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# **Inspection Maintenance Program Requirements Incorporating the Onboard Diagnostic Check: Response to Comments**

Transportation and Regional Programs Division  
Office of Transportation and Air Quality  
U.S. Environmental Protection Agency

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Written comments on EPA's September 20, 2000 Notice of Proposed Rulemaking (NPRM) were received from five main categories of commenters: individual states and state organizations (24 sets of comments); automotive manufacturing, fuel, and service industries (eight sets of comments); the I/M testing and equipment industries (six sets of comments); environmental and health interests (two sets of comments); and private citizens (12 sets of comments). The state comments included two state organizations -- the Northeast States for Coordinated Air Use Management (NESCAUM) and State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) -- as well as comments from 20 state environmental agencies (Oregon, New Jersey, Illinois, New Hampshire, Vermont, Wisconsin, Utah, North Carolina, Missouri, Pennsylvania, Connecticut, Colorado, Texas, Georgia, Massachusetts, Alaska, Maryland, California, New York, and Rhode Island). The commenters from the automotive industry included: Alliance of Automobile Manufacturers (AAM); Association of International Automobile Manufacturers (AIAM); Automotive Parts and Service Alliance (APSA); Motor and Equipment Manufacturers Association (MEMA); Ethyl Corporation (Ethyl); Mitsubishi Motors of America (Mitsubishi); National Automobile Dealers Association (NADA); American Automobile Association (AAA); and Automotive Service Association (ASA). Commenters for the I/M testing industry were represented by: SPX Corporation (SPX); Environmental System Products, Incorporated (ESP); Peter McClintock of Applied Analysis; Waekon Corporation (Waekon); and Donald Stedman (an inventor of remote sensing devices for assessing vehicle emissions). Environmental and public health interests were represented by the American Lung Association (ALA) which submitted both individual comments and also took the lead in submitting a separate letter of

comment co-signed by 18 other local health and environmental organizations.

Because of the extensive (and wide-ranging) nature of the comments received, EPA has prepared this separate, "Response to Comments" document which can be found in the docket for this rulemaking (Public Docket No. A-2000-16) as well as online at:

[www.epa.gov/otaq/regs/im/obd/obd-im.htm](http://www.epa.gov/otaq/regs/im/obd/obd-im.htm). This document summarizes the comments received during the public comment period (Docket Category IV-D), and records EPA's responses to those comments. The reader should note, however, that many of the most significant comments on the September 20, 2000 NPRM are addressed in the preamble for the final rule.

## **ISSUE 1: OBD-I/M PILOT STUDIES**

EPA received input from a variety of commenters including Maryland, New Jersey, AAA, ESP, and Peter McClintock of Applied Analysis suggesting that the three pilot studies conducted by EPA to evaluate the use of the OBD-I/M check in I/M programs do not sufficiently support the conclusion that I/M programs can rely upon the OBD-I/M check exclusively when it comes to testing model year (MY) 1996 and newer, OBD-equipped vehicles.

### **1.1. EPA's OBD-I/M Pilot Study is Not Rigorous Enough**

Commenters cited figures related to the promulgation of the original enhanced I/M tailpipe tests suggesting that the promulgation of those tests were based upon pilot samples numbering in the thousands of vehicles. This was then compared to the sample of vehicles used in the 201 vehicle OBD-I/M tailpipe pilot study, with the suggestion that the OBD-I/M pilot study was significantly less thorough than the pilot studies used to promulgate more traditional, tailpipe tests. Commenters also suggested that EPA's pilot testing did not adequately address the issue of OBD system durability.

Response to Issue 1.1: EPA does not agree that the OBD-I/M testing done to date is "less thorough" than the work done prior to the implementation of the IM240 or ASM tests. The sample sizes cited by the commenters are do not represent paired IM240/FTP tests, but are based upon projected FTP emissions derived from IM240 tests. In reality, the test program used to promulgate the IM240 consisted of a total of 274 paired IM240/FTP tests. Similarly, for the ASM test program, a sample of 105 paired ASM/FTP tests were performed by EPA. EPA therefore believes that the current 201 vehicle OBD study is well within the range of the studies cited. Furthermore, EPA intends to perform additional testing and will continue work in this area as the program is implemented throughout the nation.

While the Agency intends to work with stakeholders to continue the study of OBD technology in the future (particularly with regard to the durability of such systems), we do not believe this should preclude states from taking advantage of this important environmental control measure as soon as is practical. While there is no substitute for studying vehicles as they naturally age, EPA believes that OBD systems will prove to be quite durable in actual use, based upon the fact that the OBD computer is primarily a self-contained, software-based system that will not change as a result of vehicle aging. EPA is aware that environmental changes such as temperature cycles and exposure to ambient operating conditions has the potential to negatively impact non-software-based peripherals associated with the OBD system such as sensors and wiring harnesses, but the Agency believes that safeguards within the OBD system design provide assurance that the system will continue to identify these problems as they occur, even when the vehicles in question are substantially older than those involved in EPA's pilot testing to date. For example, if the OBD computer fails to detect a signal from a monitor due to an age-related

fault in the wiring harness or deterioration of the sensor itself, the OBD system would respond to this loss of signal by setting a DTC. Indeed, detecting such age-related malfunctions and deterioration is one of the primary design features of the OBD system itself.

1.2 EPA Has Not Adequately Addressed Potential Operational Problems Caused by Malfunction-Not-Reproduced (MNR) Vehicles

EPA received comment from AAA expressing concern about the Malfunction-Not-Reproduced (MNR) vehicles, claiming that the problem is more wide-spread than EPA suggests and that the Agency should use the proposed one-year delay to look at this issue and the issue of "OBD false failures" more closely.

Response to Issue 1.2: Based on the MNR levels encountered during the repair phase of the EPA pilot, the Agency is continuing to work with OEMs and the repair industry to address this issue. A continuation of the OBD/FTP study would focus more attention on this issue in order to support those states that have committed to moving forward with OBD implementation at this time. It should also be understood that the behavior of the vehicles listed as MNR is within what would be considered normal operation for any mechanical system and that these failures are not false failures. EPA maintains that these vehicles functioned as designed and that in the field these vehicles would have cleared the MIL under continued operation as long as the problem which illuminated the MIL did not reoccur. Thus these vehicles would have passed an I/M test as long as the original illumination did not occur just prior to an I/M test. The likelihood of this occurring at a level which would be problematic in implementation is remote but possible.

The Agency stated in the Technical Support Document (TSD) for this regulation that it

believed that the number of MNR vehicles found during the 201 vehicle OBD-I/M tailpipe study was largely the result of aggressive procurement methods used during the study. At this time, EPA is finishing a high-mileage OBD study and has not found a single MNR case in the 43 vehicles sampled. This lends support to the Agency's original theory regarding this issue (i.e., that the higher number of MNR cases found in the original study is a product of aggressive procurement). Furthermore, EPA believes that the automotive manufacturers have an interest in limiting the occurrence of MIL illuminations for which the malfunction cannot be reproduced. This interest is due to the automotive manufacturer's need to use the OBD system for diagnostics for vehicle repair outside the I/M arena as well as to protect the public perception regarding the serviceability of their vehicles. Because of these interests, EPA believes that manufacturers have an incentive to build repairable OBD systems which limit owner inconvenience while otherwise complying with the applicable OBD certification requirements.

## **ISSUE 2: TIER II EMISSIONS STANDARDS**

EPA received one comment from Colorado expressing concern about the impact of the newly promulgated Tier II emissions standards (2004+ MY standards) on the federal OBD program. In particular, Colorado expressed concern that setting the OBD malfunction threshold for MIL illumination at 1.5 times the Tier II certification standard would lead to more frequent MIL illuminations because the OBD trigger point would be at a much lower absolute emissions level than for current Tier I vehicles. According to the State, this could allegedly create unreasonably costly repairs that have minimal emissions benefits.

Response to Issue 2: Currently, there is no evidence to support the commenter's claims about increased MIL illumination and the resulting impact of non-beneficial, costly repairs.



However, EPA understands the commenter's concerns about the possibility that the current thresholds on lower emissions could potentially prove problematic in the future. The California Air Resources Board (CARB) is planning to address the threshold issue in their upcoming OBD regulatory revisions and EPA is coordinating with CARB regarding the best options for addressing this issue should it become warranted.

### **ISSUE 3: OBD SERVICE INFORMATION AND CERTIFICATION INFORMATION**

EPA received comments from several organizations encouraging the Agency to propose and expedite rules to ensure repair shops have access to all service information necessary to use the diagnostic systems, quickly and at a reasonable price. Several commenters also suggested that EPA should not consider OBD as an I/M test until it discloses all OBD certification information. Commenters claimed that the proprietary nature of individual OBD designs means that the I/M test is not standardized and that keeping the unique design parameters of each manufacturers OBD system confidential deprives the public of the opportunity to comment on or evaluate the proposal. Further comment suggested that an assessment of OBD effectiveness is not possible without full disclosure of this information.

Response to Issue 3: EPA published its Service Information Final Rule on August 9, 1995 (60 FR 40474) requiring that vehicle manufacturers make available to aftermarket service providers any and all information needed to make use of a vehicle's emission control diagnostic system. EPA is currently drafting an NPRM to propose changes to the 1995 regulations to further improve the accessibility of service and repair information for the automotive aftermarket. EPA expects the proposal to be issued early in 2001.

With regard to OBD certification information, EPA disagrees with commenters that

successful implementation of the OBD-I/M check depends upon the release of specific OBD system design and certification information. While it is true that there is some variance from manufacturer to manufacturer in the design of their systems, EPA believes that the information needed to make use of the OBD system is widely available will be further enhanced once the Agency finalizes the amendments to the Service Information Rule as described above.

Additionally, EPA is working with automobile manufacturers and Weber State University to support the development of a web site designed specifically for use by I/M programs that will provide easy access for states to obtain manufacturer information of particular interest to I/M programs. Examples of the information that will be found on this Web site when it is launched include, but is not limited to, diagnostic link connector locations and technical service bulletins for vehicles with readiness problems. Dealerships and aftermarket service providers will have access to this same information to assist in the diagnosis and repair of OBD-equipped vehicles. EPA will continue to work with manufacturers and I/M programs to ensure that sufficient information needed by states to successfully implement OBD checks is available to them.

#### **ISSUE 4: OUTREACH**

Eleven commenters addressed OBD outreach and education issues. Of those 11 commenters, 2 were state organizations (NESCAUM and STAPPA/ALAPCO), 5 were state environmental agencies (Illinois, Utah, Massachusetts, Rhode Island, and Vermont), 2 were auto repair industry representatives (APSA and ASA), 1 was an automobile manufacturer representative (AIAM) and 1 was an I/M testing contractor (ESP).

The majority of comments received encouraged EPA to place a high priority on the development and implementation of a comprehensive outreach and public education plan.

STAPPA/ALAPCO proposed that EPA initiate a collaborative effort with states between now and 2002 to develop (and implement) a general OBD implementation strategy. Three commenters (STAPPA/ALAPCO, Utah, and Massachusetts) further requested that EPA fund, as well as develop and implement such programs. NESCAUM stressed the need for national coordination, while the majority of commenters viewed EPA's continued support of technician training as an important component of any OBD program implementation, outreach and public education process.

APSA recommended that EPA promote the need for motorists' early response to the Malfunction Indicator Lights (MIL) as opposed to waiting for an inspection, and ASA expressed a willingness to assist the Agency in promoting such a message. Other commenters (ASA and ESP) supported an Agency increase in public education and outreach efforts, and suggested that education efforts address the variety of test programs, the appropriateness of those tests as the vehicle population ages, and sending the right message regarding MIL response and intermittent problems such as MILs triggered by loose gas cap or poor fuel quality.

Response to Issue 4: EPA agrees that the successful incorporation of OBD technology into I/M programs will require the development of a comprehensive outreach and education program that will benefit drivers, automotive repair technicians (including dealerships, service stations, repair facilities, fleets, auto parts staff, and private garages) and state testing personnel. In an effort to reach these audiences with well-defined, consistent messages and relevant information, the Agency will convene an OBD Stakeholder Task Force, which will include representatives of state organizations, automotive manufacturing and service industries, testing and equipment industries, the repair industry, environmental groups, and others with an interest

in implementing the OBD-I/M check. One of the primary goals of this task force will be to make recommendations to EPA on how the Agency can best assist states and others with the coordination and incorporation of those resources to address the needs of individual programs. Because resources are limited, it will take multiple partners and resource contributions to accomplish this task and EPA will work to coordinate and integrate activities through the OBD Stakeholder Task Force. EPA encourages states to work together to the greatest extent possible to utilize existing materials that can be customized and repackaged by each state as appropriate. In addition, the Agency will continue to actively partner with states and other organizations to leverage resources and foster tools for states and others to use as part of their individual outreach efforts.

EPA also agrees that an effective OBD outreach and public education implementation plan will include a strong focus on the public's response to MIL illumination. Many motorists are not aware of OBD and the role it can play in the early detection of a problem that might adversely effect emission control systems as well as impact vehicle performance and fuel efficiency. In addition, OBD program education is necessary to inform the driving public about the issue of vehicle readiness and how to respond to intermittent problems such as MIL illumination triggered by a loose gas cap or poor fuel quality. Such efforts to educate the public must include automobile repair technicians and service writers as partners who will play a major role in communicating clear, consistent, accurate information directly to the consumer. To help ensure the communication of clear, consistent, accurate information to the consumer, the Agency will work with the OBD Stakeholder Task Force to assist and coordinate with APSA, the states, and other interested parties in the development and dissemination of such information. EPA also

encourages states to pursue their own OBD outreach and public education efforts, and EPA will work with the states to help ensure that the public receives consistent messages regarding the importance of OBD.

## **ISSUE 5: EVAPORATIVE SYSTEM TESTING**

### **5.1 EPA Evaporative Emissions Pilot Study**

Comments on EPA's 30 vehicle OBD-I/M evaporative pilot study were received from MEMA, ASA, ALA, and Maryland. MEMA, ASA, and ALA expressed concern that the 30 vehicle pilot study relied on induced failures of the evaporative emission control system to determine the effectiveness of the OBD evaporative emission monitoring system. MEMA, ASA, and Maryland raised concerns about the small sample size of the pilot study. MEMA and Maryland questioned EPA's conclusions regarding OBD evaporative monitoring system effectiveness based upon the fact that 3 out of 25 vehicles with induced failures did not detect the failure, for an alleged false pass rate of 12 percent.

Response to Issue 5.1: The 30 vehicle pilot study used induced failures of the evaporative emission control system rather than natural failures for three reasons: 1) information learned from discussions with auto manufacturers and the contractor for the 30 vehicle study, Automotive Testing Laboratories, Inc. (ATL), suggested that the overwhelming number of natural failures of the evaporative emissions control system detected by the OBD systems are due solely to loose gas caps; 2) to screen vehicles in an I/M lane for a variety of failure modes, and to obtain a sample adequately representing passenger cars and light-duty trucks properly sales weighted over the 1996-2000 model years, would have required a much longer time period and a much more costly study than EPA could justify in the time available; 3) in-use emissions

data collected to support EPA mobile emissions models show that evaporative emissions control systems are more likely to fail as a function of time rather than mileage, and thus few natural failures would be expected in the newer, real world OBD vehicle fleet.

EPA's sampling method was not intended to produce a statistically representative sample of the real world population of OBD evap vehicles. Nevertheless, EPA believes that the 30 vehicle sample was sufficiently large and representative to allow for a reasonable level of assurance that the results would have been the same had more vehicles been sampled. EPA therefore concludes that the 30-vehicle sample represents a reasonable compromise, given the constraints of timeliness and cost (FTP evaporative emission testing using the 3 day plus running loss test is very expensive). Additionally, EPA does not accept the assertion that the 12 percent failure rate in this sample translates to the real world fleet. In fact, if that had been EPA's intention, based on market share there would never have been 2 Mazda vehicles in the sample. Nevertheless, EPA has acknowledged (in an April 19, 2000 FACA workgroup consensus agreement) that more testing is desired in the future, in particular with an emphasis on real world failures to ensure OBD systems are performing properly, as well as to obtain more representative, real-world data to support future modeling efforts. It should be noted, however, that no member of the FACA workgroup objected to the study size for the limited purposes stated above.

However, the commenter is correct that 3 of 25 vehicles with induced failures that did not illuminate the MIL or register a DTC when tested by ATL, 2 of these 3 vehicles were both 1998 Mazda 626s, which represents 100 percent of that manufacturer's portion of the 30 vehicle sample. EPA technical staff at the National Vehicle and Fuel Emission Laboratory (NVFEL) in

Ann Arbor, Michigan investigated this issue by procuring two identical vehicles, inducing faults in the evaporative emissions control system in a manner identical to the failure modes examined by ATL, and then operating the vehicles over the FTP on a chassis dynamometer as well as on an actual road route in the Ann Arbor area. During the course of this investigation, EPA found that the Mazda vehicles successfully identified the induced failures, both on the dynamometer and on the road. Thus, since EPA could not confirm the ATL results, it is arguable that the Mazda vehicles may not have been OBD system failures and should not have been included as 2 of the 3 suspected OBD-I/M check false passes. The TSD for this rulemaking provides additional detail concerning the Mazda investigation discussed here.

Concerning the third vehicle, a 1999 Mercury Tracer, time did not permit an examination to determine why the OBD system did not detect the induced failure, as it had to be returned to the rental agency. EPA is currently engaged in ongoing discussions with the Ford Motor Company to determine the cause for the Tracer's failure to detect the induced fault in the evaporative emission control system. Because it was unable to determine the cause for the Tracer's failure to detect the induced fault at the time of the study, however, EPA has concluded that this vehicle should be included as a false OBD-I/M pass.

In conclusion, EPA believes that the true "false pass" rate of the OBD evaporative emission control system in the pilot study is 1 of 25 vehicles. However, this sample is not statistically representative, therefore the sample failure rate is not transferrable to the broader fleet. EPA maintains that this finding suggests that the vast majority of OBD evaporative emission monitors are performing as designed in the field -- a conclusion which was not challenged during briefings of the interim results at public forums, at the OBD FACA

workgroup technical meetings, or after publication of the final EPA technical report on the 30 vehicle study. Nevertheless, the Agency agrees that additional OBD evaporative system testing should be done and intends to continue work in this area. Based upon the work done to date, however, the Agency believes it is in the best interest of public health to implement the OBD-I/M evaporative system check as part of the overall OBD-I/M check as soon as practical (though no later than the deadline requirements established by today's rulemaking).

## 5.2 Functional Backup Tests for the OBD-I/M Evaporative Emission Monitoring System

Three commenters (ALA, ESP, and Waekon) claimed that EPA should require the use of a non-OBD-based, functional evaporative system test to detect potential evaporative emission failures in the case of OBD evaporative monitors which are "not ready" or for MY 1996-98 light-duty vehicles and trucks that are not equipped with evaporative emission monitors as a result of the 20, 40, 90 percent phase-in allowance for those model years. Alternatively, Mitsubishi maintained that backup functional evaporative system testing is unnecessary because the number of vehicles with unset readiness codes is small, the readiness issue itself is largely confined to MY 1996-97 vehicles, the 1996 and 1997 model year vehicles, and the readiness problem can be resolved by allowing states to exempt a limited number of vehicles from certain readiness rejection criteria as proposed in EPA's September 20, 2000 NPRM.

Response to Issue 5.2: While EPA does not prohibit I/M programs from conducting functional evaporative system checks on OBD-equipped vehicles, the Agency also does not believe it is reasonable to require such tests for either evap not-ready vehicles or for those vehicles which do not have OBD evaporative emission monitors due to phase-in of that



requirement. If a state wishes to conduct a functional test they should consult the Agency who will work with the state to determine the acceptability of the functional test in the I/M environment and to assess an appropriate level of credit. This consensus position was developed through the OBD-I/M FACA workgroup meetings where EPA was an active participant.

EPA does not require functional evaporative system tests on OBD-equipped vehicles for two reasons:

1) The likelihood of identifying additional evaporative emission failures by performing additional, non-OBD-based, functional testing is small. This is so because the subset of vehicles in question is small (i.e., only that fraction of MY 1996-98 vehicles not equipped with evaporative emission monitors, or those vehicles not evap-ready at the time of the OBD-I/M test). Furthermore, since the introduction of vehicles manufactured to comply with the enhanced evaporative emission standard in 1996, and the Onboard Refueling Vapor Recovery (ORVR) standard in 1998, vehicles have better and more reliable purge systems, better component durability obtained through material changes, and better engineered component connectors, making them less likely to fail.

2) Even today, prior to mandatory OBD-I/M testing, the majority of I/M states do not conduct functional evaporative emission testing (with the exception of the gas cap test). This is so because current functional evaporative system tests other than the gas cap test tend to be too intrusive and time-consuming to perform. EPA believes it is very unlikely that a state which is not currently conducting functional evaporative system testing would choose to conduct such testing on OBD-equipped vehicles, whose designs make it very difficult or impractical to locate and/or disconnect components, or clamp vapor control lines in the I/M lane environment.

Furthermore, unless they are equipped with an evaporative emission "service port," MY 1996 and newer, OBD-equipped vehicles designed to meet the enhanced evaporative emission standard are even more difficult to test with a functional I/M evaporative emission test than are pre-MY 1996 vehicles.

5.3 EPA Did Not Compare the OBD-I/M Evaporative Emission Test With the I/M "Pressure Test"

Waekon commented that EPA's 30-vehicle pilot study did not compare the OBD-I/M evaporative emission test with the current method for finding leaks in the vapor emission control system (i.e., the I/M "pressure test").

Response to Issue 5.3: The 30-vehicle study did not directly compare the two methods. This is because the control hardware employed on MY 1996 and newer vehicles is incompatible with a functional pressure test (see response to issue 5.2 above). This is the assessment of EPA and the auto manufacturers, and was previously discussed in technical forums, including the FACA OBD-I/M workgroup. Additionally, the state of Arizona has attempted to conduct the pressure test on some MY 1996-97 vehicles and has found that the testability rate for these vehicles is only 44 and 35 percent, respectively. Furthermore, Waekon was the only FACA workgroup participant to challenge this aspect of the 30 vehicle study design.

Although not included in their comments submitted to the docket for this rulemaking, Waekon distributed a test plan to the FACA OBD-I/M workgroup which addressed their concern that the functional pressure test is theoretically more stringent than the OBD leak check. This conclusion concerning relative stringency is based upon assumptions made by Waekon concerning the robustness of the OBD leak detection system as well as assumptions about the

vapor space volume in the fuel tank. The FACA workgroup did not support Waekon's test plan because it did not contain sufficient FTP evaporative emission testing, which is the only method presently available to prove whether a leak detected during an I/M test actually translates to a failure of FTP standards. The consensus agreement developed by members of the FACA workgroup in April 2000 stated that alternative functional I/M evaporative emission tests are permitted as long as they are an accepted vehicle manufacturer practice and supported by results which demonstrate the viability of the method in an I/M environment. Those state I/M programs or other interested parties wishing to pursue this further should consult with the Agency on a case by case basis.

#### 5.4 OBD I/M Proposals Are Not Consistent With the FACA Workgroup

##### Recommendations

Waekon claimed that the treatment of evaporative emissions in the OBD-I/M NPRM is inconsistent with the consensus agreement developed by members of the FACA workgroup in April 2000. Waekon further maintained that evaporative emission reduction credits for OBD-equipped vehicles will be improperly modeled because such modeling does not account for OBD evaporative monitor phase-in allowance period. Lastly, Waekon questioned how MOBILE6 would account for I/M evaporative emission testing on OBD-equipped vehicles.

Response to Issue 5.4: EPA disagrees with Waekon's claim that the NPRM is inconsistent with FACA's OBD-I/M workgroup recommendations. States desiring to conduct functional evaporative emission testing on OBD-equipped vehicles may do so provided they consult with the Agency and adopt testing methods that are supported by test data and have the likelihood of success in implementation. With regard to crediting such additional testing, EPA

will work with states on a case-by-case basis to determine an appropriate level of credit. The FACA workgroup consensus statement did not address credit issues because MOBILE6 policy decisions were still being developed at the time EPA's OBD-I/M decisions were being made. The credit issue is discussed in more detail below.

#### 5.5 Allowance of "Paper" Credits Due To Incorrect Assumptions Regarding Testability

Waekon expressed concern that MOBILE6 may not properly account for the emission reduction benefits associated with additional, functional, non-OBD-based evaporative system testing of OBD-equipped vehicles. Waekon further suggested that MOBILE6 would inflate the emission reduction credit attributed to OBD-only evaporative system testing, based upon the assumption that MOBILE6 does not account for the MY 1996-98 evaporative system monitoring phase-in allowance period.

Response to Issue 5.5: Waekon's comment mistakenly suggests that EPA is not properly accounting for the MY 1996-98 phase-in allowance period with regard to MOBILE6's assessment of OBD-I/M evaporative emission reduction benefits. Although MOBILE6 itself has not yet been released, many MOBILE6 technical support documents are currently available to the public. Specifically, EPA report M6.IM.003 (available via the web at [www.epa.gov/oms/m6.htm](http://www.epa.gov/oms/m6.htm)) indicates that the benefits from the OBD evaporative system test will only apply to the 20, 40, and 90 percent of MY 1996, 1997, and 1998 vehicles which are actually equipped with OBD evaporative emission monitors. Regarding the concern that MOBILE6 assumes a very low testability rate for the functional pressure test (i.e., only 12 percent for MY 1998 and newer vehicles based upon testability data generated by the Arizona

I/M program), EPA will consider allowing more modeling credit if and when such an adjustment is justified. Again, this is achieved when alternative functional tests are accepted as technically valid by EPA and supported by data, and EPA has confidence the test will be used successfully in I/M programs.

In summary, EPA believes it has properly accounted for the phase-in of OBD evaporative emission monitors during the MY 1996-98 phase-in period. Furthermore, EPA believes that it has used good judgement (based on actual I/M program data) for assuming relatively low testability rates for a functional pressure test on OBD-equipped vehicles. Lastly, the Agency believes it has properly accounted for the impact of both the evaporative monitoring phase-in period and supplemental, functional evaporative system testing in MOBILE6.

#### 5.6 Definition of the 0.040 inch Diameter Leak Detection Threshold

Maryland asked if the requirement to detect a leak equivalent to 0.040 inches in diameter can be interpreted as detecting multiple leaks whose summed cross sectional areas equate to the area equivalent of a hole 0.040 inches in diameter.

Response to Issue 5.6: At present, EPA's OBD-I/M leak detection standard is based on an orifice with a diameter equal to 0.040 or 0.020 inches, with the more stringent detection threshold to be phased-in starting with MY 2000. Current OBD certification regulations (December 22, 1998, 63 FR 70681) do not discuss the issue of multiple leaks which may equate to the 0.040 or 0.020 inch diameter standards

#### 5.7 Vehicle Specific Information on OBD Evaporative Emissions Monitors

Maryland asked if EPA will provide vehicle specific information on the operation of OBD evaporative emissions monitors and identify the vehicles with evaporative emission service

ports.

Response to Issue 5.8: Although information on the operation of OBD evaporative emission monitors, including which vehicles are equipped with service ports, is available as part of the new vehicle certification process. However, accurately compiling this information and translating it from current certification-based categories to categories that would be useful in an I/M context is not straightforward. Depending on the volume of interest for such information, EPA will consider such requests and how best to distribute the necessary information, including the use of I/M look-up tables, EPA-run or sponsored web sites, or other means. However, based on the experience of the currently-operating OBD-I/M programs such as Wisconsin and others, EPA does not expect there to be a significant need for this information for the successful implementation of the OBD-I/M check.

#### **ISSUE 6: OBD FAILURE THRESHOLDS AND "OVER-SENSITIVITY"**

Four commenters (MEMA, ESP, Peter McClintock of Applied Analysis, and Robert B. Farmer, a private citizen) expressed concern that OBD is over-sensitive and could negatively impact the acceptance of the OBD-I/M check. MEMA claimed that the over-sensitivity of OBD in detecting intermittent failures would lead to motorist frustration. ESP echoed these concerns and suggested that the MIL-on/low FTP emissions vehicles in the 201-vehicle tailpipe study show that OBD's over-sensitivity could lead to high OBD failure rates. Similarly, Peter McClintock of Applied Analysis claimed that EPA needs to address the cost of repairs related to OBD sensitivity. Mr. McClintock further claimed that OBD is over-sensitive due to the automobile manufacturer's fear of recall; that oxygen sensors only modestly out-of-specification will be flagged for replacement well before actually increasing emissions; that the bulk of parts

identified by OBD as malfunctioning will occur outside the 2 year/24,000 mile warranty period; and that motorists will bear the brunt of excessive OBD failures. Mr. McClintock also estimated that the incremental cost of going from IM240-only to dual IM240 and OBD-I/M testing could exceed \$1 billion after OBD fleet turnover, assuming: 1) a vehicle fleet of 50 million vehicles, 2) an average cost of repair of \$250 - \$300, and 3) an OBD-I/M failure rate double the failure rate under traditional tailpipe testing. Robert B. Farmer (a private citizen) expressed the belief that OBD is "fragile" or over-sensitive based upon his experience of clearing the OBD system of six MIL-on vehicles and allegedly finding that all six remained MIL-free for at least two years. Mr. Farmer also recommended that manufacturers be made to cover all OBD-related costs out to 80,000 miles. Lastly, EPA received comment from the State of Alaska suggesting that EPA should require that OBD repairs performed under warranty include the cost necessary to complete and reset all readiness monitors.

Response to Issue 6: In response to the general issue of OBD over-sensitivity, precise fuel control strategies are required to keep the engine operating near or at peak performance, fuel economy and emission targets (i.e., stoichiometry) to meet current and future emission standards. Thus, all critical emissions-related components must operate within acceptable tolerances to maintain the fuel control and ensure the durability of the three-way catalyst and engine components. Otherwise, degraded driveability, fuel economy, and emissions performance may occur. By addressing emissions-related component problems, the vehicle may be restored to near-peak performance and the fuel control strategy can operate at or near nominal, peak operating conditions.

The function of OBD per the 1990 Clean Air Act is to detect and identify deterioration

and malfunctions in these emissions-related components. To detect deterioration and malfunctions of emission control and engine components, the OBD system utilizes software to make determinations on component performance. Typically, the in-use operating values and ranges of the emissions-related components are compared to known, design values in the computer's library. If this comparison yields unfavorable results, the OBD system identifies this component by illuminating the MIL and storing a fault code for this component. Also, for many of the major emission control components, engine control inputs and outputs are used to determine the vehicle's operating conditions to prevent monitoring during inappropriate conditions that may yield false malfunction indications. This process includes several factors that must be accounted for: the accuracy of the ranges and values used in the comparison; the accuracy of the inputs and outputs used to determine engine operating conditions, compensating for normal degradation over the lifetime of the vehicle; and a wide range of vehicle operating conditions dependent on the operator of the vehicle. To address these factors, the OBD system must execute the following functions: perform checks of the inputs and outputs to verify that these components are operating correctly and sending correct values; perform component cross-checks to verify the accuracy of values and ranges; check tolerances or "headroom" in many of the component thresholds recognizing that the vehicle will naturally degrade with time; store wide ranges of monitoring information to account for different driving styles and vehicle operations; and use other components as the basis for enabling criteria for monitoring. For example, the catalyst monitor compares the signals from the pre-catalyst and post-catalyst exhaust stream oxygen sensors. In addition, the catalyst must reach proper operating conditions and must be evaluated under specific operating conditions such as certain vehicle speeds. A



simplistic explanation of the process the OBD system performs for this example might be: 1) evaluate the vehicle speed sensor (VSS) to make sure the reported vehicle speed is accurate; 2) cross-check the vehicle speed sensor value based on other engine operating conditions and known, design values; 3) evaluate and cross-check the oxygen sensor values for accuracy; 4) compare the required vehicle speed versus the current vehicle speed to enable monitoring; and, 5) make a determination of catalyst condition based on the comparison of the pre-catalyst and post-catalyst oxygen sensors. These checks are necessary to minimize the incorrect diagnosis of expensive emission control components, such as the three-way catalyst, and to accurately diagnose the condition of a less costly component that influences the diagnosis of more expensive components.

In summary, the components on the vehicle are extremely interrelated and, therefore, must be analyzed as an overall system in a step-by-step iterative process that balances the need to monitor and verify accuracy with the need to avoid creating false malfunction indications. The perceived over-sensitivity of OBD is actually an effort on the part of the OBD system to be thorough, accurate, and comprehensive. In addition, manufacturers have different approaches to vehicle hardware and software design that can heavily influence OBD system operation. Therefore, while it is possible that some vehicles may be characterized as "over-sensitive," this cannot be generally applied to all OBD system designs. Also, intermittent failures are not unique to OBD-equipped vehicles; pre-OBD-equipped vehicles also experience intermittent problems and such are considered a normal part of vehicle operation. Furthermore, in most cases (such as misfire trouble codes), the intermittent problem will self-clear after normal vehicle operation has resumed. In response to the specific comments from MEMA regarding the

potential for motorist frustration, EPA agrees that significant consumer outreach is needed to send a balanced message regarding the public's need to respond to MILs and the nature of intermittent problems that can lead to MIL illumination. EPA is committed to this initiative and believes that motorists will be accepting of this situation once they understand the value of the OBD system. EPA believes it is important to make the public aware of OBD's ability to identify lower cost, incremental repairs of emission-related components prior to their becoming more costly repairs, and that responding to these "early warnings" promptly can extend the life of the vehicle by minimizing component deterioration.

In response to the specific comments from ESP regarding the MIL on/low FTP emission vehicles identified in the 201-vehicle tailpipe study, EPA believes that in most cases the MIL was triggered by a malfunctioning component that had not yet led to actual excess emissions (but likely would if left unaddressed). In other cases, the MIL illumination may be the result of an intermittent failure condition such as a misfire, which would self-clear after continued operation of the vehicle under normal conditions. To help minimize the potential for confusion related to intermittent fault detection, later OBD regulations make it easier for the OBD system to self-clear in the event of intermittent problems that do not recur. An in-depth analysis of the vehicles with a MIL on and low FTP emissions from the 201-vehicle study is available in the technical report, "Evaluation of Onboard Diagnostics for Use in Detecting High Emitting Vehicles," as well as in the TSD for this rulemaking.

In response to the specific comments from Peter McClintock of Applied Analysis, EPA does not believe the thoroughness on the part of the manufacturers to design and implement OBD systems is necessarily due to a fear of recall. There are many other factors that the

manufacturer must simultaneously address including fuel economy, emissions, driveability, performance, and consumer satisfaction for a specific vehicle application. Therefore, recall cannot be identified as the primary reason for the thorough methods which the OBD system performs. In addition, if the commenter believes that the threat of recall is primary in creating over-sensitivity, the commenter has overlooked the fact that false MIL illumination is also cause for an enforcement action under EPA's current certification regulations. Under these regulations, manufacturers are expected to install OBD systems that are feasible and accurate, which will minimize false malfunction indications and potentially needless repairs, and thus will gain consumer credibility and acceptance. Therefore, EPA is as concerned about false MIL illumination as it is no MIL illumination when high emissions or malfunctioning components are present. Regarding the comment on oxygen sensor identification, not only are the oxygen sensors used to identify a malfunction of the catalyst, the main emission control component and one of the more expensive components on the vehicle, but they also are the primary control component which allows proper fuel control. Therefore, to prevent incorrect diagnosis and improper replacement of the catalyst and to maintain fuel control, oxygen sensors may be scrutinized more frequently and in greater detail by the OBD system. This provides for replacement of a less costly oxygen sensor rather than an expensive catalyst replacement. Regarding the comment on parts replacement beyond 2 years/24,000 miles, this warranty requirement is required by law as a minimum but many manufacturers have warranties beyond 2 years/24,000 miles. Many manufacturers provide warranty coverage for 3 years/36,000 miles, while some offer a 5 year/50,000 mile warranty, and one manufacturer even provides warranty coverage for 10 years/100,000 miles. Thus, there is the opportunity for components to be

replaced under warranty well beyond 2 years/24,000 miles, depending upon the make and model of the vehicle in question. In addition, due to the thoroughness of the OBD system, many manufacturers have the incentive and the initiative to design more durable engine and emission control components. This ensures proper operation of the vehicle, specifically the OBD system, throughout the useful life of the vehicle, ensures that consumers are protected from less-than-robust designs and frequent repairs early in the vehicle's life, and are informed about minor component problems before they evolve into costly, major repairs. The commenter should also refer to the preamble of original OBD regulations finalized on February 19, 1993 (58 FR 9468). In its discussion of "General System Requirements", EPA specifically states that we expect manufacturers to install OBD systems that are feasible and accurate, which will minimize false malfunction indications and potentially needless repairs, and thus will gain consumer credibility and acceptance.

Regarding the suggestion that moving from an IM240-only program to dual IM240 and OBD-based testing could lead to incremental costs of \$1 billion or more, EPA has no basis to support or dispute the claims and assumptions used to develop this estimate. However, it should be pointed out that this estimation does not take into account that OBD actually helps limit repair costs by identifying the area of repair whereas an IM240 program does not. If the cost of inaccurate repairs and repeat repair visits based on IM240 results is added into the analysis, this may significantly estimate downward.

In response to the specific comments from the private citizen, Robert B. Farmer, without knowing the nature of the specific failures on the six vehicles the commenter cleared, EPA cannot come to a conclusion regarding the claims made. Regarding the need for the

manufacturers to cover all OBD costs up to 80,000 miles, including vehicle diagnostics, the Clean Air Act mandates warranty coverage of the specified major emission control components only (i.e., catalyst, electronic emissions control units and an on board emissions diagnostic device) for 8 years/80,000 miles. These items are the more expensive components on the vehicle and any costs associated with their repair, including diagnostic costs, will be included. Any diagnostic costs related to repairs on components other than the items mentioned above are covered under the general warranty period (i.e., 2 years/24,000 miles) in the Clean Air Act. Therefore, warranty coverage of labor costs, diagnostic procedures and parts other than the specified major emission control components up to 8 years/80,000 miles is discretionary and not required under the Clean Air Act.

In specific response to the State of Alaska's comment that OBD repairs performed under warranty should include the cost necessary to complete and reset all readiness monitors, EPA feels that, while this is an important implementation issue involving the scope and coverage of the emissions performance warranty regulations, it is not directly germane to this final rule. EPA will issue written guidance on this matter in a subsequent guidance document.

## **ISSUE 7: TECHNICAL SUPPORT DOCUMENT**

### **7.1 Scan Tool Availability**

EPA received comment suggesting that only manufacturer dealerships will have access to the more sophisticated scan tool functions needed to diagnose their affiliated manufacturer's product line.

Response to Issue 7.1: As discussed above in Issue 3, EPA has in place regulations that require auto manufacturers to make available to aftermarket service providers any and all

information needed to access a vehicle's OBD system. These regulations include a provision that requires automobile manufacturers to either make available their OEM-specific diagnostic scan tools or make available to aftermarket scan tool manufacturers the information needed to develop and produce highly functioning aftermarket generic scan tools. As a result of these regulations, EPA believes that independent mechanics and dealerships have adequate access to diagnostic equipment and scan tools, as well as all necessary service and repair information.

#### 7.2 False Malfunction Indicator Light Illumination

EPA received comment stating that the auto companies face severe penalties from EPA if the MIL does not illuminate for high emissions and no penalty for false alarms.

Response to Issue 7.2: The implication that auto manufacturers will set MILs indiscriminately to avoid EPA penalties without regard to falsely identifying an emissions problem completely ignores the OEMs' incentive to both avoid undue warranty claims by dissatisfied customers and the innate free-market competition between OEMs motivating them to make better products and gain market share from a rival who is falsely setting MILs and consequently inconveniencing their customers. The implication of the comment is that there is inherent collusion between manufacturers to falsely set MILs. EPA has absolutely no indication that this is the case and does not believe any evidence in support of this exists. Furthermore, the commenter has provided no evidence to support these allegations.

#### 7.3 OBD Cannot Be Considered An Emission Test

EPA received comment stating that OBD is not an emission test.

Response to Issue 7.3: While OBD is not an "emission" test in the traditional sense in that it provides actual measurement of pollutants emitted by a vehicle, the Agency nevertheless

believes that its technical evaluations have demonstrated that the OBD-I/M check functions at least as well as previously used emission tests when it comes to triggering repairs to reduce in-use emissions. This belief is based upon the available comparisons of the OBD-I/M check to traditional emission tests like the IM240, which have shown the OBD-I/M check to be equal to or better than the best emission tests in current use. Additional information concerning the results of EPA's OBD-I/M pilot testing can be found in the TSD for this rulemaking.

#### 7.4 Technical Support Document Analyses

EPA received comment stating that the statement that the "complete results of the pilot studies, including EPA's analysis of its findings, can be found in the Technical Support Document " is not true.

Response to Issue 7.4: EPA maintains that the TSD does contain the complete results and analysis of its OBD study and the supporting data can be found in EPA document EPA420-R-00-013, as clearly stated in Appendix 8 of the draft TSD. The other study results can be found under EPA420-R-00-012 and EPA420-R-00-014, which are also referenced in the TSD. All of these documents are available on EPA's Web site.

#### 7.5 Cost of the Rulemaking

EPA received comment on its claim that the NPRM, when finalized, will not impose costs of \$100 million or more is incorrect. The commenter, in turn, suggested that the NPRM was creating an additional burden on state I/M programs that would exceed the \$100 million limit.

Response to Issue 7.5: This rule does not impose a new requirement upon the regulated community. The costs-benefits analysis associated with OBD were addressed under the original

1992 I/M rule and the 1993 OBD certification requirements. Both regulations were subject to public comment and were subsequently finalized. The current rulemaking represents an amendment of existing requirements and actually provides states an opportunity to reduce their current I/M testing burden.

#### 7.6 False MIL Failure Rates

EPA received comment asserting that the false failure for the OBD-I/M check is unacceptable high because too many vehicles in EPA's OBD tailpipe pilot study were found to have MILs illuminated but did not have FTP emission values greater than their respective certification standard.

Response to Issue 7.6: Page 13 of the draft TSD states: "As a matter of design, OBD should be able to identify the need for repairs and/or maintenance prior to actual increased emissions. This is because OBD monitors the performance of individual emission control components, several of which may need to fail in sequence, or over a period of time before the problem shows up at the tailpipe. For example, a periodic misfire might not lead to immediate increases in emissions, but eventually can destroy the catalyst, at which time tailpipe emissions will increase substantially (as will the likely cost of repairs). Traditional tailpipe tests are incapable of identifying this kind of preventative repair, because such tests rely exclusively upon measurement of post-catalyst tailpipe emissions. Therefore, with traditional tailpipe tests, a relatively inexpensive problem to begin with may become critical before it can be detected."

Following this text in the draft TSD is a table that provides additional information with regard to the 136 vehicles mentioned in the comment above. Specifically, 88 of the 136 vehicles were LDVs, and in 63 of these cases broken parts were found and repaired, while 3 LDVs had



the MIL self-clear. The remaining 48 vehicles from the 136 were LDTs and in this instance 34 of these 48 vehicles were found to have broken parts, while 9 LDTs had the MIL self-clear. This reduces the claimed "false-failure" or Malfunction-Not-Reproduced (MNR) figure to 25 and 14 LDVs and LDTs respectively, for a total of 39 as compared to the 136 vehicles cited in the comment.

EPA believes that the recruitment methodology used during the 201-vehicle OBD tailpipe pilot study was biased in the direction of recruiting intermittent failures. As discussed earlier, EPA had a great deal of difficulty finding OBD-equipped vehicles with MILs on. While understandable, given the relative newness of OBDII as a vehicle requirement, the scarcity of MIL-on vehicles led EPA to recruit such vehicles as soon as a MIL was illuminated. As a result, a significant portion of the vehicles recruited into the pilot may have not been given the opportunity to self-clear codes set for non-recurring, intermittent problems, such as misfire. In the real world, many of these vehicles would clear themselves, just as OBD is designed to do in the case of non-recurring, intermittent problems. EPA's continued effort in evaluating the OBD technology has resulted in a test program recruiting OBD vehicles with high mileage. In this test program 43 vehicles have been recruited solely by mileage with 16 having the MIL illuminated. EPA has not found any MILs which qualify as "MNR" out of these 16. While not conclusive this is at least directional evidence that EPA's theory regarding a possible procurement bias in the 201-vehicle sample may explain the number of MNR vehicles found in that sample.

It should be noted that the intermittent problems discussed above are no different than the sorts of intermittent problems that occur on pre-OBDII vehicles (i.e., MY 1995 and older). OBD technology does not cause these intermittent problems to occur, and it is not intended to

prevent or eliminate them. Rather, OBD is designed only to indicate and provide a possible root cause for the technician to investigate. Discussions with repair technicians and members of the Service Technician Society have shown that intermittent misfire and fuel trim problems are being routinely and successfully addressed in the real world with field fixes. Anecdotal evidence indicates that these repairs are limiting the post repair return of vehicles with these codes. Furthermore, possible future changes to the OBD certification regulations to make extinguishing MILs easier for misfire and fuel system problems should reduce the frequency of these intermittent MILs on future model years vehicles.

#### 7.7 Methods for Projecting OBD Failure Rates

EPA received comment that the Agency did not adequately describe methods used to project OBD failure rates in its analysis of the Wisconsin pilot data.

Response to Issue 7.7: The methodology used to project NOx failure rates from the Wisconsin pilot data is clearly described in detail in EPA Report "Analyses of the OBD II Data Collected from the Wisconsin I/M Lanes" (EPA420-R-00-014). Nevertheless, EPA agrees that the method could be refined further and a note providing a high and low estimate of failures from the Wisconsin data has been submitted to the docket for this rulemaking.

#### 7.8 OBD Failure Rates vs IM240 Failure Rates

EPA received comment from Dr. Donald Steadman that by current standards OBD will fail four times as many vehicles as the IM240 test.

Response to Issue 7.8: Dr. Steadman provided no data to support this statement. However, EPA is aware of typical failure rates seen in established IM240 programs such as those operating in Wisconsin, Arizona, and Colorado, and those failure rates for the fleet are in

the range of 15-20 percent. The OBD Wisconsin pilot data on 116,667 vehicles plainly illustrates that the failure rates for the IM240 and the OBD-I/M check are nearly identical for the high end estimate of IM240 failures. At the low end, IM240 is estimated to fail approximately half as many vehicles as OBD. However, EPA believes that comparisons of this nature are not accurate because the percent of the fleet involved (failures) is too small to provide accurate ratios of failures between the two tests. For the Wisconsin data for MY 1996 vehicles the failure rates were 2.5 percent for the OBD-I/M check and 2.2 percent for the IM240 test, while for MY 1997 and MY 1998 vehicles the failure rates for both tests was below 1 percent. This information was presented on page 41, Table 19 of the draft TSD. Based upon this information, the Agency maintains that the comment alleging a fourfold increase in OBD failures relative to the IM240 is incorrect.

#### 7.9 Review of TSD Data

One commenter recommended that "EPA ask their Clean Air Scientific Advisory Committee (not just a subcommittee of a subcommittee)" to review the data and the TSD.

Response to Issue 7.9: The OBD workgroup -- an open workgroup consisting of representatives from the testing and repair industries, vehicle manufacturers, the states, EPA, scan tool manufacturers, the academic community, private consultants, and providers of OBD technician training -- has worked closely with the Mobile Source Technical Review Subcommittee (MSTRS) established under the Federal Advisory Committee Act (FACA) and the MSTRS falls under the umbrella of the Clean Air Act Advisory Committee (CAAAC). In keeping with the procedural protocol established by the CAAAC, EPA received approval for the testing design from the MSTRS prior to starting the tailpipe test program and the MSTRS was

kept informed with quarterly reports during the two year test period while an OBD workgroup under the MSTRS monitored the entire testing program. EPA believes that CAAAC review of this information, including the NPRM, has been substantial and sufficient. The Agency does not currently perceive the added benefit of requesting additional review.

#### 7.10 OBD Policy Developed with Insufficient Data

We received comment that EPA has based national policy on the results of 17 vehicles from the 201-vehicle OBD tailpipe pilot study.

Response to Issue 7.10: It is inaccurate to portray the results from 17 vehicles to be the foundation of the Agency's position when the TSD categorically provides details and references to the analyses and data from the Wisconsin pilot and the 201-vehicle OBD tailpipe study which were used to formulate the OBD policy framework. Furthermore, the 17 vehicles cited above are only the recruited vehicles that failed a Lane IM240 with no MIL illumination and were used solely as an estimate to gauge the magnitude of a potential OBD error of omission problem. Therefore, it is unfair to charge EPA with basing national policy on the results from only 17 vehicles. The number of OBD-equipped vehicles used from the 201-vehicle OBD tailpipe study to estimate repair benefits and credit levels is 191, and this number is comparable to the number of paired FTP data used when establishing IM240 (274 paired FTP tests) and the ASM (105 paired FTP tests) tests in the early to mid 1990s. EPA is continuing to work with ESP and the Colorado Department of Health in their recruitment of no-MIL/lane IM240 failures (currently 12 vehicles). At this time EPA is not aware of anything from this program which changes the Agency's analysis of its original data.

#### 7.11 Methodology of Pilot Studies

Issue has been taken with the treatment of two vehicles (CDH04 and ATL78) in the 201-vehicle OBD tailpipe study inquiring as to why the results from these vehicles were dropped from the analyses.

Response to Issue 7.11: As stated above in response to Issue 7.7, the methodology used to project NOx failure rates from the Wisconsin pilot data is clearly described in detail in EPA Report "Analyses of the OBD II Data Collected from the Wisconsin I/M Lanes" (EPA420-R-00-014). It is unclear how the commenter can have found EPA to be withholding information from the study when all available data on each vehicle is reported and the vehicles are fully described in the text of the report EPA-420-R-00-013). Additionally, each vehicle was included in any analysis which did not require FTP results. The results from the two vehicles cited were removed from portions of the analyses requiring FTP results for the following reasons. CDH04 was a MY 1996 GM S10 pickup truck that failed the IM240 in the lane, but could not be driven on the FTP. Although its MIL was off, this was attributed to an electrical short that would have been detected by an OBD-I/M check (and would, in turn, constitute grounds for failing the vehicle). A thorough description of this vehicle and test issues appears on page 15 and Appendix 6 of the draft TSD accompanying the NPRM. The second vehicle (ATL78) was a Malibu that was excluded from portions of the test program because raw fuel was found to be dripping from the tailpipe. This vehicle did not receive an FTP test and was removed from portions of the program over concerns regarding the risk it posed to the analyzer bench (which could have been contaminated by excessive hydrocarbons) and operator safety. What the commenter fails to point out is that each vehicle was removed from both the IM240 and the OBD benefits calculations. Because both vehicles were OBD finds as well as IM240

finds, the suggestion that EPA was somehow skewing the results of its analysis in favor of OBD by not including these vehicles in those portions of the study requiring FTP data is unfounded. In reality, EPA was more likely to hurt the case for OBD by "dropping" them from the analysis. EPA believes that a primary goal was to evaluate OBD with an independent method. For this program, that independent method was the FTP. Projecting FTP values based on the IM240 (as suggested by the commenter) would violate this independence and would constitute a clear bias in evaluating the two tests. EPA did not project FTP values.

#### 7.12 Concerns of Consumer Inconvenience

Dr. Donald Steadman asserts that EPA incorrectly claims that an IM240 test with the fast-pass option enabled is faster than the OBD-I/M check and that by doing so, EPA is redefining customer inconvenience. The commenter also compared 20 IM240 failures from an on-going study in Colorado and the 193 OBD MIL-on vehicles from the 201-vehicle OBD tailpipe study, concluding based upon this comparison that the IM240 test is more convenient to the customer.

Response to Issue 7.12: There is not data provided by the Dr. Steadman to support the claim regarding customer convenience and the length of the OBD-I/M check vs. a fast-pass IM240 test. Therefore, EPA cannot evaluate this assertion. However, preliminary data from the Oregon I/M program (which began implementing mandatory OBD testing on December 1, 2000) suggests that the OBD-I/M test on average is faster than the Oregon BAR31 tailpipe test (which in turn was adopted because it was considered to be a shorter, faster alternative to the IM240). The Agency is encourage by these early results and will continue to work with states implementing the OBD-I/M check to ensure that the check is performed as efficiently and

accurately as possible. Additionally, the Agency believes that the inherent nature of the OBD can will be more convenient as compared to any dynamometer-based test. This is due to the very nature of conducting proper and safe dynamometer tests require protocols. While improvements have been made in the efficiency of dynamometer testing, they are still time consuming in comparison to OBD scanning.

Concerning Dr. Steadman's direct comparison between tests results from the on-going Colorado study and EPA's 201-vehicle study, such a comparison is not valid because different criteria were used to recruit the samples for these two studies. Therefore, comparing the "failing" class in one study to the "failing" class in the other primarily serves to obscure the results rather than focus on the meaningful outcomes to be gained from both efforts when evaluated objectively.

#### 7.13 Remote Sensing

EPA received comment that the use of remote sensing devices (RSD) is more cost effective than the OBD-I/M check, but that "EPA is guilty of hypocrisy in its attitude towards on-road remote sensing as a stand-alone IM test."

Response to Issue 7.13: No data are provided by the commenter to support this claim concerning the cost effectiveness of RSD. Currently, it is EPA's position that RSD appears to be a useful tool for estimating fleet average emissions, but the inherent variability of the technique when used on individual vehicles makes it less desirable to use as the primary I/M network pass/fail test. EPA has suggested that RSD proponents evaluate the performance of RSD technology by comparing it to the FTP, as was done for the IM240 and OBD-I/M check. No data set of comparable size and quality to existing correlation studies pair RS and FTP

substantially for its consideration as a primary test and none is offered by the commenter.

#### 7.14 Alternative Method for Calculating IM240 Failures

Peter McClintock of Applied Analysis offered an alternative method for calculating the number of IM240 failures reported by EPA. The commenter suggested that the number of IM240 failures reported by EPA was too high, thus bringing into question the conclusion that the OBD-I/M check and IM240 tests failed about the same number of vehicles. Mr. McClintock appended undocumented data that allegedly shows that 31 percent of the vehicles tested would pass a "second chance" IM240 test if one was given.

Response to Issue 7.14: The original analysis in report EPA 420-R-00-014 characterized the number of vehicles failing the IM240 in Wisconsin as the number of vehicles that exceeded the cutpoints for any of the three pollutants after a full 240-second test. Mr. McClintock suggested that this methodology resulted in too high a number of NO<sub>x</sub> failures because the method used by EPA to project these NO<sub>x</sub> failures did not include the opportunity for a "second chance test" as would have been the case for HC failures (unlike HC and CO, the Wisconsin program measures, but does not fail vehicles based upon a NO<sub>x</sub> cutpoint). The commenter suggested that if second chance testing had been available for NO<sub>x</sub> failures, the overall IM240 failure rate would have been lower. Mr. McClintock further suggested that the NO<sub>x</sub> failure rate could be adjusted by assuming that only 31 percent of the vehicles failing for NO<sub>x</sub> would have continued to fail a second chance test (based upon the second chance testing data for HC and CO).

On page 10, Table 7 of EPA's Wisconsin report, the Agency reported a total of 952 MY 1996 vehicles failing the IM240 test, 561 failing HC and/or CO and 391 failing NO<sub>x</sub> out of a



total of 43,735 MY 1996 vehicles tested. Some of these NOx-failing vehicles in question probably received a "second chance" test based upon their initial HC and/or CO results, but EPA has no way of knowing if this number was large or small. What is known is that 94 of the 391 vehicles counted as NOx failures were 150 percent over the NOx cutpoint and would not have received a "second chance" for NOx. Subtracting the 94 from the 391 leaves 297 vehicles that may have been entitled to a second chance NOx test. If 31 percent, as Mr. McClintock suggests, of the 297 would have failed their second chance test, that means that 92 vehicles should be added to the number of failing IM240 vehicles. These 94 and 92 failures together contribute 186 NOx failures to be added to the 561 HC and/or CO failures resulting in a total IM240 failure rate of 747 instead of the 952 reported in EPA's Wisconsin analysis.

It should be pointed out, however, that there is no reason to expect NOx to perform the same way as HC and CO in "second chance" testing as Mr. McClintock suggests. Rather, the two major reasons that vehicles pass the IM240 procedure the second time and not the first are catalyst conversion effectiveness and the amount of fuel fed to the engine. When the vehicle is run the second time, the catalyst is warmer and the fuel consumption is less, and the catalytic converter is therefore more efficient (i.e., cleaner). A warm catalyst running lean will help reduce the emissions of HC and CO. NOx behaves differently, however. The reducing portion of the three-way converter is more efficient as the converter gets warmer, but it may not have the same response as the oxidizing portion (which controls HC and CO). The more significant issue is the effect of temperature on the "feed gas" (the exhaust from the engine to the catalytic converter). As the engine warms up the amount of fuel is reduced (the engine gets leaner). Leaner burning reduces HC and CO but increases NOx. Maximum NOx production occurs at

the theoretically chemically correct ratio which the computer tries to maintain in closed loop operation. For these reasons, EPA acknowledges that the number of NOx failures might be less than 391 if Wisconsin was controlling NOx as well as HC and CO, but the number would be considerably higher than the 121 vehicles that the commenter suggests. Being conservative, the range would be between 186 and 391 (total IM240 failures would then be between 747 and 952) with the likelihood leaning toward the upper end. Furthermore, even if the total were the 186 reflected by the low end of this window it would not change the Agency's conclusion that the OBD-I/M check and the IM240 test failed about the same number of vehicles.

## **ISSUE 8: APPLIED ANALYSIS COMMENTS ON TECHNICAL SUPPORT DOCUMENT**

### **8.1 Biased Recruitment of Vehicles**

Peter McClintock of Applied Analysis asserted that EPA did not appropriately recruit vehicles for its pilot studies

Response to Issue 8.1: Page 5 of the draft TSD states: "The recruitment of vehicles for pilot testing was controlled by the need to answer two basic questions concerning the effectiveness of OBD-I/M testing relative to traditional tailpipe tests:

- 1) Do vehicles identified by OBD-I/M actually need repair? and,
- 2) Does OBD-I/M miss high emitters that would be caught by traditional tailpipe testing?

To address the first question, EPA recruited vehicles identified by OBD as possible high emitters in need of repair (i.e., vehicles with the malfunction indicator light illuminated). To address the second question, EPA focused on those vehicles that failed a properly preconditioned

IM240, but for which no MIL was illuminated."

Nevertheless, the comment raises a valid point given that the 201-vehicle study sampling generated more data on vehicles with a MIL illuminated than on high emitting vehicles with the MIL off. However, EPA does not agree that this unconditionally negates the findings with regard to the relative effectiveness of the OBD-I/M check, nor should it prevent moving forward with the implementation of the OBD-I/M check at this time.

In recognition of the sampling bias cited, EPA has attempted to work closely with ESP and the state of Colorado in the on-going Colorado study that was designed to address this particular sampling bias concern. However, while the study has been gathering data since the Summer of 2000 (and although approximately 25 percent of the Denver IM240-eligible fleet was tested over that time period) fewer than 20 vehicles have met the study's criteria that the vehicle display no MILs commanded on while nevertheless failing the IM240 in the lane, followed by a confirmatory IM240 failure in the lab and subsequent FTP testing. This argues very strongly that although there was a recruiting bias in the 201-vehicle OBD tailpipe study, it would appear at this time that the population of vehicles that would be adversely affected as a result of this recruitment bias is exceedingly small. The Agency and the OBD FACA workgroup plan on following the Colorado study as it continues.

## 8.2 Vehicles Included in Pilot Studies Are Too New

Peter McClintock and others asserted that the vehicles included in the pilot studies were not old enough to accurately assess the effectiveness of OBD.

Response to Issue 8.2: EPA recognizes the concern raised regarding the long-term durability of the OBD system and agrees that this issue requires further study. In recognition of

the potential impact of high mileage on OBD effectiveness, the Agency recently completed testing and has begun analyzing the results from a study of 43 OBD-equipped vehicles with odometer readings of 100,000 miles or more. Early indications suggest that high mileage does not have a noticeable impact on the effectiveness of the OBD system to detect needed repairs. With regard to the impact of simple aging, EPA recognizes the value of gathering additional information in the future on the durability of OBD systems as they age, and stands ready to revise the OBD-I/M requirements should future studies warrant a change.

### 8.3 Conflicting Results from the Colorado Study

Peter McClintock asserted that the data used by EPA to support OBD-I/M testing is not valid based upon allegedly conflicting results from the on-going Colorado study.

Response to Issue 8.3: EPA believes that the results of the Colorado study indicate a possible lane IM240 testing issue when compared to laboratory controlled IM240 tests. Specifically, the correlation between lane-240 tests and lab-240 tests used to confirm the lane results prior to performing an FTP are poor. This result is certainly cause for concern because any one test should correlate quite well with itself; however, this has not been found to be the case in the Colorado study.

Furthermore, as stated in response to Mr. McClintock's first comment above, it appears that the Colorado study is having difficulty obtaining vehicles and until a larger sample is tested and the study completed it is premature to draw conclusions on partial results. The manufacturers of vehicles identified by the Colorado study with inherent OBD problems have been contacted directly by EPA and this issue is being addressed.

As stated earlier, EPA is continuing to monitor the progress of the Colorado study very

closely and will offer assistance to the state and its contractor as necessary.

#### 8.4 Assumption of IM240 False Failures

Peter McClintock commented on the use of an inconsistent pre-conditioning procedure in the 201-vehicle study that could have adversely affected the number of IM240 false failures. He also pointed out that in some cases there was a time delay between the first IM240 test and the confirmatory IM240 test which also would have had a negative impact on the number of IM240 false failures. Mr. McClintock further maintained that because no FTP tests were performed on the 17 high-emitting MIL-off vehicles cited in the OBD tailpipe study, EPA should not classify the 15 vehicles that did not have high emissions on their confirmatory lab-240's as IM240 false failures.

Response to 8.4: EPA has been careful to only use the FTP as the benchmark standard of comparison throughout the 201-vehicle OBD tailpipe study. It should also be pointed out that 3 of the 15 vehicles discussed above did in fact have paired FTP tests which verified that the vehicles were clean despite having been failed at the IM240 lane. The remaining 12 lane-failures/lab-passes did not receive corroborating FTP tests. Therefore, these 12 vehicles should not be called "false failures" in the same way that vehicles that fail an I/M test but pass an FTP are categorized as false failures. However, the fact that on 15 of the 17 vehicles identified as IM240 failures in the lane could not be confirmed as IM240 failures in the lab raises concern regarding how the IM240 test is being performed in the Colorado lane environment. This finding also begs against following the suggestion by Mr. McClintock and others that FTP emissions for vehicles ATL78 and CDH04 be extrapolated based upon their IM240 emissions. Furthermore, the purpose of the FTP test program was not to evaluate the IM240 test.

Therefore, EPA does not believe this point does not impact the conclusions with regard to on-board diagnostics.

Mr. McClintock also claims that EPA uses a double standard when classifying IM240 false failures vs. OBD-I/M false failures because an IM240-failing vehicle with low FTP emissions is considered a false failure while an OBD-I/M-failing vehicle with low FTP emissions is described as demonstrating OBD's ability to identify preventative maintenance. The commenter's point on this issue is well taken in that repair of a failed IM240 vehicle that may have passing FTP emissions could also have preventive maintenance aspects similar to those seen by repairing an OBD MIL-on vehicle with passing FTP emissions. However, a fundamental element of the OBD system that is completely lacking from the pure tailpipe test procedure is that OBD provides the repair technician with a clear starting point and likely components in need of repair. This is an inherent design feature of OBD and not of the I/M tailpipe tests. No such information is available from a pure tailpipe test emission failure, so that the repair technician has no clear direction on what may be in need of repair. The end result is that under the pure tailpipe test scenario the repair technician could possibly increase the emission level of the vehicle because there is no clear indication with regard to what component has failed. Alternatively, the repair technician could simply opt to replace the catalyst, a "repair" that would very likely reduce emission levels, but which also may fail to address a potential problem upstream of the catalyst in the vehicle's emission system.

With regard to modifying the IM240 to reduce the possibility of false failures, EPA has addressed this issue directly in the April 2000 IM240 Evap and Technical Guidance, which provides modal retest algorithms and positive kinetic energy specifications for use as a post-test

diagnostics tool designed to address the false failure issue. These methods are based on numerous studies conducted by EPA, Arizona , and Sierra Research over the past 5 years. To date, only the Arizona IM240 program has actively pursued implementing these strategies in their day-to-day lane testing.

## **ISSUE 9: MISCELLANEOUS COMMENTS**

### **9.1     Release of OBD Implementation Guidance**

Three commenters (STAPPA/ALAPCO, Alaska, and Maryland) requested that EPA release the OBD Implementation Guidance.

Response to Issue 9.1: EPA has released a draft version of its OBD Implementation Guidance document for comment. This document is available via the web at [www.epa.gov/otaq/regs/im/obd/obd-im.htm](http://www.epa.gov/otaq/regs/im/obd/obd-im.htm). The draft will be finalized shortly after this rulemaking and will be available at the web address listed above.

### **9.2     Untestable Vehicle Designation**

Maryland commented: "An 'untestable' designation for 8.1 percent of the OBD vehicles could have significant operational and emissions impacts on an operating program."

Response to Issue 9.2: This appears to be a misinterpretation of EPA draft TSD's Table 16. The column titled "% DLC location problem in sample" totals to 8.1 percent of the 2,583 vehicles tested during the Sierra Pilot study conducted in Wisconsin. The purpose of this table was to demonstrate that EPA was aware of the concern regarding the ability of lane inspectors to locate data link connectors in high-throughput I/M lanes. Based on this concern EPA developed a DLC location table for all vehicles manufactured for sale in the United States for MY 1996-2000. Additionally, EPA issued a manufacturer guidance letter (VPCD-98-14). A copy of this

guidance letter can be found on the web at: [www.epa.gov/otaq/regs/im/obd/obd-ld.htm](http://www.epa.gov/otaq/regs/im/obd/obd-ld.htm). EPA has continued to monitor the Wisconsin program since the time of this initial study and has found the ability of inspectors to locate even hard-to-find DLCs is now approaching 100 percent. EPA believes that the use of its DLC table and other resources which have been published will significantly reduce the learning curve time period over which state programs may experience with this problem. This belief is born out in the Portland, Oregon program which also locates close to 100 percent of DLCs.

### 9.3 MOBILE5B Assumptions For Miles Driven

Citing EPA's TSD, Maryland asked: "Is the estimate of 20,000 to 22,000 miles driven for model years 1997 and 1998 a MOBILE5B assumption?"

Response to Issue 9.3: This question refers to section 4.3.2.1 of EPA's draft TSD, which states: ". . . because the data we have for MY 1998 and 1997 represents vehicles that are being tested at the same age (i.e., when they are one year old) we can assume that the average mileage accumulation for MY 1997 vehicles at the time of their first test is similar to that of MY 1998 vehicles at the time of their first test (i.e., between 20,000 to 22,000 miles, depending upon vehicle class)." This statement is not based on the MOBILE5B model but is based on empirical data gathered in the Wisconsin program and presented in the draft TSD under Table 17. Because Wisconsin did not report odometer readings to EPA while MY 1997 vehicles were being OBD tested, EPA did not have average mileage accumulations for MY 1997 vehicles. EPA assumed that the mileage accumulation for MY 1997 vehicles would be similar to MY 1998 vehicles for which odometer data had been reported.

### 9.4 Colorado Attainment Redesignation



EPA received comment from the Colorado Department of Public Health and Environment suggesting that EPA provide additional flexibility for areas that are not serious ozone nonattainment areas or carbon monoxide nonattainment areas.

Response to Issue 9.4: With respect to areas seeking redesignation to attainment, section 107(d)(3)(E)(v) of the CAA requires that an area must meet all applicable requirements under section 110 and part D of the CAA. We interpret section 107(d)(3)(E)(v) to mean that for a redesignation to be approved by EPA, the State must meet all requirements that applied to the subject area prior to or at the time of the submission of a complete redesignation request. Specific to the OBD requirement, this means that any area currently implementing an I/M program which submits a complete redesignation request prior to the required January 1, 2002 start-up date<sup>1</sup> will not be required to implement an OBD program. In our evaluation of a redesignation request, we do not need to consider other requirements of the CAA that became/will become due, in this case OBD, after the date of the a Governor's submission of a complete redesignation request.<sup>2</sup> However, in the event a complete redesignation request is disapproved by EPA all requirements that became due during our review and evaluation period

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<sup>1</sup> Incorporation of OBD implementation will begin January 1, 2002. States will have three options for complying with OBD requirements: 1) full mandatory implementation beginning January 1, 2002; 2) an additional twelve month delay if a State can demonstrate just cause; 3) a cycle of phase-in utilizing OBD as a screening tool in concert with an existing tailpipe program.

<sup>2</sup> This is articulated in the September 4, 1992, EPA redesignation policy memorandum entitled "Procedures for Processing Requests to Redesignate Areas to Attainment", signed by John Calcagni, Director, Air Quality Management Division. Under section 175(c) of the CAA, the requirements of Part D remain in force and effect for the area until such time as it is redesignated. Upon redesignation to attainment, the requirements that became due under section 175(c) after submittal of a complete redesignation request would no longer be applicable.

then become applicable to the area. EPA believes that the process described above provides sufficient flexibility to serious ozone and CO nonattainment areas on the issue of OBD implementation.

#### 9.5 Import Vehicles That Do Not Comply with Federal OBD Regulations

The State of Alaska commented that EPA should address the issue of illegal importation of vehicles from Canada that do not comply with OBD hardware and/or software requirements.

Response to Issue 9.5: While EPA feels that this an important issue, we believe that it is not directly germane to this final rule. EPA will provide further clarification of its import policy in future guidance to states.

#### 9.6 I/M Lookup Tables

EPA received comments from the Automotive Parts and Service Alliance (APSA) suggesting that EPA should map current I/M lookup tables with the Automotive Aftermarket Industry Association (AAIA) make/model tables to help link diagnostic reports with parts ordering and inventory operation.

Response to Issue 9.6: EPA understands that the I/M lookup tables are an important tool for I/M programs. To this extent, EPA is willing to consider and facilitate the addition of information that will enhance the usefulness of those lookup tables for end-users. EPA has had some initial discussion with interested parties on what parameters should be added to the lookup tables. While no final decisions have been made, we will continue to explore the issue.