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## **ENVIRONMENTAL PROTECTION**

### **ENVIRONMENTAL REGULATION**

#### **OFFICE OF AIR QUALITY MANAGEMENT**

##### **Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles (Diesel Powered Motor Vehicle Inspection and Maintenance Program)**

**Proposed Amendments:** N.J.A.C. 7:27-14.2, 14.4, and 14.6, and 7:27B-4.5

Authorized By: Lisa P. Jackson, Commissioner, Department of Environmental Protection

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, and 8.11, and 39:8-61.

Calendar Reference: See Summary below for explanation of exception to calendar requirement.

DEP Docket Number: 05-08-05/94

Proposal Number: PRN 2008-196

A public hearing concerning this proposal and a proposed State Implementation Plan (SIP) revision will be held at 9:00 A.M. on Wednesday, July 30, 2008 at:

New Jersey Department of Environmental Protection

Hearing Room, 1<sup>st</sup> Floor

401 East. State Street

Trenton, New Jersey 08625

Directions to the hearing room may be found at the Department's website address

<http://www.state.nj.us/dep/where.htm>.

Submit written comments by August 15, 2008, to:

Alice A. Previte, Esq.

Attn: DEP Docket No. 05-08-05/94

Office of Legal Affairs

New Jersey Department of Environmental Protection

401 East State Street, Fourth Floor

PO Box 402

Trenton, NJ 08625-0402

The Department of Environmental Protection (Department) requests that commenters submit comments on disk or CD as well as on paper. Submittals on disk or CD must not be access-restricted (locked or read-only) in order to facilitate use by the Department of the electronically submitted comments. Submittal of a disk or CD is not a requirement. The Department prefers Microsoft Word 6.0 or above. Macintosh™ formats should not be used. Each comment should be identified by the applicable N.J.A.C. citation, with the commenter's name and affiliation following the comment.

The agency proposal follows:

### **Summary**

Since the Department is providing a 60-day comment period on this proposal, this proposal is excepted from the rulemaking calendar requirement pursuant to N.J.A.C. 1:30-3.3(a)5.

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The Department is proposing to amend N.J.A.C. 7:27-14, Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles, to reduce the opacity cutpoints, strengthen the visible smoke standard for diesel-powered trucks and buses, and clarify the rules' exemption for emergency vehicles. This rulemaking is a part of the Department's Statewide effort to reduce diesel exhaust emissions from diesel-powered vehicles. This proposal also represents a revision to the State Implementation Plan.

Diesel exhaust contains particulate matter in several size ranges, from coarse soot that can actually be seen as individual particles, to virtually invisible ultra-fine particles less than one micron in diameter ( $PM_{1.0}$ ). In this proposal, the term "particulate matter" or "PM" means the mostly visible particle fraction, including particles up to 10 microns in diameter ( $PM_{10}$ ).

Although the opacity measurement technique utilized in the Diesel Powered Motor Vehicle Inspection and Maintenance Program (Diesel Inspection Program) focuses on  $PM_{10}$  emissions, reductions of particulate matter less than 2.5 microns in diameter ( $PM_{2.5}$ , which is a fraction of  $PM_{10}$ ) will also occur when a vehicle is properly maintained.

Diesel-powered engines, such as those found in trucks and buses, are responsible for a significant amount of the particulate pollution in New Jersey, which can disproportionately affect people in densely populated high traffic areas, especially in urban centers. The emission of particulate matter and other chemical compounds in the exhaust of diesel engines pose a real health risk to the people of the State. Analysis of data from the Department's air monitoring system shows that diesel emissions contribute up to 12 percent of the particulate matter 2.5 microns or less in diameter in the State.<sup>1</sup>

Scientific and academic studies have repeatedly shown links between exposure to fine particles and health effects, including premature death and increased incidents of asthma, allergies, and other breathing disorders. A recent report by the New Jersey Clean Air Council

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states that only smoking and obesity outrank exposure to particulate matter in the estimated number of premature deaths caused every year.<sup>2</sup> Asthma and emphysema are exacerbated by particulate matter in the atmosphere. The United States Environmental Protection Agency (USEPA)<sup>3</sup> and the California Air Resources Board (CARB)<sup>4</sup> have classified diesel exhaust as a substance carcinogenic to humans, and have also identified diesel particulate matter and diesel exhaust organic gases as mobile source air toxics (a group of pollutants for which there is no national air quality standards, but that are likely to be emitted into the air in sufficient quantities to cause adverse health effects).

Fine particle emissions from diesel engines can be reduced by implementing stricter diesel emission cutpoints and idling regulations, encouraging the use of truck stop electrification and auxiliary power units, retrofitting diesel engines with particulate control devices, and increasing public awareness of diesel exhaust health effects through an anti-idling campaign. To that end, a law was enacted in 2005 creating a mandatory diesel retrofit program for approximately 40,000 existing diesel-powered vehicles and pieces of equipment throughout the State that are publicly owned, or are privately owned and are under contract to a public agency. (See P.L. 2005, c.. 219.) The proposed stricter cutpoints are a concurrent effort intended to provide additional reductions of particulate matter and diesel exhaust by encouraging better maintenance and repair practices.

Smoke opacity, which is an indicator of particulate matter, is the degree to which a plume of smoke will obstruct transmission of visible light. It is typically expressed as a percentage of obstructed light. When the Department adopted the existing smoke opacity cutpoints in 1998 (30 N.J.R. 901(a) and 2476(b)), excessively smoking diesel-powered vehicles were a common sight on the State's roads and highways. Enforcement of the State's opacity cutpoints has made those excessively smoking vehicles the exception, rather than the rule.

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There are approximately 70,000 heavy-duty diesel vehicles with a gross vehicle weight rating equal to or greater than 18,000 pounds in the New Jersey fleet of registered vehicles that are inspected under the Diesel Inspection Program. Inspection data collected since the beginning of the Diesel Inspection Program in 1998 show progressive improvement in smoke emissions to the point where today approximately 98 percent of the New Jersey registered heavy-duty diesel vehicles (trucks) with a GVWR equal to or greater than 18,000 pounds pass the existing opacity test by more than 30 percentage points on average. Opacity is measured on a scale of zero to 100 percent. For example, most engines subject to a cutpoint of 55 percent opacity would pass inspection and emit smoke at only 25 percent opacity.

Although the majority of the fleet complies with the existing opacity cutpoints, compliance does not necessarily result in achieving the best possible emission reduction; an improperly performing engine can pass inspection at the existing cutpoints. Currently available control technology allows diesel engines to emit at rates much lower than the existing cutpoints, when operating in accordance with the manufacturers' specifications. The proposed amendments to the rules governing the Diesel Inspection Program will be in step with the current diesel engine technology. As diesel engine technology becomes more effective at reducing emissions, it is appropriate that the cutpoints become more stringent to encourage owners and operators to ensure that the technology is operating properly, thereby avoiding reasonably preventable emissions.

Excessive smoke opacity is an established indicator of improper performance and poor maintenance. Regular maintenance and common engine repairs help to control emissions of diesel exhaust particles and reduce other pollutants. Reducing the opacity cutpoints for heavy-duty diesel vehicles and diesel buses will result in the reduction of visible quantities of particulate matter, including soot and air toxics throughout the State.

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The proposed stricter cutpoints are based on an analysis of the periodic inspection records collected from 1998 through 2003. The data indicate the fleet performs at smoke opacity emission levels significantly below the existing standard. In developing the proposed cutpoints for a given engine model year, the Department took into account the average opacity value of those vehicles that passed the periodic inspection. It then considered how often diesel engines of that model year achieved the same opacity value during inspection. This data analysis indicated three opacity groups, very closely aligned with the level of engine control technology.

As with the existing cutpoints, the older engines, controlled mechanically rather than electronically, would be subject to the least stringent cutpoint. Newer electronically controlled engines, with various mechanical enhancements, would be subject to more stringent cutpoints. The proposed stricter cutpoints are a logical extension of the Department's existing program. No new test method, procedure or equipment is required. In most cases, existing engines will be able to meet the proposed cutpoints by following the manufacturers' recommended maintenance practices, or by repairing commonly occurring mechanical faults.

Although newer diesel-powered vehicles and equipment usually operate more cleanly and contribute less to air quality problems than their predecessors, diesel-powered trucks and buses tend to remain in service for 20 years or more. Unless existing diesel-powered trucks and buses that operate in the State are properly maintained and repaired, such that the emissions from them are reduced, these trucks and buses will continue to contribute significantly to air pollution in the State for many years to come.

Implementing stricter opacity cutpoints for heavy-duty diesel vehicles and diesel buses will reduce emissions and improve air quality. Although the proposed cutpoints may result in some additional costs for vehicle owners and operators, those relatively small costs are reasonable when compared with the reduced impact on public health. In many cases, the

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increased maintenance that will result from the proposed stricter cutpoints will generate a net savings because of the reduced amounts of fuel used by better-maintained engines.

## **Background**

### **New Jersey's Diesel Inspection Program**

The Department adopted amendments to N.J.A.C. 7:27-14, Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles, and N.J.A.C. 7:27B-4, Air Test Method 4: Testing Procedures for Motor Vehicles, in July 1998. (See 30 N.J.R. 2476(b)). The amendments, along with amendments to the Motor Vehicle Code (Title 39 of the New Jersey Statutes), and the Motor Vehicle Commission rules at N.J.A.C. 13:20-26, created the current Diesel Inspection Program.

The Diesel Inspection Program establishes emissions standards for diesel-powered trucks, commercial buses and school buses. The Department's regulations define heavy-duty diesel vehicles as a diesel-powered motor vehicle, other than a diesel bus, having a GVWR exceeding 8,500 pounds, designed primarily for transporting persons or property. (See N.J.A.C. 7:27-14.1) Thus, under the Department's rules, heavy-duty diesel vehicles are primarily trucks. However, the Motor Vehicle Commission rules define heavy-duty diesel trucks as those "with a GVWR of 18,000 or more pounds." (N.J.A.C. 13:20-46.1) Therefore, at this time the Diesel Inspection Program applies only to diesel-powered trucks that have a GVWR equal to or greater than 18,000 pounds, and diesel buses.

The Department implemented the Diesel Inspection Program in two phases. A pilot roadside enforcement program in July 1995 led to Phase One, which started in April 1998, with inspections and penalties for both New Jersey and out-of-State registered vehicles. Phase Two,

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which began in July 1998, continued the roadside enforcement program, and began an annual, periodic exhaust emissions inspection program for diesel trucks and buses.

The Roadside Enforcement Program is administered by the State's Motor Vehicle Commission, in cooperation with the New Jersey State Police. The Department provides technical assistance, oversight and quality assurance. Teams of Motor Vehicle Commission inspectors and State Troopers operate mobile test facilities at selected locations, and may also perform roving spot inspections. The periodic inspection program requires each heavy-duty diesel vehicle to undergo an annual inspection, which includes an opacity test, within 90 days of registration renewal. Privately owned, State-licensed diesel emissions inspection centers (DEICs) perform the periodic inspections. Inspectors from the Motor Vehicle Commission perform annual inspections of diesel buses.

#### Existing Opacity Cutpoints

The test procedures used in the Diesel Inspection Program to determine exhaust smoke opacity include the snap acceleration test, rolling acceleration test, and power brake test. Opacity is measured as the degree to which light is extinguished when smoke passes between a light source and a photoreceptor. Opacity is expressed as a percentage, where zero percent means that the light source is completely unobstructed, and 100 percent means that the light source is totally obscured.

The existing opacity cutpoints for diesel vehicles are set forth at N.J.A.C. 7:27-14.6, and are listed in Table 1 below. All emission standards, unless otherwise specified, are for peak smoke opacity to be determined in accordance with the snap acceleration test, rolling acceleration test, or power brake test methods. Peak opacity is the point at which the exhaust smoke is darkest during the test cycle. A well-maintained and properly tuned diesel engine

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should not emit smoke of any color in the exhaust, except for very short puffs of black smoke during acceleration, deceleration, or change of engine speed. Blue smoke, created by the intrusion and burning of engine lubricating oil into the combustion chamber, is an indication of mechanical malfunction, poor maintenance, or excessive wear. Engines emitting visible blue smoke for more than three consecutive seconds are in need of mechanical repair; thus, the existing prohibition for blue smoke as set forth in Table 1 below.

**Table 1**

**EXISTING OPACITY CUTPOINTS**

<b>Engine Model Year</b>	<b>Opacity Cutpoint</b>
<u>Heavy-Duty Diesel Vehicles GVWR over 8,500 pounds</u>	
1973 and older	70 percent
1974 or 1990	55 percent
1991 and newer	40 percent
No visible blue smoke >three consecutive seconds	
<u>Diesel Bus and School Bus GVWR over 8,500 pounds</u>	
1987 and older	40 percent
1988 and newer	30 percent
No visible blue smoke >three consecutive seconds	
<u>Retrofitted* Diesel Buses GVWR over 8,500 pounds</u>	
All model years	30 percent

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No visible blue smoke >three consecutive seconds

\* Retrofitted buses are equipped with post-manufacture internal and/or external emissions control technology, and/or exhaust after-treatment devices, as required under the USEPA Urban Bus Program.

Existing rules at N.J.A.C. 7:27-14.6(e) provides for an alternative opacity standard for diesel-powered motor vehicles with engines of model year 1973 and earlier that, due to their design, are unable to meet the applicable standard.

#### Proposed Opacity Cutpoints

Diesel exhaust contains many harmful chemicals that are emitted into the air. Most of the major exhaust components - particulate matter (primarily in the form of solid carbon, or soot), oxides of nitrogen, carbon monoxide, and sulfur dioxide - are criteria pollutants, identified by USEPA as pollutants that can cause harm to human health and the environment, and cause property damage. The term "criteria" air pollutants is used because they are regulated by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. Diesel exhaust also contains other toxic chemicals, including volatile organic compounds such as acrolein, benzene, formaldehyde, trimethylbenzene, and polycyclic aromatic hydrocarbons. These chemicals are commonly referred to as "hazardous air pollutants," or "air toxics."

Diesel-powered motor vehicles are of particular concern because, although they are a small part of the vehicle population, they emit pollutants in far greater proportion to their

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numbers. The Department estimates that heavy-duty diesel vehicles (trucks) inspected in the periodic program make up 1.5 percent of New Jersey's on-road vehicle population and account for approximately 5.8 percent of the annual vehicle miles traveled. However, they contribute up to 89 percent of all particulate matter 10 microns or less in diameter, and up to 56 percent of oxides of nitrogen emissions from all mobile sources.

The Department considers the existing Diesel Inspection Program to be a success. The initial objective, which was to identify and initiate repair of diesel vehicles that emit more than the regulations allow, has been met. The Department attributes the decrease in visible smoke emissions to the initial impact of the roadside enforcement effort; the rate at which the regulated community achieved a high level of compliance; the influence of the periodic inspection component; and the rate of introduction of new vehicles into the fleet to replace older, higher emitting, vehicles. The regulated community has achieved and maintained a high level of maintenance and repairs, as evidenced by the high percentage of heavy-duty diesel vehicles passing initial periodic inspections, which is well over 97 percent. The ongoing objectives of the Diesel Inspection Program are to maintain and improve the level of maintenance and repair that is the basis for the program's success, and to continue developing and implementing regulatory mechanisms that encourage diesel-powered vehicles that operate in New Jersey to achieve their maximum performance capability, in order to minimize exhaust emissions.

Only 2.4 percent of heavy-duty diesel vehicles (trucks) fail their initial periodic inspections. This performance level may be attributed to the improved engine technology, the regulated community's compliance with the inspection mandate of the Diesel Inspection Program, and increased maintenance and repairs to meet the applicable cutpoint. Not all of the vehicles that pass initial inspection are operating at peak efficiency, however. In many cases even out-of-specification or malfunctioning engines are capable of passing inspection. This is

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contrary to the program's continuing goal to ensure that diesel vehicle engines are properly maintained, which will enable diesel vehicles to emit at the lowest level consistent with the engine and pollution control technology for a particular engine. Therefore, the Department is proposing to tighten the opacity cutpoints for diesel vehicles.

When the program was created, legislative findings and declarations at N.J.S.A. 39:8-59 provided:

The Legislature finds and declares that exhaust emissions from diesel buses, heavy-duty diesel trucks, and other diesel-powered motor vehicles contribute significantly to air pollution problems within the State; that such emissions diminish the quality of life and health of our citizens; and that *the technology and state of the art in determining and controlling the level of unacceptable exhaust emissions from diesel buses, heavy-duty diesel trucks, and other diesel-powered motor vehicles are continually being advanced and that the procedures, test methods and standards for determination of such unacceptable levels must be reflective of those advances.* (emphasis added)

When the Department proposed amendments to the Diesel Inspection Program (29 N.J.R. 971(a), 980) it stated,

The implementation of these amendments, repeals and new rules will have a positive impact on the environment by reducing the emissions from diesel-powered motor vehicles, specifically, by reducing particulate matter emissions. These reductions will result from the more complete combustion of diesel fuel by non-compliant vehicles that will be repaired as a result of

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the increased enforcement of the diesel emission standards. In enacting the diesel statute, the New Jersey State Legislature found that the exhaust emissions from diesel vehicles (1) contribute significantly to air pollution problems within the State; (2) that such emissions diminish the quality of life and health of New Jersey citizens; and (3) that the *technology and state of the art in determining and controlling the level of unacceptable exhaust emissions from these vehicles are continually being advanced and that the procedures, test methods and standards for determination of such unacceptable levels must be reflective of those advances.* (emphasis added)

A November 1998 report submitted to USEPA by the Society of Automotive Engineers entitled “Establishment of Smoke Opacity Cutpoints for SAE J1667 Test Procedure,” stated, “The recommended cutpoints are based on current technologies for heavy-duty diesel vehicle engines. However, *lower cutpoints might be appropriate in the future, as more advanced emission control technologies are developed.* States such as California and New Jersey are looking at exploring more stringent cutpoints in later iterations of their programs.”<sup>5</sup> (emphasis added)

New Jersey is not alone in its assessment of the need for stricter control of diesel emissions. The Province of Ontario, Canada, has already instituted lower cutpoints, implementing mandatory opacity cutpoints of 30 percent for diesel-powered trucks and buses with registered gross weights of over 4,500 kilograms (9,900 pounds), of engine model year 1991 and newer, and 40 percent for such vehicles of engine model year 1990 and older. Ontario also has an incentive program for owners of such vehicles who voluntarily meet a more stringent standard of 20 percent opacity.

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Based on an analysis of the inspection records from the Diesel Inspection Program, the Department has re-evaluated the existing opacity cutpoints, and has developed these proposed amended rules to implement stricter cutpoints that are in line with the technical capability and actual emissions performance levels that inspected vehicles demonstrated. The Department projects that if current maintenance practices are maintained, the initial inspection pass rate will drop from approximately 98 percent to approximately 92 percent in the first year that the proposed new cutpoints are enforced, due to an anticipated increase in inspection failures from approximately 2.4 percent to approximately 8.1 percent overall failure rate of total inspections. These projections are based on test results from the approximately 70,000 heavy-duty diesel vehicles (trucks) that were inspected in the periodic program in 2003. The approximately 26,000 commercial and school buses in New Jersey are not included in this analysis, but are expected to show similar pass rates. A separate analysis of school bus inspection data is presented in the discussion of N.J.A.C. 7:27-14.6, Inspection standards, where proposed amendments to the bus opacity cutpoints are discussed.

As the fleet of diesel vehicles adjusts to the new cutpoints, and maintenance practices improve, the failure rate for heavy-duty diesel vehicles (trucks) is expected to return to near the current failure rate of 2.4 percent within one or two years, which would include one to two inspection cycles. Inspection records indicate that the majority of currently inspected vehicles that fail the existing cutpoints are repaired, and then pass re-inspection. Some vehicles cannot be tracked to a passing re-inspection. They are presumed to have left the New Jersey fleet by either being retired or taken out of the State, and to have no impact on the fleet failure rate. If, as is common in inspection and maintenance programs, many of the potentially failing heavy-duty diesel vehicles are repaired prior to inspection, the first year failure rate will be significantly less than the projected 8.1 percent.

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The full range of maintenance and repairs commonly performed on diesel vehicles is expected to generate an overall emissions benefit for many air pollutants, and in particular the criteria pollutants, such as particulate matter, oxides of nitrogen and carbon monoxide. Examples of typical maintenance or repair items are poorly adjusted engine or fuel injection timing; minor problems with the injectors; a missing or disabled puff limiter; a clogged air filter or intercooler, or other air flow problems; and carbon build-up in the engine. More extensive repairs are likely to be needed on vehicles that have an incorrect or worn turbocharger, excessive oil consumption, engine mechanical failure, electronics that have failed or been tampered with, and moderate or severe injector problems.

The New Jersey fleet has shown that it can meet and surpass the existing cutpoints by a significant margin. The Department examined the results from over 144,000 inspections performed during inspection years 2002 and 2003. The combined overall average opacity inspection value was 32 opacity points below applicable opacity cutpoint. For example, if the applicable cutpoint was 55, the average opacity for vehicles that passed inspection was 18. The engines tested easily met the cutpoints.

The proposed opacity cutpoints, much like the existing cutpoints, follow evolutionary advances in diesel engine technology, primarily in air and fuel control systems. Technology benchmarks - mechanical controls, first generation, second, and later generation electronic controls - are closely tied to the existing and proposed cutpoints, shown in Table 2 below.

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**Table 2**

**EXISTING AND PROPOSED OPACITY CUTPOINTS BY MODEL YEAR**

For Trucks:

EXISTING		PROPOSED	
1973 and older	70 percent		
1974-1990	55 percent	1990 and older	40 percent
1991 and newer	40 percent	1991-1996	30 percent
		1997 and newer	20 percent

For Buses:

EXISTING		PROPOSED	
NORMAL*	RETROFITTED	NORMAL	RETROFITTED**
1987 and older	40 percent	30 percent	1987 and older
1988 and newer	30 percent	1988-1993	30 percent
		1993 and older	30 percent
		1994 and newer	20 percent
		1994 and newer	20 percent

For all heavy-duty diesel vehicles and diesel buses: No Visible blue smoke for more than three seconds	For all heavy-duty diesel vehicles and diesel buses: No visible smoke of any color for more than three seconds.
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\*The term “normal” means buses with a standard exhaust system configuration, not equipped with exhaust aftertreatment devices or other post-production emission control technologies commonly referred to as “retrofits” under the USEPA Urban Bus Program

\*\*The break between 1993 and 1994 bus engine model years coincides with a reduction in the USEPA on-road diesel engine particulate matter standard for diesel buses from 0.10 grams per brake horsepower hour (g/bhp/hr) to 0.07 g/bhp/hr.

The proposed cutpoints are more restrictive than the existing cutpoints in neighboring states. New Jersey’s existing cutpoints apply to diesel vehicles that operate in New Jersey, whether or not the vehicle is registered in New Jersey. Out-of-State vehicles fail roadside inspection at approximately the same rate as New Jersey registered vehicles. Out-of-State vehicles are capable of achieving the same level of performance as the New Jersey vehicles. Because the proposed new cutpoints will also affect out-of-State diesel vehicle owners and operators, in order to provide sufficient public notice, the Department proposes to expand the public education and outreach campaign to include communication and cooperation with neighboring states to promote and enable compliance by out-of-State vehicles.

### **Proposed Amendments to N.J.A.C. 7:27-14**

#### **N.J.A.C. 7:27-14.2 Applicability**

The Department proposes to amend the exception for diesel-powered emergency vehicles at N.J.A.C. 7:27-14.2(b), which currently exempts from the subchapter’s requirements (including general prohibitions, highway standards, test procedures and inspection standards) those diesel-powered motor vehicles that have a GVWR equal to or greater than 18,000 pounds, that “are owned and operated by a county, municipality, fire district, or duly incorporated non-profit

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organization for first aid, emergency, ambulance, rescue, or fire-fighting purposes.” Proposed amended N.J.A.C. 7:27-14.2(b) would clarify and expand this exemption, as discussed below. Diesel vehicles of any size that are actively performing emergency services are exempt from the prohibition of idling at N.J.A.C. 7:27-14.3(b)4, and remain so.

The Department has found that some local and county governments misinterpret the existing rules’ exemption for diesel-powered motor vehicles with a GVWR equal to or greater than 18,000 pounds “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,” found at N.J.A.C. 7:27-14.2(b), and consider the inspection requirement inapplicable to any publicly owned diesel-powered motor vehicles, regardless of its use.

Inspection records indicate that municipal compliance with the inspection requirement is lower than expected, with only approximately one out of every five publicly owned heavy-duty diesel vehicles having been inspected. Further, the Department has received reports of publicly owned heavy-duty diesel vehicles and/or fleets that have not been inspected at all.

The Legislature intended to exempt vehicles that were maintained in a constant state of readiness for action in an emergency situation. These types of vehicles, which include fire, police, ambulance and emergency vehicles, are typically maintained in an optimum condition to ensure availability. This condition obviated the primary intent of the program, which was to identify poorly maintained, excess-emitting vehicles. The Legislature also recognized that removal of emergency vehicles from service for inspection was inconsistent with the need to maximize availability for providing emergency services. However, this is not the case with vehicles that are normally used for construction and other government provided services. These vehicles, including dump trucks, are not used primarily for emergency purposes and, therefore,

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the communities they service are unlikely to suffer unduly by having the vehicles out of service for a short time in order to be inspected.

The proposed amendment to N.J.A.C. 7:27-14.2(b) is intended to make it clear that vehicles that qualify for the exemption are not used on a daily basis for general transportation or utility function, are designed for response to a particular emergency, and are brought into action only in response to an emergency situation. An example of a common misapplication of the exemption would be a dump truck outfitted with a snowplow for the winter season. The primary function of a dump truck is to haul materials of different types from place to place on a daily basis, although it may perform other utility functions, such as transportation and towing of equipment or other vehicles. Heavy rescue vehicles, and vehicles that are designed to respond to releases of hazardous materials, on the other hand, are examples of vehicles designed to respond to and address specific emergency situations, that would appropriately fall under the exemption. The Department intends to make it clear that a multi-purpose utility vehicle, such as a dump truck or other construction vehicle, even if pressed into service during an emergency, is not exempt from the inspection or other requirements of the rules.

As discussed above, emergency vehicles with a GVWR equal to or greater than 18,000 pounds are, under the existing rules, exempted from the subchapter. The Department recognizes that many emergency vehicles in the State are diesel powered motor vehicles, with a GVWR less than 18,000 pounds. As are their larger counterparts, these vehicles are maintained in a constant state of readiness for action in an emergency situation. Accordingly, the Department proposes to exempt all heavy-duty diesel powered emergency vehicles from the requirements of the subchapter.

N.J.A.C. 7:27-14.4 General public highway standards

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The Department proposes to amend the visible smoke standard at N.J.A.C. 7:27-14.4(a)2.

N.J.A.C. 7:27-14.1 defines smoke as “the emissions, including airborne solid and/or liquid particles, exclusive of water vapor, released into the atmosphere from a process of combustion.”

Visible smoke of any color, with the exception of brief puffs of black smoke that do not exceed the applicable opacity cutpoint during rapid changes in engine speed, indicate a malfunction of the engine, which creates excess emissions. The color of exhaust smoke is widely accepted throughout the industry as a method of diagnosing engine malfunction. A well maintained, normally operating engine at normal operating temperature does not emit smoke in the exhaust for more than a few seconds, and never continuously.

Table 3 below lists common engine malfunctions and the colors of smoke that they create in the exhaust stream.<sup>6</sup>

**Table 3**

**DIESEL ENGINE SMOKE COLOR AND MALFUNCTION DIAGNOSIS**

<b><u>Diesel Engine Smoke Color</u></b>	<b><u>Probable Causes</u></b>	<b><u>Diagnosis</u></b>
White	Incomplete fuel combustion	Faulty injection system Incorrect timing Overheated engine Overly cold engine
Blue	Engine oil being burned	Worn piston rings, valves, or cylinders Ignition timing off
Gray/Black	Incomplete fuel combustion	Oil level too high

Incorrect timing

Faulty injection system

Clogged air filter

*Source: Clean Air Council of Pennsylvania*

The prohibition in proposed amended N.J.A.C. 7:27-14.4(a)2 against smoke of any color in the engine exhaust for more than three seconds will encourage owners and operators to maintain and repair their engines, which will in turn result in increased fuel mileage and extended engine life, and may reduce the frequency of necessary engine repairs. The three-second allowance is sufficient to account for smoke emission associated with the diesel engine combustion cycle during acceleration, deceleration, and shifting gears. The proposed addition of the phrase “when the engine is at normal operating temperature” will allow for white smoke emissions during cold weather starting, which emissions normally disappear when the engines’ combustion chambers warm up, and for blue smoke emissions due to slight engine wear, which emissions are eliminated when thermal expansion of internal engine components creates sealing within operating tolerance.

#### N.J.A.C. 7:27-14.6 Inspection standards

The Department proposes to amend the rules to reduce the smoke opacity cutpoints for trucks, buses, and retrofitted buses, currently set forth at N.J.A.C. 7:27-14.6(b) through (d). Existing N.J.A.C. 7:27-14.6(a) states that a diesel-powered motor vehicle is not deemed to have passed inspection, unless it meets the public highway standards at N.J.A.C. 7:27-14.4 and the applicable smoke opacity standards at subsections (b) through (e). The proposed amendment to N.J.A.C. 7:27-14.6(a) would similarly end the applicability of subsection (a) six months after the

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operative date of the rules. Subsections (a) through (e) would remain in the rules, but would not apply to any vehicle. Instead, proposed new subsections (h) through (k) would apply.

The Diesel Inspection Program uses opacity as an indicator of particulate matter. Amending the opacity cutpoints as proposed will encourage increased maintenance and repairs, and reduce smoke emissions. This will result in an overall reduction of diesel soot particles and the criteria pollutants (particulate matter, oxides of nitrogen, and carbon monoxide), as well as a reduction in hydrocarbons and other air toxics. Diesel exhaust emissions, including soot (composed in large part of elemental carbon, to which toxic chemicals adsorb), have been identified as a toxic air contaminant.<sup>7</sup> When opacity is reduced, soot (black particles chiefly composed of carbon, produced by incomplete combustion of fuels), also described as visible particulate matter, is reduced by virtue of optimizing the air-to-fuel ratio, and the combustion process.

If owners/operators perform only those repairs strictly necessary to address smoke emissions, there may actually be an increase in emission of some pollutants. However, CARB considered the results from several studies that measured reductions of particulate matter and engine emissions. From that data, CARB developed factors that took into account the effect of various engine repairs, which were incorporated into its mathematical model that calculates amounts of emissions from diesel vehicles. Through this modeling, CARB found that maintenance and repairs, including both those directly related to address smoke emissions and those performed as regular vehicle maintenance, yielded an overall reduction in emissions.<sup>8</sup>

Stricter opacity cutpoints will encourage improved overall fleet maintenance and repairs, from which the State will derive emission benefits. A well-maintained engine will run closer to the manufacturer's original specification and typically emit fewer pollutants. A well-tuned engine uses less fuel, thereby increasing fuel economy. Industry advocates recognize that the

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presence of smoke in the exhaust equates to lower fuel economy, shorter engine life, higher maintenance costs, and higher operating costs.<sup>9</sup> Therefore, an owner/operator who maintains a diesel vehicle to comply with the proposed amended opacity cutpoints may actually experience an economic benefit in the form of higher fuel economy, longer engine life, lower maintenance costs, and lower operating costs.

The Department proposes to amend the opacity cutpoints for buses, creating a new tier for 1994 and newer buses at 20 percent opacity. (See proposed N.J.A.C. 7:27-14.6(j) and (k).) The change in allowed opacity between model years 1993 and 1994 coincides with a reduction in the USEPA on-road heavy-duty engine particulate matter standard from 0.10 grams per brake horsepower hour (g/bhp/hr) to 0.07 g/bhp/hr.<sup>10</sup> A random sample of approximately 1,000 Motor Vehicle Commission inspection records from 2001 shows that school buses manufactured in 1994 and later can easily meet a 20 percent opacity standard. Included in this sample are both truck chassis based (Type C) and transit style buses (Type D). Type C buses made up 83.7 percent of the sample, and Type D, 16.3 percent. Buses 1993 and older made up approximately 40 percent of the sample, and 1994 and later were 60 percent. In the aggregate sample only 1.2 percent of all buses failed the existing 30 percent opacity cutpoint, yielding a passing rate of over 98 percent. The average passing opacity for all buses was 14.7 points below the applicable cutpoint. Nearly 98 percent would have passed the proposed 20 percent opacity cutpoint, producing a minimal increase in failing inspections to almost two percent.

Under existing N.J.A.C. 7:27-14.6(e), and the Sampling and Analytical Procedures rules at N.J.A.C. 7:27B-4.5, a diesel-powered motor vehicle with an engine of model year 1973 or older that failed to meet the cutpoints, and had undergone unsuccessful attempts to remedy the failure, may be subjected to a referee procedure using diagnostics to determine what additional repairs may need to be performed. This referee procedure, described at N.J.A.C. 7:27B-4.5,

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entails a post-repair evaluation and opacity inspection performed by the Department. Once it has been established that the engine of the diesel vehicle is incapable of meeting the applicable cutpoint, an individual alternative smoke opacity standard will be assigned to the specific vehicle.

In the history of the Diesel Inspection Program, there has never been an application for an alternative smoke opacity standard. Inspection data show that diesel vehicles 1973 and older have easily met and surpassed the existing 70 percent cutpoint, and that the majority of those vehicles are in compliance with the new proposed cutpoint of 40 percent.

The Department's proposed cutpoints are set based on three tiers of engine model years: 1990 and older, 1991 through 1996, and 1997 and newer. The existing rules' three tiers are based on model years 1973 and older, 1974 through 1990, and 1991 and newer. (See Table 2 above.) The existing rule allowing an alternative smoke opacity standard was established at the tier for model years 1973 and older, which was the category of oldest vehicles. The Department determined that these vehicles, because of their technology level, were most likely to need an alternative standard, if any were required.

Under the proposed rules, engines of that vintage (1973 and older) will have their opacity cutpoint decreased from 70 percent to 40 percent. In 2003, heavy-duty vehicles in operation that were 35 years old or older made up approximately four percent of the fleet, and that number has become smaller with each subsequent year. Although the Department's data do not indicate that there will be a problem, it is possible that a few of these vehicles may be unable to meet the proposed 40 percent cutpoint. In that case, an alternative smoke opacity standard could be appropriate for those vehicles.

Similarly, diesel vehicles with engines of model year 1974 through 1990 will have to meet a proposed cutpoint of 40 percent, decreased from the existing rules' 55 percent cutpoint.

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Those with engines of model years 1991 through 1996 will need to meet a slightly decreased cutpoint of 30 percent. Again, although the Department does not believe, based on its inspection data, that well maintained and properly functioning vehicles with engines of 1996 and older will have difficulty meeting the proposed standards, there remains the possibility that some facet of their engine technology may make them unable to meet the 30 percent cutpoint. Likewise, an alternative smoke opacity standard could be appropriate.

Based upon the inspection data, the Department believes that no alternative smoke opacity standard is necessary; however, interested persons may have information or data that indicates the ability to request an alternative standard is appropriate. Therefore, the Department is accepting comment on proposed alternatives at N.J.A.C. 7:27-14.6 to repeal the alternative smoke opacity standard; expand its applicability to a broader range of vehicles; or retain the existing standard.

Proposed Alternative 1 at N.J.A.C. 7:27-14.6(l) continues the alternative smoke opacity standard at existing N.J.A.C. 7:27-14.6(e), which is available to vehicles of all model years 1973 and older through N.J.A.C. 7:27B-4.5.

Proposed Alternative 2 at N.J.A.C. 7:27-14.6(l) expands the alternative smoke opacity standard at existing N.J.A.C. 7:27-14.6(e) to 1996 and earlier model years. The Department would adopt a corresponding amendment at N.J.A.C. 7:27B-4.5.

Proposed Alternative 3 at N.J.A.C. 7:27-14.6(l) expands the availability of the alternative smoke opacity standard to all model years. The Department would adopt a corresponding amendment at N.J.A.C. 7:27B-4.5.

If either Alternative 2 or Alternative 3 were adopted, the corresponding proposed amendments at N.J.A.C. 7:27B-4.5 would restrict the alternative smoke opacity standard to five opacity percentage points above the lowest opacity value achieved from testing subsequent to

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required repairs, and limit the awarded alternative smoke opacity standard to a period of one inspection cycle.

If none of the three alternatives is adopted, the ability to apply for an alternative smoke opacity standard would be eliminated six months after the operative date of the rules, in accordance with proposed amended N.J.A.C. 7:27-14.6(e). The proposed corresponding amendment at N.J.A.C. 7:27B-4.5 would do away with the procedure for applying for the alternative standard.

In order to provide the regulated community with a reasonable period of time to prepare for enforcement of the proposed new cutpoints, the Department is proposing that the new cutpoints would go into effect six months after the operative date of the amended rules. Vehicle owners will be able to take advantage of this period of time to schedule and perform any additional maintenance or repairs that may be necessary for their vehicles to comply with the new cutpoints; inspection facilities may use the time to become familiar with the new cutpoints and model year applicability and to recalibrate their equipment; and the Department will be able to perform additional outreach and education, especially to the owners of out-of-State registered vehicles, that are also subject to New Jersey's on-road enforcement program.

#### N.J.A.C. 7:27B-4.5 Procedures for establishing an alternative smoke opacity standard for diesel-powered motor vehicles

As discussed above, the Department is accepting comment on alternative proposed amendments at N.J.A.C. 7:27B-4.5. The proposed amendments would expand or eliminate the alternative smoke opacity standard for diesel powered motor vehicles.

If the Department adopts Alternative 1 at N.J.A.C. 7:27-14.6(l), it would also adopt proposed Alternative 1 at N.J.A.C. 7:27B-4.5(a), in which reference to engines of model year

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1973 and older is deleted. Because proposed Alternative 1 at N.J.A.C. 7:27-14.6(l) limits the availability of an alternative smoke opacity standard to engines of model year 1973 and older, the inclusion of the model year in Alternative 1 at N.J.A.C. 7:27B-4.5(a) is not necessary.

If the Department adopts Alternative 2 or 3 at N.J.A.C. 7:27-14.6(l), it would also adopt Alternative 2 at N.J.A.C. 7:27B-4.5(a), which removes the model year restriction from N.J.A.C. 7:27B-4.5(a). Because the model year restriction is contained in proposed Alternatives 2 and 3 at N.J.A.C. 7:27-14.6(l), the Department would remove the model year restriction from N.J.A.C. 7:27B-4.5(a).

The Department does not anticipate that either Alternative 2 or 3 at N.J.A.C. 7:27-14.6(l) will result in an increase in emissions, since inspection results indicate that the technology used in most diesel engines allows the vehicles to meet or surpass the proposed cutpoints without the need for an alternative. However, in the event Alternative 2 or 3 at N.J.A.C. 7:27-14.6(l) is adopted, the Department would limit the alternative smoke opacity standard at N.J.A.C. 7:27B-4.5(b) to five opacity percentage points above the lowest opacity value achieved from testing subsequent to required repairs, and limit the awarded alternative smoke opacity standard to a period of one inspection cycle. This limitation will ensure that there will be no “backsliding” from the existing cutpoints.

Also under Alternative 2 at N.J.A.C. 7:27B-4.5, if a vehicle has been granted an alternative smoke opacity standard, proposed N.J.A.C. 7:27B-4.5(d) would allow the alternative smoke opacity standard to remain in effect until the next required periodic inspection.

If the Department adopts none of the proposed alternatives at N.J.A.C. 7:27-14.6(l), it would also adopt Alternative 3 at N.J.A.C. 7:27B-4.5(a), under which the alternative smoke opacity standard at N.J.A.C. 7:27B-4.5 would remain in effect for six months after the operative date of the rules.

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Table 4 below presents the proposed alternatives at N.J.A.C. 7:27-14.6(l) and N.J.A.C.

7:27B-4.5(a), and how they correspond.

**Table 4**

<b><u>Alternative at N.J.A.C. 7:27-14.6(l)</u></b>	<b><u>Alternative at N.J.A.C. 7:27B-4.5(a)</u></b>	<b><u>Availability of Alternative Smoke Opacity Standard</u></b>
Alternative 1	Alternative 1	Vehicles 1973 and older
Alternative 2	Alternative 2	Vehicles 1996 and older (with limit on opacity percentage points)
Alternative 3	Alternative 2	All vehicles (with limit on opacity percentage points)
none	Alternative 3	Existing alternative smoke opacity standards in effect for six months after the operative date of the amendments.

An analysis of inspection data has shown that the average passing opacity, overall, and within each specific engine model year, was below the existing cutpoints by significant margins. Diesel vehicles 1990 and older pass with opacity values between approximately 20 to 30 percent. Diesel vehicles with engines manufactured from 1991 through 1996 pass at approximately 15 percent or less, and 1997 and newer at less than 10 percent.

Based on this data, the Department believes that the proposal to reduce the opacity percentage points added to the lowest opacity value achieved from testing subsequent to required

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repairs for the alternative opacity standard from 10 to five is technically feasible and takes into account the age and technology level of the diesel vehicle, the demonstrated performance level, and the goal of the program to achieve excess emissions reductions.

The Department proposes to eliminate the reservation of N.J.A.C. 7:27B-4.7 through 4.15.

### **Social Impact**

The Department anticipates that the proposed amendments will result in a positive social impact, particularly in the public health sector. Implementing stricter cutpoints will help to reduce diesel exhaust, including soot, thereby reducing the attendant health effects, and may also contribute locally to reduce haze and increase visibility. Areas of high population and heavy traffic, such as urban centers, may experience greater reductions in diesel exhaust and soot emissions.

The alternatives that the Department proposes at N.J.A.C. 7:27-14.6 and 7:27B-4.5 would have no social impact. The existing rules allow an alternative smoke opacity standard for vehicles with engines of model year 1973 and older. This is comparable to Alternative 1 at N.J.A.C. 7:27-14.6. In the history of the Diesel Inspection Program, there has never been an application for an alternative smoke opacity standard. The Department anticipates that properly maintained diesel engines of all model years would easily meet the proposed opacity standards and no vehicle would apply for an alternative smoke opacity standard. Accordingly, the proposed Alternatives would have no impact.

Not only does diesel exhaust contribute to the overall state wide air pollution problem, it can be the source of local, or even site specific pollution. Comparing data from the Department's air monitoring system, using the high concentration of elemental carbon as an indicator of diesel

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emissions, the average contribution of diesel emissions at the Elizabeth monitoring site (located next to Exit 13 on the New Jersey Turnpike at the entrance to the Goethals Bridge near Route 1) was 12 percent, compared to seven percent at the New Brunswick monitoring site (located on the New Jersey Turnpike near Route 1). The Elizabeth site also recorded the highest readings for particulate matter 2.5 microns or less in diameter in the state. Weekday variations indicated that the diesel emissions are mostly from vehicles such as delivery trucks and commuter buses that operate primarily on weekdays. Although the two cities are significantly different in size, both are highly urbanized and subject to high levels of intra- and inter-city traffic. The difference between 12 percent in Elizabeth and seven percent in New Brunswick can be attributed to the differences in the vehicle traffic, as well as population.<sup>1</sup> Implementation of stricter cutpoints will provide an actual reduction of soot and other diesel exhaust emissions, as well as a reduction in the risk of exposure in areas of high traffic and/or dense population.

Diesel exhaust is classified as a probable human carcinogen by many governmental authorities, including the International Agency for Research on Cancer<sup>11</sup> (an authority under the World Health Organization), the United States National Toxicology Program<sup>12</sup> and the USEPA.<sup>13</sup> The State of California classifies diesel exhaust as a known carcinogen.<sup>14</sup> California's South Coast Air Quality Management District recently estimated that nearly 71 percent of the cancer risk from air pollutants in the area is associated with diesel emissions.<sup>15</sup> Diesel exhaust contains both carbon particulates and 40 compounds classified as hazardous air pollutants under the Clean Air Act<sup>16</sup>, including benzene, 1,3-butadiene, and soot, which are classified as known human carcinogens.

Approximately 30 scientific studies have explored the association between diesel exhaust exposure and bladder cancer. A recent meta-analysis of this literature found increased risk between 18 percent and 76 percent. These findings are based primarily upon studies of truck

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drivers, railroad workers, bus drivers and shipyard workers.<sup>16</sup> Further, numerous studies have found an association between occupational exposure to diesel exhaust and lung cancer.<sup>17</sup> Exposure to particulates has been associated with increased mortality among those with cardiopulmonary diseases; exacerbation of symptoms for asthma, bronchitis, and pneumonia; decreased lung function; and retarded lung development. Exposure has also been associated with increased hospital admissions and emergency room visits for respiratory illnesses.<sup>16</sup>

Components of diesel exhaust are genotoxic (capable of causing damage to DNA- and of contributing to the development of tumors), mutagenic (capable of causing mutations, but not necessarily a carcinogen), and can produce allergy symptoms, including inflammation and irritation of airways. There is no known safe exposure to diesel exhaust for children, especially those with asthma or other chronic respiratory disease.

Asthma is a serious health concern in New Jersey. According to the last Federal estimate (1998) more than 600,000 New Jersey residents, including children and those under five years of age, have asthma. Asthma sufferers in New Jersey accounted for nearly 14,000 hospital admissions in 2001, roughly one of every 100 hospitalizations.<sup>18</sup> The deaths of 80 residents of New Jersey in 1999 can be attributed to asthma.<sup>19</sup> Risk of death from asthma increases considerably with age, with the 65-plus population having the highest rates.<sup>19</sup>

Diesel exhaust accounted for about five percent of the new occupational asthma cases in New Jersey between 1993 and 1997.<sup>20</sup> The reduction of particulate matter and oxides of nitrogen from diesel exhaust associated with increased maintenance and repairs will contribute to lower incidences of asthma and allergy attacks, related breathing difficulties and possibly avert premature deaths. Ground level ozone, for which oxides of nitrogen are a precursor, also exacerbates asthma, and may also be reduced by the proposed amendments.

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The Centers for Disease Control and Prevention (CDC) estimates that 4.5 million U.S. children have asthma.<sup>16</sup> Diesel exhaust can adversely affect children with underlying respiratory illnesses such as asthma, bronchitis, and infections, and may enhance the effects of some allergens among sensitive individuals.<sup>16</sup> Children are at greater risk because a greater dose of pollution is delivered to their lungs during this crucial growing period. Children inhale more air than adults, relative to body surface area, breathing frequency, and heart rate, because children have greater metabolic needs, due to growth.<sup>21</sup> Because of these factors, when exposed to the same amount of pollutants as an adult, the child will receive a much greater dose than the adult. The human lung continues to develop through adolescence, and exposure to harmful air pollutants during childhood has an important impact on lung development.<sup>22</sup>

According to hospital data and statistical analysis, children are more likely to be hospitalized with asthma than adults, with the highest hospitalization rate among children under five years of age.<sup>19</sup> The USEPA estimates that 13 percent of children nationally, which equates to approximately 250,000 children in New Jersey, have been diagnosed with asthma. The hospitalization rate in New Jersey of children under five years old increased nearly 12 percent between 1985 and 1999.<sup>19</sup>

The USEPA is implementing the 2007 Federal engine standards that will reduce diesel particulate emissions by ninety percent from model year 2007 and newer engines, compared to the previous standards. It is estimated that this will result in an estimated 8,300 fewer premature deaths, 17,600 fewer cases of childhood acute bronchitis and 360,000 fewer asthma attacks.<sup>16</sup> In New Jersey, each year this would equate to 249 fewer premature deaths, 528 fewer cases of childhood acute bronchitis and 10,800 fewer asthma attacks. These estimates demonstrate the scale of the respiratory health threat from existing diesel engines. The Department is projecting a reduction of diesel particulate emissions in the existing fleet of approximately 40 percent from

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the implementation of the new stricter cutpoints, from which it is possible that a commensurate reduction in health effects could be achieved.

### **Economic Impact**

The Department anticipates some of the regulated community will initially incur additional costs as a result of the proposed amendments, in the form of additional expenditures on maintenance and repairs. However, some or all of the increased maintenance and repair costs may be offset by an improvement in fuel economy and vehicle reliability. Since excess particulate and smoke emissions are directly attributed to incomplete combustion, any repairs to correct excess smoke emissions should also improve fuel economy.

A literature search provided the base figures for the maintenance and repair costs used in this economic impact analysis. All costs were adjusted to 2007 dollars based on the Federal consumer price index. The Department reviewed inspection records from the diesel emission inspection centers to estimate the size of the New Jersey fleet, and the amount spent on repairs. The Department's anticipates that for each vehicle that may fail inspection, in a worst case scenario, there would be a moderate per vehicle cost of \$1,036 to comply with the proposed stricter cutpoints, as discussed below. Commercial and school buses were not included in the Department's analysis; however, the Department anticipates that the repair costs for these vehicles would be comparable to the cost that other diesel vehicles would incur.

The Colorado School of Mines performed an initial study of 20 diesel-powered motor vehicles (trucks and buses) with a GVWR of 25,000 pounds or more, in order to investigate the effect of repairs on excessively smoking diesel vehicles.<sup>23, 24</sup> The study group consisted of vehicles of varying model years (primarily pre-1991 vehicles) that had failed the opacity test. The study determined that "excessive smoke is caused by operation at a fuel/air ratio above the

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smoke limit (opacity cutpoint) and, thus, repairs typically involve components that affect fuel/air ratio.”<sup>24</sup> Almost all vehicle engines studied required repairs to the injectors and fuel pumps, and adjustments to fuel pump calibration and injection timing.

In addition to the benefit of lower opacity, the study showed that the repairs performed resulted in an average increase in fuel economy of 0.08 miles per gallon or 1.2 percent. Moreover, as a result of the maintenance and repairs, breakdowns and vehicle downtime were reduced, and engine life was extended. The study results for repairs are presented in Table 5 below.

**Table 5**

**COLORADO SCHOOL OF MINES DIESEL ENGINE REPAIR STUDY\***

<u>Repair Type</u>	<u>Number of engines repaired</u>
Injection pump work	10
Injectors replaced	11
Required replacement of all injectors	9
Injection timing and governor adjustment	most common, pre-1991
Injector replacement	Most common, 1991 and newer
Improperly adjusted throttle linkage	3
Cracked intercooler.	1
Repair cost range	\$100 - \$2,403

\* The study group consisted of 20 diesel vehicles, primarily pre-1991. The study treated the cost of repairing a vehicle twice as a single cost.

Table 6 below summarizes the cost of general vehicle maintenance and repairs. This information was used to estimate the per mile cost of maintenance and repairs for the New Jersey

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fleet. The costs cited in Table 6 include maintenance and repairs for engine, transmission, brakes, suspension, air, electrical, and collision repairs, and in some cases fuel and tires. The studies did not indicate what portion of these total maintenance and repair costs specifically pertained to engine and fuel delivery system repairs or smoke opacity repairs.

**Table 6**

**COSTS OF OPERATING TRUCKS, VARIOUS SOURCES** <sup>25</sup>

<u>Source / Year</u>	Maintenance + Repairs* <u>cents/mi**</u>	Average Miles per Power Unit <u>(HDDV) per year</u>	Maintenance + Repairs, <u>\$\$/year***</u>
American Trucking Association, 2003 <sup>1</sup>	\$0.0523	116,090	\$6,072
Minnesota Department of Transportation, 2001 <sup>2</sup>	\$0.1177	100,000+	\$11,770
Owner-Operators Independent Drivers Association, 2003 <sup>3</sup>	\$0.0863	107,368	\$9,266
Averages	\$0.0854	107,819	\$9,036

\*Maintenance and repairs, in terms of the documents reviewed, refer to the entire scope of vehicle related mechanical operations, encompassing costs of parts and labor, without a breakdown for each system.

\*\*Actual amount as adjusted to 2007

\*\*\*Approximate annualized cost

1- Survey, “Top 20” ranked respondents in each of 6 carrier classes, large multi-vehicle fleets.

USDOT survey Form M used to collect data. Cost of parts is included in maintenance and repairs.

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- 2- Literature review. Analysis synthesized existing information using then current economic factors.
- 3- Industry survey of single truck fleets.

Table 7 below presents studies that specifically examined engine and/or fuel system repairs, and smoke opacity repairs. This information was used to estimate the cost of achieving compliance with the proposed stricter cutpoints.

**Table 7**

**ENGINE / EMISSIONS RELATED REPAIR COSTS<sup>25</sup>**

<u>Source</u>	<u>Amount*</u>	<u>Comment</u>
Colorado School of Mines	\$1,293	Mechanical repairs directly related to correcting excess smoke during the course of the study.
USEPA	\$766	Post warranty EGR related emissions repair costs, per incident.
United Parcel Service	\$1,050	Engine and fuel system mechanical maintenance + repairs, per year.
Average	\$1,036	Illustrative of what cost may be incurred if mechanical repairs are required to attain compliance with more stringent cutpoints, inclusive of all the variants listed.

\*Actual amount as adjusted to 2007.

To perform this economic impact analysis, the Department used a simple arithmetic average of the amounts from the nation-wide studies cited in Table 6 and Table 7 above. The terms “maintenance,” “preventive maintenance” and “repairs” are used differently in the various studies underlying the Tables above. In calculating costs, the studies included all vehicle related

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equipment except fuel and tires. The term “repairs” can mean actual smoke related repairs, post-warranty emission equipment repairs, or engine and fuel system component maintenance and repairs, depending on the study. Incorporating all of these elements into a composite cost figure yields a conservative estimate that illustrates the highest costs that may be incurred if mechanical repairs are necessary to attain compliance with more stringent cutpoints. Increased maintenance costs, without repairs, are expected to be significantly less. Once compliance is achieved, expenditures for maintenance and repairs should return to normal operating cost levels.

As demonstrated in Table 6 above, the total annual cost of maintenance and repairs per vehicle was determined to be approximately \$9,036, or \$0.085 per mile. As outlined in Table 7 above, the potential cost of repairs to comply with the stricter cutpoints for those vehicles that fail inspection is \$1,036. Applying these national estimates to the New Jersey fleet per vehicle average of approximately 51,500 miles per year, which was derived from the United States Environmental Protection Agency MOBILE6 emissions model, the Department estimates that the annual cost of maintenance and repairs for the New Jersey fleet is \$308 million. Based on the estimated 3.6 billion miles per year, the cost per mile is \$0.085. This equates to approximately \$4,400 per vehicle.

Heavy-duty diesel vehicles (trucks) in New Jersey collectively travel more than 9.8 million miles per day, or 3.6 billion miles per year. Based on calendar year 2003 inspection records from approximately 70,000 heavy-duty diesel trucks, the periodic inspection initial failure rate at the existing cutpoints is approximately 2.4 percent. Implementation of the proposed stricter cutpoints is projected to increase the failure rate to 8.1 percent overall, which is an additional 5.7 percent, or an additional 4000 vehicles. Applying the Table 7 per vehicle emission repair cost of \$1,036, or \$0.02 per mile, that 5.7 percent equates to approximately \$4

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million in additional maintenance and repairs costs for the 206 million miles logged annually by the 4000 vehicles potentially in need of repairs in order to meet the proposed cutpoints.

As discussed above, approximately 4,000 heavy-duty diesel trucks are anticipated to fail the proposed stricter cutpoints. These trucks achieve an average of six miles per gallon, before repairs are made that will allow them to pass the proposed standards. If these trucks realize the benefit of the 1.2 percent post-repair fuel savings cited in the Colorado School of Mines study, approximately 100 gallons per vehicle per year would be saved. At a cost of \$3.00 per gallon, fuel cost savings could be approximately \$300.00 per vehicle per year. If the 4,000 vehicles are repaired in order to meet the proposed new cutpoints, they would save approximately 400,000 gallons, which equates to \$1.2 million per year. The cost of repairing the vehicles in order that they meet the standards is potentially \$4 million. Thus, over four years, the owners of the trucks should recoup, through fuel savings, the cost of the repairs.

The Department anticipates that the portion of the New Jersey fleet of heavy-duty diesel vehicles (trucks) that already is in compliance will perform some additional preventive maintenance in order to assure that the vehicles pass inspection. Exactly how much is unknown, but if the \$4 million in increased costs for maintenance and repairs to the entire New Jersey fleet of 70,000 vehicles is applied to the vehicles in compliance, then the proposed stricter cutpoints would increase the existing per vehicle maintenance cost for the fleet by approximately \$59.00, or \$0.001 per mile.

If, in order to ensure that the vehicles pass inspection, the entire New Jersey fleet of heavy duty diesel trucks and buses undertakes a higher level of maintenance and repairs, even those vehicles that are not anticipated to fail inspection could realize a fuel savings as a result of improved maintenance. The fuel savings could offset some or all of the additional vehicle maintenance undertaken as a result of the proposed new cutpoints.

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Health care for asthma, which is exacerbated by diesel exhaust, costs an average of \$500.00 per child, per year, for medications, physician care, and hospital treatment.<sup>16</sup> According to the 2000 Census, there are almost two million children under the age of 18 in New Jersey.<sup>26</sup> As of 2002, 12 percent (or approximately 250,000) of New Jersey children had been diagnosed with asthma. Of this 12 percent who have been diagnosed with asthma, 67 percent suffer constantly from the effects of asthma, according to findings from the New Jersey Behavioral Risk Factor Survey (NJBFRS).<sup>28</sup> Based upon that estimate, the health care costs associated with childhood asthma in the State total more than \$125 million per year. A national survey estimated that there are 5.8 million American children four to 18 years of age that have asthma<sup>27</sup> and 54 percent miss school or daycare on an average of nearly four days per year. Thirty-nine percent of parents of asthmatic children miss work due to their child's condition. In New Jersey, that would equate to 135,000 children missing 540,000 school days, and if a parent missed all of a workday as a result of the child's illness, the lost wages could exceed \$90 million per year, in addition to the lost productivity. The projected reductions in air pollution from the proposed rules will have a positive impact on school and work absenteeism in New Jersey by helping to reduce the number of asthma attacks and hospitalizations. Reducing the number of missed workdays, and attendant health care expenses, would have a positive impact on the New Jersey economy.

Due to the projected increase in maintenance and repairs, the repair community may see some increase in business. However, the Department anticipates that any increase in repairs needed to comply with the new cutpoints will diminish over time, lasting only an inspection cycle or two until the fleet adjusts to the new cutpoints.

The Department does not anticipate that the proposed amendments will result in either increased cost or more work to the State. The existing inspection methods can be used to

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measure emissions at the stricter cutpoints. Therefore, there are no increased monitoring costs associated with the more stringent cutpoints. There may be a brief increase in the number of penalties assessed as a result of non-compliance; however, as discussed previously, the Department anticipates that the failure rate will increase for only a few years until the fleet adjusts to the new cutpoints.

### **Environmental Impact**

Heavy-duty diesel vehicles (trucks) make up 1.5 percent of the New Jersey on-road fleet, contributing up to 5.8 percent of the daily vehicle miles traveled. They emit up to 56 percent of oxides of nitrogen, and up to 89 percent of particulate matter on-road emissions from all sources in the State. The Department projects that as a result of the proposed amendments, carbon monoxide, hydrocarbons, oxides of nitrogen, and particulate matter will be reduced, as will the production of air toxics such as benzene, 1,3 butadiene, formaldehyde, acrolein, acetaldehyde, polycyclic aromatic hydrocarbons and diesel particulate matter. The 26,000 diesel buses in the State, which also operate heavy-duty diesel engines, likewise contribute to the air pollution. The proposed cutpoints for diesel buses would also result in reduced air pollution.

The Department anticipates that implementing the stricter opacity cutpoints will have less of a regulatory impact per vehicle than the initial implementation of the diesel inspection/maintenance program, since the majority of excess emitters had come into compliance after the first round of diesel vehicle periodic inspections and roadside enforcement, and because awareness of the inspection requirement continues to encourage ongoing maintenance and repairs in order to maintain compliance.

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In the Department's experience, two years after implementation of the proposed stricter cutpoints the initial increase in inspection failure rates will diminish. At that point most diesel vehicles should come into compliance. The resulting emission reductions would be obtained directly from repairs made necessary by the new cutpoints. Thereafter, the environmental benefit from implementation of the stricter cutpoints will be achieved as a result of ongoing maintenance, rather than repairs made in response to enforcement of the stricter cutpoints.

Vehicles presented for annual inspection tend to have necessary maintenance performed prior to inspection. Vehicles inspected at roadside are more likely to be in normal operational mode, and possibly in need of maintenance or repairs. The latter group of vehicles will show the largest initial benefit from implementation of the proposed stricter cutpoints. In estimating the emission benefits, the Department compared prior years' periodic versus roadside inspection pass/fail rates, and applied the figures to calendar year 2003 annual diesel emission inspection center data. The Department projects that the proposed cutpoints will result in additional emission reductions of volatile organic compounds (VOCs), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), and particulate matter (PM). Emission reduction estimates are shown in tons of pollutants per day and per year, in Table 8 below.

**Table 8**

**ESTIMATE OF EMISSION REDUCTIONS**

<u>Air</u> <u>Pollutant</u>	Current	Proposed	Current	Proposed	Reduction Percent, Proposed <u>Cutpoints</u>
	Program	Cutpoints	Program	Cutpoints	
	<u>Tons/Day</u>	<u>Tons/Day</u>	<u>Tons/Yr</u>	<u>Tons/Yr</u>	
VOC (2009)	1.58	0.59	577	215	37
VOC (2010)	1.52	0.55	555	201	36
CO (2009)	6.92	2.57	2526	938	37
CO (2010)	6.23	2.27	2274	829	36
NO <sub>x</sub> (2009)	0.44	0.17	161	62	39
NO <sub>x</sub> (2010)	0.39	0.14	142	51	36
PM <sub>2.5</sub> (2009)	0.15	0.06	55	22	40
PM <sub>2.5</sub> (2010)	0.13	0.05	47	18	40
TOTAL (2009)	9.09	3.39	3319	1237	38
TOTAL (2010)	8.27	3.01	3018	1099	37

“Current Program” means the emissions reductions derived from the existing Diesel Inspection Program. “Proposed Cutpoints” means the additional emissions reductions obtained from implementing the proposed stricter cutpoints.

### **Federal Standards Statement**

Executive Order No. 27 (1994) and N.J.S.A. 52:14B-1 et seq. (P.L. 1995, c.#65) require State agencies that adopt, readopt or amend State regulations that exceed any Federal standards or requirements to include in the rulemaking document a Federal standards analysis.

The Department compared the proposed amendments at N.J.A.C. 7:27-14, Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles, to Federal regulations at 40 CFR Part 86, Subpart I, Emission Regulations for New Diesel Heavy-Duty Engines; Smoke Exhaust Test Procedure. These Federal regulations were promulgated pursuant to the Clean Air Act and set forth the substantive Federal standards governing on-highway diesel-powered vehicles. The USEPA has established peak smoke standards of 50 percent for most new diesel heavy-duty engines during their engine certification process. The USEPA peak smoke value is determined by mounting the engine on a dynamometer, and measuring the smoke output of the engine during a Federal Testing Protocol (FTP) drive cycle. The engine manufacturers are responsible for meeting the certification values established by the FTP.

The New Jersey smoke opacity test utilizes a chassis-based, in-use smoke testing procedure for existing engines, with an optional on-road procedure. The vehicle/engine owners/operators are responsible for meeting the New Jersey smoke opacity cutpoints. Because the proposed New Jersey cutpoints are separate and distinct from the Federal standards, both in test method and person responsible, the proposed amendments neither conflict with, nor exceed, the Federal standard.

Moreover, the Federal requirement at 40 CFR Part 86, Subpart I, is a new vehicle standard, which the State is preempted from establishing or enforcing. New Jersey's existing and proposed amended rules are an in-use standard, aimed at addressing deterioration. As such, the two standards supplement each other, but are independent, and do not conflict.

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The Department proposes to include the within amendments in the New Jersey State Implementation Plan. Specifically, the proposed amendments will reduce emissions of diesel exhaust and oxides of nitrogen, which will assist in the meeting the PM<sub>2.5</sub> and Ozone National Ambient Air Quality Standards (NAAQS). The Federal Clean Air Act requires states to develop and implement plans to meet Federally established health and welfare standards, or NAAQS. The USEPA has not established standards for diesel inspection and maintenance programs. Therefore, the proposed amendments do not conflict with or exceed the Federal standards and, accordingly, no Federal Standards analysis is required.

### **Jobs Impact**

The proposed amendments are not expected to have an impact on employment and jobs in New Jersey. The Department does not anticipate that the proposed amendments would result in business creation, elimination or expansion, or business competitiveness in New Jersey. The costs expected to be incurred by diesel vehicle owners and operators to comply with the proposed amendments are not anticipated to affect their operations in such a way as to impact employment.

### **Agriculture Industry Impact**

Pursuant to N.J.S.A. 52:14B-4(a)(2), the Department evaluated the proposed amendments to determine the nature and extent of their impact on the agricultural industry.

The Department anticipates that the proposed amendments will have a positive impact on the State's agricultural industry. As discussed in the Environmental Impact above, one of the primary environmental benefits expected to result from the proposed amendments will be a reduction in soot, which accumulates and deposits in soil, water, and on plant life, affecting

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photosynthesis and reducing growth and crop yield. Reducing emissions of diesel exhaust, including soot will reduce contamination of air, soil, and water by toxic constituents that adsorb to the carbon particles in diesel exhaust, thus reducing the bioaccumulation in plants and animals. As a result of reducing volatile organic hydrocarbons and oxides of nitrogen, which are precursors to ozone, ozone injury to crops and plants may also be reduced, thereby benefiting agriculture in the State.

### **Regulatory Flexibility Analysis**

As required by the New Jersey Regulatory Flexibility Act, N.J.S.A. 52:14B-16 et seq., the Department evaluated the reporting, record-keeping, and other compliance requirements that the proposed amendments would impose upon small businesses. The Regulatory Flexibility Act defines the term “small business” as “any business which is a resident in this State, independently owned and operated and not dominant in its field, and which employs fewer than 100 full time employees.”

The proposed amendments to N.J.A.C. 7:27-14 would apply to the owners and operators of approximately 70,000 heavy-duty diesel vehicles, and 26,000 diesel buses, many of whom are small businesses. Some owners/operators of diesel vehicles may need to repair their vehicles if the vehicles cannot meet the new cutpoint. As discussed in the Economic Impact above, the Department estimates the highest cost to repair a diesel vehicle to make it comply with the proposed cutpoints would not exceed a one-time expense of approximately \$1,000 per vehicle. Beyond that, the average annual additional maintenance cost per vehicle as a result of the proposed cutpoints would be approximately \$59.00. This cost would include repairs and maintenance by qualified professionals, who the owner/operators may need to hire in order to

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comply with the proposed amendments. There are no additional recordkeeping or reporting requirements imposed as a result of the proposed amendments.

To exempt small businesses from any requirements or to reduce any requirements would compromise the goals of the rules, which is to reduce diesel emissions and their impact in the State.

### **Smart Growth Impact**

Executive Order No. 4 (2002) requires State agencies that adopt, amend or repeal State regulations to include in the rulemaking document a Smart Growth Impact statement that describes the impact of the proposed amendments on the achievement of smart growth and implementation of the State Development and Redevelopment Plan (State Plan).

The proposed amendments to the State's Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles rules do not relate to the State's land use and development policies in a way that would either encourage or discourage any development or redevelopment in this State contrary to the guiding principles of the State Plan. As a result, the Department does not expect the proposed amendments to have an impact on the State's achievement of smart growth or implementation of the State Plan. However, by virtue of the anticipated reduction of, and exposure to, diesel emissions, including soot, in areas of high truck use and increasing population, may have a positive impact on some growth areas by providing a cleaner environment and better air quality.

Because the proposed amendments will help protect air quality, the proposed amendments support the conservation and environmental protection goals and policies underlying the State Plan.

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

## CHAPTER 27

### AIR POLLUTION CONTROL

#### SUBCHAPTER 14. CONTROL AND PROHIBITION OF AIR POLLUTION FROM DIESEL-POWERED MOTOR VEHICLES

##### N.J.A.C. 7:27-14.2 Applicability

(a) (No change.)

(b) This subchapter [does] **shall** 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 nonprofit organization for first aid, emergency, ambulance, rescue, or fire-fighting purposes; **and that is generally held in ready status, and only brought into service during an emergency requiring immediate action. Such vehicles do not include multi-purpose utility vehicles, such as dump trucks, highway construction vehicles, or other vehicles used to perform temporary emergency service.**

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(c) (No change.)

#### 7:27-14.4 General public highway standards

(a) No person shall cause, suffer, allow or permit the operation of any diesel-powered motor vehicle upon the public roads, streets or highways of the State or upon any public property or upon any quasi-public roadway in the State, if the vehicle:

1. (No change.)

2. Emits visible [blue] smoke **of any color** in the exhaust emissions for more than three consecutive seconds[,] **when the engine is at normal operating temperature.**

3.-5. (No change.)

#### 7:27-14.6 Inspection standards

(a) [No]**Before (six months after the operative date of the rules), no** diesel-powered motor vehicle shall be deemed to have passed an inspection unless it meets:

1. – 2. (No change.)

(b) [A]**Before (six months after the operative date of the rules), a** heavy-duty diesel vehicle, tested using the snap acceleration smoke opacity test, the rolling acceleration smoke opacity test, or the power brake smoke opacity test set forth at N.J.A.C. 7:27B-4, shall not emit smoke in the exhaust emissions which exceeds the following opacity standards:

1. – 4. (No change.)

(c) [A]**Before (six months after the operative date of the rules), a** diesel bus, tested using the snap acceleration smoke opacity test, or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, shall not emit smoke in the exhaust emissions which exceeds the following opacity standards:

1. – 3. (No Change.)

(d) [A]**Before (six months after the operative date of the rules), a** retrofitted diesel bus, tested using the snap acceleration smoke opacity test, or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, shall not emit smoke in the exhaust emissions which exceeds a peak smoke opacity standard of 30 percent;

(e) [A]**Before (six months after the operative date of the rules), a** diesel-powered motor vehicle, tested using the snap acceleration smoke opacity test, the rolling acceleration smoke opacity test or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, and for which an alternative smoke opacity standard has been established in accordance with the procedures set forth at N.J.A.C. 7:27B-4.5, shall not emit smoke in the exhaust emissions which exceeds the smoke opacity standard established as the alternative smoke opacity standard for that vehicle.

(f) – (g) (No change.)

**(h) On and after (six months after the operative date of the rules), no diesel-powered motor vehicle shall be deemed to have passed an inspection unless it meets:**

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

**2. The applicable smoke opacity standards set forth in (i) through (k) below.**

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**(i) On and after (six months after the operative date of the rules) a heavy-duty diesel vehicle, tested using the snap acceleration smoke opacity test, the rolling acceleration smoke opacity test, or the power brake smoke opacity test set forth at N.J.A.C. 7:27B-4, shall not emit smoke in the exhaust emissions that exceeds the following opacity standards:**

**1. For model years 1990 and older, the level of peak smoke opacity shall not exceed 40 percent;**

**2. For model years 1991 through 1996, the level of peak smoke opacity shall not exceed 30 percent;and**

**3. For model years 1997 and newer, the level of peak smoke opacity shall not exceed 20 percent.**

**(j) On and after (six months after the operative date of the rules) a diesel bus, tested using the snap acceleration smoke opacity test, or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, shall not emit smoke in the exhaust emissions that exceeds the following opacity standards:**

**1. For model years 1987 and older, the level of peak smoke opacity shall not exceed 40 percent;**

**2. For model years 1988 through 1993, the level of peak smoke opacity shall not exceed 30 percent; and**

**3. For model years 1994 and newer, the level of peak smoke opacity shall not exceed 20 percent.**

**(k) On and after (six months after the operative date of the rules) a retrofitted diesel bus, tested using the snap acceleration smoke opacity test, or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, shall not emit smoke in the exhaust emissions that exceeds the following opacity standards;**

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**1. For model years 1993 and older, the level of peak smoke opacity shall not exceed**

**30 percent;**

**2. For model years 1994 and newer, the level of peak smoke opacity shall not exceed**

**20 percent.**

### **ALTERNATIVE 1**

**(l) On and after (six months after the operative date of the rules) a diesel-powered motor vehicle that is equipped with an engine model year 1973 or older tested using the snap acceleration smoke opacity test, the rolling acceleration smoke opacity test or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, and for which an alternative smoke opacity standard has been established in accordance with the procedures set forth at N.J.A.C. 7:27B-4.5, shall not emit smoke in the exhaust emissions that exceeds the smoke opacity standard established as the alternative smoke opacity standard for that vehicle.**

### **ALTERNATIVE 2**

**(l) On and after (six months after the operative date of the rules) a diesel-powered motor vehicle that is equipped with an engine model year 1996 or older tested using the snap acceleration smoke opacity test, the rolling acceleration smoke opacity test or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, and for which an alternative smoke opacity standard has been established in accordance with the procedures set forth at N.J.A.C. 7:27B-4.5, shall not emit smoke in the exhaust emissions that exceeds the smoke opacity standard established as the alternative smoke opacity standard for that vehicle.**

### **ALTERNATIVE 3**

**(l) On and after (six months after the operative date of the rules) a diesel-powered motor vehicle tested using the snap acceleration smoke opacity test, the rolling acceleration smoke opacity test or the power brake smoke opacity test, set forth at N.J.A.C. 7:27B-4, and for which an alternative smoke opacity standard has been established in accordance with the procedures set forth at N.J.A.C. 7:27B-4.5, shall not emit smoke in the exhaust emissions that exceeds the smoke opacity standard established as the alternative smoke opacity standard for that vehicle.**

### **END OF ALTERNATIVES**

#### CHAPTER 27B

#### SAMPLING AND ANALYTICAL PROCEDURES

#### SUBCHAPTER 4 AIR TEST METHOD 4: TESTING PROCEDURES FOR DIESEL-POWERED MOTOR VEHICLES

### **ALTERNATIVE 1**

7:27B-4.5 Procedures for establishing an alternative smoke opacity standard for diesel-powered motor vehicles

- (a) In the event that a heavy-duty diesel vehicle[, which is equipped with an engine model year 1973 or older,] fails to pass an exhaust emissions inspection as part of either a periodic inspection or an inspection conducted as part of the roadside enforcement program, the

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owner or lessee of the heavy-duty diesel vehicle may request the Department to establish an alternative smoke opacity standard for that vehicle-engine-chassis combination, if the cause of the failure is due to the design of the vehicle, rather than to insufficient repair and maintenance. The procedures for obtaining this alternative smoke opacity standard are as follows:

1. – 4. (No change.)

(b) – (c) (No change.)

## **ALTERNATIVE 2**

7:27B-4.5 Procedures for establishing an alternative smoke opacity standard for diesel-powered motor vehicles

(a) In the event that a heavy-duty diesel vehicle[, which is equipped with an engine model year 1973 or older,] fails to pass an exhaust emissions inspection as part of either a periodic inspection or an inspection conducted as part of the roadside enforcement program, the owner or lessee of the heavy-duty diesel vehicle may request the Department to establish an alternative smoke opacity standard for that vehicle-engine-chassis combination, if the cause of the failure is due to the design of the vehicle, rather than to insufficient repair and maintenance. The procedures for obtaining this alternative smoke opacity standard are as follows:

1. - 4. (No change.)

(b) If the Department determines that the vehicle cannot be repaired to meet the standards 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

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opacity standard by adding [10] **five** percentage points [or the maximum points as necessary to not yield an alternative smoke opacity standard in excess of 100 percent] to the [highest] **lowest** 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.)

**(d) The alternative opacity standard granted to a specific vehicle and engine combination shall remain in effect until the vehicle's next required periodic inspection, at which time the opacity standard in effect for that engine model year shall be applicable.**

### **ALTERNATIVE 3**

7:27B-4.5 Procedures for establishing an alternative smoke opacity standard for diesel-powered motor vehicles

(a) [In] **Before (six months from the operative date of the proposed rules), in** the event that a heavy-duty diesel vehicle, which is equipped with an engine model year 1973 or older fails to pass an exhaust emissions inspection as part of either a periodic inspection or an inspection conducted as part of the roadside enforcement program, the owner or lessee of the heavy-duty diesel vehicle may request the Department to establish an alternative smoke opacity standard for that vehicle-engine-chassis combination, if the cause of the failure is due to the design of the vehicle, rather than to insufficient repair and maintenance. The procedures for obtaining this alternative smoke opacity standard are as follows:

1. - 4. (No change.)

(b) – (c) (No change.)

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**END OF ALTERNATIVES**

[7:27B-4.7 (Reserved)

7:27B-4.8 (Reserved)

7:27B-4.9 (Reserved)

7:27B-4.10 (Reserved)

7:27B-4.11 (Reserved)

7:27B-4.12 (Reserved)

7:27B-4.13 (Reserved)

7:27B-4.14 (Reserved)

7:27B-4.15 (Reserved)]

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