust Gas Recirculation Flow Insufficient Detected                     | 52      |
| P0440 | EVAP System  | 39      |
| P1443 | Evaporative Emission Control System Control Valve (Ford Lincoln Mercury) | 38      |
| P0420 | TWC System Low Efficiency Bank 1   | 27      |
| P0135 | HO2S Heater Ckt. Bank 1 Sensor 1   | 21      |
| P0153 | HO2S Slow Response Bank 2 Sensor 1                                       | 20      |
| P0141 | HO2S Heater Ckt. Bank 1 Sensor 2   | 19      |
| P0403 | EGR Solenoid Control Circuit   | 18      |
| P0302 | Misfire detected in cylinder #2  | 17      |
| P0171 | Fuel Trim System Lean Bank 1   | 16      |
| P0101 | MAF System Performance   | 15      |
| P0301 | Misfire detected in cylinder #1  | 15      |

## **Training Classes**

*As an ongoing service to the repair industry, The WVIP Analyzer will publish a list of private and public training centers that offer courses in automotive repair technology.*

*The following is just a sampling of training courses available to you. The WVIP Analyzer is not recommending any specific course and would encourage you to contact us at 414-266-1080 if you are aware of other training opportunities.*

### **WISETECH PROVIDERS**

Waukesha County Technical College  
800 Main Street  
Pewaukee, WI 53072  
262/691-5465

James Eden, Asset Instructor/Coor.  
Milwaukee Area Technical College  
5555 West Highland Road  
Mequon, WI 53092  
262/242-6500 ext. 364



Gateway Technical College  
Racine Campus  
1001 South Main Street  
262/619-6492

Jim Frantz  
Lakeshore Technical College  
1290 North Avenue  
Cleveland, WI 53015-9761  
920/458-4183

### **Other Training**

Tim Houghtaling  
Automotive Seminars Inc.  
800/450-0402

Wells Technical Services  
Wells Manufacturing Corporation  
920/929-6258  
Technician Hotline (Free)  
1-800-558-9770 Press 3

### **AUTOMOTIVE RELATED WEB SITES**

WWW.CCAR-GREENLINK.ORG  
WWW.I-ATN.COM  
WWW.AUTO-TALK.COM  
WWW.STS.SAE.ORG  
WWW.ASTTRAINING.COM

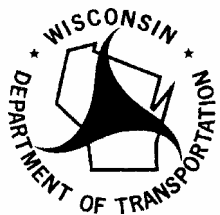
## ***The WVIP Analyzer***

Editing/Design: Susan Krueger,  
Envirotest Wisconsin, Inc. (ESC)

Technical Support Editors: Tom  
Fitzpatrick, Dane Osmonson, Steve  
Collelo, Steve Kukawka, Dan White, ESC;  
Jerry Medinger, Chuck Rhodes, WisDOT.

The WVIP Analyzer is published by the  
Wisconsin Department of Transportation,  
Division of Motor Vehicles, Bureau of  
Vehicle Services,  
Inspection/Maintenance Section.  
Inquiries may be directed to Joe Paulick,  
c/o the Wisconsin Vehicle Inspection  
Program, 1150 North Alois Street,  
Milwaukee WI 53208 (1-414-266-1080)  
or joseph.paulick@dot.state.wi.us

*The information contained in this  
publication is for information purposes  
only*



Department of Transportation  
Division of Motor Vehicles  
MOTOR VEHICLE EMISSION  
INSPECTION SECTION  
1150 North Alois Street  
Milwaukee, WI 53208