ENVIRONMENTAL PROTECTION

OFFICE OF AIR QUALITY MANAGEMENT

Diesel-Powered Motor Vehicle Inspection and Maintenance Program

Adopted Amendments:	N.J.A.C. 7:27-14 and 7:27B-4
Proposed:	April 7, 1997 at 29 N.J.R. 971(a).
Adopted:	, 1997, by Robert C. Shinn Jr., Commissioner, Department of Environmental Protection, with the approval of the Attorney General Peter Verniero.
Filed:	, 1997 as R. 1997, d , with **substantive and technical changes** not requiring additional public notice and comment (See N.J.A.C. 1:30-4.3) **and not adopting N.J.A.C. 7:27-14.3(d) at this time.**
Authority:	N.J.S.A. 13:1B-3(e), 13:1D-9, 26:2C-8 et seq., specifically 26:2C-8, 8.1 through 8.5, 8.11, and N.J.S.A. 39:8-61.
DEP Docket Number:	03-97-03/619.
Effective Date:	(60 days from signature).
Expiration Date:	Exempt

The Department of Environmental Protection (the Department) is adopting amendments to N.J.A.C. 7:27-14 (Subchapter 14, Control and Prohibition of Air Pollution From Diesel-Powered Motor Vehicles) and N.J.A.C. 7:27B-4 (Subchapter 4, Air Test Method 4: Testing Procedures for Motor Vehicles), its rules which govern emission standards, testing procedures and equipment specifications for the inspection of diesel-powered motor vehicles.

The purpose of the adopted amendments is to control and reduce the release of air pollutants from diesel-powered motor vehicles. These rules, in conjunction with complementary rules adopted by the Division of Motor Vehicles (DMV) within the New Jersey Department of Transportation (DOT), form the basis for an enhanced diesel inspection and maintenance program. This program is designed to reduce the excessive emission of particulate matter (PM) which results from vehicle malfunction, poor or improper maintenance and/or emission-related tampering. The Department is adopting these amendments pursuant to the Air Pollution Control Act (APCA), N.J.S.A. 26:2C-1

et seq., and N.J.S.A. 39:8-59 et seq., referred to herein as the diesel statute. Enacted on June 30, 1995, the diesel statute authorizes and directs the State to implement a program which will reduce in-use emissions from diesel vehicles.

The Department's and the DMV's proposals appeared in the New Jersey Register on April 7, 1997 at 29 N.J.R. 971(a) and 29 N.J.R. 1264(a) respectively. The Department and the DMV jointly held a public hearing on April 28, 1997 to provide interested parties the opportunity to present comments on the Department's and the DMV's proposed amendments. The comment period closed on May 7, 1997. The Department received oral and/or written comments on its proposed amendments from the following persons:

1. Michael Block, Engine Manufacturers Association
2. Lee Cattaneo, Citizen
3. Samuel L. Cunninghame, New Jersey Motor Truck Association
4. Marie A. Curtis, New Jersey Environmental Lobby
5. Eric DeGesero, Fuel Merchants Association of New Jersey
6. Martin Edwards, Truckers Against Roadside Testing (TART)
7. Michael Klewin, Citizen
8. Therese Langer, Rutgers Environmental Law Clinic, Natural Resources Defense Counsel, New Jersey Public Interest Research Group
9. Edward Lloyd, Rutgers Environmental Law Clinic
10. Radha Maharajh, Citizen
11. Howard L. Sargent, CalTest Instruments Inc.
12. Allen Schaffer, American Trucking Associations
13. Richard Skaggs, United Bus Owners of America
14. Linda Stansfield, American Lung Association

An additional comment was received by the DMV but referred to the Department since part of the comment referred to the Department's proposal:

15. Maria D. Laurino, United Water New Jersey

Comments the Department received on the proposed amendments are summarized and responded to below. Comments received by the DMV on its proposed amendments are summarized and responded to elsewhere in this issue of the New Jersey Register, as part of the DMV's adoption of its complementary rule.

Summary of Hearing Officer's Recommendations and Agency Responses:

David West, Chief of the Department's Bureau of Transportation Control, served as the Hearing Officer at the April 28, 1997, public hearing held at the Department of Environmental

Protection Building in Trenton, New Jersey. The Hearing Officer recommended that the Department adopt the proposed rule amendments, with substantive and technical changes, not requiring re-proposal. The Hearing Officer recommended further that the Department not adopt at this time provisions proposed at N.J.A.C. 7:27 7:27-14.3(d). The Department has accepted the Hearing Officer's recommendations.

The Department adopts herein the proposed amendments, with changes. Please see the Summary of Public Comments and Agency Responses and the Summary of Agency-Initiated Changes, below, for more detail. The Hearing Officer's recommendations are set forth in the hearing officer's report. A copy of the record of public hearing is available upon payment of the Department's normal charges for copying ($0.75 per page for first 10 pages, $0.50 per page for the following 10 pages, $0.25 per page for additional pages). Persons requesting copies should contact:

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Summary of Public Comments and Agency Responses:

The number(s) in parentheses after each comment corresponds to the commenter numbers above to indicate the person(s) who submitted the comment. The comments are as follows:

1. COMMENT: Several commenters supported the efforts of the Department, the DOT, and the Office of the Attorney General in developing effective and reasonable rules for a strong diesel inspection and maintenance program, and generally agreed that the program should be implemented promptly. The commenters saw this as an important and long overdue step toward alleviating one of the most serious air pollution problems in New Jersey, and one which has the support of the people of New Jersey. One commenter predicted that other states now considering adoption of such programs will look to New Jersey to help guide their proposals. (4, 7, 8, 9, 13, 14)

2. COMMENT: One commenter supported this rulemaking because of its special concern with the emission of particulate matter by heavy-duty diesel vehicles, which emit ninety percent of the particulate matter attributable to mobile sources, while accounting for only five

percent of vehicle miles traveled. The commenter submitted detailed testimony concerning the enormous number of people in New Jersey who may face lung cancer, emphysema, chronic bronchitis, adult and pediatric asthma as a result of this pollution. Another commenter referred to the numerous epidemiological studies which have shown the relationship between particulate pollution and a variety of adverse health effects, including a shortening of life expectancy by one to two years in affected individuals. The commenter noted in particular the 1996 study put together by the Natural Resources Defense Council which listed four locations scattered throughout New Jersey among the top fifty metropolitan areas affected with high concentrations of particulate pollution, which also suffer from high rates of respiratory and cardiovascular disease. These commenters agreed that when these diesel rules take effect the improved health implications for the State's residents will be enormous. A third commenter agreed with the Department's expectation that the cost of implementing the program should be offset by a decrease in health care costs from associated diesel emissions exposure, and that increased vehicle maintenance costs will be offset by an increase in fuel economy. (4, 10, 14)

3. COMMENT: One commenter supported the promulgation and prompt implementation of the adopted emission standards and test methods to decrease pollution from diesel-powered school buses, particularly because they will address the impact of school yard pollution on fragile and relatively unprotected young lungs. (14)

4. COMMENT: One commenter supported the three-prong approach of self-inspection, roadside enforcement and a periodic inspection as providing flexibility and allowing the State to regulate out-of-state, as well as New Jersey-registered heavy-duty diesel vehicles and diesel buses. (14)

5. COMMENT: One commenter noted that the enhanced diesel inspection and maintenance program is important not only in helping to address the health effects of poor air quality, but also for leveling the playing field for automobile owners, who have participated in the auto inspection program for more than two decades, by getting the trucks and the buses to play by the same rules that apply to automobiles. (4)

6. COMMENT: One commenter commended the Department for adopting the enhanced diesel inspection and maintenance program rules, suggesting that by doing so, New Jersey is anticipating the new national ambient air quality standard (NAAQS) for particulate matter (PM), adoption of which is expected this year. The commenter suspected that New Jersey may well be in noncompliance when the new standard known as PM2.5 (based on PM with a diameter of 2.5 microns or less) is adopted. The commenter, therefore, characterized this action to reduce diesel particulate emissions as a sound first step toward meeting a new PM goal. Another commenter added that it and its members support the adoption of state diesel inspection and maintenance (I/M) programs, especially for areas not in compliance with the NAAQS, believing that these programs help ensure that the emissions control technologies designed and produced by the engine manufacturers are operated as intended. (1, 4)

7. COMMENT: One commenter, having worked for a number of years with the DMV and the Department to develop this enhanced diesel inspection and maintenance program, stated it was looking forward to enforcement of the program beginning as soon as possible, in order to identify and address any problems with the program. The commenter stated that its organization wants clean air, and anticipates that this enhanced diesel I/M program will accomplish this goal and is one that the trucking industry can comply with and live with. (3)

RESPONSE TO COMMENTS 1 - 7: The Department thanks the commenters for their support and recognition of the efforts which went into developing the diesel enhanced inspection and maintenance program. We appreciate the support of the New Jersey Motor Truck Association, which has worked with the Department and the DMV in developing this enhanced diesel I/M program and being a leader in the country in this respect. The Department looks forward to working closely with industry, the regulated community and environmental groups during the implementation of the new diesel program.

8. COMMENT: Several commenters stated that the proposed smoke opacity standards were generally not stringent enough to satisfy the public health and air quality concerns which the program seeks to address. One commenter presented detailed information supporting the conclusion that most heavy-duty diesel engines (HDDEs) are capable of achieving smoke opacity emission levels much below the proposed standards. Some commenters felt that the proposed smoke opacity standards are more than fair in terms of stringency, that is, they are not too stringent. One commenter suggested that the Department consider the health implications of a too lenient smoke opacity standard for trucks, including a higher death rate, cancer rate and increase in lung disease, and try to get that smoke opacity standard as low as possible. Two commenters who argued for more stringent smoke opacity standards suggested that the standards be revised prior to adoption. Other commenters suggested that the Department phase in more stringent smoke opacity standards. (4, 8, 9, 13, 14)

RESPONSE: The Department selected the adopted smoke opacity standards to achieve a balance between fairly identifying excess-emitting vehicles without creating the likelihood of false failures. A more detailed explanation of how the Department determined the level of stringency to which these smoke opacity standards should be set is set forth in the proposal summary published in the New Jersey Register on April 7, 1997, at 29 N.J.R. 971(a). The Department does, however, share the concerns expressed by the commenters and will review the effectiveness of the smoke opacity standards as it gains additional in-use data, particularly from the newer technology engines.

9. COMMENT: Several commenters stated that the smoke opacity standard applied to a pre-1974 heavy-duty diesel vehicle (HDDV) should be more stringent, especially since these older vehicles are generally responsible for a disproportionately high level of population exposure. A number of commenters stated that the majority of the pre-1974 model year HDDVs are capable

of meeting and should be held to the 55 percent smoke opacity standard which applies to model years 1974 through 1990 HDDVs. Another commenter pointed out that the proposed 70 percent peak smoke opacity standard for pre-1974 diesel engines is more accurately applied only to turbo-charged diesel engines. The older, non-turbo-charged diesel engines were not designed to meet a peak opacity standard; peak opacity standards were not developed by the United States Environmental Protection Agency (EPA) until after 1973 when they were developed to check on the proper functioning of turbo-charged engines. The 70 percent peak opacity standard for pre-74 model years should, therefore, be limited to turbo-charged diesel engines. Finally, a commenter suggested that the Department should not promulgate both a lenient smoke opacity standard and an alternative smoke opacity standard. (7, 8, 9, 14)

RESPONSE: The Department has carefully examined the issue of smoke opacity standards for older HDDVs. The commenter is correct in stating that the EPA's certification process for new diesel engines did not include smoke opacity standards until 1974. While it appears that the majority of these vehicles are capable of meeting a more stringent smoke opacity standard than 70 percent, there is a high level of uncertainty as to which specific types of vehicles within this population are capable of meeting the standard. As such, the Department has established an alternative smoke opacity standard to address this uncertainty among the pre-1974 diesel engines. By doing so, the Department expects to gather more data on the emission performance of these older diesel vehicles, which could then form the basis for promulgating an applicable smoke opacity standard for all these older vehicles.

10. COMMENT: One commenter stated that the pilot data obtained for this enhanced diesel I/M program demonstrates that buses as a population are capable of meeting a more stringent standard than other types of heavy-duty diesel-powered motor vehicles because of efforts made by the industry to reduce in-use emissions from the existing bus population, and that the failure of the trucking industry to achieve similar emissions reductions from its vehicles should not result in the promulgation of less stringent smoke opacity standards for trucks than for buses. The commenter suggested that the Department should not establish smoke opacity standards based on current in-use smoke opacity levels for trucks, but should base them on the levels the trucks could achieve, if they, like the buses, work to lower their emissions. To do otherwise would, in the opinion of the commenter, be unfair to the bus industry which, the commenter states, has been reducing emissions nationwide for the past ten years by repairing vehicles and by using emission-reducing devices and additives. (13)

RESPONSE: The Department does not agree that the ability of the diesel bus population to achieve lower emissions than that achieved by the diesel truck population is attributable solely to the greater efforts of the diesel bus community to reduce emissions. While the diesel bus community is to be commended for its efforts in reducing emissions, at least some of the differential between the level of emissions from diesel buses and diesel trucks can be attributed to differences in the engine technologies. Diesel bus engines are typically of a different technology than diesel truck

engines: the former are two-stroke engines while the latter are four-stroke engines. Two stroke engines have exhaust gases scavenged with fresh air from a supercharger, which tends to dilute the exhaust stream, effectively lowering smoke opacity. This is not true for diesel truck engines. This is confirmed by the Department's analysis of data bases of in-use emission testing results which indicates that in-use emission test results from diesel bus engines show less variability and are generally considerably lower than emissions from diesel truck engines.

In regard to the commenter's suggestion to consider using retrofits to lower emission from diesel trucks, N.J.S.A. 26:2C-8.4 provides that the Department's vehicle emission standards must be reasonably attainable by properly functioning vehicles without the addition of any aftermarket air pollution control devices, systems or engine modifications. The Department, therefore, cannot establish emission standards that could only be met through the use of such techniques.

11. COMMENT: One commenter objected to the smoke opacity standards as overly stringent, stating its belief that in promulgating them the Department has deviated from what the commenter sees as the primary purpose of the program, the identification of gross emitters. The commenter recommended a smoke opacity standard of 55 percent for all vehicles, arguing that other states are using this standard and that using a more stringent standard would increase the probability that trucks that are within the range of the EPA's new engine certification standard may exceed the State's in-use standard, resulting in an unfair failure. (12)

RESPONSE: The Department believes that the adopted smoke opacity standards are equitable and not overly stringent, and will serve the purpose of identifying gross-emitting heavy-duty diesel vehicles. These standards reflect the technological advancements and performance capabilities that have been achieved for heavy-duty diesel engines, particularly those manufactured after model year 1990, which have resulted in continually lower exhaust emissions. As such, the Department views the 40 percent smoke opacity standard established for a model year 1991 or newer HDDV to be equitable when compared to the 55 percent smoke opacity standard for 1974 through 1990 model year HDDVs. Based upon the data available at this time, however, the Department believes that it would be inequitable to establish a smoke opacity standard of 55 percent for HDDVs with engines manufactured prior to model year 1974.

The smoke opacity standards established for pre-1991 model years provide a doubling of smoke emissions from HDDVs compared to the modal peak smoke emission from all engine families certified for model year 1987. The Department adopted these rather lenient standards as a means of allowing the State to differentiate the population of normal-emitting engines from engines which grossly exceed their designed emission performance standard. Post-1990 HDDVs were certified to particulate standards which were two and one-half times more stringent than pre-1991 HDDV standards. In-use data for post-1990 New Jersey-registered HDDVs show a marked skew below 55 percent opacity and therefore a more stringent opacity standard was indicated for these model year vehicles in order to keep both false failures and false passes to a minimum.

Furthermore, by establishing smoke opacity standards more stringent than 55 percent, the Department is not, as the commenter suggests, deviating from the standards other states are

employing in their diesel inspection programs. The Department understands that California, Connecticut, Illinois and Washington, have or are planning diesel inspection programs with smoke opacity standards more stringent than 55 percent.

12. COMMENT: Several commenters supported the establishment of more stringent emission standards for model year 1997 and newer diesel-powered motor vehicles and heavy-duty diesel vehicles. Support was based on public health considerations and the anticipated need for the State to take further action to comply with the new proposed NAAQS for particulate matter, PM 2.5. If New Jersey is not in attainment of this NAAQS, it will be required to implement additional State Implementation Plan control strategies for particulate matter as part of its responsibilities under the Clean Air Act, as amended. One commenter stated that the diesel engine manufacturing industry has touted the ability of model year 1994 and newer diesel engines to be "smoke-free" and suggested that the Department promulgate more stringent emission standards of 10 percent smoke opacity to match these claims, especially as they are also supported by data from New Jersey's pilot program. Another commenter urged the Department to add a requirement that a more stringent standard be promulgated within six months. (7, 9, 14)

13. COMMENT: A number of commenters advised against the establishment of more stringent standards for model year 1997 and newer diesel vehicles. These commenters expressed concern that there is insufficient data from in-use vehicles to support these standards. Another commenter stated that the EPA's new engine certification particulate standards are not expected to become more stringent at least until model year 2004. This commenter argued that the use of more stringent standards for these newer vehicles will not serve the purpose of diesel inspection and maintenance programs, that is, identifying excessively emitting vehicles suffering from mal-maintenance or tampering. (1, 12)

RESPONSE TO COMMENTS 12 AND 13: The Department recognizes the need to address an assortment of concerns in considering more stringent smoke opacity standards for model year 1997 and newer diesel vehicles, such as those raised by the commenters. The Department agrees that the EPA adoption of the new NAAQS for PM2.5 in July 1997 will likely require the State to take further action to reduce PM2.5 emissions, including the establishment in the near future of appropriate and more stringent standards for these newer vehicles. The Department agrees that modern technology diesel vehicles are being designed to meet more stringent emission standards than their predecessors, and that a more stringent smoke opacity standard may be necessary to identify those newer vehicles which are polluting at levels higher than those which they were originally designed to meet. However, until in-use emissions data is available for these vehicles, promulgation of more stringent smoke opacity standards may be premature. The Department does not anticipate this data will be available in time to adopt new standards within the next six months, as suggested by one commenter. However, as this data becomes available the Department will evaluate the need and appropriateness of promulgating more stringent standards for these newer vehicles and, if appropriate, will then propose such standards.

14. COMMENT: Two commenters objected to the proposed smoke opacity standards for buses; one on the grounds that they are too stringent and the other on the grounds that, while not too stringent, the bus smoke opacity standards are unjustifiably more stringent than those proposed for heavy-duty diesel vehicles with substantially similar engines. Both commenters maintained that the engines used in diesel buses other than those which satisfy the EPA's definition of urban bus are the same or similar to engines used in heavy-duty trucks and thus should be treated in a similar fashion with respect to smoke opacity standards. (1, 13)

RESPONSE: The Department believes that it has established appropriate smoke opacity standards for diesel buses, standards that all buses, whether or not they are "urban buses" as that term is defined by the EPA, can meet if they are properly maintained and repaired. They are, therefore, not too stringent. These smoke opacity standards were based upon the Department's analysis of pilot data from the Commercial Bus Inspection and Enforcement Unit of the DOT containing engine information, as well as extensive consultation with the DOT, engine manufacturing organizations, suppliers of alternative fuel and engine retrofit manufacturers.

Nor are these smoke opacity standards too stringent in comparison to the standards established for heavy-duty diesel trucks with substantially the same engines. In both cases, the Department has developed smoke opacity standards which it believes vehicles in each category can meet. Built into these standards is a margin of safety, to further protect against the event of false failures, that is, the incorrect failure of compliant vehicles.

The Department recognizes that the engines used in diesel buses, other than "urban buses" as defined by the EPA, were manufactured to the same new engine emission certification standards as were the engines which are typically used in heavy-duty trucks. However, a diesel bus will typically utilize a considerably different engine design, that is, buses use a two-stroke engine design while trucks use a four-stroke engine design. Diesel bus engines have exhaust gases scavenged with fresh air from a supercharger, which tends to dilute the exhaust stream, effectively lowering smoke opacity. This is not the case with truck engines. Thus a more stringent standard was more appropriate for diesel buses than their heavy-duty diesel truck counterparts. In addition, the results of the DOT pilot study indicated that the population of buses, in its current state of maintenance generally exhibits lower smoke opacity values than does the heavy-duty diesel truck fleet. This supported further the Department's conclusion that it would be appropriate to establish a more stringent smoke opacity standard for diesel buses than for other diesel-powered motor vehicles.

15. COMMENT: One commenter maintained that the Department's definition of diesel bus should be modified because he felt it to be so broad that it would require all buses to meet the more stringent smoke opacity requirements established for urban buses, not just those which have been designed to do so. The commenter predicted that application of a smoke opacity standard of 40 percent to pre-1993 model year buses will lead to false failures in the program. (1)

RESPONSE: The Department defined "diesel bus" to match the definition contained in the

diesel statute. While this definition essentially covers the universe of diesel-powered buses, the rule distinguishes between various categories of buses in terms of the smoke opacity standards to be applied to each category. That is, N.J.A.C. 7:27-14.6(c)1 sets forth a smoke opacity standard of 40 percent for diesel buses, model years 1987 and older, and N.J.A.C. 7:27-14.6(c)2 sets forth a smoke opacity standard of 30 percent for diesel buses, model years 1988 and newer. This same smoke opacity standard of 30 percent is applied to a category of diesel buses which the Department refers to as "retrofitted diesel buses." (See N.J.A.C. 7:27-14.6(d)) The Department believes these retrofitted diesel buses are those buses which the commenter refers to as "urban buses," that is, those buses which are equipped with an engine which has been retrofitted or rebuilt to meet a particulate emission standard of 0.10 g/bhp-hr (grams per brake horsepower per hour) in conformance with the EPA requirements set forth at 40 C.F.R. 85.1403(b) or (c). Generally these buses are model year 1993 or older. However, the Department is applying the same 30 percent smoke opacity standard to diesel buses which are not retrofitted diesel buses and are older than model year 1993 (but newer than model year 1987), because it has determined that these diesel buses can, in fact, meet this smoke opacity standard. There is no reason to not require these buses to meet a smoke opacity standard consistent both with the emission certification standards to which they were manufactured, as well as their in-use emission level.

16. COMMENT: One commenter supports the current proposal regarding diesel-powered buses, but prefers the use of alternately-fueled buses in crowded urban areas. (14)

RESPONSE: The Department appreciates the commenter's support. As the commenter recognizes, the use of alternatively-fueled buses is outside the scope of this rulemaking; however, the Department is are addressing the issue of alternatively-fueled buses as part of the Department's New Jersey Clean Fleets Program.

17. COMMENT: One commenter expressed support for the enhanced diesel inspection and maintenance program based on the grave and expensive danger to public health which particulate matter from diesel-powered motor vehicles represents. The commenter pointed out that these emissions are more dangerous than emissions from smokestacks because they occur at breathing level, in close proximity to passengers as they embark and disembark from buses, to pedestrians along the streets, and to drivers. (14)

RESPONSE: The Department agrees that human exposure to diesel exhaust emissions is a public health concern and is one of the primary reasons the Department is promulgating these enhanced diesel inspection program rules.

18. COMMENT: One commenter noted that since diesel particles can remain suspended for up to one week and can transport over large distances, any particulate matter emitted from HDDVs in the states west of New Jersey (Pennsylvania, West Virginia, Ohio, Indiana, Illinois) would likely contribute greatly to the level of particulate matter in New Jersey. The commenter asks

why New Jersey is acting now to implement a diesel emission testing program when the EPA has taken this transport problem under advisement and is thus not yet mandating any such program. (6)

RESPONSE: The commenter is correct in recognizing that pollution from particulate matter is a regional as well as a local concern. In addition to this concern, the Department must address the prevalence of localized exposure to diesel emissions, such as concentrated street level and human exposure hot spots such as urban centers. Because addressing the emissions from New Jersey-registered diesel vehicles alone will not solve the problem of particulate matter pollution in this State, this rule also addresses pollution originating from diesel vehicles registered in other states and travelling through New Jersey. In addition, our neighboring states are also preparing to address particulate matter pollution from mobile sources in their own states by implementing programs similar to the one adopted herein.

The following states are currently testing or running diesel inspection programs:

Arizona has an annual testing program for all 1967 and newer diesel-powered passenger cars and trucks;

California has a voluntary periodic testing program that is anticipated to become mandatory for fleets with two or more HDDVs. There is also a roadside testing program which has been on hold, but which California is in the process of reinstating;

Colorado is operating a decentralized periodic and self-inspection program for all on-road, diesel-fueled vehicles;

Connecticut has been operating a pilot roadside diesel program since October 1995 for diesel vehicles with a gross vehicle weight rating (GVWR) of more than 19,000 pounds. Connecticut's enabling legislation envisions the program to be operational by October 1997;

Illinois is in the planning stages of developing a diesel inspection program;

Maryland has been operating a pilot heavy duty diesel testing program since May 1993;

Nevada has been operating a roadside enforcement program for HDDVs since July 1, 1996. It has also been operating a decentralized testing program for LDDVs since 1994;

New York has completed a pilot program and is in the process of developing a decentralized, biennial testing program for 1968 and later model year vehicles up to 10,000 pounds GVWR;

Ohio is currently operating a centralized, contractor-run diesel inspection program, for LDDVs, and is developing an urban bus self-inspection program;

Utah has been operating diesel inspection programs in several counties since December 1994; and

Washington State has been operating a diesel inspection program since August 1993 on all 1968 and newer model year diesel vehicles.

The United States is joined in these efforts by the Canadian province of British Columbia, which is operating a pilot program testing HDDVs. In addition, New Jersey continues to work with the other North Eastern States for Coordinated Air Use Management (NESCAUM) member states in order to generate and evaluate pilot study data to ensure an effective and well-coordinated regional approach to addressing particulate matter pollution from diesel vehicles.

19. COMMENT: A number of commenters supported the alternative smoke opacity standard for pre-1974 diesel-powered motor vehicles set forth at N.J.A.C. 7:27B-4.13. One commenter, however, stated that the requirement at N.J.A.C. 7:27B-4.13(a)2(1) that a candidate vehicle for an alternative smoke opacity standard be tuned to minimize smoke in the exhaust emissions, would require, for an engine which may be incapable of meeting the standard within its design configuration, that repairs be conducted outside of manufacturer's specifications. The commenter stated that other states, in recognition of this dilemma, require corrective repairs, not to the opacity standard but only to manufacturer's specifications in order to avoid requiring corrective action to smoke opacity limits that an engine was never designed to meet. The commenter stated further that requiring corrective action to an opacity standard could promote tampering as a means to try to meet such an opacity limit, and could result in increased NO_x emissions. (1, 4, 7, 9)

RESPONSE: The Department is not requiring that engines be repaired to tolerances outside their original design capabilities or specifications in order to quality for the alternative smoke opacity standard. The requirement at N.J.A.C. 7:27B-4.13(a)2(i), that candidate vehicles be "tuned to minimize the level of smoke in the exhaust emissions..." is designed to work within manufacturer's tolerances. The Department added this requirement to ensure that the subject vehicle is documented to be unable to meet the Department's smoke opacity standards, even when tuned to minimize smoke in the exhaust emissions to the extent possible, using the manufacturer's specifications. More specifically, N.J.A.C. 7:27B-4.13(a)2(ii) requires that the candidate engine receive a determination by the Diesel Emission Inspection Center "to be within the design, specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer." In order to avoid any or potential for confusion regarding this point, however, the Department has modified N.J.A.C. 7:27B-4.13(a)2(i) to make clear that the vehicle not be adjusted out of specifications in order to minimize the level of smoke in the exhaust.

20. COMMENT: One commenter suggested that the best means of ensuring that the integrity of the procedures for establishing an alternative smoke opacity standard for pre-1974 diesel-powered motor vehicles set forth at N.J.A.C. 7:27B-4.13 is to require documentation from a licensed testing facility. (9)

RESPONSE: The Department agrees with the commenter. N.J.A.C. 7:27B-4.13(a) requires the applicant to obtain documentation demonstrating that the vehicle "engine and all fuel control and emission-related components have been...determined by, or to the satisfaction of, a licensed diesel emissions inspection center, to be within the design specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer." The Department believes this documentation should adequately address the commenter's concern. As further clarification of the involvement of the diesel emissions inspection center (DEIC), however, the Department has determined to amend N.J.A.C. 7:27B-4.13(a) to delete the phrase "or to the satisfaction of." In addition, N.J.A.C. 7:27B-4.13(a) also provides for involvement and oversight by the Department and/or its designee throughout the entire process of establishing an alternative smoke opacity

standard, thus further ensuring the integrity of the process.

21. COMMENT: One commenter pointed out that the proposed method for calculating the alternative smoke standard, by allowing a margin of 10 percent opacity, could result in a smoke opacity standard of 110 percent in the case of a vehicle which is certified as only being able to meet a 100 percent smoke opacity standard. (7)

RESPONSE: The Department, on adoption, has added to N.J.A.C. 7:27B-14.13(b) the following clause: "or maximum points as necessary to not yield an alternative smoke opacity standard in excess of 100 percent."

22. COMMENT: One commenter asked how visible black smoke would be defined in terms of a smoke opacity percentage and whether a vehicle exhibiting a smoke opacity of well under 40 percent would be regarded as having visible black smoke emissions. The commenter suggested that it might be helpful to define visible black smoke quantitatively. (8)

RESPONSE: Generally speaking, smoke will appear as black at an opacity of about 15 to 20 percent. At lower opacity levels, smoke is visually observed as grey or white or in many cases is invisible. Thus smoke with an opacity less than 40 percent would appear as black if it is above this 15 to 20 percent threshold, as the commenter inquired. The Department does not see a need to define black smoke quantitatively, since this determination is only being used in a screening test for which a visual examination should suffice. No vehicles will fail the roadside enforcement inspection based on the results of the visible black smoke test.

23. COMMENT: The commenter suggested that the general instructions under Air Test 4 (N.J.A.C. 7:27B-4.2) should be modified to provide that the required operation of the engine for at least 15 minutes for warm-up purposes should be under a load and not just at an idle. The commenter suggests that operating the vehicle at an idle is not an appropriate means of warming up an engine, and the accuracy of the test could be affected if the engine is not in a warmed-up state before the test is conducted. (7)

RESPONSE: N.J.A.C. 7:27B-4.2(a)4 as proposed provided that no measurements are to be made until the engine is at normal operating temperature. However, the commenter is correct; if the engine is operated at idle during the 15 minutes required by the rule, and not driven or operated under load, there is the possibility that the engine may not be at normal operating temperature when testing begins. For those vehicles which do not have an engine oil temperature gauge (which would indicate whether or not the engine is at normal operating temperature) the vehicle could, as a result, be improperly tested before the engine has reached normal operating temperature. To avoid this result, the Department has modified N.J.A.C. 7:27B-4.2(a)4 on adoption to read as follows:

4. Operate the engine *under load, or by driving the vehicle,* for at least 15 minutes or until the engine temperature gauges read within normal operating ranges; do not make any

measurement until the engine is at normal operating temperature;

24. COMMENT: One commenter objected to the visual blue smoke test as inaccurate and ill-defined, which he felt should be used, if at all, to screen passing, not failing, vehicles. The commenter found the Department's definition of blue smoke to not be sufficiently specific, inviting confusion between excessive smoke from high-emitting vehicles and white smoke from vehicles, which, while fully compliant, are not at normal operating temperature (a common white smoke phenomenon). The commenter suggested that a visible black smoke test which does not reference smoke color would be more appropriate for screening. (1)

RESPONSE: The visible blue smoke standard, set forth at N.J.A.C. 7:27-14.4(a)2 and incorporated by reference within the inspection standards at N.J.A.C. 7:27-14.6, serves as a general prohibition which must be met by diesel-powered motor vehicles at all times. In establishing this standard, the Department consulted with the DMV which had researched the cause of continuous blue smoke. This research included discussions with diesel repair facilities, diesel fleet maintenance supervisors and diesel vehicle operators. Based on these inquiries, the Department concluded there are no normal operating conditions under which a warmed-up engine would emit continuous visible blue smoke. In fact, visible blue smoke emissions from a properly warmed-up diesel engine is generally recognized in the diesel repair community as a diagnostic tool for the purpose of engine troubleshooting, that is, it indicates serious engine malfunction such as a severely worn cylinder/piston/piston ring interface, leaking turbocharger seals and/or excessive valve train wear, and thus the need for repair or adjustment to the engine. However, because a moderate (and thus acceptable) amount of engine wear could lead to a momentary release of blue smoke, a vehicle exhibiting continuous visible blue smoke for less than three consecutive seconds will go on to take the full emissions test.

The Department agrees with the commenter that insufficient or improper engine warming can result in continuous blue smoke emissions, even in a properly functioning diesel vehicle. Accordingly, as is discussed more fully in the Department's response to comment 23, above, N.J.A.C. 7:27B-4.2(a)4 is modified herein to require that all diesel-powered vehicles, in order to satisfy the condition of warmup, must be operated under actual or simulated driving conditions for at least 15 minutes.

25. COMMENT: One commenter questioned the justification for maintaining the exemptions to the three-minute idle standard set forth at N.J.A.C. 7:27-14.3. Idling is a poor method of warming up an engine. It is also an inappropriate means of building up brake pressure; federal regulations provide that a vehicle which cannot achieve brake pressure within three minutes must be posted out-of-service. The only exemption to the three minute idle standard which the commenter felt would be justified is in the case of auto buses, which may need to exceed this idle standard in order to meet a requirement that passenger compartments be kept within a certain temperature range. (7)

RESPONSE: At the time it proposed these rules, the Department did not see a need to address the idling standard, except to add a further requirement that a motor vehicle manufactured with a sleeper berth not be granted an exemption from the idling standard when the vehicle's operator is using the vehicle for sleeping or resting if that vehicle is equipped with a functional auxiliary power system designed in whole or in part to maintain cabin or sleeper berth comfort or to mitigate cold weather start-up difficulties. However, the commenter's points are well taken. The Department will investigate the commenter's assertions regarding continued justification for exemptions to the three-minute idling standard for diesel vehicles. If warranted, the Department will propose appropriate regulatory revisions in a subsequent proposal.

26. COMMENT: One commenter requested the Department to postpone for at least six months any plans to start a more stringent emission test for HDDVs. (6)

RESPONSE: The Department developed the diesel emission test procedures and smoke opacity standards adopted herein in response to the legislative mandate contained in the diesel statute, which also implicitly requires the speedy implementation of this program by the State. In any event, the Department developed test procedures and standards such that vehicles would not be held to a standard more stringent than they were designed to meet.

27. COMMENT: One commenter objected that waiving the roadside enforcement test for vehicles that have passed a periodic inspection would seriously undermine the enhanced diesel inspection program. The commenter argued that this would affect the ability of the roadside enforcement program to monitor the effectiveness of the periodic inspection program, particularly in light of the generally acknowledged tendency of truck operators (more frequently than automobile owners) to alter an engine's operating characteristics to "power up" the engine, which they could do after a periodic inspection. (8)

RESPONSE: The Department appreciates the support of the commenter for the roadside enforcement program and agrees with the commenter's assessment of its importance as an enforcement tool. It should be made clear, however, that exemption from roadside enforcement inspection is not automatic for HDDVs which have passed a periodic inspection. These vehicles must first undergo, at a minimum, a visible black smoke screening test pursuant to N.J.A.C. 7:27-14.5(a)4 and will be observed for any obvious visible defects in order to qualify for a waiver. Since smoke is perceived as black starting at about 15 to 20 percent opacity, vehicles emitting at a higher opacity level will receive an emissions inspection. The purpose of the visible black smoke screening test is, in fact, to identify those vehicles which, even if they have recently undergone an emissions inspection, exceed the smoke opacity standards so as to require additional roadside emission testing. In addition, as the DMV explains in the adoption of its enhanced diesel inspection and maintenance rules elsewhere in this issue of the New Jersey Register, the DMV may suspend the visible black smoke test (and, concomitantly, the exemption from roadside enforcement inspection) as necessary

to audit the program or when the full emissions test is to be conducted for training purposes. Thus this screening test was specifically designed to not interfere with the auditing of the program.

28. COMMENT: Two commenters objected to what they perceived as a bias on the part of the Department toward sampling or partial-flow smokemeters, which they attributed to lobbying and misinformation provided by an equipment manufacturer in competition with one of the commenters. One commenter argued that the Department deliberately slanted the smokemeter specifications set forth at N.J.A.C. 7:27B-4 to promote the marketing of a competitor's smokemeter to the virtual exclusion of all other manufacturers' smokemeters. (11, 13)

RESPONSE: The Department is not biased towards any particular smoke-measuring technology, nor has it developed the equipment specifications with the intent of promoting the product of any particular smokemeter manufacturer. The Department does not maintain any special relationship with any particular equipment manufacturer. The Department's intent was to issue a performance-based specification for smokemeters and to evaluate all candidate instruments relative to that specification. The Department knows of three equipment manufacturers who have expressed their ability to meet the smokemeter specifications.

29. COMMENT: One commenter objected to the Department's smokemeter specifications. The commenter felt that the only equipment which would satisfy these specifications would be too expensive and complicated for bus owners and garage mechanics, who are intimidated by computers. The commenter felt that if the equipment appears complicated, garage mechanics won't use it. The commenter objected that the specifications would exclude the American-made meters which were designed to help such a mechanic. (13)

30. COMMENT: The commenter felt that the equipment specifications proposed by the Department can only be met by a smokemeter known as the Bosch RTT-100, which he characterized as inaccurate and likely to result in the issuance of citations wrongly based on opacity measurements made with it, as happened with California's diesel inspection program. (11)

RESPONSE TO COMMENTS 29 AND 30: The Department is currently reviewing smokemeters which have been submitted for consideration in this program and is optimistic that the smokemeter equipment meeting the Department's specifications will be affordable for private garages and will not be overly sophisticated or beyond the technological capabilities of the average repair technician. The Department is already aware of four different smokemeter models whose manufacturers assert can satisfy the Department's equipment specifications. The Department assures the commenter that all smokemeters which the Department approves for use in the enhanced diesel inspection and maintenance program will fully comply with all the Department's specifications for smokemeters and, as such, will provide an accurate smoke opacity measurement.

31. COMMENT: One commenter objected to the prohibition of emission testing using

a full-flow smokemeter on vehicles with an exhaust tailpipe or stack with a diameter of more than five inches. The commenter stated this prohibition is inconsistent with emission testing procedures recommended by the Society of Automotive Engineers (SAE) and would have the effect of prohibiting the use of full-flow smokemeters completely by making them ineligible to measure the opacity of smoke from pipes six inches in diameter. The commenter found no basis for this requirement and objected to it as seemingly designed for the sole purpose of ruling out the use of full-flow smokemeters by the State of New Jersey, inspection stations licensed by the State of New Jersey, and vehicle owners doing self-inspections. (11)

32. COMMENT: Another commenter found the exclusion from testing of pipes with a terminal diameter of six inches to be appropriate because of the documented phenomenon known as vortex shedding. Vortex shedding occurs due to the low exhaust velocities that result from stacks more than five inches in diameter. The commenter noted that the EPA, to avoid this problem, stipulates in its rules for new engine certification testing that smoke opacity measurements shall not be made for stacks more than five inches in diameter. SAE J35 and SAE J1243 reiterate those requirements. (7)

RESPONSE TO COMMENTS 31 AND 32: The commenter is correct in noting that the test procedures set forth at N.J.A.C. 7:27B-4.3 restrict the use of a full-flow smokemeter to exhaust stack diameters of five inches or less. The procedures do, however, allow for the use of pipe adaptors for stack diameters of more than five inches to accommodate the use of full-flow smokemeters while maintaining good engineering practice. (See N.J.A.C. 7:27B-4.3(a)4, (b)3 and (c)5.) The reason for this requirement is to maintain an adequate exhaust flow to avoid significant spreading of the exhaust plume as it exits the exhaust pipe and collides with atmospheric pressure. This collision phenomenon, known as vortex shedding, becomes significant from heavy-duty diesel vehicles with exhaust stack diameters of greater than five inches, and especially in the case of vehicles utilizing dual exhaust pipes. The result of vortex shedding is an erroneously high opacity reading regardless of the corrected values produced when using the SAE J1667 measurement algorithms. (See SAE 801373 for further details.) This is especially of concern during non-loaded emission testing, such as is encountered during the snap acceleration test, where engines, for a variety of reasons, are least able to produce sufficient exhaust flow. These reasons include, among other things, low turbocharger speed, lagging in airflow momentum within the engine air intake system, and air inertia outside the exhaust pipe. Thus, by restricting exhaust pipe diameters to no more than five inches when utilizing full-flow smokemeters, the Department is ensuring that the exhaust gases and suspended particles exit the exhaust pipe with an adequate velocity to maintain an optical path length commensurate with the pipe diameter for a distance sufficient for an accurate opacity measurement to be taken.

33. COMMENT: One commenter asserted that the Department failed to establish smokemeter measurement accuracy requirements. The commenter recommended accuracy requirements based upon confidence intervals used for comparative test results and correlations

between various smokemeters. (11)

RESPONSE: The Department agrees with the commenter as to the importance of establishing smokemeter accuracy requirements, and has, in fact, done so in this rulemaking. The Department requires, at N.J.A.C. 7:27B-4.15(a)1, that "the smokemeter shall, at minimum, conform to all specifications and standards set forth in SAE J1667 and incorporated herein by reference." SAE J1667 contains two such smokemeter accuracy requirements. First, SAE J1667 establishes a linearity, also known as a tolerance, of two percent opacity throughout the instrument range. Secondly, SAE J1667 requires that the point at which the instrument measures zero percent opacity cannot drift more than one percent opacity in one hour. The Department further requires, at N.J.A.C. 7:27B-4.2(a)2 and 3, that all instruments have their opacity readings verified, on a weekly basis, for a zero value and an upscale opacity value using a neutral density filter certified to a known value, plus or minus one percent. Coupled with the internal zero and span check required in SAE J1667, the verification will serve to ensure the instrument's linearity within two percent opacity of point. The linearity specification, when considered in conjunction with the precision of the neutral density filter, produces an overall instrument accuracy of three percent opacity.

The method for verifying accuracy offered by the commenter is useful in determining the comparative performance of smokemeters under similar operating condition, but only assuming an appropriate reference or benchmark is established.

34. COMMENT: One commenter objected to the requirement set forth at N.J.A.C. 7:27B-4.3(a)4, (b)3, and (c)5 that when a full-flow smokemeter is used "smoke opacity shall be measured only from an exhaust outlet which serves as the effluent point of an exhaust pipe ending in a straight length of at least two linear feet." The commenter notes that a similar requirement is contained in SAE J35, but argued that this requirement is only appropriate for engine development and evaluation, not for testing in-use vehicles. (11)

RESPONSE: The Department's requirement set forth at N.J.A.C. 7:27B-4.3(a)4, (b)3, and (c)5, that there be at least a two foot length of straight pipe when using a full-flow smokemeter is based on sound engineering judgment supported by SAE 35 (1988), SAE J1243 (appendix C), and 40 CFR 86.884-8. These requirements are intended to minimize exhaust flow turbulence in order to obtain accurate smoke opacity results from a full-flow instrument which measures at the pipe termination. Good engineering practice need not be restricted to laboratory conditions; the State has a valid interest in applying this practice to its periodic inspection program.

35. COMMENT: The test procedures at N.J.A.C. 7:27B-4 14.3 (a)4, (b)3 and (c)5 provide for smoke opacity measurement from an exhaust pipe ending in a straight section of at least two feet in length. The rule should also provide that the pipe should be cut squarely. (7)

RESPONSE: The Department believes that the suggested method is not necessary. The degree of precision which will be achieved even without this requirement should produce an accurate

and repeatable test result. The angle of the wall of the cut exhaust pipe will not affect the direction of the exhaust flow nor will it impede hookup of smokemeters meeting the specifications set forth at N.J.A.C. 7:27B-4.15.

36. COMMENT: One commenter found unnecessary, costly and otherwise objectionable the requirement that oil temperature and revolutions per minute (RPM) be checked in conducting a smoke opacity test on a bus. The commenter raised the concern that checking the oil temperature could be hazardous, and could result in burns to the person reaching into the bus to do the check. The commenter pointed out that this safety issue was raised by an SAE committee in 1991. The commenter further stated that this requirement will impede roadside testing. Finally, the commenter felt that this requirement has only been included as a way to give an advantage to the one manufacturer whose equipment is designed to take these measurements. (11, 13)

RESPONSE: The Department, after consultation with the DMV, has determined that it is necessary to require smokemeters used by DEICs in the periodic inspection program to be equipped with an integral means of measuring engine oil temperature and engine RPM in order to maintain quality control within the periodic inspection program. The engine oil temperature information will be used by the Department and the DOT to confirm that the inspected vehicle was completely warmed up and at full proper operating temperature during testing, thus avoiding false failures due to improper warmup. The engine RPM measurement and its corresponding graphical printout will allow the Department and the DOT to monitor test results to ascertain the quality of the test performed during the inspection. These requirements are not applicable to equipment which will be used during roadside enforcement inspections, which will be directly administered by the DOT. The motivation for including these requirements was to maintain quality control for the program; not, as the commenter suggests, to provide any advantage to any particular smokemeter manufacturer.

In regard to the safety of the oil temperature requirement, the Department has determined that with the exercise of due caution, the insertion of an oil temperature probe does not represent an unreasonable safety concern. Insertion of an oil temperature probe is not an unusual or particularly difficult procedure. In fact, it is no more hazardous than removing an oil dip-stick to check the oil level in the engine. Furthermore, the DMV's regulations for the licensing of inspectors at DEICs require successful completion of a training course which will include training in relevant safety precautions.

37. COMMENT: One commenter recommended a revision of the definition of "neutral density filter" to include language to clarify that the verification for which the filter is used is limited in its capability to assess the smokemeter's overall accuracy. (11)

RESPONSE: The Department agrees that the neutral density filter verification is limited in its ability to completely assess the accuracy of a smokemeter. The neutral density filter verification

is intended to serve as a quality control measure to be conducted by the DEIC on a weekly basis, as is recommended in SAE J1667. Smokemeter accuracy will be more fully evaluated during the periodic audit of a DEIC by the DOT. The complete auditing protocol is currently under development. For clarification, however, the Department has, upon adoption, modified the definition of "neutral density filter" by substituting the phrase "accuracy of the raw opaque value within the measurement path" for the phrase "opacity measurement accuracy".

38. COMMENT: One commenter recommended deletion of the reference to the Department's April 30, 1981 smokemeter specification. (11)

RESPONSE: The Department agrees with the commenter that all references to the prior smokemeter specifications, which were contained in the definition of "smokemeter" at N.J.A.C. 7:27B-4.1, should be deleted since they are being replaced by new smokemeter specifications. The Department proposed deleting this reference and so indicated by enclosing the text in brackets. The Department also proposed adding text referencing the smokemeter specifications now set forth at N.J.A.C. 7:27B-4.15. The Department has adopted these modifications as proposed.

39. COMMENT: One commenter felt that the 8,500 pound threshold for defining HDDVs is too low, because diesel-powered vans, which weigh more than 8,500 pounds, resemble diesel cars more closely than they do HDDVs. As more diesel-powered vans are equipped with afterburner technology, these vehicles could have their emissions inspected in the same manner as diesel-powered cars. A second commenter raised this same issue in respect to small pickup trucks, which he believes are no longer being manufactured at 8,500 pounds GVWR but are now manufactured at 8,600 or 8,800 pounds GVWR. This commenter asks whether these small pickup trucks would be subject to both a safety inspection at a private inspection facility or a central car inspection facility, like a gasoline-fueled car, as well as a diesel emissions inspection, at a diesel emission inspection center, like a HDDV. Another commenter asked that the definition of HDDV be changed to include only those vehicles with weight exceeding 26,000 pounds, on the grounds that the trucking industry needs uniformity; almost every other regulation dealing with heavy-duty trucks is set at the 26,001 pound threshold. (2, 3, 5)

RESPONSE: While the Department has established smoke opacity standards and test procedures for the class of diesel-powered vehicles with GVWRs of 8,500 to 18,000 pounds, these vehicles are not, at this time, subject to emission inspection under the rules promulgated by the DMV. The Department agrees with the commenter that these lighter heavy-duty diesel vehicles do not fit well into the HDDV category, and will be exploring what smoke opacity standards and test procedures are appropriate for these vehicles, and, if different from those currently adopted, will propose adoption of new standards and test procedures. Such modifications may include the revision of peak and continuous smoke opacity standards, and different or supplemental test methods, possibly including the use of a chassis dynamometer. Similarly, the DMV will be exploring the necessary and appropriate modifications, if any, it needs to make to the operational aspects of the

enhanced diesel inspection and maintenance program to accommodate the emission inspection of these vehicles.

Regarding the commenter request that the emission testing rules apply only to vehicles with a GVWR of 26,000 pounds or more, the diesel statute requires the DMV Director to establish a periodic inspection program and a roadside enforcement program for diesel-powered motor vehicles, heavy-duty diesel trucks and diesel buses, including, at a minimum, diesel-powered motor vehicles with a GVWR of more than 18,000 pounds. Thus the commenter's suggestion would exempt from testing vehicles for which the statute mandates inspection.

40. COMMENT: One commenter asked for clarification as to whether the exemption from the enhanced diesel inspection program provided for certain municipal diesel vehicles applies only to emergency vehicles, or to all municipal vehicles. (7)

RESPONSE: The exemption to which the commenter refers does not extend to all municipal vehicles, but only to those municipal vehicles used for emergency and other such purposes. Specifically, the Department's rule provides in the applicability section at N.J.A.C. 7:27-14.2(b) that the provisions of subchapter 14 do not apply to a "diesel-powered motor vehicle with a GVWR equal to or greater than 18,000 pounds that is designed or used for the transporting of property on any public road, street or highway, on any public property, or on any quasi-public roadway in this State, *and* is owned and operated by a county, municipality, fire district, or duly incorporated non-profit organization for first aid, emergency, ambulance, rescue, or fire-fighting purposes." (Emphasis added)

41. COMMENT: One commenter expressed support for the periodic inspection program, including the provision that it be phased in over several months to assist in the transition. (4)

42. COMMENT: Another commenter opposed the requirement for periodic emissions inspections, arguing that an annual smoke test would provide little information relative to the emissions characteristics of that vehicle the other 364 days of the year and thus would be of very little value in improving air quality, but would involve significant compliance costs for fleet vehicles. The random roadside enforcement program will provide the State with a very effective system to capture excessively-smoking vehicles, making the periodic requirement unnecessary. Most trucks which are smoking will experience decrements in fuel economy, engine performance and other key parameters prior to any periodic smoke test identifying this condition. (12)

RESPONSE TO COMMENTS 41 and 42: The Department appreciates the support expressed by one commenter for the periodic inspection program. Inclusion of a periodic inspection component is mandated by the diesel statute, and, for reasons described more fully in the proposal of these rule amendments, is critical to the success of the program, providing assurance of compliance that was not experienced in the most recent self-inspection program. It has been the

Department's experience that indicators of mal-maintenance have not adequately served as the impetus for repairs that the commenter argued they would.

43. COMMENT: One commenter supported the roadside enforcement program as a method whereby New Jersey can begin to address the out-of-state polluters. Two commenters supported the enhanced diesel inspection program, but stressed the importance of auditing and enforcement, particularly to ensure that those fleets qualifying for self-inspection, that is, fleets which are licensed as DEICs, perform that function in an adequate matter. One commenter noted further that the efforts of the Department's Commissioner, the Governor and the Legislature will be needed to ensure the availability of funding for the enforcement of this program. (4, 14)

RESPONSE: The Department appreciates the support expressed by the commenters and agrees that the functions of auditing and enforcement which will be undertaken by both the Department and the DMV are critical to the success of this program.

44. COMMENT: Several commenters noted the need to address excess oxides of nitrogen (NO_x) emissions in order for the State to attain the NAAQS for ozone (for which NO_x is a precursor), and suggested that the Department add emission standards and tests capable of identifying and reducing excess NO_x emissions from HDDVs to the enhanced diesel inspection program. The commenters noted the magnitude of contributions of HDDVs to NO_x pollution in New Jersey and the absence of any provisions within the proposed program to address the issue or provide for such standards and test procedures in the future. One commenter also suggested that the Department phase in dynamometer-based testing. (8, 9, 14)

RESPONSE: The Department agrees that the heavy-duty diesel vehicles (HDDVs) contribute significantly to the State's inventory of NO_x, an ozone precursor. However, the relationship between in-use NO_x emissions from HDDVs and malmaintenance and/or tampering is not well established. The emission reduction benefits of instituting a NO_x in-use test procedure and standard cannot currently be accurately assessed without further in-use test data. The Department intends to gather such in-use data and then make an assessment of the feasibility and effectiveness of an in-use NO_x standard for HDDVs, before adding such dynamometer-based testing.

45. COMMENT: Two commenters expressed great concern regarding the importance of regulating emissions from off-road diesels, pointing out that construction equipment, generators used by casinos for power, municipal compactors and railroad trains, both passenger and freight, have severe detrimental health effects on those living nearby. Recognizing the difficulty in regulating the emissions from these diesel engines, the commenters urged the Department and the DOT to act quickly to promulgate appropriate standards and test procedures for off-road diesels as soon as possible, as they are critical to the efforts to clean the air over our roads. (4, 14)

RESPONSE: Many of the air pollution sources which are mentioned in the comments are

addressed more specifically in the Department's rules at N.J.A.C. 7:27-3 Control and Prohibition of Smoke from Combustion of Fuel; N.J.A.C. 7:27-4 Control and Prohibition of Particles from Combustion of Fuel; and N.J.A.C. 7:27-5 Prohibition of Air Pollution. Furthermore, the diesel statute directs the Department to implement emission standards and test methods for various types of non-road vehicles. At this time, however, the Department lacks complete information to effectively address such air pollution sources. The Department is currently gathering data on non-road vehicle emissions and potential testing methodologies. This will be followed by an examination and development of appropriate emission standards and test methods for such diesel-powered motor vehicles. Following data collection and analyses, the Department intends to propose emission standards and test methods for non-road vehicles in a subsequent regulatory proposal.

46. COMMENT: Two commenters stated that ambient conditions such as altitude, temperature, dew point, barometric pressure and salt air content have a measurable effect of up to 10 percent in opacity, upon diesel exhaust emissions. One commenter suggested this could be a problem in New Jersey if the 40 percent peak smoke opacity standard for 1991 and newer model year engines is adopted, given what the commenter sees as a high level of saltwater particles in the air in this State. The commenter asked how the Department has accounted for such variations in testing conditions within its testing protocols. The other commenter suggested that until the State can employ more sophisticated tests that are not affected by these conditions it should rely only on the periodic and self-inspection components to determine vehicle compliance. (6, 15)

RESPONSE: The Department recognizes that many of the atmospheric conditions mentioned by the commenter can affect smoke opacity levels and, accordingly, has addressed them at N.J.A.C. 7:27B-4.2 General Instructions For All Tests. For instance, emission testing is only to be conducted under favorable temperature conditions, that is, the temperature must be between 35 and 95 degrees Fahrenheit. Dew point is also accounted for in the general instructions; testing is only to be conducted when the temperature of the ambient air is above the dew point. Many of the test conditions specified merely repeat those recommended in SAE J1667. The Department does not see variations in altitude among the various test sites to be an issue in New Jersey, which to date does not maintain test sites at altitudes greater than one thousand feet above sea level.

In establishing smoke opacity standards for the enhanced diesel inspection program, the Department examined data accumulated during extensive pilot testing undertaken by the DMV. This pilot testing was conducted throughout the State under varying climatic and geographic conditions to develop an understanding of in-use heavy-duty diesel engine emissions throughout New Jersey. Thus, the information used to establish New Jersey's diesel enhanced inspection and maintenance program reflects variations in conditions which are normally encountered throughout the State. Therefore, variations in test conditions have been either accounted for in the establishment of the adopted emissions standards or have been incorporated into the General Instructions For All Tests as conditions which must be satisfied in order to conduct official testing. There is no need, therefore, to employ "more sophisticated" tests in the roadside enforcement program, as one

commenter suggested.

47. COMMENT: One commenter suggests that the term "wide open throttle" may not be an appropriate term of art for an engine that has no throttle. One of the principal design features of a diesel engine is the fact that it is a non-throttle engine. (7)

RESPONSE: Although the term "wide open throttle" may be technically incorrect since diesel engines do not utilize a throttling mechanism to modulate air intake, the term is widely used in the testing of diesel engines as well as throttled engines. The Department understands this minor concern and has already addressed the possibility of any misunderstandings by including a clarification of this point within the definition of wide open throttle itself at N.J.A.C. 7:27B-4.1.

48. COMMENT: One commenter inquired as to the basis for the Department's conclusion that 10 to 20 percent of the registered owners of heavy-duty diesel trucks were complying with the self-inspection requirements for smoke opacity inspection. (7)

RESPONSE: The Department arrived at this conclusion as its best estimate, based on available data supplied by the DMV. While this is a gross estimate, subject to uncertainty, it is supported by anecdotal information available to both the DMV and the Department. However, the Department did not rely on the absolute accuracy of this estimate in designing the program, the implementation of which is required by the diesel statute. The Department provided this estimate in its proposal for background informational purposes only.

49. COMMENT: One commenter challenged the Department's assumption that the enhanced diesel inspection program would result in a daily particulate emission reduction of 7.4 tons, suggesting that a better estimate, given the additional level of compliance with the EPA standards for new engines, would be a daily particulate emission reduction of no more than 2.38 tons. (6)

RESPONSE: The Department realizes that the data used to calculate the emission inventory projections in the referenced study are not current, as they were based on a 1989 study. (Assessment of Control Strategies for Heavy-Duty Diesel-Powered Vehicles: Final Report. Radian Corp, Austin TX. October 24, 1989.) The Department, however, has used the best available information in deriving the cost-effectiveness ratio contained in the proposal and believes this information was adequate for the projections it made.

50. COMMENT: One commenter disputes the accuracy of the Department's statement in the proposal's summary that HDDVs and diesel buses are responsible for only five percent of the vehicle miles traveled (VMT) in New Jersey as well as the Department's statement that HDDVs are responsible for only 7.45 million VMT annually, and suggests that these figures should not be used to justify the proposed program. Specifically, the commenter suggests that the method used to project the inventory underestimates VMT attributable to HDDVs in New Jersey, and offers

alternative data and sources to arrive at an alternative and significantly higher figure of 245 million VMT. The commenter also objects to any reliance on the 1989 study contracted by the Department and conducted by Radian Corporation, on the grounds that it focussed primarily on the New Jersey Turnpike where vehicle truck counts and mileage figures were available and did not include the two major east/west interstates, I-78 and I-80. (6)

RESPONSE: The Department believes the VMT estimates used for heavy-duty diesel vehicles are sufficiently accurate for the purpose of the rule proposal. The Department used what it believed to be the best data available at the time in making the emission inventory and cost/effectiveness projections for this proposal. Nonetheless, the Department recognizes that these assumptions may be conservative and underestimate the impact of heavy-duty diesel vehicles on the air quality in New Jersey. As better data becomes available to the Department, the Department will update its emission inventory calculations and projections.

51. COMMENT: One commenter noted that the lack of compliance in the voluntary stage of the proposal and the inability to enforce the requirements for out-of-state diesel vehicles which use the roadways in New Jersey are weaknesses of the enhanced diesel inspection and maintenance program. (10)

RESPONSE: The Department expects the roadside enforcement component of the program, which will be in effect during the voluntary stage of the periodic inspection component, will result in an increased level of compliance with the program requirements because of the substantial fines to be imposed on non-compliant vehicles. Because the roadside enforcement program will apply to out-of-state as well as New Jersey-registered diesel-powered vehicles, the State will indeed be able to apply and enforce these smoke opacity standards against these out-of-state vehicles as they travel through this State.

52. COMMENT: One commenter indicated unconditional opposition to the practice of allowing used motor vehicle oil to be added to any diesel fuel. This adulteration of diesel fuel creates even more complex chlorinated compounds and adds to the number of carcinogens and heavy metals in diesel emissions. Instead, the commenter suggests the State develop less dangerous ways of disposal. (14)

53. COMMENT: Two commenters opposed the provision prohibiting used oil blending in diesel fuel at N.J.A.C. 7:27-14.3(d), stating that the trucking industry supports the practice of blending used oil into diesel fuel as a cost-effective and environmentally responsible way in which to dispose of the used lubricating oil which it generates. One commenter expressed concern that improper management of used oil can result in long-term environmental liability for the generator for unscrupulous disposal practices by a vendor or recycler. The commenter felt that this problem is avoided by the blending of used oil by the trucking industry, which blends at levels of 0.25 to a maximum of 2.0 percent in order to ensure compliance with federal diesel fuel formulation

requirements. The commenters felt that blending used oil in diesel fuel at levels below two percent has a negligible impact on smoke and other emissions from a diesel engine, in some cases even lowering emissions of nitrogen oxides, and does not result in significant levels of any unregulated pollutants. Nor do they believe that the very limited blending that occurs in diesel fuel results in any worse impact on the environment than from the aggregation of used oil by commercial interests to burn for energy generation or as part of a process. The commenters argued that the Department has not established a cause-and-effect relationship between used oil blending and increased levels of dioxin or excessive smoke. One commenter countered the Department's contention that such blending will raise levels of dioxin, pointing out that, even on a properly maintained engine, lubrication oil will enter the combustion chamber through, among other places, the engine rings and valve guides, and be combusted. The commenter also argued that little evidence exists that used oil blending, especially in the limited percentages allowed by the EPA, has any effect upon the level of smoke emissions. (1, 12)

RESPONSE TO COMMENTS 52 AND 53: Based on the comments it received, the Department has determined to reserve the prohibition on blending of used motor oil with on-highway diesel fuel. The Department hereby solicits further comments, which may be submitted until close of business Wednesday, October 1, 1997, on this portion of the proposal, only. Comments should be sent to:

Ann Zeloof, Esq.
Attention: DEP Docket No. 03-97-03/619
Department of Environmental Protection
CN 402
Trenton, New Jersey 08625-0402

The Department also obtained additional information and comments relevant to this proposed prohibition at a public workshop held on July 30, 1997 regarding rules now being developed by the Department which would permit the combustion of on-specification used motor oil. These measures should allow the Department to obtain and assess additional data and take measures, as needed, to ensure consistency between the prohibition and other Department policies on energy recovery and waste stream reuse. Should the Department determine to adopt the used oil blending provisions it will publish further notice in the New Jersey Register.

54. COMMENT: One commenter suggests that by proposing a prohibition of blending used oil into diesel fuel where none exists federally, the Department has proposed a rule which is inconsistent with federal guidelines. (1)

RESPONSE: The EPA has neither prohibited nor expressly permitted the blending of used motor oil into diesel fuel. As is explained in greater detail in the summary of the proposal at 29 N.J.R. 971(a), the Department's prohibition does not go beyond the federal requirements.

55. COMMENT: The commenter suggests that the Department propose any rules concerning waste oil disposal as a separate proposal and not as part of a diesel inspection and maintenance program, as this aspect of the proposal is materially unrelated to the diesel emissions inspection program. (1, 12)

RESPONSE: The Department chose to include the prohibition of blending used motor oil into diesel fuel in the new enhanced diesel inspection and maintenance rules as it believed this to be the place where the affected parties are most likely to look for rules which apply to their actions. The Department appreciates this comment and, accordingly is considering amending its used oil management rules at N.J.A.C. 7:26A-6 to reflect and/or cross-reference this prohibition. The Department is also considering making this prohibition part of the used oil combustion rules currently under consideration.

56. COMMENT: In order to be consistent with SAE J1667, which describes a procedure based upon optical path length which is based in turn upon engine horsepower, the commenter suggests that the Department modify its rule at N.J.A.C. 7:27B-4.3 to add engine horsepower as a required parameter for the calculation of optical path length as provided in the SAE J1667 calculation. (1)

RESPONSE: The Department agrees with the commenter and has accordingly made changes to N.J.A.C. 7:27B-4.3. The specifications for a smokemeter, as set forth at N.J.A.C. 7:27B-4.15, require that the smokemeter meet the specifications set forth in SAE J1667. The SAE J1667 specifications require that the smokemeter adjust final test opacity scores based upon engine horsepower and exhaust stack diameter. This adjustment, known as the Beer-Lambert Law is used to correct opacity readings from diesel-powered motor vehicles with an exhaust stack diameter which deviates from the standard exhaust stack diameter used during certification by the EPA of the engine for sale for on-road use. The Department does not believe that it is necessary to reiterate the details of SAE J1667 since the proposed rule incorporates all software and opacity measurement mechanisms by reference. However, the Department does recognize that this element of smoke opacity measurement may not have been sufficiently clear within the proposed rule language, and shares the commenter's concern that the person operating the equipment during testing understand the need to enter the proper information into the smokemeter in order to obtain the correct opacity reading. Therefore, the Department has modified N.J.A.C. 7:27B-4 upon adoption to more clearly require the use of engine horsepower to determine the standardized exhaust stack diameter, and further clarify the methods for measuring effective optical path length.

57. COMMENT: The commenter suggests that application of the snap acceleration smoke opacity test not be limited to vehicles equipped with a low speed engine, as proposed by the Department at N.J.A.C. 7:27-14.5(a)1, (b)1, (d)1 and (e)1. The commenter argues that there is ample technical support from manufacturers of heavy-duty diesel engines that the snap test need not be restricted to a low-speed engine, and that there is no technical justification for the Department's

restriction. (1)

RESPONSE: The commenter is correct; the rules at N.J.A.C. 7:27-14.5 do restrict application of the snap acceleration test to vehicles equipped with a low-speed engine. A low speed engine is defined as an engine with a maximum governed RPM of no more than 2,400. The 2,400 RPM threshold in the Department's rules is based on data collected during the pilot testing phase of the enhanced diesel inspection and maintenance program. That data revealed that the snap acceleration test was not effective in identifying excess smoke emissions from high speed HDDV engines.

The technical basis for the ineffectiveness of the snap-acceleration test on high-speed diesel engines involves the internal mass of the engine. On a high-speed diesel engine, the mass of the internal engine mechanisms fail to supply sufficient inertia to produce an effective load under the conditions encountered during the snap acceleration test. Therefore, without a sufficient load on the engine, the snap acceleration test produces unrealistically low smoke opacity results. This in turn tends to produce an unacceptably high incidence of false passes (errors of omission) when the snap-acceleration test is applied to a high-speed diesel engine.

58. COMMENT: The commenter urges the Department to follow the recommendation contained in SAE J1667 that vehicles with engines that do not have governors should fail the smoke opacity test. (1)

RESPONSE: N.J.A.C. 7:27B-4.3(a)(1), as adopted herein, provides that smoke opacity testing, using the snap acceleration smoke opacity test, will be discontinued if it is determined that the subject vehicle has a disabled or an improperly functioning governor until the governor is repaired or a properly functioning governor is installed. By providing for the termination of the test instead of failing the vehicle, the DMV will allow the truck owner, within a prescribed time limit, to repair the governor so that a valid smoke opacity test can subsequently be performed on the vehicle. Once the governor is repaired or replaced, a valid smoke opacity test can then be performed to determine compliance with smoke opacity standards. Alternatively, at the DMV's discretion, a rolling acceleration or stall test can be performed on the vehicle to determine compliance.

59. COMMENT: One commenter questioned the basis for the requirement at N.J.A.C. 7:27B-4.2(a)3 that testing be discontinued if the smokemeter does not read within one percent opacity of the neutral density filter value during the value verification process. (1)

RESPONSE: The rule text to which the commenter refers does not preclude further emission testing provided that the smokemeter correctly measures the opacity of the neutral density filter. This may be satisfied by adjusting the smokemeter, an automatic and involuntary sequence used by some manufacturers, or by utilizing another smokemeter. The one percent absolute opacity standard applies to the certified accuracy of the neutral density filter as indicated at N.J.A.C. 7:27B-

4.2. The purpose of this requirement is to ensure that the smokemeter is calibrated and measuring to a known standard of opaque value. The smokemeters which the Department has examined and expects will satisfy the criteria set forth at N.J.A.C. 7:27B-4.13 perform electronic self-adjustments when reading such a known value provided that the filter was included as original equipment with the smokemeter. Thus a failure to read the neutral density filter to within one percent opacity of its certified value is an indication of smokemeter malfunction.

The overall precision of the smokemeter is three percent opacity. The use of a neutral density filter with a one percent analytical tolerance for verification thus denotes an accepted potential error of one percent opacity. SAE J1667, which is incorporated by reference, allows for a linearity error, that is, a difference in opacity reading at points across the instrument scale, of two percent opacity. These two tolerances must be viewed as additive for determination of overall instrument accuracy when evaluated using an independent means such an independent neutral density filter or another smokemeter which is of a known accuracy. Therefore, the actual instrument accuracy and thus the tolerance to which it will be audited is plus or minus three percent opacity.

60. COMMENT: The commenter recommends that the Department amend its rules to require a "post-test-zero-shift" check, referring to a verification of the instrument reading while no smoke is passing through the opacity measurement apparatus. A post-test-zero-shift check is a quality control requirement which is conducted upon the smokemeter at the end of a test cycle. The purpose of this check is to ensure that the smokemeter is reading correctly when there is no smoke within its optical path to obscure light and thus give an opacity reading of an appreciable value. The purpose of this check is to ensure that there has not been an appreciable accumulation of diesel exhaust particles upon the smokemeter optical hardware, as such a buildup may yield an erroneously high opacity value. (1)

RESPONSE: The Department agrees with the commenter that a so-called post-test-zero-shift check is necessary. Such a verification check is included in the specifications set forth in SAE J1667. However, for greater clarity the Department has added, on adoption, a requirement at N.J.A.C. 7:27B-4.2(a)(11) that the verification check be performed.

61. COMMENT: The commenter recommends the revision of N.J.A.C. 7:27B-4.3(a)9 to permit repeating the snap acceleration smoke opacity test if the difference between the highest and lowest values of the three peak smoke opacity readings is greater than five percent smoke opacity. (1)

RESPONSE: N.J.A.C. 7:27B-4.3(a)9 provides, under the circumstances described in the comment, that the snap acceleration smoke opacity test will be invalidated. This is to be distinguished from a determination that the vehicle has failed the smoke opacity test. As such, the test may be repeated, as is suggested by the commenter. The Department has modified N.J.A.C. 7:27B-4.3(a)9 on adoption, as follows, in order to clarify that the test can be repeated until a valid

reading can be obtained.

9. Determine the arithmetic mean of the three peak smoke opacity readings recorded in (a) 8 above. If the difference between the values (given in percent smoke opacity) of the highest and lowest of the three peak smoke opacity readings is greater than five percent smoke opacity, the test shall be invalid *, **and may be repeated until the difference between these values is five percent smoke opacity or less***. If the arithmetic mean of the three peak smoke opacity readings exceeds the standards set forth at N.J.A.C. 7:27-14.6(b), (c), (d) or (e), or an alternative smoke opacity standard established pursuant to N.J.A.C. 7:27B-4.13, as applicable, the vehicle shall be deemed to have failed to pass the snap acceleration smoke opacity test.

In addition, the following parallel provision has been added to the procedures set forth at N.J.A.C. 7:27B-4.3(c) for the stall test.

12. Determine the arithmetic mean of the three peak smoke opacity readings recorded in (c) 11 above. *If the difference between the values (given in percent smoke opacity) of the highest and lowest of the three peak smoke opacity readings is greater than five percent smoke opacity, the test shall be invalid, and may be repeated until the difference between these values is five percent smoke opacity or less.*

62. COMMENT: The commenter suggested the Department revise N.J.A.C. 7:27B-4.3(a)7 to substitute "allow the engine to idle for a minimum of 5 seconds and a maximum of 45 seconds" for the phrase "allow the engine to idle for five to 45 seconds". (1)

RESPONSE: The Department appreciates the efforts of the commenter to help increase the clarity of these rules. However, the Department is confident that the language adopted at N.J.A.C. 7:27B-4.3(a)7 is sufficiently clear to the regulated community without further modification.

63. COMMENT: One commenter suggested modifying the definition of exhaust stack diameter at N.J.A.C. 7:27B-4 to refer to the measuring of the external rather than the internal diameter of the pipe, as this would be sufficiently accurate for the purposes of these tests. Another commenter suggested that the nominal diameter of the exhaust stack should be used, that is, the diameter should be rounded off to the nearest whole inch, for example, 2, 3, 4, or 5 inches. (7, 11)

RESPONSE: Rounding the diameter of the exhaust stack to the nearest inch is acceptable and within the specifications set forth at N.J.A.C. 7:27B-4. It is the Department's understanding that most smokemeters do not provide for a more specific exhaust diameter input than one inch increments. Since the diameter can be rounded off to the nearest inch, measurement of the external diameter will be sufficiently accurate for the majority of vehicles that have relatively thin exhaust

stack pipes.

There have been instances, however, of vehicles having exhaust stacks of an unusual construction, in some cases using thick-walled materials. Examples of such unusual configurations include heated bed asphalt dump trucks and vehicles with heavily modified exhaust configurations. Such configurations, though unusual, can introduce significant error in the results of an opacity test if these factors are not properly accounted for. Therefore, in the case of a vehicle that has an exhaust stack with wall thickness that will result, when rounding off to the nearest inch, in a different diameter, the wall thickness must be subtracted from the external diameter.

64. COMMENT: The commenter suggested the Department follow the SAE J1667 recommendation that at least three exhaust soot purge cycles be conducted prior to actual opacity measurement. (11)

RESPONSE: The Department agrees with the commenter that exhaust soot purges are necessary to ensure accurate test results. However, the Department has determined that the two exhaust soot purges required at N.J.A.C. 7:27B-4.3(a)7, (b)5, and (c)7 are sufficient to address this issue. In addition, the failure to properly purge soot would be reflected by the test validation criteria used in SAE J1667, and incorporated within the adopted rule at N.J.A.C. 7:27B-4.3(a)9 and (c)12. This test validation criteria examines the arithmetical difference between the highest and lowest test values for consistency within five percent opacity.

65. COMMENT: The commenter expressed concern over data network transfer and test printout format requirements as being vague and potentially costly to design. (11)

RESPONSE: Since the DOT will not be establishing an electronic data acquisition network to accommodate the network of DEICs, the Department has not promulgated any requirements for electronic data formatting. As to the Department's requirements for test printout format at N.J.A.C. 7:27B-4.15, these requirements are intended to be performance-based requirements. That is, the Department specifies minimum requirements that must be contained in the printout, and allows the smokemeter manufacturer the flexibility to design the actual format of the printout. For example, the only specification for the printout set forth at N.J.A.C. 7:27B-4.15 is that there be a minimum level of resolution for the printout of engine RPM over the test cycle. The rule gives the smokemeter manufacturer the flexibility to design a format for the printout that satisfies the performance-based specification for the printout of engine RPM.

66. COMMENT: One commenter recommended the Department not permit the use of sampling-type meters in order to be consistent with the SAE J35 recommendation against use of sampling type smokemeters for transient testing. The basis for this SAE J35 recommendation was that sampling type instruments have excessive and variable response delays and do not provide an accurate measurement of an engine's transient smoke characteristics. The commenter states further

that sampling type smokemeters did poorly during a correlation study conducted by the SAE for the purposes of evaluating the capabilities of several different smokemeters. The commenter offered examples of test results supporting his contention that the sampling type smokemeters were inaccurate for the purposes of official testing. (11)

RESPONSE: The SAE material relied upon by the commenter is not relevant to current technology sampling-type smokemeters. SAE J35 pre-dates the development of sampling-type smokemeters with sample measurement response times useful for transient opacity emission testing. SAE J1667, the specifications incorporated by reference in the rules at N.J.A.C. 7:27B-4.15, establishes instrument response times for opacity measurement (the time it takes an instrument to respond to changes in opacity) which the SAE has deemed necessary for proper opacity measurement during the snap acceleration test. The snap acceleration test is the most likely of the three smoke opacity tests to produce rapidly changing opacity conditions and thereby necessitate a rapid smokemeter response time. Therefore, the Department's smokemeter specifications should be more than sufficient for all opacity tests that may be performed in the enhanced diesel inspection and maintenance program.

The Department is aware of the SAE correlation study relied upon by the commenter. Although it has been more than a year since the SAE completed this April 1996 study, it has yet to formally release any reports, data or conclusions developed pursuant to such studies. The Department, therefore, is unable to comment upon this study or any information which is derived from the study.

67. COMMENT: The commenter feels that the Department's rule should, but does not include the recommendations contained in Internation Standards Organization (ISO) CD 11614, regarding minimum pipe diameter requirements intended to ensure that a nonturbulent sample is taken by a sampling meter. (11)

RESPONSE: The methodology referred to by the commenter is outmoded; current technology incorporated within sampling type smokemeters enables them to satisfy the specifications set forth in SAE J1667. ISO CD 11614 was written when a state-of-the-art sampling smokemeter used exhaust pressure to transport the sample from the vehicle to the measurement unit. Current technology sampling smokemeters either use active sample extraction or the sample transport path is of such a minute dimension and of low resistance that the sample response time lag is insignificant. Both active sampling and short-path type smokemeters obviate the need for laminar flow, which is necessary when there is a significant pressure differential between the exhaust stream and the sample extraction unit. Active sampling smokemeters seek to avoid this issue by inducing sample flow and thus seeking to equalize the pressure differential between the exhaust stream and the sample lines.

68. COMMENT: Two commenters suggests that New Jersey should follow the approach

established by the EPA and many state and local governments and use only the SAE J1667 Test Procedure incorporating the snap acceleration test in the roadside and periodic inspection programs. Only the snap test is needed to accomplish the goal of the program, which is to reduce the number of excessively smoking vehicles in New Jersey due to tampering and/or mal-maintenance. It is not necessary to use the rolling acceleration test or the stall test to meet this goal; therefore the fact that these tests correlate better to new engine certification testing is meaningless and unnecessarily costly. One commenter expressed concern that neither the stall test nor the rolling acceleration test be used in the program since they have not received industry approval. The Department should allow only SAE-approved tests as part of the diesel inspection and maintenance program. (1, 5, 12)

69. COMMENT: Three commenters support the Department's decision to not follow the EPA recommendation that states initiating an in-use diesel emissions testing program adopt the snap acceleration test otherwise referred to as the SAE J1667. The commenters support the inclusion of the stall acceleration test and the rolling acceleration test in addition to the snap acceleration test in New Jersey's enhanced diesel inspection and maintenance program. The use of multiple smoke opacity tests will strengthen the program. The snap test is not a universal test, and is not a particularly good measure of emissions over a typical loaded driving cycle, nor is it useful either for lighter vehicles or for those with automatic transmissions. Other tests are required to make an accurate determination of excessive emissions of full-range heavy-duty diesel vehicles. In fact, the SAE published a paper which recommended the stall procedure for use on heavy-duty diesel trucks with automatic transmissions. In addition, the stall test can also be used, in conjunction with a dynamometer, to measure NO_x emissions. Accordingly, the commenters support adoption of the rolling acceleration test and the stall test in lieu of the snap test for periodic testing. In so doing, New Jersey is taking the lead in adopting a program more sound than one based entirely on the snap test. (7, 8, 9)

RESPONSE TO COMMENTS 68 and 69: The Department recognizes that the snap acceleration test has limitations in its application and effectiveness. The snap acceleration test, which is an unloaded test, is primarily useful in detecting a fairly narrow range of engine defects on low speed diesel engines. However, the snap acceleration test does identify defects with certain key emission control components, for example, puff limiters on low speed diesels and, because of its operational utility, is useful in a roadside enforcement setting.

Because of the limited applicability and effectiveness of the snap acceleration test, the Department investigated other in-use test procedures. The rolling acceleration test and the stall test, both loaded emission tests, are generally recognized as being more effective in identifying high-emitting HDDVs, especially with regard to modern technology HDDV engines. These loaded emission tests therefore, can be used to address excess emissions from classes of HDDVs that would be less effectively evaluated with the snap acceleration test.

70. COMMENT: The commenter notes that the Department's proposal fails to provide

any guidelines for the discretionary use of the three smoke opacity tests. It is unclear whether one or more of these tests must be performed at any given time, whether an additional test must be performed if a prior test's results are inconclusive or represent a failure, and who would make this determination. The commenter suggests that without guidelines the test or tests could be performed inconsistently and unfairly. (1)

RESPONSE: The Department evaluated the three smoke opacity tests adopted herein, and found all to be technically valid. The actual operational decisions on use of the adopted test procedures will be made by the DMV after consultation with the Department.

71. COMMENT: Will the Department accept responsibility if there is personal injury or property damage incurred as the result of the administration of a non-SAE approved test? (5)

RESPONSE: For clarification, the SAE does not approve test procedures. The SAE has issued a "recommended practice" document known as J1667 which recommends the use of the snap acceleration test procedure for testing diesel emissions. The SAE, through J1667, does not, however, render a judgment on other available tests and as such SAE does not reject their potential use.

Furthermore, the Department does not see any reason to expect personal injury or property damage to result from the proper administration of any of the smoke opacity tests. In any event, the State's liability for any such damages would be no different than it is generally for its actions in conducting properly authorized tests. A discussion of the State's liability for its actions in conducting the inspection of motor vehicles, however, goes beyond the scope of this adoption document.

72. COMMENT: One commenter requested further background information on the consultation process between the Department and the DMV regarding the control of emissions from off-road diesel vehicles referred to in the Department's introduction to its proposal. (7)

RESPONSE: The Department and the DMV met on several occasions to discuss the inspection of non-road diesel-powered motor vehicles. During these meetings, the Department and the DMV agreed that there is a lack of sufficient data to support establishing an in-use emission standard for non-road engines. It was also agreed that more research is needed prior to implementation of a fair and effective in-use emission testing program for non-road diesel-powered motor vehicles.

Summary of Agency-Initiated Changes:

N.J.A.C. 7:27-14.3 - The Department had proposed at N.J.A.C. 7:27-14.3(d) a prohibition against the introduction of used motor oil or fuel into which used motor oil has been added, into the fuel tank of any diesel-powered motor vehicle. As discussed above, the Department has determined, based on comments received regarding this proposed prohibition, to reserve the adoption of this

provision at this time. Should the Department determine to adopt this provision at some later date it will give notice of such subsequent adoption by publication in the New Jersey Register.

N.J.A.C. 7:27B-4.1 - Based on comments suggesting such a change, the Department has determined to modify for greater clarity the definition of "neutral density filter" proposed at N.J.A.C. 7:27B-4.1. The Department has also modified upon adoption the definition of "exhaust stack diameter" to provide for the measurement of the external, not the internal diameter of the pipe and to provide that the measurement be rounded off to the nearest whole inch, except in those instances where the thickness of the wall is so great that using the external diameter would result, when rounding off to the nearest inch, in a diameter a full inch greater than that which would have resulted from the measurement of the internal diameter.

N.J.A.C. 7:27B-4.2 - The Department has determined to add a provision at N.J.A.C. 7:27B-4.2(a)11 a requirement that a verification check, known as a "post-test-zero-shift" check, be performed after every smoke opacity test set forth at N.J.A.C. 7:27B-4.3 to verify the instrument reading while no smoke is passing through the opacity measurement apparatus.

N.J.A.C. 7:27B-4.3

- The Department has determined to add a requirement to its smoke opacity testing procedures for heavy-duty diesel vehicles and diesel buses at N.J.A.C. 7:27B-4.3(a)3 and 4, 4.3(b)2 and 3 and 4.3(c)4 and 5 that the inspector determine the engine horsepower of the vehicle being testing and enter this value and the exhaust stack diameter into the smokemeter. The Department is making this change based on a commenter suggestion that this procedure be explicitly required.

- In response to comments, the Department has determined to add provisions to N.J.A.C. 7:27B-4.3 at 4.3(a)9 and (c)12 to explicitly allow for the repeat of the snap or stall test after a prior test has been discontinued due to excessive variability between the highest and lowest of the three peak smoke opacity readings obtained during the test run.

- The Department is also correcting a typographical error in N.J.A.C. 7:27B-4.3(a)9.

N.J.A.C. 7:27B-4.13

- In response to a comment, the Department is modifying the provisions at N.J.A.C. 7:27B-4.13(a)2.i to clarify that, in establishing that a vehicle qualifies for consideration for the establishment of an alternative smoke opacity standard, its engine is to be tuned to minimize the level of smoke in the exhaust emissions consistent with the design, specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer.

- The Department is also modifying the provisions set forth at 7:27B-4.13(a)2.ii to delete the phrase "or to the satisfaction of", to clarify that the determination that the vehicle engine and all fuel control and emissions-related components are consistent with the design, specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer is to be made by the diesel emission inspection center.

- Based upon a commenter suggestion, the Department is modifying the provisions at 7:27B-

4.13(b) to clarify that the procedure for establishing the alternative smoke opacity standard will not result in an alternative standard which exceeds 100 percent opacity.

N.J.A.C. 7:27B-4.15 - ***are we still considering a change here? Dave, let's discuss.***

In addition to the above, the Department identified and corrected a number of minor typographical errors which appeared in the rule proposal as it appeared in the April 7, 1997 New Jersey Register.

Federal Standards Statement

The adopted changes to the Department's rules will not modify the program design so as to in any way impose standards or requirements that exceed those contained in Federal law. Accordingly, neither Executive Order No. 27(1994) nor N.J.S.A. 52:14b-23 requires a cost-benefit analysis.

Full text of the adoption follows (additions to proposal indicated in boldface with asterisks ***thus***; deletions from proposal indicated in brackets with asterisks *[thus]*):

7:27-14.1 Definitions

"Idle" means an operating mode *[and]* where the vehicle engine is not engaged in gear and where the engine operates at a speed at the revolutions per minute specified by the engine or vehicle manufacturer.

7:27-14.2 Applicability (No change from proposal.)

7:27-14.3 General prohibitions

(a)-(c) (No change from proposal.)

Reserved from adoption: *(d) No person shall cause, suffer, allow or permit the introduction of used motor oil or fuel into which used motor oil has been added, into the fuel tank of any diesel-powered motor vehicle.*

7:27-14.4 General public highway standards (No change from proposal.)

7:27-14.5 Test requirements

(a) - (e) (No change from proposal.)

(f) A person testing a diesel-powered motor vehicle, as part of either the roadside enforcement program established pursuant to N.J.S.A. 39:8-64 and N.J.A.C. 13:20-46 or the periodic inspection program established pursuant to N.J.S.A. 39:8-64 and N.J.A.C. 13:20-26.17, or the self-inspection program established pursuant to N.J.A.C. 13:20-26 and *[16.53-3]* ***16:53-3***, shall conduct an examination of the emission control apparatus as described at N.J.A.C. 7:27B-4.8(d).

7:27-14.6 Inspection standards (No change from proposal.)

(a) (No change from proposal.)

1. The general public highway standards set forth at *[N.J.A.C. 7;27-14.4]* ***N.J.A.C. 7:27-14.4***; and

2. The applicable smoke opacity standards set forth in (b), (c), (d) and (e)*[,]* below.

7:27-14.7 Non-interference with the motor vehicle codes (No change from proposal.)

SUBCHAPTER 4. AIR TEST METHOD 4: TESTING PROCEDURES FOR MOTOR VEHICLES

7:27B-4.1 Definitions

The following words and terms, when used in this subchapter, have the following meanings, unless the context clearly indicates otherwise.

...

"Exhaust stack diameter" means*[:

1. For a vehicle equipped with exhaust piping consisting of sections of a single diameter and a straight tailpipe, the internal diameter of the exhaust outlet of the vehicle;

2. For a vehicle equipped with exhaust piping consisting of sections of different and/or varying diameters, the external diameter of the first straight section of the exhaust piping downstream of the engine exhaust manifold and upstream of the muffler, minus twice the thickness of the pipe wall of the measured section;

3. For a vehicle equipped with exhaust piping of a single diameter and a curved tailpipe, the external diameter of the first straight section of exhaust piping upstream of the curved outlet, minus twice the thickness of the pipe wall of the measured section; and

4. For a vehicle equipped with exhaust piping of a configuration other than those listed in paragraphs 1, 2 and 3 above, the exhaust stack diameter shall be determined in accordance with Appendix D of SAE J1667, incorporated herein by reference]* * **the external diameter of the exhaust outlet of the vehicle, rounded to the nearest whole inch, except in those instances where the thickness of the pipe wall is so great that using the external diameter would result, when rounding off to the nearest inch, in a diameter measurement which is a full inch greater than that which would have resulted from the measurement of the internal diameter.***

...

"Neutral density filter" means a device used to calibrate or verify the *[measurement accuracy]* ***accuracy of the raw opaque value within the measurement path*** of a smokemeter which consists of a lens of neutral particle density and which filters visible light to a known opacity value.

...

7:27B-4.2 General instructions for all tests

(a) 1. -8. (No change from proposal.)

9. If, at any time before or during the inspection of a diesel-powered motor vehicle, continuous blue smoke is observed in the exhaust emissions for more than three seconds, discontinue the testing and determine that the vehicle has failed to pass the smoke opacity test conducted pursuant to N.J.A.C. 7:27-14.6; *[and]*

10. At the conclusion of the inspection of a diesel-powered motor vehicle at a DEIC, ensure that a printed test report has been produced by the smokemeter*[.]* ***and**

11. At the conclusion of the smoke opacity test confirm that the smokemeter reads a value of less than +/-2.0 percent opacity when the smokemeter is disengaged from the vehicle exhaust stream.*

(b) - (d) (No change from proposal.)

7:27B-4.3 Smoke opacity testing procedures for heavy-duty diesel vehicles and diesel buses

(a) 1. and 2. (No change from proposal.)

3. If using a partial-flow smokemeter, measure the exhaust stack diameter *[and enter this measurement into the smokemeter]***and determine the engine horsepower. Enter these values into the smokemeter*;**

4. If using a full-flow smokemeter, install the smokemeter so that the measurement path is in the axis of the exhaust plume and within five centimeters of the exhaust outlet, and so that the installation is in accordance with SAE J1667 Appendix D. ***Measure the exhaust stack diameter and determine the engine horsepower. Enter these values into the smokemeter.*** Smoke opacity shall be measured only from an exhaust outlet which serves as the effluent point of an exhaust pipe ending in a straight length of at least two linear feet and which has an internal diameter of no more than five inches (127 mm), or from an exhaust outlet to which a leak-free adaptor has been attached to allow the vehicle to meet these conditions;

5. - 8. (No change from proposal.)

9. Determine the arithmetic mean of the three peak smoke opacity readings recorded in (a) 8 above. If the difference between the values (given in percent smoke opacity) of the highest and lowest of the three peak smoke opacity readings is greater than five percent smoke opacity, the test shall be invalid ***, and may be repeated until the difference between these values is five percent smoke opacity or less***. If the arithmetic mean of the three peak smoke opacity readings exceeds the standards set forth at N.J.A.C. 7:27-14.6(b), (c), (d) or (e), or an alternative smoke opacity standard established pursuant to N.J.A.C. 7:27B-4.13, as applicable, the vehicle shall be deemed to have failed to pass the snap acceleration smoke opacity test.

(b) The testing procedures for the rolling acceleration smoke opacity test, required pursuant to N.J.A.C. 7:27-14.5, shall be performed, on a straight and level road course, as follows:

1. (No change from proposal.)

2. If ***using*** a partial-flow smokemeter *[is used]*, measure the exhaust stack diameter *[and enter this measurement into the smokemeter]* ***and determine the engine horsepower. Enter these values into the smokemeter***;

3. If ***using*** a full-flow smokemeter *[is used]*, install the smokemeter so that the measurement path is in the axis of the exhaust plume and within five centimeters of the exhaust outlet and so that the installation is in accordance with SAE J1667 Appendix D. ***Measure the exhaust stack diameter and determine the engine horsepower. Enter these values into the smokemeter.*** Smoke opacity shall be measured only from an exhaust outlet which serves as the effluent point of an exhaust pipe ending in a straight length of at least two linear feet and which has an internal diameter of no more than five inches (127 mm), or from an exhaust outlet to which a leak-free adaptor has been attached to allow the vehicle to meet these conditions;

4. - 6. (No change from proposal.)

7. Record the peak smoke opacity reading obtained during the test run described in (b) *[4]* ***6*** above. If the peak smoke opacity reading exceeds the standards set forth at N.J.A.C. 7:27-14.6(b) or (e), or an alternative smoke opacity standard established pursuant to N.J.A.C. 7:27B-4.13, as applicable, the vehicle shall be deemed to have failed to pass the rolling acceleration smoke opacity test.

(c) (No change from proposal.)

1. - 3. (No change from proposal.)

4. If ***using*** a partial-flow smokemeter *[is used]*, measure the exhaust stack diameter *[and enter this measurement into the smokemeter]* ***and determine the engine horsepower. Enter these values into the smokemeter***;

5. If ***using*** a full-flow smokemeter *[is used]*, install the smokemeter so that the measurement path is in the axis of the exhaust plume and within five centimeters of the exhaust outlet and so that the installation is in accordance with SAE J1667 Appendix D. ***Measure the exhaust stack diameter and determine the engine horsepower. Enter these values into the smokemeter.*** Smoke opacity shall be measured only from an exhaust outlet which serves as the effluent point of an exhaust pipe ending in a straight length of at least two linear feet and which has an internal diameter of no more than five inches (127 mm), or from an exhaust outlet to which a leak-free adaptor has been attached to allow the vehicle to meet these conditions;

6. - 11. (No change from proposal.)

12. Determine the arithmetic mean of the three peak smoke opacity readings recorded

in (c) 11 above. ***If the difference between the values (given in percent smoke opacity) of the highest and lowest of the three peak smoke opacity readings is greater than five percent smoke opacity, the test shall be invalid, and may be repeated until the difference between these values is five percent smoke opacity or less.*** If the arithmetic mean of the three peak smoke opacity readings exceeds the standards set forth at N.J.A.C. 7:27-14.6(b), (c), (d), (e) or an alternative smoke opacity standard established pursuant to N.J.A.C. 7:27B-4.13, as applicable, the vehicle shall be deemed to have failed to pass the stall smoke opacity test.

(d) (No change from proposal.)

7:27B-4.13 Procedures for establishing an alternative smoke opacity standard for diesel-powered motor vehicles

(a) (No change from proposal.)

1. (No change from proposal.)

2. The owner or lessee shall submit documentation to the Department, or its designee, demonstrating that the vehicle engine and all fuel control and emissions-related components have been, within 45 calendar days of submission of said documentation:

i. Tuned to minimize the level of smoke in the exhaust emissions ***consistent with the design, specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer***; and

ii. Determined by *[, or to the satisfaction of]* a licensed diesel emissions inspection center, to be within the design, specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer;

3. - 4. (No change from proposal.)

(b) If the Department determines that the vehicle cannot be repaired to meet the standard s set forth at N.J.A.C. 7:27-14.4 and 14.6, it shall issue an alternative smoke opacity standard report to the owner or lessee which establishes an alternative smoke opacity standard for the specific vehicle-engine-chassis combination. The Department shall establish this alternative smoke opacity standard by adding 10 percentage points ***or the maximum points as necessary to not yield an alternative smoke opacity standard in excess of 100 percent*** to the highest smoke opacity percentage obtained from all testing of the vehicle performed subsequent to any tuning, repairing, or rebuilding of the engine pursuant to (a) 2, above.

(c) (No change from proposal.)

7:27B-4.15: Specifications for a smokemeter for determining compliance with N.J.A.C. 7:27-14

(a) (No change.)

1. (No change.)

2. The smokemeter shall be capable of accepting as input the vehicle exhaust stack diameter ***and the engine horsepower***;

(b) (No change from proposal.)

1. - 3. (No change from proposal.)

i. - v. (No change from proposal)

vi. The oil temperature when measured during testing conducted pursuant to N.J.A.C. 7:27B-4.3(a)5, *[7:27B-4.3]*(b)4 or *[7:27B-4.3]*(c)6.

Based on consultation with staff, I hereby certify that the above statements, including the Federal Standards Statement, addressing the requirements of Executive Order 27(1994) and N.J.S.A. 52:14B-23, permit the public to understand accurately and plainly the purposes and expected consequences of these adopted amendments. I hereby authorize the adoption of these amendments.

August 11, 1997 /s/

DATE: ROBERT C. SHINN, JR.
Commissioner, Department of Environmental Protection