ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 85, 86, and 1039

[EPA–HQ–OAR–2011–1032; FRL–9673–2]

RIN 2060–AR46

Heavy-Duty Highway Program: Revisions for Emergency Vehicles and SCR Maintenance

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of proposed rulemaking.

SUMMARY: This proposal consists of three parts. First, EPA is proposing revisions to its heavy-duty diesel regulations that would enable emergency vehicles, such as dedicated ambulances and fire trucks, to perform their mission-critical life-saving work without risking that abnormal conditions of the emission control system could lead to decreased engine power, speed or torque. The revisions would allow manufacturers to request and EPA to approve modifications to emission control systems on emergency vehicles so they do not interfere with the vehicles' missions. Second, EPA is proposing to revise the emission-related maintenance and scheduled maintenance intervals for all motor vehicles and nonroad compression-ignition engines to specify minimum maintenance intervals for replenishment of consumable chemical reductant in connection with the use of selective catalytic reduction technologies. Third, EPA is proposing to offer short-term relief for nonroad engines from performance inducements related to the emission control system, for general purpose nonroad vehicles while operating in temporary emergency service. These actions are not expected to result in any significant changes in regulatory burdens or costs.

DATES: Comments on all aspects of this proposal must be received on or before July 27, 2012. See the **SUPPLEMENTARY INFORMATION** section on "Public Participation" for more information about written comments.

Public Hearings: EPA will hold a public hearing on Wednesday, June 27, 2012 in Ann Arbor, Michigan. The hearing will start at 10 a.m. local time and will continue until everyone has had a chance to speak. For more information about the public hearing, see "How Do I Participate in the Public Hearing?" under the **SUPPLEMENTARY INFORMATION** section on "Public Participation" below at Section VIII.B.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2011–1032, by one of the following methods:

- *www.regulations.gov:* Follow the on-line instructions for submitting comments.
- *Email: a-and-r-docket@epa.gov.*
- *Fax:* (202) 566–9744.
- *Mail:* Environmental Protection Agency, Air Docket, Mail-code 6102T, 1200 Pennsylvania Ave. NW., Washington, DC 20460.
- *Hand Delivery:* EPA Docket Center (EPA/DC), EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC, Attention Docket No. EPA–HQ–OAR–2011–1032. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OAR–2011–1032. For additional instructions on submitting written comments, see the **SUPPLEMENTARY INFORMATION** section on "Public Participation" below at Section VIII.A.

Docket: All documents in the docket are listed in the *www.regulations.gov* index. Although listed in the index, some information is not publicly available, e.g., confidential business information or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy in the docket. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy at the EPA Docket Center, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Lauren Steele, Environmental Protection Agency, Office of Transportation and Air Quality, Assessment and Standards Division, 2000 Traverwood Drive, Ann Arbor, Michigan 48105; telephone number: 734–214–4788; fax number: 734–214–4816; email address: *steele.lauren (@epa.gov).*

SUPPLEMENTARY INFORMATION:

Does this action apply to me?

This proposed action would affect you if you produce or import new heavy-duty or nonroad diesel engines that are intended for use in vehicles that serve the emergency response industry, including all types of dedicated and purpose-built fire trucks and ambulances. You may also be affected by this action if you manufacture diesel engines that make use of a consumable chemical reductant to comply with emissions standards for nitrogen oxides. You may also be affected by this action if you produce or import diesel engines for nonroad applications. The following table gives some examples of entities that may be affected by this proposed action. Because these are only examples, you should carefully examine the proposed and existing regulations in 40 CFR parts 85, 86 and 1039. If you have questions regarding how or whether these rules apply to you, you may call the person listed in the **FOR FURTHER INFORMATION CONTACT** section above.

Category	NAICS Codes [a]	Examples of potentially regulated entities
Industry	336111 336112 333618 336120	Engine and Truck Manufacturers
Industry	541514 811112 811198	Commercial Importers of Vehicles and Vehicle Components
Industry	811310	Engine Repair, Remanufacture, and Maintenance

Note:
[a] North American Industry Classification System (NAICS).

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I. Overview

A. Emergency Vehicle Provisions

EPA is proposing amendments to its heavy-duty diesel engine programs that would specifically allow engine manufacturers to request to deploy specific emission controls or settings for new and in-use engines that are sold for use only in emergency vehicles. EPA is proposing these revisions to enable fire trucks and ambulances with heavy-duty diesel engines to perform mission-critical life- and property-saving work without risk of losing power, speed or torque due to abnormal conditions of the emission control systems.

EPA's current diesel engine requirements have spurred application of emission controls systems such as diesel particulate filters (commonly called soot filters or DPF's) and other after-treatment systems on most new diesel vehicles, including emergency vehicles. Some control system designs and implementation strategies are more effective in other segments of the fleet than in emergency vehicles, especially given some emergency vehicles' extreme duty cycles. By this action, EPA intends to help our nation's emergency vehicles perform their missions; to better ensure public safety and welfare and the protection of lives and property.

B. Diesel Exhaust Fluid Provisions

EPA is proposing to amend its regulations for diesel engines to add provisions specifying emission-related maintenance and scheduled maintenance intervals for replenishment of consumable chemical reductant in connection with engines and vehicles that use selective catalytic reduction (SCR) technologies. This would apply to the use of SCR with model year (MY) 2011 and later light-duty vehicles and nonroad compression ignition (NRCI) engines, and MY 2012 and later heavy-duty vehicles and engines.

Most manufacturers of diesel engines and vehicles subject to our current standards regulating oxides of nitrogen (NO_X) have chosen to use a NO_X reduction technology known as selective catalytic reduction (SCR) in order to meet these requirements. SCR systems use a chemical reductant that usually contains urea and is known as diesel exhaust fluid (DEF). The DEF is injected into the exhaust gas and requires periodic replenishment by refilling the DEF tank.

Given that SCR use is now common in the transportation sector and replenishment of DEF is necessary for SCR to be effective, it is appropriate to add DEF replenishment to the list of scheduled emission-related maintenance published in the Code of Federal Regulations (CFR), rather than rely on a case-by-case approval as is specified in the current regulations. This action would improve the clarity and transparency of EPA's requirements for SCR systems.

C. Nonroad Equipment Used Temporarily in Emergency Service

EPA is proposing short-term relief from emission control system performance inducements for any nonroad compression ignition engine powered vehicles operating in temporary emergency service. This relief would address concerns about unusual circumstances where performance inducements could hinder equipment performance in emergency conditions, which are defined as conditions in which the functioning (or malfunctioning) of emission controls poses a significant risk to human life. We are proposing provisions for a short-term emergency bypass of the normal emission controls, including inducement strategies, which could result in a loss of power of an engine; thus, allowing the equipment to temporarily perform emergency-related work. By this action, EPA would help our nation's nonroad equipment perform temporary emergency service; to better ensure public safety and welfare and the protection of lives.

II. Statutory Authority and Regulatory Background

A. Statutory Authority

Section 202(a)(1) of the Clean Air Act (CAA or the Act) directs EPA to establish standards regulating the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines that, in the Administrator's judgment, causes or contributes to air pollution which may reasonably be anticipated to endanger public health or welfare. Such standards apply for the useful life of the vehicles or engines. Section 202(a)(3) requires that EPA set standards applicable to emissions of hydrocarbons, carbon monoxide, NO_X and particulate matter (PM) from heavy-duty trucks that reflect the greatest degree of emission reduction achievable through the application of technology which we determine will be available for the model year to which the standards apply. We are to give appropriate consideration to cost, energy, and safety factors associated with the application of such technology. We may revise such technology-based standards, taking costs into account, on the basis of information concerning the effects of air pollution from heavy-duty vehicles or engines and other sources of mobile source related pollutants on the public health and welfare.

Section 202(a)(4)(A) of the Act requires the Administrator to consider risks to public health, welfare or safety in determining whether an emission control device, system or element of design shall be used in a new motor vehicle or new motor vehicle engine. Under section 202(a)(4)(B), the Administrator shall consider available methods for reducing risk to public health, welfare or safety associated with use of such device, system or element of design, as well as the availability of other devices, systems or elements of design which may be used to conform to requirements prescribed by (this subchapter) without causing or contributing to such unreasonable risk.

Section 206(a) of the Act requires EPA to test, or require to be tested in such manner as it deems appropriate, motor vehicles or motor vehicle engines submitted by a manufacturer to determine whether such vehicle or engine conforms to the regulations promulgated under section 202. Section 206(d) provides that EPA shall by regulation establish methods and procedures for making tests under section 206.

Section 213 of the Act gives EPA the authority to establish emissions standards for nonroad engines and vehicles (42 U.S.C. 7547). Sections 213(a)(3) and (a)(4) authorize the Administrator to set standards and require EPA to give appropriate consideration to cost, lead time, noise, energy, and safety factors associated with the application of technology. Section 213(a)(4) authorizes the Administrator to establish standards to control emissions of pollutants (other than those covered by section 213(a)(3)) which ''may reasonably be anticipated to endanger public health and welfare.'' Section 213(d) requires the standards under section 213 to be subject to sections 206–209 of the Act and to be enforced in the same manner as standards prescribed under section 202 of the Act.

B. Background: 2007 and 2010 NO_X and PM Standards

(1) On-Highway Standards

On January 18, 2001, EPA published a rule promulgating more stringent standards for NO_X and PM for heavy-duty highway engines (''the heavy-duty highway rule'').[1] The 0.20 gram per brake-horsepower-hour (g/bhp-hr) NO_X standard in the heavy-duty highway rule first applied in MY 2007. However, because of phase-in flexibility provisions adopted in that rule and use of emission credits generated by manufacturers for early compliance, manufacturers were able to continue to produce engines with NO_X emissions greater than 0.20 g/bhp-hr. The phase-in provisions ended after MY 2009 so that the 0.20 g/bhp-hr NO_X standard was fully phased-in for model year 2010. Because of these changes that occurred in MY 2010, the 0.20 g/bhp-hr NO_X emission standard is often referred to as the 2010 NO_X emission standard, even though it applied to engines as early as MY 2007.

The heavy-duty highway rule adopted in 2001 also included a PM emissions standard for new heavy-duty diesel engines of 0.01 g/bhp-hr, effective for engines beginning with MY 2007. Due to the flexible nature of the phase-in schedule described above, manufacturers have had the opportunity to produce engines that met the PM standard while emitting higher levels of NO_X. During the phase-in years, manufacturers of diesel engines generally produced engines that were tuned so the combustion process inherently emitted lower engine-out NO_X while relying on PM after-treatment to meet the PM standard. The principles of combustion chemistry dictate that conditions yielding lower engine-out NO_X emissions generally result in higher engine-out PM emissions. This is what we call the NO_X-PM trade-off. For many new low-NO_X diesel engines today, engine-out PM emissions could be at or above the levels seen with the MY 2004 standards (0.1 g/bhp-hr). To meet today's stringent PM standards, manufacturers rely on diesel particulate filter after-treatment to clean the exhaust.

(2) Nonroad Standards

EPA adopted similar technology-forcing standards for nonroad diesel engines on June 29, 2004.[2] These are known as the Tier 4 standards. This program includes requirements that will generally involve the use of NO_X after-treatment for engines above 75 hp and PM after-treatment (likely soot filters) for engines above 25 hp. These standards phase in during the 2011 to 2015 time frame.

III. Direct Final Rule

In addition to this notice of proposed rulemaking, EPA is also publishing a Direct Final Rule (DFR) addressing the emergency vehicle provisions described in Section IV of this document. We are doing this to expedite the regulatory process to allow engine and vehicle modifications to occur as soon as possible. However, if we receive relevant adverse comment on distinct elements of the emergency vehicle provisions in this proposal by July 27, 2012, we will publish a timely withdrawal in the **Federal Register** indicating which provisions we are withdrawing. Any provisions of the DFR that are not withdrawn will become effective on August 7, 2012, notwithstanding adverse comment on any other provision. We will address all public comments in the final rule based on this proposed rule.

As noted above, EPA is publishing the DFR to expedite the deployment of solutions that will best ensure the readiness of the nation's emergency vehicles. We request that commenters identify in your comments any portions of the emergency vehicle proposed action described in Section IV below with which you agree and support as proposed, in addition to any comments regarding suggestions for improvement or provisions with which you disagree. In the case of a comment that is otherwise unclear whether it is adverse, EPA would interpret relevant comments calling for more flexibility or less restrictions for emergency vehicles as supportive of the direct final rule. In this way, the EPA will be able to adopt those elements of the DFR that are fully supported and most needed today, while considering and addressing any

[1] Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (66 FR 5001).

[2] Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel (69 FR 38958).

adverse comments received on the proposed rule, in the course of developing the final rule.

Note that Docket Number EPA–HQ–OAR–2011–1032 is being used for both the DFR and this Notice of Proposed Rulemaking (NPRM).

IV. Emergency Vehicle Provisions

A. Background on Regulation of Emergency Vehicles

Typically, the engines powering our nation's emergency vehicles belong to the same certified engine families as engines that are installed in similarly sized vehicles sold for other public and private uses.[3] Historically, engine and vehicle manufacturers have sought EPA certification for broad engine families and vehicle test groups that are defined by similar emissions and performance characteristics. Engine families typically only consider the type of vehicle in which the engine is intended to be installed to the extent that it fits into a broad vehicle weight class and, to a lesser extent, the vehicle's intended duty cycle (i.e. urban or highway).

Because of the above-described manufacturing practices and the narrow CAA authority for any exemptions, EPA has historically regulated engines for emergency vehicles, including ambulances as well as police vehicles and fire-fighting apparatus, in the same manner as other engines.

In the public comments received on the proposed heavy-duty highway rule, EPA received some comments about DPF technologies and regeneration cycles on heavy-duty trucks, including one comment that expressed concerns that the systems may not be failsafe.[4] However, none of the comments specifically raised technical feasibility with respect to emergency vehicles, and EPA's response was based on the best information available at the time. After publishing the final rule requiring heavy-duty highway engines to meet performance standards that compelled technologies such as DPF's, EPA received a letter from the National Association of State Fire Marshals, requesting some provision for public safety in implementing this new rule, considering that fire departments across the nation have trouble covering basic costs and may not have funds for more expensive trucks.[5] This letter did not raise any technical feasibility issues, and EPA did not see a need to take action.

More recently EPA has received letters from fire apparatus manufacturers and ambulance companies requesting relief from power or speed inducements related to low levels of DEF for SCR systems on emergency vehicles.[6] Power and speed reduction inducements were new on vehicles equipped with SCR. These were not specifically mandated by EPA but designed by manufacturers to occur if DEF levels became low, to induce operators of the vehicles to perform the required emission-related maintenance in use. More discussion on this, including why the emergency response community requested relief and what action EPA took, is found below in Section IV.C(3).

Recently, beginning in October 2011, EPA received a series of comment letters from fire chiefs and other interested stakeholders, requesting regulatory action to relieve emergency vehicles from the burden of complying with the 2007 PM standards.[7] EPA promptly opened a dialogue with the fire chiefs and engine manufacturers to understand the issues. Power and speed reductions were occurring on some vehicles with soot filters but without SCR systems, in part related to engine protection measures designed by manufacturers. Essentially, these soot filters are supposed to be self-cleaning by periodically burning off accumulated soot during normal vehicle use. The cleaning process is called regeneration, and when this doesn't work as designed, the filter gradually gets more clogged, which can lead to engine problems. EPA has determined that while other pathways are available for resolving some issues related to soot filters on emergency vehicles, there remains a public safety issue related to design of engines and emission control systems on emergency vehicles that should be addressed through this rulemaking. More discussion of this, including why relief was requested and what other actions can be taken in addition to EPA regulation, is found below in Sections IV.C and IV.D.

B. Current Provisions for Other Emergency Vehicles and Engines

On December 1, 2011, in a proposed rule issued jointly with the National Highway Traffic Safety Administration (NHTSA), EPA proposed to exclude light-duty emergency and police vehicles from all phases of greenhouse gas (GHG) emissions standards, in part due to concerns related to technical feasibility, and in part to harmonize with NHTSA's program. Consistent with authority under the Energy Policy and Conservation Act, NHTSA's corporate average fuel economy program already provides manufacturers with the option to exclude emergency vehicles.[8] The agencies are considering and responding to comments on this proposal, and plan to finalize this rule in summer 2012.

In addition to the above proposed exemption for on-highway engines from GHG standards, EPA has provided limited regulatory relief for other types of emergency-use engines. First, EPA's May 6, 2008 final rule adopting Tier 3 and Tier 4 standards for marine diesel engines allows for emergency and rescue vessels to meet an earlier, less stringent tier of standards under 40 CFR parts 89, 94 and 1042.[9] We adopted these provisions to avoid compromising engine performance during emergency operation, and to ensure that more stringent emission standards did not cause a situation where there were no certified engines available for emergency vessels. Such engines are not subject to the Tier 4 standards, which generally involve selective catalytic reduction and diesel particulate filters. The regulations also allow for meeting less stringent standard if there are no suitable engines that are certified to the current standards.

EPA also adopted limited exemption provisions for emergency rescue equipment for small spark-ignition nonroad engines in 1999.[10] Under this provision, equipment manufacturers needed to demonstrate that no engine models certified to current emission standards were available to power the emergency rescue equipment. We

[3] In this proposal, emergency vehicle is defined as a fire truck or an ambulance for on-highway applications, and for nonroad applications, we are defining emergency equipment as specialized vehicles to perform aircraft rescue and firefighting functions at airports, or, or wildland fire apparatus. *See* Section IV.C and proposed revisions at 40 CFR 86.1803–01 and 40 CFR 1039.801.

[4] Heavy-Duty Highway Final Rule, December 21, 2000 Response to Comments, Section 3.2.1, ''Technical Feasibility of Engine/Vehicle Standards//Diesel Engine Exhaust Standards,'' page 3–58 to 3–60, available at *http://www.epa.gov/otaq/highway-diesel/regs/2007-heavy-duty-highway.htm.*

[5] Letter dated February 1, 2001 to C. Whitman, EPA Administrator from G. Miller, President, National Association of State Fire Marshalls.

[6] *See,* for example, letter dated October 22, 2009, from Roger Lackore of the Fire Apparatus Manufacturers' Association and Randy Hanson of the Ambulance Manufacturers Division, to Keisha Jennings of EPA.

[7] *See,* for example, letter dated October 4, 2011 from Congressman Filner to EPA Administrator Jackson, and letter dated October 14, 2011, from Director Cimini of the Southeast Association of Fire Chiefs to EPA Administrator Jackson.

[8] *See* 49 U.S.C. 32902(e).

[9] Final Rule: Control of Emissions of Air Pollution from Locomotives and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder, 73 FR 25098, May 6, 2008, and republished to correct typographical errors on June 30, 2008, 73 FR 37096.

[10] Final Rule: Phase 2 Emission Standards for New Nonroad Spark-Ignition Nonhandheld Engines at or Below 19 Kilowatts, 64 FR 15208, March 30, 1999.

recently moved this provision to 40 CFR part 1054 and included a variety of elements to clarify and improve oversight of the exemption in a later final rule.[11] These elements include a requirement that the engines meet the most stringent standards feasible (but less than the current standards for certification) and annual reporting to EPA on the availability of compliant engines that meet the needs of other emergency equipment using such engines.

In these rules, EPA recognized that equipment and vessels designed and purpose-built exclusively for use in emergency equipment have demanding performance specifications and in some cases extreme duty cycles. The marine diesel provisions also recognize that engines certified to the latest emissions standards requiring emissions after-treatment may create some interference with engine performance or effectiveness that may be needed in emergency circumstances, when installed in some emergency equipment or vessels.

While these provisions do offer limited relief from the latest round of emissions standards for these engines, there is a general requirement to use engines meeting the most stringent emission standards as practical. There are also additional administrative responsibilities related to engine labeling, periodic reporting to EPA, and recordkeeping. These provisions in some cases also expire if compliant engines become available that can practically be used to provide power for the equipment in question. Furthermore, these limited exemption provisions are only applicable to newly certified engines. The regulations do not apply these provisions to in-use engines that are certified and deployed in emergency equipment.

C. Why is EPA taking this action?

EPA is proposing to amend its regulations to facilitate engine manufacturers' design and implementation of reliable and robust emission control systems with regeneration strategies and other features that do not interfere with the mission of emergency vehicles. Through the comments and letters we have received, as well as our own outreach and data-gathering efforts, we have learned that some emission control systems on fire trucks and ambulances today, in particular, certain applications using diesel particulate filters, are requiring an unexpected amount of operator interventions, and there are currently a nontrivial number of emergency vehicles that are electronically programmed to cut power or speed—even while responding to an emergency—when certain operational parameters are exceeded in relation to the emission control system. As we understand it, the experiences of operators are mixed, with some not reporting any problems and some reporting problems that raise public safety and welfare concerns.

EPA's standards are performance-based, and reflect the greatest degree of emission reduction achievable, according to CAA sections 202(a)(3) and 213(a)(3). Our on-highway and nonroad PM standards do not specify the type of diesel particulate filter for manufacturers to use, nor do they even mandate the use of such a filter. Our analysis of the feasibility of the 2007 on-highway PM standard is presented in Chapter III of the final Regulatory Impact Analysis (RIA) for that rule.[12] Our analysis of the feasibility of the Tier 4 nonroad compression ignition engine standards that will be phasing in through 2015 is presented in Chapter 4 of that rule's final RIA.[13] For most nonroad engines, these standards are similar in stringency to the 2007 on-highway heavy-duty engine and vehicle standards. As described below in Section VII, these two rules are providing billions of dollars of annual health benefits by virtually eliminating harmful PM emissions from the regulated engines. Even so, EPA is required by sections 202(a)(4)(B) and 213(c) of the Act to, among other things, consider methods for reducing risk to public safety and welfare associated with the use of emission control devices or systems.

Based on the information available to us, we have concluded that there is an indirect risk to public safety and welfare associated with some examples of emission control systems when they are deployed on emergency vehicles that experience extreme duty cycles. This indirect risk is related to the readiness of emergency vehicles and the risk that they may not be able to respond during emergencies with the full power, torque, or speed that the engine is designed to provide. While this risk is not inherent to the requirement to reduce emissions or to the use of diesel particulate filters on emergency vehicles, EPA believes it is appropriate to ensure that emergency vehicles can perform their emergency missions without the chance of such consequences.

EPA's current rules already provide the opportunity for manufacturers to address many issues through applications for certification of new engines and new vehicles. There is also currently a mechanism for manufacturers to deploy field modifications to the in-use fleet, including those that are substantially similar to approved upgrades for new vehicles, as well as those that apply only to vehicles that are no longer in production. As manufacturers become aware of the need for upgrades or enhancements, this process occurs within the new and in-use fleet with various degrees of application. While that process is occurring today, EPA views this issue as serious enough that we would be remiss if we did not act to ensure that our regulations clearly offer the needed flexibilities for emergency vehicles.

(1) How does a DPF work?

To explain more fully the issues that we are addressing with this action, and hence why we are taking this action, we are providing here some background information on diesel particulate filters and the process of DPF regeneration. DPF's are exhaust after-treatment devices that significantly reduce emissions from diesel-fueled vehicles and equipment. DPF's physically trap PM and remove it from the exhaust stream. Figure IV–1 depicts a schematic of a wall-flow monolith style filter, with the black arrows indicating exhaust gas laden with particles, and the gray arrows indicating filtered exhaust gas. This style of filter is the most common in today's heavy-duty diesel engines, and has very high rates of filtration, in excess of 95 percent.[14]

[11] Final Rule: Control of Emissions from Nonroad Spark-Ignition Engines and Equipment, 73 FR 59034, October 8, 2008.

[12] Final Regulatory Impact Analysis for the ''2007 Heavy-Duty Highway Rule,'' EPA420–R–00–026, December 2000. Chapter III, Emissions Standards Feasibility, is available at *http://www.epa.gov/otaq/highway-diesel/regs/ria-iii.pdf*.

[13] Final Regulatory Impact Analysis for ''Control of Emissions from Nonroad Diesel Engines,'' EPA420–R–04–007, May 2004. Chapter 4, Technologies and Test Procedures for Low-Emission Engines, is available *http://www.epa.gov/nonroad-diesel/2004fr/420r04007e.pdf*.

[14] *See* Final RIA Chapter III, Note 12, above.

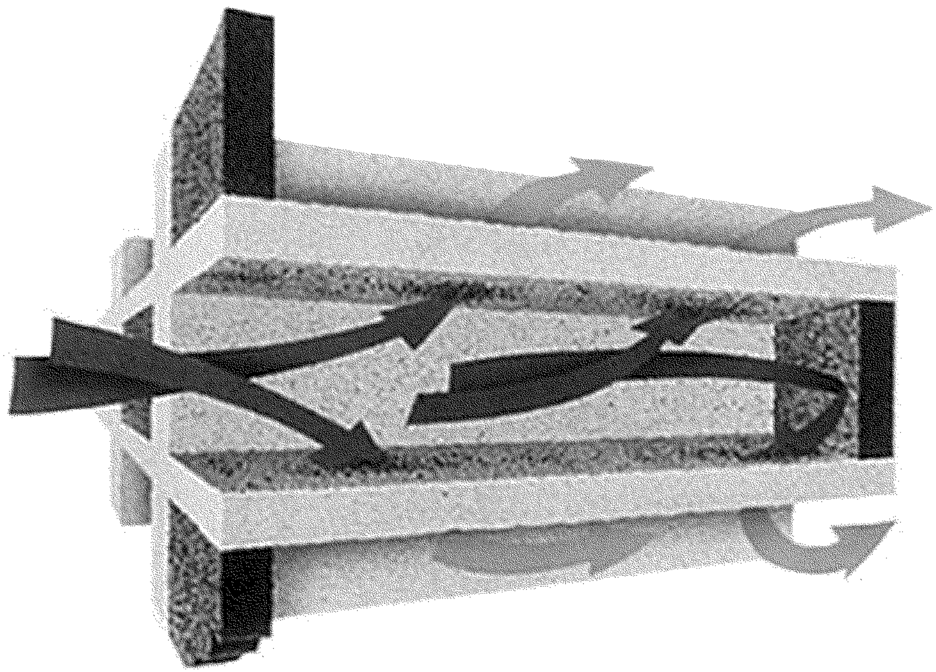

Figure IV-1 Illustration of air flow pattern in a wall-flow monolith style PM filter

(Source: Corning)

To be successful, these devices generally must be able to accomplish two things: Collect PM and clean away accumulated PM. There are two main types of PM that can accumulate: Combustible and non-combustible, and two very different types of cleaning methods: Regeneration and ash cleaning. Regeneration occurs relatively frequently, and is designed to complete the combustion (oxidation) of the trapped combustible PM components, releasing them to the exhaust as gas-phase compounds (mostly H_2O and CO_2). In contrast to the PM that can be oxidized and carried out the tailpipe as gases, the non-combustible PM such as metallic ash cannot be destroyed through regeneration and will always remain inside a DPF. To clean ash from a DPF, the filter unit is removed from the vehicle and professionally cleaned with a special machine. Fortunately, there is very little ash formation from modern diesels so ash cleaning and ash disposal occurs very infrequently, generally with at least 150,000 mile service intervals, and the mass of accumulated ash is generally small (a few teaspoons).[15] [16] This distinction is made here because the ash cleaning process is not a source of concern that has given rise to this EPA action. The infrequent cleaning of noncombustible materials from DPF's is not part of the scope of this action.

Regeneration, however, is a type of routine DPF cleaning that must occur regularly, and for which EPA does not specify a minimum interval in its regulations, in contrast to the ash cleaning process. At its very essence, regeneration involves burning off the accumulated soot. Since this burning can involve extra heat and/or oxygen or oxygen-containing compounds, this must be done carefully and safely to avoid uncontrolled burns. The discussion below in Section IV.C.(1)(b) describes the three types of routine DPF regeneration: Passive regeneration, automatic active regeneration, and manual (parked) active regeneration. A more detailed discussion is provided in a memorandum to the docket.[17] Before discussing the ways that manufacturers achieve regeneration, though, first we discuss the reason why it is needed at all.

(a) Failure of a DPF

When the style of filter installed on a diesel vehicle is the wall-flow type that is predominant in the market today, it physically traps so much of the PM that the particles accumulate on the inside of the filter and if not burned off, this PM can over time block the passages through the filtering media, making it more restrictive to exhaust flow. This is commonly referred to as ''trap plugging.'' Some other styles of filter, such as flow-through DPF's, are less prone to plugging, but do not generally reduce the PM emission rate sufficiently to meet today's stringent PM standard. Any time something gets in the way of free flowing air through an engine, it creates what we call ''exhaust backpressure.'' Even a clean, new DPF generates a small amount of exhaust backpressure due to the porous walls through which all of the exhaust flows.

Engines can tolerate a certain range of exhaust backpressure. When an increase in this backpressure, or resistance, is detected, engines can compensate to a point. An increase in exhaust backpressure from a DPF trapping more and more PM represents increased work demanded from the engine to force the exhaust gas through the increasingly restrictive DPF. However, unless the DPF is frequently cleansed of the trapped PM, this increased work

[15] EPA's regulations at 40 CFR 86.004–25(b)(4) for heavy-duty diesel engine maintenance specify a minimum interval for DPF ash cleanout from 100,000 to 150,000 mi. Many manufacturers design DPF systems with longer maintenance intervals.

[16] *See http://www.arb.ca.gov/diesel/tru/documents/ashguide.pdf.*

[17] *See* memo dated May 4, 2012, ''Diesel Particulate Filter Regeneration,'' Docket ID EPA–HQ–OAR–2011–1032.

demand can lead to reductions in engine performance and increases in fuel consumption. This loss in performance may be noticed by the vehicle operator in terms of poor acceleration and generally poor drivability of the vehicle.

If a DPF is not regenerated and it becomes plugged, there is a risk of two types of failure. The degree of this risk and which consequence may be experienced will depend on the engine and emission control system design. One consequence is that the lack of air flowing through an engine will cause an engine to shut down because it can no longer compensate for the extra work being demanded of it. The other is a risk of catastrophic DPF failure when excessive amounts of trapped PM begin to oxidize at high temperatures (i.e., DPF regeneration temperatures above 1,000 °C) leading to a ''runaway'' combustion of the PM within the DPF. This can cause temperatures in the filter media to increase beyond its physical tolerance, possibly creating high thermal stresses where the DPF materials could crack or melt. This is an unsafe condition, presenting physical danger to occupants as well as to objects and persons near the vehicle. Further, catastrophic failure can allow significant amounts of the diesel PM to pass through the DPF without being captured. That is, the DPF is destroyed and PM emission control is lost. For all these reasons, most manufacturers generally design their emission control systems to prevent uncontrolled shutdown or runaway DPF regeneration by programming the engine's electronic control module (ECM) to limit maximum engine speed, torque and/or power when excessive backpressures are detected. This mode of engine operation at reduced performance may allow a vehicle to ''limp home'' to receive service. In extreme cases the ECM may command the engine to shut down to prevent a catastrophic failure.

(b) Types of Regeneration

There are three types of routine DPF regeneration. Passive regeneration refers to methods that rely strictly on the temperatures and constituents normally available in the vehicle's exhaust to oxidize PM from a DPF in a given vehicle application. Passive regeneration is an automatic process that occurs without the intervention of an engine's on-board diagnostic and control systems, and often without any operator notice or knowledge. Passive regeneration is often a continuous process, because of which, it is sometimes referred to as continuous regeneration. In a vehicle whose normal operation does not generate temperatures needed for passive DPF regeneration, the system needs a little help to clean itself. This process is called active regeneration, and supplemental heat inputs to the exhaust are provided to initiate soot oxidation. There are two types of active regeneration: Those that may occur automatically either while the vehicle is in motion, while idling, or while powering an auxiliary device such as a pump or ladder (power take-off (PTO) mode), and those that must be driver-initiated and occur only while the vehicle is stationary and out-of-service.

Vehicles with automatic active regeneration systems require operators to be alert to dashboard lamps and indicators. Written instructions are provided to operators to explain what each lamp means (such as high temperatures or need for regeneration) and what action is called for (such as driving at highway speeds or initiating a manual active regeneration). Because EPA emissions standards are performance based; and therefore, do not dictate any required emission control system technologies or configurations, each manufacturer has the discretion to program the timing and sequence of lamps as needed to inform drivers of the condition of the emission control system. As noted above, it is not uncommon in today's heavy-duty fleet for an engine's ECM to limit its maximum speed, torque or power when a plugging DPF is detected. These engine and emission control system protection measures can alert drivers to the need to change driving conditions to facilitate automatic active regeneration or to make plans to allow for a manual active regeneration.

A manual active regeneration allows the engine's ECM to increase engine speed and exhaust temperature to a greater extent than what is typically allowed during an automatic active regeneration. Because the ECM takes full control of an engine during a manual active regeneration, the vehicle must remain parked and not used for other purposes, such as pumping water in PTO mode. Some manual active regenerations may require towing the vehicle to a special service center, and may occur while the DPF is on the vehicle, or offline with the DPF removed from the vehicle. In such cases, if a spare DPF is not available, the vehicle could be out of service overnight. If a driver disregards such warnings, the risk of uncontrolled engine shutdown or a catastrophic DPF failure may increase. EPA encourages the design of robust systems calling for minimal driver interventions, while providing drivers with clear and early indicators before any interventions are needed. EPA also encourages accurate and thorough operator training to ensure that the correct remedial action is taken at the earliest available time.

Actively regenerating DPF systems typically require sufficient air flow, temperature and soot accumulation before an automatic active regeneration will be requested by the engine's ECM. As mentioned above, this may occur either while the vehicle is in motion or parked, if pre-set engine operating conditions are met (such as speed and temperature). When the engine's ECM signals the initiation of an automatic active regeneration and the extra heat is generated, an ideal DPF system accomplishes this as a transparent process, with no effects perceivable by the driver.

A variety of manufacturer approaches can be taken to produce the supplemental heat needed for active regeneration. Diesel engines of MY 2007 or newer often incorporate one or more of the following approaches:

- On-board electrical heaters upstream of the filter.
- Air-intake throttling in one or more of the engine cylinders. When necessary, this device would limit the amount of air entering the engine, raising the exhaust temperature and facilitating regeneration.
- Exhaust brake activation. When necessary, this device would limit the amount of exhaust exiting the engine, raising the exhaust temperature and facilitating regeneration.
- Engine speed increases. This approach is sometimes used in combination with the other approaches to deliver more heat to the filter to facilitate regeneration.
- Post top-dead-center (TDC) fuel injection. Injecting small amounts of fuel in the cylinders of a diesel engine after pistons have reached TDC introduces a small amount of unburned fuel in the engine's exhaust gases. This unburned fuel can then be oxidized over an oxidation catalyst upstream of the filter or oxidized over a catalyzed particulate filter to combust accumulated particulate matter.
- Post injection of diesel fuel in the exhaust upstream of an oxidation catalyst and/or catalyzed particulate filter. This method serves to generate heat used to combust accumulated particulates by oxidizing fuel across a catalyst present on the filter or on an oxidation catalyst upstream of the filter

• On-board fuel burners upstream of the filter.[18]

These are presented here merely as examples, and are by no means a complete list of the strategies available to manufacturers when designing engines that use automatic active DPF regeneration, though not all may be applicable to all engines. A common approach that gets a lot of consumer attention is the use of fuel burners or fuel injection strategies. This approach is often called ''dosing.'' Vehicle owners may notice an increase in fuel consumption when driving a vehicle that relies heavily on fuel dosing for its automatic active regenerations. In this case, when an engine's ECM gives the signal, the doser injects a metered amount of diesel fuel into the exhaust flow (or cylinders), which reacts with the DPF catalyst to raise the temperature to a point that enables regeneration. EPA does not have information about which manufacturers employ this technique or the number or types of vehicles with engines that use fuel dosing as part of the active regeneration strategy. Estimates of the additional fuel use by a vehicle whose DPF regeneration system employs fuel dosing are described below in Section VII.B. This is also mentioned here because one of the possible outcomes of this EPA action is that some manufacturers may alter their strategies for automatic active regenerations on emergency vehicles, which may have a modest effect on supplemental fuel use due to dosing. Further discussion of this is provided below in Section VII.

(2) Why are emergency vehicles having problems with DPF regeneration?

At the time of promulgation of the heavy-duty highway rule, EPA and the engine manufacturers expected the 2007-compliant engine emission control systems would be integrated with advanced engine controls to ensure DPF regeneration under all vehicle operating conditions and environments. While this is widely true today, the experience of the rule implementation thus far indicates there are still some exceptions.

Although EPA is aware of a relatively small number of emergency vehicles that are experiencing problems with DPF regeneration, of those that are having problems, most of the problems can be related to the vehicle's duty cycle, the ambient conditions, and/or the engine's combustion characteristics. A vehicle's duty cycle means how it is driven, including its speeds, loads, and distances, as well as time out of service and time spent idling. A vehicle's duty cycle can vary by the demographic of the service area, including whether the vehicle responds to emergencies in a rural or urban community, and whether it drives over flat or hilly terrain. Because DPF regeneration requires heat and oxygen (basic ingredients for combustion), the success of DPF regeneration strategies can also be influenced by ambient conditions such as extreme cold winter temperatures and whether the vehicle operates near sea level or at a high elevation. The engine combustion and exhaust characteristics can influence the success of a DPF regeneration strategy since parameters such as engine-out NO_X and PM emission levels can influence how easily the soot can be oxidized, and how much soot needs to be oxidized and how often.

Both the engine's duty cycle and the overall control strategy of the engine's emission control system play a large role in the success of integrating a DPF with an engine to control PM emissions. In this section we provide additional discussion of how engine combustion characteristics and vehicle duty cycle can lead to DPF regeneration problems on emergency vehicles. In Section IV.E, below, we discuss our proposed regulatory action to address these issues. While our proposed approach specifically targets engine combustion characteristics and emission control system design, we encourage emergency vehicle owners to inquire with their dealers and manufacturers regarding suitable vehicle and engine options that are appropriate for their duty cycle as well as their demographic and geographic location.

(a) Engine Combustion Characteristics

Engine combustion characteristics can be designed to enable continuous passive regeneration or to rely heavily on automatic active regeneration. As mentioned above, regeneration is a combustion process, burning off the accumulated PM or soot. The PM is created because the initial combustion process in the engine was imperfect. To completely convert all fuel to CO_2 and water, the combustion process needs more heat and oxygen. Both of these things create NO_X because nitrogen (N_2) is naturally present in the air and readily oxidizes at high temperatures. Thus there is a NO_X-PM trade-off of most diesel combustion processes (homogeneous charge compression ignition being an exception) where lower combustion temperatures help control NO_X but create more PM, and higher temperatures that destroy PM (or prevent it from being created) can generate more NO_X.

In an engine with a DPF system, combustion settings, or calibrations that enable continuous passive regeneration, tend to be those with higher engine-out NO_X and lower engine-out PM, partly because of the higher temperatures that create the NO_X, partly because of the NO_X itself that can act as an oxidizer (to burn off soot), and partly because of the lighter soot loading rate. In contrast, engine calibrations that may lead to a heavy reliance on automatic active regeneration tend to be those with lower engine-out NO_X and higher engine-out PM, partly because of the lower temperatures, partly because of a lack of helpful NO_X, and partly because of a heavier soot loading rate. Note that ''engine-out'' means emissions upstream of any after-treatment cleaning devices such as DPF or SCR. An example of a DPF system that may rely almost exclusively on active regeneration to maintain a clean PM filter, from an engine calibration perspective, would be an engine using advanced exhaust gas recirculation, because it would have very low engine-out NO_X and relatively high engine-out PM. An example of a DPF system that may rarely experience automatic active regeneration (and frequently passively regenerate), from an engine calibration perspective, would be an engine using SCR to control NO_X, because it could have comparatively high engine-out NO_X and relatively low engine-out PM. The SCR after-treatment would then reduce the high engine-out NO_X to provide very low tailpipe NO_X.

Thus it is important to note that this NO_X-PM trade-off is a critical design parameter when developing an engine that will be successfully integrated with a DPF-equipped emission control system. To date, all of the concerns expressed to EPA regarding emergency vehicles with DPF regeneration issues have been for vehicles that do not employ SCR technology, and thus may have higher engine-out PM. The differences in engine combustion characteristics of the MY 2007 vehicles compared to those of the majority of MY 2010+ vehicles support the concept that the emergency vehicle fleet may experience fewer DPF regeneration troubles as it migrates to engines that use after-treatment to meet EPA's 2010 NO_X standards. Such a trend may indicate that some engine manufacturers may see a greater need to address in-use emergency vehicles than new vehicles.

[18] MECA Diesel Particulate Filter Maintenance: Current Practices and Experience (June 2005) *http://www.meca.org/galleries/default-file/Filter_Maintenance_White_Paper_605_final.pdf.*

(b) Duty Cycles

As noted above, the duty cycle of a vehicle is one of the factors that influences how often the DPF regenerates passively or actively. It is important to note that all DPF systems with active regeneration components also have the capability to passively oxidize soot accumulated on the filter, though some of the above-described factors may inhibit successful passive regeneration. Operation at highway speeds and high engine loads (high load means demanding more work from the engine, such as accelerating, driving uphill or carrying heavy cargo) typically leads to successful passive regeneration of a DPF. An example from a duty-cycle perspective of a vehicle that frequently experiences automatic passive regeneration would be a long-haul tractor-trailer. There is also often a threshold of speed or load that is required for automatic active regeneration strategies as well, though not as great as for passive regeneration—often at least 5 miles/hour or parked with a PTO engaged. In some vehicles, passive regeneration occurs so rarely that a DPF system relies almost exclusively on active regenerations to maintain a clean PM filter. An example of this from a duty-cycle perspective would be a vehicle that operates at idle, low speed and low load over most of its duty cycle. Many emergency vehicles fall into this category.

It is possible to collect duty cycle data from trucks by extracting information that is broadcast by the engine's ECM. ECM's broadcast information such as engine speed, load, temperature, DPF backpressure, and many other parameters relevant to engine operation. In 2004 the Fire Apparatus Manufacturers Association conducted a data-collection project, downloading logged data from emergency vehicles in use across the United States, to document duty cycles and engine conditions typically experienced in the emergency fleet, including pumpers, aerials, and rescue vehicles in urban, suburban and rural communities.[19] The 2004 FAMA data set includes 26 service months of data from 51 pumper trucks, 31 service months of data from 21 aerial trucks, and 14 service months of data from 4 rescue vehicles. Overall, the data reveal that emergency vehicles in urban centers log more hours than vehicles in suburban or rural areas, with the urban and suburban vehicles logging over five and four times the average rural engine hours, respectively, on an annual basis. This demographic data could be helpful to fleet managers who wish to understand why they have or have not experienced certain troubles with their vehicles. The data also indicate that vehicles with PTO capability (pumpers and aerials) operate in PTO mode on average about 10 percent of their operating time. Further, the data indicate the vast majority of emergency fleet operation is at loads below 10 percent of maximum capacity and engine speeds below 1,000 rpm. Data of this type could be helpful to engine manufacturers who may wish to assure that their emission control system designs will be successful for a given application. For the vehicles from which operating data were collected, FAMA determined an average engine load using the total horsepower, percent load, and percent time at load. Table IV–1 presents a summary of the engine load data compiled in FAMA's study.

Table IV–2 presents operating data by both vehicle type and demographic, and Table IV–3 presents an overview of the data by vehicle type.

TABLE IV–1—FAMA ENGINE LOAD DATA

Apparatus type	Capacity range in study	Population average percent running load
Pumper	315–500 hp	18
Aerial	170–500 hp	30
Rescue	350–500 hp	20

TABLE IV–2—FAMA DUTY CYCLE DATA BY DEMOGRAPHIC

Service area	Operating condition	Pumper	Aerial	Rescue	Service area average
Rural	Engine Hours (Avg Annual)	301	204	301	295
	PTO Hours (Avg Annual)	70	63		
	Low Speed (% Time < 1,000 RPM)	63	73	51	[a]62
	Medium Speed (% Time 1,000 < RPM < 1,800)	27	19	42	[a]29
	High Speed (% Time > 1,800 RPM)	11	9	7	[a]9
	Low Load (% Time < 10%)	61	83	59	[a]68
	Medium Load (% Time 10% < Load < 90%)	36	11	39	[a]29
	High Load (% Time > 90%)	3	6	2	[a]4
Suburban	Engine Hours (Avg Annual)	1364	1133	367	1272
	PTO Hours (Avg Annual)	168	[b]123		
	Low Speed (% Time < 1,000 RPM)	71	68	77	[a]72
	Medium Speed (% Time 1,000 < RPM < 1,800)	23	27	17	[a]22
	High Speed (% Time > 1,800 RPM)	6	5	7	[a]6
	Low Load (% Time < 10%)	54	37	78	[a]56
	Medium Load (% Time 10% < Load < 90%)	44	58	22	[a]41
	High Load (% Time > 90%)	3	5	0	[a]3
Urban	Engine Hours (Avg Annual)	1107	2379	1686	1681
	PTO Hours (Avg Annual)	93	[b]213		
	Low Speed (% Time < 1,000 RPM)	62	73	57	[a]64
	Medium Speed (% Time 1,000 < RPM < 1,800)	32	22	32	[a]29
	High Speed (% Time > 1,800 RPM)	5	5	11	[a]7
	Low Load (% Time < 10%)	73	53	44	[a]57
	Medium Load (% Time 10% < Load < 90%)	24	42	51	[a]39
	High Load (% Time > 90%)	3	5	5	[a]4

Notes:
[a] Straight average by EPA from summary results. Other values in this table are weighted averages compiled by FAMA using individual vehicle data.
[b] Includes both pumping and aerial operating hours.

[19] Fire Apparatus Manufacturer's Association, Fire Apparatus Duty Cycle White Paper, August 2004, available at *http://www.deepriverct.us/firehousestudy/reports/Apparatus-Duty-Cycle.pdf*.

TABLE IV–3—FAMA DUTY CYCLE DATA BY VEHICLE TYPE

Operating condition	Pumper class average	Aerial class average	Rescue class average	Fleet average
Engine Hours (Avg Annual)	[a] 924	[a] 1239	[a] 785	1244
PTO Hours (Avg Annual)	[b] 117		....	....
Low Speed (% Time < 1,000 RPM)	66	71	61	67
Medium Speed (% Time 1,000 < RPM < 1,800)	27	23	30	26
High Speed (% Time > 1,800 RPM)	7	5	9	7
Low Load (% Time < 10%)	62	50	56	58
Medium Load (% Time 10% < Load < 90%)	35	45	41	38
High Load (% Time > 90%)	3	5	3	3

Notes:

[a] Straight average by EPA from summary results. Other values in this table are weighted averages compiled by FAMA using individual vehicle data.

[b] Includes only pumping hours. Aerial operating hours averaged 69 hours per year.

We can see from this study that engines on emergency vehicles across the country are commonly operated over duty cycles that offer very limited opportunities to regenerate DPF's. It is also important to note that emergency vehicles do not typically get deployed on planned duty schedules with predictable blocks of garage time for servicing or maintenance. While some other types of vocational vehicles may have duty cycles with many characteristics similar to those shown above, emergency vehicles are unique in their need to be ready to deploy at any moment for the purpose of protecting public safety and welfare by saving human lives that may be in immediate danger.

When trucks with an engine-driven PTO are working in a stationary PTO mode, some engines achieve the conditions to enable an automatic active regeneration during this time. While this is normally designed to be a transparent process, in practice some effects of this type of regeneration have been noticed by operators. EPA has received information from fire chiefs indicating that there have been instances where engine ECM's took control from the operator during water pumping operations. When an automatic active regeneration is initiated during a water pumping operation, for example, an ECM may be programmed to alter throttle position or engine speed to achieve the conditions needed to complete an automatic active regeneration. Depending on the design of the water pumping system's pressure regulation, this may in turn affect the water pressure in the fire hoses. EPA has not heard of this occurring on a widespread basis, and has reason to believe that affected engine and truck manufacturers have identified and corrected this issue on some vehicles. EPA's current regulations already allow manufacturers to develop and request EPA approval for certification of engines with emission control strategies where the process of undergoing automatic active regeneration would not interfere with safely pumping fire suppressant. EPA requests comment on whether any EPA action should be taken to explicitly address this situation beyond what we are already proposing in this action.

While not addressed directly in this proposed action, there are technologies that could be implemented to decrease the amount of time emergency vehicles spend with their main engines operating at light loads and at idle. These technologies include electronically programmed automatic engine start/stop systems and hybrids. Automatic start/stop systems automatically stop and start an engine depending upon whether or not it is needed to supply power to the vehicle. This technology is already being implemented on other heavy-duty vehicles to decrease unnecessary engine idling. Hybrid drivetrains also decrease engine idling with an integrated alternate power source such as a battery. We are currently seeing an increase in the use of hybrid technologies in heavy-duty diesel vocational vehicles. Garbage trucks, utility company trucks, and other work trucks are using hybrid technology to power on-board hydraulic systems and cab heating and cooling systems. In conventional vehicles these systems are powered by a main engine typically operating at light load or at idle. Because automatic start/stop and hybrid technologies improve fuel economy and decrease greenhouse gas emissions, we believe that they will be used in more and more vehicles in the future. We believe there is potential for these technologies to be integrated into future designs of emergency vehicles to decrease their operation at light loads and at idle. Such technologies would not only improve fuel economy and decrease greenhouse gas emissions from emergency vehicles, they would also help to prevent their diesel particulate filters from becoming plugged due to excessive operation at light loads and at idle. While we are not proposing any specific action at this time related to decreasing the amount of time emergency vehicles operate at light load or at idle, we request comment on the potential for application of alternate power sources and idle reduction technologies on emergency vehicles.

(3) What are the concerns for emergency vehicles using SCR?

Selective Catalytic Reduction (SCR) is an exhaust after-treatment system used to control NO_X emissions from heavy-duty engines by converting NO_X into nitrogen (N_2) and water (H_2O). The technology depends on the use of a catalytic converter and a chemical reducing agent, which generally is in an aqueous urea solution, and is often referred to as diesel exhaust fluid (DEF). Some trade names for this chemical reductant include AdBlue, BlueDef, NOxBlue, and TerraCair.

Most engine manufacturers chose to comply with the 2010 NO_X emission standard by adding SCR to their engine models. In general, the approach with an SCR system has been a sound and cost effective pathway to comply with EPA's 2010 emissions standards, and it is the primary path being used today.

DEF is injected into the exhaust upstream of the SCR catalyst where it forms ammonia and carbon dioxide. The ammonia then reacts with NO and NO_2, so that one molecule of urea can reduce two molecules of NO or one molecule of NO_2. A robust SCR system can achieve about 90 percent reduction in cycle-weighted NO_X emissions. Improvements have been made over the last several years to improve the NO_X conversion rate and reduce the impact of lower exhaust temperatures on the conversion efficiency.

Because an SCR system is only effective when DEF is injected into the exhaust, we consider refilling a vehicle's DEF tank to be a critical emission-related engine maintenance requirement. We are taking action elsewhere in this notice (See Section V) to establish this in our regulations. Therefore, manufacturers have implemented a number of strategies to induce a vehicle operator to refill a vehicle's DEF tank when needed. These operator inducements generally include first illuminating one or more dashboard lights to warn the operator that the DEF tank needs to be refilled soon. However, if such initial inducements are persistently ignored by the vehicle operator, eventually additional inducements are typically activated that decrease the maximum speed or power of the vehicle. These additional inducements are intended to create conditions making operational conditions of the vehicle increasingly unacceptable if the initial dashboard lamp illumination inducements are persistently ignored. Similar inducements may occur in cases where DEF quality does not meet system specifications, or if the SCR system is not functioning correctly for another reason.

While decreasing vehicle performance can be an effective inducement strategy, we believe it may not be appropriate in all situations for emergency vehicles because of their special need to be ready at any moment for the purpose of protecting public safety and welfare by saving human lives that may be in immediate danger. We recognized this during the initial implementation of our 2010 NO_X standards, and we worked with the Fire Apparatus Manufacturers' Association (FAMA), the Ambulance Manufacturers Division of the National Truck Equipment Manufacturers Association, and the International Association of Fire Chiefs to support the publication of a May 18, 2010 memo that instructed emergency vehicle manufacturers and engine manufacturers to implement less severe inducement strategies for emergency vehicles.[20] In this proposal we are taking additional steps so that emergency vehicle manufacturers and engine manufacturers have the option to further reduce the severity or eliminate altogether any performance related inducements that are or could be implemented on emergency vehicles and their engines during emergency situations. We believe that this additional flexibility will help to prevent any abnormal condition of a vehicle's emission control system from adversely affecting the speed, torque, or power of an emergency vehicle during emergency situations.

D. What would occur if EPA took no action?

(1) The Industry Would Continue to Get Smarter

Improving the components of diesel particulate filters is the current subject of research and development activities within the automotive and air pollution control industries. Aspects that are being improved include filter ash storage capacity, filter pressure drop, substrate durability, catalyst activity, as well as other physical and chemical properties that can optimize the device for heavy-duty vehicle applications.

Engine manufacturers have taken a systems approach, optimizing the engine with its after-treatment system to realize the best overall performance possible. Manufacturers can manage the functioning of the emission control system by adjusting parameters such as the thermal profile of the after-treatment system, the exhaust gas chemical composition, the rate of consumption of DEF, the rate of particle deposition, and the conditions under which DPF regenerations (soot cleaning) may occur.

In a broad and general sense, the trend is that DPF's are slowly becoming even more robust without EPA intervention. Future DPF's will need fewer total regenerations during the useful life of the engine and control system, more passive and fewer active regenerations will occur, and manual regenerations will become rarer.

In addition, vehicle operators and fleet managers will continue to become more experienced with this new generation of sophisticated electronically-controlled vehicles. Manufacturers across the country are providing training on actions fleet managers can take to decrease problems with DPF regenerations. These actions include:

- Use low-ash engine oils.
- Avoid extended idling.
- Maintain insulation on the exhaust pipe.
- Maintain the crankcase filter.
- Periodically operate a vehicle at higher speeds and loads.

The Technology & Maintenance Council (TMC) of the American Trucking Associations conducted a survey in late 2011 to compare user experiences between EPA 2010, EPA 2007, and EPA 2004 vintage trucks.[21] According to TMC, 72 percent of the survey respondents indicated that driver understanding of the 2007-vintage after-treatment system was worse than driver understanding of the 2004-vintage after-treatment system, and 33 percent of respondents indicated that driver understanding of the 2010-vintage after-treatment system was worse than driver understanding of the 2007-vintage after-treatment system. The responses regarding driver understanding of fault codes and dash lamps indicated that drivers have 69 percent poorer understanding of 2007 vs. 2004 fault codes and dash lamps, and 50 percent poorer understanding of 2010 vs. 2007 fault codes and dash lamps. We expect that this education component will gradually improve over time without EPA intervention.

(2) The Fleet Would Continue to Migrate to the 2010 Standards

Vehicles with 2010-compliant heavy-duty diesel engines tend to place different demands on their DPF systems than pre-2010 vehicles. With the addition of NO_X after-treatment such as SCR, engines may be tuned to emit lower engine-out PM (recall the NO_X-PM trade-off described above). When an SCR system is integrated, it provides the opportunity to run an engine at lower soot levels and elevated levels of NO_2, which is a chemical species that efficiently oxidizes the soot in the absence of elevated temperatures. It is EPA's expectation that vehicles of MY 2010 and beyond, particularly those using SCR, will generally experience fewer troubles with DPF's than the earlier model year vehicles, due to the nature of the on-board technology as well as the many years of experience gained by manufacturers since 2007. The 2011 TMC survey included an assessment of relative satisfaction levels between EPA 2010, EPA 2007, and EPA 2004 vintage trucks. The survey results indicate that after-treatment durability is better with EPA 2010 trucks compared to EPA 2007 trucks, with less time out of service.[22] As an illustration, according to a Volvo product brochure, the company's EPA 2010-compliant trucks eliminate the need for active DPF regeneration, reducing driver involvement with the emission control

[20] FAMA 2010, Emergency Vehicle SCR and DEF Inducement Guidelines; 2010 Engine Emissions Control Requirements.

[21] American Trucking Associations, Technology & Maintenance Council, S3 Engine Study Group. Survey conducted Fall 2011, public slides dated February 2012 available at *http://www.truckline.com/Federation/Councils/TMC/Documents/2012%20Annual%20Meeting%20and%20Exhibition%20Documents/TMC12A_TECH2.pdf.*

[22] *See* ATA/TMC, Note 21.

system, using a design that allows for the DPF system to reliably oxidize accumulated soot using continuous passive regeneration.[23]

(3) Some Trucks Would Continue to Experience Problems

Even though such trends would indicate that instances of emergency vehicles experiencing difficulty managing regeneration of DPF's would decrease, in the absence of this EPA action, some vehicles would be likely to continue to experience some problems.

EPA has learned that some engine manufacturers have disabled these engine protection measures on some emergency vehicles. In these cases the manufacturer has reasoned that an operator should be allowed to remain in control of an emergency vehicle even facing risk of catastrophic failure, with the consequences of that failure being less severe than the consequences of the vehicle prematurely losing power, torque and/or speed while performing emergency services.

Without a clear action from EPA to provide the regulatory flexibility needed for swift deployment of robust remedies throughout the emergency vehicle fleet, implementation of best practices could be inconsistent, insufficient, or even impossible due to regulatory constraints. Some vehicles would continue to experience frequent plugging of DPF's, frequent forced filter regenerations, and reduced engine power, speed or torque that diminish the ability of first responders to save lives and property. There would also remain a heightened risk that an emergency vehicle could be taken out of service when it is most needed.

E. Proposed Regulatory Action

As described above in Section IV.C, many DPF-equipped vehicles include engine controls and driver alerts that lead to decreases in maximum speed, torque, or power when DPF backpressure exceeds normal levels, as protective measures for either the engine or the DPF, or as inducements for the operator to immediately conduct DPF regeneration. Similarly, vehicles equipped with selective catalytic reduction (SCR) systems for NO_X reduction currently have engine controls and driver alerts that lead to eventual loss of speed, torque, or power when the SCR controls detect abnormal conditions (such as a malfunction, low DEF levels, etc.), as inducements to take immediate corrective action to allow the SCR to function normally. In most vehicles, these alerts and inducements may be easily avoided with normal driving and routine maintenance, and if activated, these inducements would not have any significant effect on public safety and welfare. In emergency vehicles, however, should any of these limits on maximum speed, torque, or power occur while a vehicle is responding to an emergency, it could be a matter of life or death. To address these issues that could otherwise limit the maximum speed, torque or power of an emergency vehicle's engine when it is needed most, EPA is proposing to amend 40 CFR part 86 to revise the definition of defeat device; add new definitions of emergency vehicle, ambulance and fire truck; and add new labeling requirements for new on-highway engines with approved Auxiliary Emission Control Devices for emergency vehicles. EPA is also amending its regulations at 40 CFR part 1039 to revise the definition of defeat device, add a new definition of emergency equipment, and add a new labeling requirement for nonroad engines with approved Auxiliary Emission Control Devices for emergency equipment.

In our current regulations, engine manufacturers may request as part of an application for new engine or vehicle certification, and EPA may approve, Auxiliary Emission Control Devices, if they are not determined to be ‘‘defeat devices.’’ Auxiliary Emission Control Devices, or AECD's, are any design element of an engine's emission control system that senses temperature, vehicle speed, engine RPM, transmission gear, manifold vacuum, or any other parameter for the purpose of activating, modulating, delaying, or deactivating the operation of any part of the emission control system.[24] Some AECD's can temporarily decrease the effectiveness of an emission control system. This type of AECD is only permitted in very limited situations, for example, when such excursions are deemed to be necessary in order to protect the vehicle, engine, and or emission control system during limited modes of operation.

A defeat device is a type of AECD that reduces the effectiveness of vehicle emission controls in situations when such reduction in effectiveness is not approved or permitted by EPA. Defeat devices are not permitted by the Clean Air Act or EPA.

Approvals of AECD's are made by EPA on a case-by-case basis. In applications for engine certification, manufacturers must include a detailed description of each AECD to be installed in or on any vehicle (or engine) covered by the application, as well as a detailed justification of each AECD that results in a reduction in effectiveness of the emission control system. According to 40 CFR 86.094–21(b)(1)(i)(B), EPA may disapprove a request for an AECD based on consideration of currently available technology. Use of an unauthorized or disapproved AECD can be considered a violation of section 203 of the Act.[25]

In this action, EPA is proposing to revise the definition of *defeat device* at 40 CFR 86.004–2, 86.1803–01, and 40 CFR 1039.115 to exclude AECD's that apply only for engines on emergency vehicles, where the need for an AECD is justified in terms of preventing the vehicle or equipment from losing speed, torque, or power due to abnormal conditions of the emission control system, or in terms of preventing such abnormal conditions from occurring during operation related to emergency response.

In this action, EPA is proposing to define an *emergency vehicle* as a vehicle that is an ambulance or a fire truck. EPA is proposing to adopt a definition of *ambulance* consistent with the current U.S. General Services Administration Star of Life specification.[26] EPA is proposing to define *fire truck* as a vehicle designed to be used under emergency conditions to transport personnel and equipment and to support the suppression of fires and mitigation of other hazardous situations, consistent with the scope of standards for automotive fire apparatus issued by the National Fire Protection Association.[27] We are defining *emergency equipment* as specialized vehicles to perform aircraft rescue and firefighting functions at airports, or wildland fire apparatus. With these definitions, it is EPA's intent to include vehicles that are purpose-built and exclusively dedicated to firefighting, emergency/rescue medical transport, and/or performing other rescue or emergency personnel or equipment transport functions related to saving lives and reducing injuries coincident with fires and other hazardous situations. EPA requests comment on whether we should refine or expand our

[23] *See* Volvo 2010 product brochure, ‘‘Volvo's SCR No Regen Engine,’’ available at *http://www.volvotrucks.com/SiteCollectionDocuments/VTNA_Tree/ILF/Products/2010/09-VTM075_NoRegen_SS_041609.pdf.*

[24] *See* 40 CFR 86.082–2.

[25] *See* 40 CFR 86.094–21 and 094–22.

[26] U.S. General Services Administration, Federal Specification for the Star-of-Life Ambulance, August 1, 2007, *http://www.deltaveh.com/f.pdf.*

[27] *See* National Fire Protection Association web page. Accessed April 2012 at *http://www.nfpa.org/catalog/product.asp?title=Code-1901-2009-Automotive-Fire-Apparatus&category%5Fname=&pid=190109&target%5Fpid=190109&src%5Fpid=&link%5Ftype=search&icid=.*

definition of emergency vehicle within the scope of this action to include those equipped with heavy-duty diesel engines that serve other civilian rescue, law enforcement or emergency response functions. We are especially interested in information regarding instances of such vehicles experiencing or risking loss of power, speed or torque due to abnormal conditions of the emission control system, and how that may inhibit mission-critical life- and property-saving work.

EPA is also proposing an associated engine labeling requirement so that engines with approved emergency vehicle AECD's would be clearly identified and distinguished from other similar engines.

As mentioned above in Section IV.C, some engine manufacturers currently specify that when an engine is sold for installation in an emergency vehicle, some of the default power, torque or speed inducements be de-activated or set to alternate, less severe settings. In such applications, when the DPF system requests regeneration, the warning lights remain illuminated while the vehicle remains in complete control of the driver. In these cases the manufacturer has likely reasoned that the consequences of catastrophic failure would be less severe than the consequences of the vehicle prematurely losing power, torque and/or speed while performing emergency services. EPA has granted related AECD's in the past.

However, without the proposed optional flexibilities provided by EPA in this action, manufacturers could be prevented from implementing truly failsafe solutions for all affected vehicles. For example, while current custom solutions may allow an emergency vehicle to continue pumping water or transporting a person to safety, its DPF would continue to accumulate particles and the risk of catastrophic failure would increase.

In this action, EPA is proposing amendments so that manufacturers could apply for (and EPA could approve) AECD's that would be justified in terms of preventing the occurrence of abnormal conditions of the emission control systems for emergency vehicles or in terms of preventing the engines from losing speed, torque, or power due to such abnormal conditions. In this context, EPA would consider abnormal conditions to be parameters outside normal ranges for proper operation, such as excessive exhaust backpressure from high soot loading on a DPF or insufficient DEF for use with an SCR system.

EPA is encouraging manufacturers to apply for AECD's that are tailored for engines on emergency vehicles, considering the duty cycle information presented above in Section IV.C(2)(b) along with any other information needed to design failsafe emission control systems for new emergency vehicles. EPA is also encouraging manufacturers to design field modifications to address these issues on in-use emergency vehicles, including those whose engines are no longer in production. Further discussion of field modifications is provided below in Section IV.F(2).

To achieve these goals, EPA understands that increased flexibility would be needed because EPA's strict NO_X and PM standards present many design constraints. Below we describe some solutions that EPA believes it could approve as part of an emergency vehicle AECD or field modification, as proposed. Upon adoption of these amendments, EPA would encourage requests by engine manufacturers for emergency vehicle AECD's and/or field modifications for in-use emergency vehicles for which service disruptions related to abnormal conditions of emission control systems may occur or have occurred. EPA suggests that such AECD's or field modifications could include, but are not limited to, one or more of the following strategies:

(1) Liberalized Regeneration Requests

It is current practice that most modern diesel engine ECM's are set to initiate an automatic active regeneration only above a designated DPF soot load, and those vehicles equipped with manual regeneration switches are set to not allow the option of initiating manual active regeneration until an even greater soot load is detected. The reason why manufacturers do this is related to certification of engine families and vehicle test groups. If manufacturers can limit the frequency of regenerations by design, then they can be assured that average emissions will remain below the certified average emission level. Excess regenerations could lead to higher average emissions, since some exhaust emissions increase during regeneration. Particularly for engines not equipped with SCR systems, NO_X emissions can increase by an order of magnitude during regeneration, and these temporary increases in emission are accounted for in EPA's certification process. See Section VII, below, for more information about the emissions impacts of DPF regenerations. In addition, excess regenerations could shorten the useful life of the DPF system since high temperatures place stress on filter substrates.

EPA believes that emergency vehicle AECD's that enable more frequent automatic active and manual active DPF regenerations, associated with a wider range of soot loads could improve the reliability of DPF systems without significantly compromising emissions reductions or durability. As explained below Section IV.F(4), EPA does not expect this provision to affect other aspects of certification. For emergency vehicles with approved AECD's that involve changes in the frequency of regeneration, EPA proposes that the resulting increase in NO_X emissions not be counted against certification levels for applicable engine families or vehicle test groups. Furthermore, EPA proposes that emissions certification testing be conducted with any approved AECD's for emergency vehicle or equipment deactivated. According to EPA's current engine certification data, engines from MYs 2008 and 2011 have an average maximum automatic active regeneration frequency near 20 percent, with the typical frequency between three and seven percent. Those with frequencies near zero rely almost exclusively on passive regeneration.[28] EPA requests comment on whether an option for more frequent automatic active and/or manual active DPF regenerations for emergency vehicles would be beneficial for reliability of those DPF systems, and whether EPA should apply any constraints on the frequency of manual active DPF regenerations when approving AECD's for emergency vehicles.

(2) Engine Recalibration

As mentioned above, in-cylinder combustion chemistry dictates a NO_X-PM trade-off where engines calibrated to reduce in-cylinder NO_X tend to have higher PM levels. These factors lead to higher rates of particle accumulation and lower rates of particle oxidation on filters. EPA believes that AECD's that incorporate engine calibration modifications could enable operation in a ''low soot mode'' with a reduced rate of particle deposition that would lead to more frequent and effective passive regenerations. Such calibration modifications could also extend the operating time between all types of regenerations, improve active regeneration effectiveness, and boost reliability of the DPF systems. On engines with downstream (i.e., SCR) NO_X controls, SCR control could be

[28] Frequency in percent refers to the fraction of engine test cycles during which an automatic active regeneration occurs.

modulated such that engine recalibration would not significantly affect NO_X emissions. On engines without downstream NO_X controls, EPA believes that some degree of increased NO_X emissions during the conditions justified by the AECD would be approvable for emergency vehicles. As explained below in Section IV.F(4), EPA does not expect this provision to affect other aspects of certification. When manufacturers calculate the average NO_X emissions during a test cycle, they incorporate data regarding both the frequency of regeneration and the increase in NO_X emissions during regeneration. For emergency vehicles with approved AECD's that involve recalibration to alter regeneration frequency or average NO_X emissions, EPA proposes that the resulting increase in NO_X emissions not be counted against certification levels for applicable engine families or vehicle test groups. Furthermore, EPA proposes that emissions certification testing be conducted with any approved AECD's for emergency vehicle or equipment deactivated. A discussion of the estimated emissions impacts of recalibration is found below in Section VII.B. EPA requests comments on whether an upper limit of average NO_X emissions—considering regeneration frequency and duration, peak NO_X emission rate, and operating conditions under which the AECD is triggered—should be established as part of the implementation of this AECD option, and what levels may be appropriate.

(3) Backpressure Relief

It is EPA's objective that all of our clean diesel emissions standards be implemented with reliable technologies that require a minimum amount of driver intervention and do not compromise the utility of vehicles. EPA understands that manufacturers are motivated to seek design solutions that are cost effective and easily deployable. However, by focusing solely on preventive measures such as those described above, manufacturers may not achieve a completely failsafe DPF strategy on all emergency vehicles. EPA anticipates that some vehicles may benefit from an additional failsafe measure that relieves engine exhaust backpressure as a last resort to prevent loss of engine speed, torque or power. There are products on the market today that could be configured to temporarily relieve excessive engine exhaust backpressure when detected, then return the system to normal at the instant that backpressure returns to a safe level. Such a device may be justified as a failsafe measure, and may be included as part of an overall strategy that also includes preventive measures, if justified and properly limited, where excess PM emissions would be expected to be emitted only during a small fraction of vehicle operation. That is, the vast majority of DPF operating cycles would be expected to have continuous PM emission control, while any temporary backpressure relief that reduced PM control or allowed bypass of controls would be expected relatively infrequently. EPA requests comment on whether a failsafe measure to provide engine exhaust backpressure relief should be available as an approvable AECD option, and what constraints, if any, should be established for this option.

F. What engines and vehicles would be affected?

Today's proposal would apply to new and in-use fire trucks and ambulances, new and in-use airport fire apparatus and wildland fire apparatus, and heavy-duty diesel engines on these emergency vehicles and equipment.

(1) Newly Certified Engines and Vehicles

Of those new diesel engines covered by EPA's current heavy-duty diesel standards, only those installed in vehicles or equipment meeting the definition of emergency vehicle or emergency equipment would be eligible to obtain an approved AECD of the type discussed above in Section IV.E. Where a vehicle is chassis-certified and either sold as an incomplete vehicle to a truck body manufacturer or built and sold as a complete vehicle, only those sold and built as emergency vehicles would be eligible to obtain an approved AECD of the type discussed above in Section IV.E.

(2) Certified Engines and Vehicles In-Use

To address in-use engines and vehicles, EPA proposes to allow engine and vehicle manufacturers to submit requests for EPA approval of Emergency Vehicle Field Modifications (EVFMs) for on-highway emergency vehicles and Emergency Equipment Field Modifications (EEFMs) for nonroad emergency equipment. EVFMs and EEFMs would be modifications to existing hardware and software to be installed on in-use vehicles or equipment to prevent loss of speed, torque, or power due to abnormal conditions of emission control systems, or to prevent such abnormal conditions from occurring, during vehicle or equipment operation related to emergency response. EPA proposes to use an approval process similar to the process that is currently utilized to submit modifications to current applications for certification, also known as ''running changes.'' The information submitted by a manufacturer to EPA as part of this request and approval process would be similar to the information submitted for emergency vehicle or equipment AECD's.

It is important to emphasize that this proposal would allow only those approved modifications to be deployed by manufacturers and their authorized dealers. Modifications made by end users are not generally approvable; rather the tampering prohibitions would generally apply to such modifications.

EPA has identified three types of field modifications that would be permitted for emergency vehicles and emergency equipment under the proposed regulations, based on the extent to which the modification is being incorporated into new production vehicles and equipment. The three types are:

- *Type A:* Any field modification that is a change to a certified vehicle (i.e., a vehicle, engine or equipment covered by a certificate of conformity) that is identical in all respects to a running change that is approved for incorporation in new vehicles by the manufacturer. Where the running change was approved by EPA for implementation only in conjunction with certain other running changes, the field modification may be considered to be a Type A field modification only if implemented under the same constraints.
- *Type B:* Any field modification that is not identical in all respects to, but provides for essentially the same purpose as, a running change that is being incorporated in new vehicles by the manufacturer or that would have been incorporated if the vehicle were still in production. A Type B field modification is used when it is not practical to incorporate the exact running change in vehicles that have left the assembly line, or when the vehicles are no longer in production.
- *Type C:* Any field modification that is made selectively only to vehicles which have left the assembly line and which would not have been incorporated on the assembly line. For example, this would apply when making a field modification to a vehicle that is no longer in production where there are no similar vehicles in production.

The amount of justification needed for the field modification differs depending on which type of modification is being requested.

(3) Labeling Requirements

Because the engines and vehicles eligible for the AECD's described in this proposal belong to broadly certified engine families and test groups, when they are sold for installation in an emergency vehicle and equipped with one or more approved emergency vehicle AECD's, they must be labeled as such, to distinguish them from other certified engines. EPA is proposing adding a labeling requirement to 40 CFR part 86 subpart A, such that engines with one or more approved AECD's for emergency vehicle applications must be labeled with the statement: ''THIS ENGINE IS FOR INSTALLATION IN EMERGENCY VEHICLES ONLY.'' EPA is also proposing adding a labeling requirement to 40 CFR part 86 subpart S, such that vehicles with one or more approved AECD's for emergency vehicles, include the following statement on the emission control information label: ''THIS VEHICLE HAS A LIMITED EXEMPTION AS AN EMERGENCY VEHICLE.'' EPA is also adding a labeling requirement to 40 CFR part 1039, such that nonroad engines with one or more approved AECD's for emergency equipment include a label with the following statement: ''THIS ENGINE IS FOR INSTALLATION IN EMERGENCY EQUIPMENT ONLY.''

EPA requests comment on whether these labeling requirements are satisfactory to ensure that engines and vehicles operating with approved emergency AECD's are permanently distinguished from similar certified engines. EPA also requests comment on whether a similar label should be required for an in-use emergency vehicle or equipment where a field modification is deployed that prevents the engine from losing speed, torque, or power due to any occurrences of abnormal conditions of the emission control system, or prevents such abnormal conditions from occurring.

(4) Other Regulatory Provisions

Today's proposal would not alter the tampering prohibition in 40 CFR 1068.101(b)(1). This provision describes a general prohibition against anyone from removing or rendering inoperative an engine's emission controls before or after entering into service, where an exception is provided in 1068.101(b)(1)(ii) for engine modifications needed to respond to a temporary emergency, provided that the engine is restored to proper functioning as soon as possible after the emergency has passed. EPA encourages manufacturers to design their emergency vehicle AECD's to be engaged only to the extent necessary to prevent the engine from losing speed, torque, or power due to abnormal conditions of the emission control system, or to prevent such abnormal conditions from occurring during operation related to emergency response. EPA recognizes that there may be cases where an AECD may need to be engaged at times other than while actively responding to an emergency, in order to assure that loss of speed, torque or power does not occur during operation related to emergency response. EPA also recognizes that some AECD's may involve electronic approaches where the engine's functions would be modulated based on exhaust backpressure or other parameters that are not correlated with any emergency situation. EPA may even, in extreme cases, such as at high altitude or with certain older MY engines allow engagement of AECD's at all times, if they are justified as necessary to prevent engine from losing speed, torque, or power during operation related to emergency response.

We would also encourage manufacturers to design their emission control systems to discourage tampering. According to EPA's tampering prohibition, a vehicle operator who abuses or alters an approved AECD may be guilty of tampering. For example, if an AECD includes enabling an operator to initiate more frequent manual active regenerations, engine manufacturers may choose to prevent the abuse of this function by means such as a daily or weekly cap on the number of manual active regenerations, or a minimum soot loading for the function to engage. As another example, if an emergency vehicle alerts a driver to an abnormal condition of its emission control system by illuminating dash lamps, alarms or other warnings that do not limit vehicle performance, it is the operator's responsibility to take prompt action to remedy the problem.[29] If an operator disregards such warnings beyond the time needed to respond to the emergency, this may be considered tampering. It is important to note that if an emergency vehicle is not equipped to ever allow an operator to initiate a manual active regeneration, this may in practice encourage tampering by the end user.

Manufacturers of highway and nonroad engines would be required to describe any emergency vehicle AECD in an application for certification. In this action, we are not proposing any revisions to the information needed to review and approve AECD's. It is common practice for manufacturers, in describing AECD's, to identify engine parameters such as those that would operate differently to preserve adequate engine performance during an emergency, including information about how the engine would respond under different in-use operating conditions under the various sets of conditions that would otherwise cause the engine to operate at less than full performance levels. Other than the requirement for a manufacturer to describe the emergency vehicle AECD in its application for certification, we do not expect this provision to be relevant for other aspects of certification. For example, EPA proposes that emissions certification testing be conducted with any approved AECD's for emergency vehicle or equipment deactivated. Additionally, manufacturers would not need to consider emergency vehicle AECD's when developing infrequent regeneration adjustment factors (IRAFs) or when developing deterioration factors (DFs). Thus, EPA proposes that manufacturers could include emergency and non-emergency engines and vehicles in the same engine families and test groups. EPA also proposes that manufacturers may apply for emergency vehicle AECD's for new, existing, and/or formerly approved emissions certificates. EPA requests comments on this aspect of the proposal.

V. Scheduled Maintenance and Maintenance Interval for Replacement of Diesel Exhaust Fluid

EPA is proposing to include new provisions in its regulations that explicitly permit replacement of diesel exhaust fluid (DEF) as part of approved emission-related scheduled maintenance and set out the permitted maintenance intervals for replacement of DEF on diesel fueled new motor vehicles, new motor vehicle engines and new nonroad compression-ignition (NRCI) engines.

A. Background

EPA's regulations define the emission-related scheduled maintenance that may be performed for purposes of durability testing and for inclusion in maintenance instructions provided to purchasers of new motor vehicles and new motor vehicle engines.

[29] Although this action would not affect certification of engine families or test groups, EPA's regulations do offer options to manufacturers who wish to ensure that emission-related maintenance will occur in use, including visible signals that are not reset until maintenance occurs. 40 CFR 86.004–25(b)(6)(ii).

See 40 CFR 86.094–25(b); 40 CFR 86.004–25(b); 40 CFR 86.1834–01(b). The regulations include lists of emission-related maintenance and intervals for this maintenance. See 40 CFR 86.004–25(b)(4); 40 CFR 86.1834–01(b)(4). For example, in general, the maintenance interval for the adjustment, cleaning, repair of the following items is 100,000 miles of use, and then at 100,000 mile intervals thereafter for diesel cycle light-duty vehicles, diesel cycle light-duty trucks, and light heavy-duty diesel engines and at 150,000 mile intervals for medium and heavy heavy-duty diesel engines: Fuel injectors, turbochargers, electronic engine control units, particulate trap or trap-oxidizers, exhaust gas recirculation systems, and catalytic converters. The regulations also include a procedure that allows manufacturers to request a different maintenance schedule or to request new scheduled maintenance, which includes maintenance that is a direct result of the implementation of new technology not found in production prior to the 1980 model year. See 40 CFR 86.094–25(b)(7); 40 CFR 86.1834–01(b)(7).

Similarly, EPA's regulations applicable to nonroad compression-ignition (NRCI) engines define the emission-related maintenance that may be performed for purposes of providing ultimate purchasers written instructions for properly maintaining and using the engine. Such emission-related maintenance and associated intervals apply to service accumulation on emission-data engines. See 40 CFR 1039.125. This regulation includes lists of emission-related maintenance and intervals for this maintenance. See 40 CFR 1039.125(a)(2) and 1039.125(a)(3). For example, in general, the maintenance interval for adjustment, cleaning, repair or replacement for catalytic converters on engines below 130 kilowatt (kW) may not occur more frequently than after 3,000 hours and 4,500 hours for engines at or above 130 kW. This regulation also includes a procedure that allows manufacturers to request a different maintenance schedule or to request new scheduled maintenance, which includes maintenance on emission-related components that were not in widespread use on NRCI engines prior to 2011.

EPA adopted new emission standards applicable to emissions of NO_X from light-duty vehicles and trucks on February 10, 2000 (65 FR 6698). Similarly EPA adopted new standards applicable to emissions of NO_X from heavy-duty highway engines and vehicles on January 18, 2001 (66 FR 5002). These standards have been phased in since model year 2004 and all were fully phased-in by 2010. Most manufacturers of affected diesel engines and vehicles have chosen to use a NO_X reduction technology known as selective catalytic reduction (SCR) in order to meet these requirements. SCR systems use a nitrogen-containing reducing agent that usually contains urea and is known as diesel exhaust fluid (DEF). The DEF is injected into the exhaust gas and requires periodic replenishment by refilling the DEF tank.

In addition, EPA adopted new emission standards applicable to emissions of NO_X from NRCI engines on June 29, 2004 (69 FR 38958). These standards have begun to be implemented pursuant to a phase-in that began in the 2011 model year. EPA conducted a webinar workshop on July 26, 2011 with NRCI engine manufacturers to address the application of SCR emission technology. Some manufacturers are currently certifying their NRCI engines with the use of SCR systems and we expect that many manufacturers will use SCR systems to meet the final Tier IV NO_X reduction requirements for their diesel engines.

In a Guidance Document signed on March 27, 2007 (CISD–07–07), EPA indicated its belief that the requirements for critical emission-related maintenance would apply to replenishment of the DEF tank and that manufacturers wanting to use SCR technology would likely have to request a change to scheduled maintenance per 40 CFR 86.1834–01(b)(7) or 86.094–25(b)(7).

Following the completion of the Guidance, EPA received several requests for new maintenance intervals for SCR-equipped motor vehicles and motor vehicle engines.[30] EPA granted these requests for model years 2009 through 2010 for light-duty vehicles and 2009 through 2011 for heavy-duty engines, in a notice that was published in the **Federal Register** (74 FR 57671, November 9, 2009). In granting the requests, EPA stated that it

> believes the maintenance of performing DEF refills on SCR systems should be considered as 'critical emission-related scheduled maintenance.' EPA believes the existing allowable schedule maintenance mileage intervals applicable to catalytic converters are generally applicable to SCR systems which contain a catalyst, but that the DEF refills are a new type of maintenance uniquely associated with SCR systems. Therefore, the 100,000-mile interval at 40 CFR § 86.1834–01(b)(4)(ii) for catalytic converters on diesel-cycle light-duty vehicles and light-duty trucks (and any other chassis-certified vehicles) and the 100,000-mile interval (and 100,000 mile intervals thereafter) for light heavy-duty diesel engines and the 100,000-mile interval (and 150,000 mile intervals thereafter) for medium and heavy heavy-duty diesel engines at 40 CFR § 86.004–25(b)(4)(iii) are generally applicable to SCR systems. As noted, the SCR systems are a new type of technology designed to meet the newest emission standards and the DEF refill intervals represent a new type of scheduled maintenance; therefore, EPA believes that manufacturers may request from EPA the ability to perform the new scheduled maintenance of DEF refills.

EPA approved a maintenance interval for refill of DEF tanks equal to the applicable vehicle's scheduled oil change interval for light-duty vehicles and light-duty trucks. For heavy-duty engines, EPA approved a maintenance interval equal to the range (in miles or hours) of the vehicle operation that is no less than the vehicle's fuel capacity (i.e., a 1:1 ratio), for vocational vehicles such as dump trucks, concrete mixers, refuse trucks and similar typically centrally fueled applications. For all other vehicles equipped with a constantly viewable DEF level indicator (e.g. a gauge or other mechanism on the dashboard that will notify the driver of the DEF fill level and the ability to warn the driver of the need to refill the DEF tank before other inducements occur), EPA approved a DEF tank refill interval equal to no less than twice the range of vehicle's fuel capacity (i.e., a 2:1 ratio). For all other vehicles that do not have a constantly viewable DEF level indicator, EPA approved a DEF tank refill interval equal to no less than three times the range of the vehicle's fuel capacity (i.e., a 3:1 ratio).

Engine and vehicle manufacturers provided additional requests for new maintenance intervals for vehicles and engines in model years not covered by the November 9, 2009 **Federal Register** notice.[31] On January 5, 2012 (77 FR 488), EPA approved new maintenance

[30] *See* letter dated March 31, 2009 from Giedrius Ambrozaitis, Alliance of Automobile Manufacturers, Director, Environmental Affairs to Karl Simon, EPA, Director, Compliance and Innovative Strategies Division; Letter dated May 8, 2009 from Jed Mandel, Engine Manufacturers Ass'n to Karl Simon, EPA, Director, Compliance and Innovative Strategies Division; Letters dated June 29, 2009 and October 8, 2009 from Steven C. Berry, Director Government Relations Volvo Powertrain.

[31] *See* letter dated July 20, 2010 from Giedrius Ambrozaitis, Alliance of Automobile Manufacturers, Director, Environmental Affairs to Karl Simon, EPA, Director, Compliance and Innovative Strategies Division; Letter dated June 13, 2011 from Timothy A. French, Engine Manufacturers Ass'n to Justin G. Greuel, EPA, Compliance and Innovative Strategies Division; Letter dated April 28, 2011 from Steve Berry, Volvo Powertrain; Letters dated August 18, 2011 and September 27, 2011 to Karl Simon, EPA, Director, Compliance and Innovative Strategies Division from R. Latane Montague, Hogan Lovells.

intervals for the refill of DEF tanks applicable to light-duty vehicles and light-duty trucks, as well as for heavy-duty engines for 2011 and later model years. For light-duty vehicles and light-duty trucks the approved interval for DEF refill remains at the scheduled oil change interval. For heavy-duty engines the approved maintenance interval for vocational vehicles remains at 1:1 and for all other types of heavy-duty vehicles the approved maintenance interval is 2:1.

On July 26, 2011, EPA conducted a webinar workshop for NRCI engine manufacturers in order to provide EPA's thinking, at the time, about the certification of SCR-equipped NRCI engines. EPA discussed the issue of maintenance intervals for the refill of DEF and instructed manufacturers to follow the regulatory provisions in order to petition EPA for what it thought were appropriate intervals. Following the workshop, EPA received several requests for new maintenance intervals for SCR-equipped NRCI engines. EPA granted these requests for 2011 and later model years in a notice that was published in the **Federal Register** (77 FR 497, January 5, 2012). In granting the requests, EPA stated that it

> believes that SCR systems are a new technology and are properly considered a critical emission-related component. EPA believes the existing allowable schedule maintenance mileage intervals applicable to catalytic converters are generally applicable to SCR systems which contain a catalyst, but that the SCR systems are a new type of technology and that DEF refills are a new type of maintenance uniquely associated with SCR systems. Therefore, the 3,000 hour (engines below 130 kW) and 4,500 hour (engines at or above 130kW) intervals are generally applicable to SCR systems. As noted, the SCR systems are a new type of technology designed to meet the newest emission standards and the DEF refill intervals represent a new type of scheduled maintenance; therefore, EPA believes that manufacturers may request from EPA the ability to perform the new scheduled maintenance of DEF refills.

EPA approved a maintenance interval for refill of DEF tanks that shall be no less than the equipment's fuel capacity (i.e., a 1:1 ratio of DEF refill to fuel refill).

B. Proposed Regulatory Action

EPA is today proposing to add DEF replenishment to the list of scheduled emission-related maintenance for diesel-fueled motor vehicles and motor vehicle engines, as well as for NRCI engines that use SCR. EPA is also proposing to incorporate appropriate maintenance intervals for this scheduled maintenance.

(1) Scheduled Emission-Related Maintenance

EPA is proposing to list DEF replenishment as scheduled emission-related maintenance in 40 CFR 86.004–25(b)(4) and 40 CFR 86.1834–01(b)(4) for diesel-fueled motor vehicles and motor vehicle engines, as well as 40 CFR 1039.125(a)(2) and 40 CFR 1039.125(a)(3) for NRCI engines that use SCR.

Over the past several model years, since the implementation of the most recent standards for NO_X, many manufacturers have chosen SCR as the technology used to meet these stringent NO_X standards. Typically, should a manufacturer desire new maintenance (that it wishes to recommend to purchasers and perform during service accumulation on emission-data engines) not found in 40 CFR 86.004–25(b)(4) and 86.1834–01(b)(4) or at 40 CFR 1039.125(a)(2) and 40 CFR 1039.125(a)(3), then it utilizes the provisions allowing manufacturers to request such maintenance. Given that SCR use is now common in the industry and replenishment of DEF is necessary for SCR to be effective, it is appropriate to add DEF replenishment to the list of scheduled emission-related maintenance published in the Code of Federal Regulations (CFR), rather than rely on the provisions of paragraph (b)(7) for motor vehicles and paragraph 1039.125(a)(5) for NRCI engines.

(2) Maintenance Intervals for On-Highway Diesel Engines

EPA is also proposing to incorporate appropriate maintenance intervals for this scheduled maintenance. In general, they are the same as were approved under the (b)(7) process. For light-duty vehicles and light-duty trucks, we are proposing an interval equal to the scheduled oil change interval for the vehicle. Light-duty vehicles and trucks do not have the carrying and storage capacity required for the quantity of DEF needed to satisfy longer maintenance intervals such as the 100,000 mile scheduled maintenance interval generally applicable to catalytic converters. As EPA explained in its previous notices regarding this issue, automobile manufacturers have stated that it takes approximately an 8 gallon DEF tank to assure the DEF will last for the length of a typical scheduled oil change interval. Assuming an oil change interval of 10,000 miles, a DEF tank size of approximately 80 gallons would be required to meet a 100,000 mile DEF refill maintenance interval. Even a 16–20 gallon DEF tank (to meet a 2 oil change interval) would interfere with the space that is necessary for typical light-duty vehicle design and transportation needs of the consumer. Interior cabin volume and cargo space are highly valued attributes in light-duty vehicles and trucks. Manufacturers have historically strived to optimize these attributes, even to the point of switching a vehicle from rear-wheel drive to front-wheel drive to gain the extra interior cabin space taken up by where the drive shaft tunnel existed, or switching the size of the spare tire from a conventional sized tire to a small temporary tire to gain additional trunk space. Thus any significant interior, cargo or trunk space used to store a DEF tank would be unacceptable to customers. There are also packaging concerns with placing a large DEF tank in the engine compartment or in the vehicle's undercarriage. Most vehicle undercarriages are already crowded with the engine, exhaust system, including catalytic converters and mufflers, fuel tank, etc. limiting any available space for a DEF tank.

In addition to the inherently space constrained areas on the vehicle to place both fuel tanks and DEF tanks (an additional 8 gallon tank represents a very significant demand for space) the addition of the weight associated with the DEF represents significant concerns (e.g. performance and efficiency) on the operation of the vehicle. For example, assuming a density of 9 lb/gallon, an 8 gallon DEF tank represents an additional 72 lbs on a vehicle already looking to optimize performance. Adding additional DEF tank size to even accommodate a two-oil change interval is not feasible or practical given these weight constraints. A requirement for a larger DEF tank may also have an adverse effect on the ability of a manufacturer to meet greenhouse gas emission standards and fuel economy standards.

EPA notes that a DEF refill maintenance interval that is equivalent and occurring with the oil change interval is a fairly long interval (e.g. 7,500 to 12,500 miles) for light-duty vehicles and trucks and is not likely to result in overly frequent maintenance under typical vehicle driving. EPA also believes that an adequate DEF supply will be available to perform the DEF refills at the stated intervals. EPA believes it important to also consider when, where and how often vehicle owners or operators are most likely to perform the DEF refill maintenance. For light-duty vehicles and light-duty trucks, EPA believes the requested DEF refill interval's association with the oil change interval is appropriate given the likelihood of DEF availability at service stations and the likelihood that DEF refill would occur during such service.

EPA also notes that heavy-duty engines that are certified as part of complete trucks have been treated in the same manner as light-duty trucks and thus have been subject to the DEF refill interval associated with the oil change. We are proposing to continue this treatment in the regulations. In addition, EPA is aware that several manufacturers are exploring whether the DEF refill interval should not be linked to the oil change interval since the historical oil change interval (e.g., 7,000–8,500 miles) is potentially increasing to higher mile intervals (e.g., 15,000 to 30,000 miles, even higher for synthetic oil). We invite comment on the necessity and appropriateness of ''de-linking'' the DEF refill interval from the oil change interval, as well as comments on proper methods to increase the likelihood that DEF refill maintenance would occur in the appropriate interval (e.g., linking to vehicle fuel capacity, inducement criteria, etc.), should it not be linked to the oil change interval.

For heavy-duty engines, we are proposing that for vocational vehicles such as dump trucks, concrete mixers, refuse trucks and similar typically centrally fueled applications, the DEF tank refill interval should equal the range (in miles or hours) of the vehicle operation that is no less than the vehicle's fuel capacity (i.e., a 1:1 ratio). For all other vehicles, the DEF tank refill interval must provide a range of vehicle operation that is no less than twice the range of vehicle's fuel capacity (i.e., a 2:1 ratio). EPA believes it is reasonable to base the DEF refilling event on diesel refueling intervals given that it is likely that the DEF refill maintenance would be undertaken at the time of fuel refill due to DEF infrastructure developed at diesel refueling stations. EPA believes that these DEF refilling intervals are technologically necessary. EPA knows of no SCR technology for any heavy-duty engine application that is capable of operating without a DEF refill for the high mileage levels associated with other maintenance intervals. As an example, assuming that 25,000 gallons of diesel fuel were consumed to reach a 150,000-mile interval, the amount of DEF required (assuming a 3% DEF consumption rate) would require 750 gallons of DEF weighing approximately 6,750 lbs. A line-haul truck is allowed a maximum gross vehicle weight of 85,000 lbs. of which approximately 45,000 pounds is for cargo carrying. A DEF tank of 750 gallons would reduce the cargo-carrying capacity by 15%. Another example from the line haul industry suggests that a DEF tank size of over 900 gallons would be needed to reach the 150,000-mile interval for a common highway vehicle with a diesel fuel capacity of 200 gallons and achieving 6.5 miles per gallon fuel economy. Similarly, a medium heavy-duty engine (''chassis cabs'') example would require 375 gallons of DEF weighing 3,275 lbs to meet a 150,000-mile interval. EPA believes that such tank sizes are clearly not technologically feasible in light of the weight and space demands and constraints on heavy-duty trucks and the consumer demand to maximize cargo carrying capacity.

The Agency also believes that intervals shorter than 150,000 miles but longer than those we are proposing would require DEF tanks that are too large or too heavy to be feasibly incorporated into vehicles. Available data show that heavy-duty engines equipped with SCR-based systems will consume DEF at a rate that is approximately 2%-4% of the rate of diesel fuel consumption. Because of inherent space and weight constraints in the configuration and efficient operation of heavy-duty vehicles, there are size limits on the DEF tanks. Currently, there are truck weight limits that manufacturers must address when making or modifying truck designs. EPA expects and believes that manufacturers are taking significant and appropriate steps in order to install reasonably sized DEF tanks to achieve the DEF refills intervals noted. For example, manufacturers are taking such steps as reducing the number of battery packs on vehicles despite customer demands or designing space saving configurations, in some instances extending an already very limited frame rail distance to incorporate the DEF tanks and SCR systems, moving compressed air tanks inside the frame rails, redesigning fuel tank configurations at significant costs, and otherwise working with significant size and weight constraints to incorporate DEF tanks. There are several factors that support the good engineering judgment that underlies the recommended DEF refill intervals. The great majority of heavy-duty engines produced with SCR DEF tanks will provide a range of vehicle operation that is no less than twice the range of the vehicle's fuel capacity; thus, the DEF tank size will provide at least double the vehicle's operating range as provided by the fuel tank. Vehicle operators will generally refill DEF at the same time and location that they refill the tanks thus these vehicles will already be carrying twice as much DEF as the SCR system could ever consume between refills. Also, manufacturers have been incorporating warning signals and performance-related inducements on their SCR-equipped vehicles to ensure the substantial likelihood that DEF refilling will occur,[32] and there is considerable evidence that heavy-duty vehicle operators in the United States have in practice been refilling their DEF tanks prior to the tanks becoming empty in virtually all situations.[33]

EPA was provided with examples of the consequences of requiring heavy-duty vehicles to accommodate a DEF refill interval of 5:1, and the information provided to the Agency strongly suggested that great compromises would be required in cost, weight and utility. Increased tank sizes and weights on the magnitude of 150 to 325 lbs. would be required and in some cases diesel fuel volumes would need to be reduced. The extra weight associated with the DEF required to meet the 2:1 refill intervals represents a significant challenge to manufacturers seeking to meet both weight and size requirements for their vehicle designs. In addition, requiring a longer DEF refill interval may result in increased greenhouse gases and decreased fuel economy. EPA believes that in light of the existing tight space constraints and the overall desire to maximize cargo-carrying capacity to minimize emissions and meet consumer operational demands, and the built-in DEF tank size buffer to insure DEF refills, that the proposed tank DEF tank sizes are technologically necessary and are also reasonable and appropriate. EPA believes that requiring tank sizes above these ratios will cause increases in space constraints and weight that would not be appropriate for these vehicles. Similarly, manufacturers note that only a small number of applications will employ the 1:1 refilling ratio and that such vehicle applications have very limited vehicle space available to house surplus DEF. Such applications (e.g., a garbage truck, concrete mixer, beverage truck, or airport refueler) will also be refueled daily at central locations. At approximately 0.134 ft^3 per gallon, any extra DEF would displace significant space available to vehicle components and subsystems on both the vocational trucks at the 1:1 refill interval as well as the 2:1 vehicles.

[32] As discussed in Section IV above, we are proposing options for manufacturers of emergency vehicles and engines to avoid the harsh consequences of certain performance inducements. Since 2010, some manufacturers have been implementing guidance on alternative inducement criteria for emergency vehicles.

[33] *See* 76 FR 32886 (June 7, 2011) and the studies cited at 32889–32891.

During the previous administrative process leading to the January 5, 2012 **Federal Register** notice approving new maintenance intervals, EPA received a comment from one manufacturer (Navistar) suggesting that a longer DEF refill interval in the range of 35,000 to 45,000 miles was appropriate. EPA responded to these comments in detail in that notice.[34] As discussed in that notice, Navistar claimed that other technology is available that would need a maintenance interval no shorter than this. However, EPA found no evidence that such technology is actually available at this time. More importantly, the fact that other technology may be able to have a longer maintenance interval does not mean that a longer maintenance interval is appropriate for DEF-based SCR. Navistar suggested that maintenance intervals can be increased by doubling DEF tank size. EPA does not believe that requiring such an increase is appropriate given the numerous negative consequences discussed above. EPA also explained that Navistar's suggestion of reducing engine-out emissions of NO_X would likely lead to an increase in fuel consumption, and possible increases in GHG emissions, and could either require increases in the size of the fuel tank or more reductions in the operating range of a vehicle before needing to refill, which would compromise a critical design parameter of heavy-duty vehicles. EPA does not believe the desire to increase DEF maintenance intervals justifies such consequences. After reviewing these data, EPA believes that longer refill intervals than those proposed above would require larger and heavier DEF tanks. The design and engineering work performed by manufacturers thus far indicates that the recommended DEF refill intervals noted above approximate the maximum feasible maintenance intervals associated with reasonable DEF tank sizes. In any case these refill intervals are appropriate and reasonable given the substantial negative consequences of longer DEF refill interval requirements. The recommended maintenance intervals ensure that the function and operational efficiency of such vehicles are not overly compromised. Based on this information we believe the proposed intervals are warranted.

EPA has received comments from certain manufacturers indicating that EPA should set the minimum required DEF refill interval at an interval equal to the vehicle's fuel capacity (i.e., a 1:1 ratio) for all heavy-duty engines.[35] The commenters claim that this shorter maintenance interval is ''necessary and appropriate to reflect current and anticipated changes in vehicle designs, significant changes in inducement strategies, and the increased availability of DEF.'' The commenters note that certification practices of the EPA regarding inducement practices for SCR-equipped engines make it ''essentially impossible for an SCR vehicle to operate without regular DEF replenishment.'' They state that the severity of inducements related to DEF levels (e.g. severe reduction in engine power and/or vehicle speed) is ''extraordinary and must be taken into account'' when EPA is determining appropriate maintenance intervals. They state that ''in light of these severe inducements, it is reasonable to expect that a driver with a 1:1 tank ratio will operate under a firm discipline that the DEF tank must be refilled every time the fuel tanks are filled, as opposed to a driver with a 2:1 or greater tank ratio who may become accustomed to filling the DEF tank only when necessary, and is therefore more likely to rely on gauge levels, warnings, and inducements to trigger refills.''

The commenters also state that EPA's promulgation of new standards regulating greenhouse gases increase the size and weight restraints associated with DEF tank size.

EPA has adopted new greenhouse gas standards for heavy-duty on-highway trucks, and manufacturers have moved to voluntarily increase the fuel efficiency of their vehicles in advance of the effective dates of those regulations. Within these regulations, EPA recognizes the impact of weight savings on fuel efficiency and GHG emissions. In addition, manufacturers have developed innovative new DEF dosing strategies to reduce CO_2 emissions. These new strategies may involve increasing the DEF dosing rate. Increasing the DEF dosing rate also makes it more difficult to satisfy a 2:1 tank size ratio without increasing the size of the DEF tank above the size EPA previously considered the maximum reasonable size. For this reason, if the application of the 1:1 tank ratio is not expanded, EPA will effectively be mandating larger DEF tanks, with their accompanying weight increase, in order to accommodate technology advancements developed to reduce CO_2 emissions—tanks that are larger than the tanks EPA determined to be the maximum reasonably required in 2009. In addition, this could inadvertently cause manufacturers to restrict application of the most fuel efficient engines to vehicles that have reduced range between fuel and DEF refills, such that they will be unattractive to the line-haul fleets that consume the most fuel.

The commenters elaborated that:

> To meet the next round of GHG reduction requirements, some manufacturers expect to increase DEF dosing by as much as 100% over current levels. These increased levels of dosing will require a corresponding increase in DEF tank capacity and size to meet the existing 2:1 tank ratio requirements. For example, increasing DEF dosing by 40% on average would require an increase in DEF tank size of approximately 40% (depending on how much extra capacity was included in the tanks used in previous model years). The shape, size and location of DEF tanks on a truck frame are constrained by a number of factors including: the need to place the tank below the filler-neck; the need for clearance from other components such as fuel tanks, battery boxes, air tanks, diesel particulate filters, and the drive axle and wheels; the need for gravity feed; body installation requirements; clear-back-of-cab requirements; weight distribution requirements; bridge formula and related axle placement issues; and fuel capacity/driving range demands.

The commenters state that another consequence of the greenhouse gas regulations is more attention to improved aerodynamics and weight reduction, which are harmed by the need for a 2:1 DEF tank size requirement. They claim that EPA should allow manufacturers to use all available options to increase fuel efficiency and meet greenhouse gas standards. They claim that the possible harm of allowing shorter maintenance intervals are minimal, given the severe negative inducements associated with failure to replenish the DEF tank.

EPA is not proposing to allow a 1:1 DEF maintenance interval across the heavy-duty engine class at this time. EPA notes that manufacturers have been meeting a 2:1 ratio for DEF tank size for the past two years and the commenters have not provided sufficient evidence that this ratio will be infeasible in the future. Moreover, the commenters have not shown that any change in the maintenance interval is necessary or appropriate throughout the heavy-duty engine category, rather than for particular applications, or that a refill interval as low as 1:1, rather than 1.8:1 or 1.5:1, is necessary or appropriate. The feasibility of the greenhouse gas standards was not predicated on substantial increases in DEF dosing rate, although that was a possible method of compliance, and the commenters have not shown that the increase in tank size

[34] *See* 77 FR 488, at 495–96 (January 5, 2012).

[35] *See* letters dated August 18, 2011 and September 27, 2011 to Karl Simon, EPA, Director, Compliance and Innovative Strategies Division from R. Latane Montague and Hogan Lovells.

that would be associated with increased dosing, which need not be large, would be inconsistent with space constraints. While EPA agrees that the warnings and inducements in place for failure to replenish DEF will restrict the ability of operators to run without DEF, and have made operation without DEF virtually unheard of, a DEF tank ratio of 1:1 greatly increases the likelihood that operators will need to make more frequent stops to replenish DEF, and possibly may need to stop solely to replenish DEF, which may place a greater burden on the operator in terms of the frequency of DEF refills. However, we request comment on this proposal and we do not rule out the possibility we may in the final rule allow a shorter maintenance interval at least in some situations beyond what we have proposed. In particular, we request comment on whether such an interval may be appropriate in the future or whether an approach that is limited to a portion of the heavy-duty engine category or that uses an interval between 2:1 and 1:1 may be appropriate.

EPA also notes that the regulations allow any manufacturer to petition EPA under the ''paragraph (b)(7) process'' for a shorter maintenance interval than that promulgated for DEF refills if the manufacturer can show that a shorter interval is technologically necessary for the particular engine or vehicle configuration being certified.

(3) Maintenance Intervals for Nonroad Compression-Ignition Engines

EPA is also proposing to incorporate appropriate maintenance intervals for the scheduled maintenance of DEF refills on SCR-equipped NRCI engines. We are proposing the same interval (i.e., 1:1 ratio) as was approved under the § 1039.125(a)(5) process.

EPA believes it appropriate to evaluate the DEF refill rates by taking into consideration the space and weight constraints typically involved with the range of nonroad compression-ignition engines using SCR systems, including safety and impacts of weight and dosing rates on greenhouse gas emissions and fuel economy. EPA also believes it appropriate to take into consideration the likelihood that the maintenance of DEF refills will be performed by the owner or operator.[36]

EPA knows of no SCR technology for NRCI engines that is yet capable of attaining longer operation (generally beyond one tank full of diesel) without a DEF refill. As noted by the requests received for a shorter interval, there are significant space and weight constraints associated with increasing the DEF tank size in order to accommodate a 2:1 refill ratio. EPA believes it appropriate to take into consideration the need for locating the DEF tank in close proximity to the fuel tank and the remainder of the SCR system, as well as the increased likelihood that the DEF tank will be refilled if it becomes standard operating practice to refill it at the same time as the fuel tank. EPA believes that such nonroad equipment is similar to centrally-fueled heavy-duty on-highway vehicles and that there is a sufficient basis and a reasonable expectation that DEF tank refills will occur on a timely basis. In addition, because this maintenance is considered critical emission-related maintenance, § 1039.125 requires that manufacturers ensure that it have a reasonable likelihood of being done at the recommended intervals on in-use engines. Paragraph 1039.125(a)(1) sets forth several methods by which such demonstration can be made, including data showing that if a lack of maintenance increases emissions, it also unacceptably degrades the engine's performance. Thus, manufacturers will need to show compliance with this requirement to be certified. In the context of SCR systems and the potential of an empty DEF tank and an inoperable SCR system, EPA notes that equipment under such operating conditions are expected to shut down or idle only.[37]

VI. Nonroad Engines in Temporary Emergency Service

As noted previously, EPA is proposing to adopt special provisions for engines used in dedicated emergency vehicles to ensure that manufacturers are able to design and implement reliable, robust emission control systems with regeneration strategies that do not interfere with the mission of emergency vehicles. However, we are not proposing to extend this option for other engines that are not intended for emergency vehicles. Nevertheless, based on information provided to us from engine manufacturers, we have some concern that nonroad engines not normally used for emergencies may be needed in unusual emergency situations that may require very limited and temporary relief so that emission controls do not hinder the engine's performance in such emergency conditions. This section describes a flexibility that we are proposing to address this.

Our existing nonroad engine compliance regulations in 40 CFR 1068.101(b)(1)(ii) allow operators to temporarily disable or remove emission controls to address emergency situations. However, they do not necessarily allow manufacturers to design the emission controls to be disabled or removed. This has become a potential problem for modern electronically controlled engines, where many emission controls are integrated into the engine's control software. There is currently no way for an operator to selectively disable emission control software, while maintaining engine function. The proposed regulatory text would effectively extend the policy expressed in 40 CFR 1068.101(b)(1)(ii) to emission control software.

A. Use of Nonroad Engines in Emergency Situations

The provisions we are proposing are intended primarily to address engines used for power generation or in construction equipment. However, it is important to note that we are not proposing to limit this flexibility to such engines. For example, portable diesel-powered generators are often used to provide electrical power after natural disasters. If the generator is providing power to a medical facility, then any interruption in service could risk the lives of the patients. This is just one example of how an ordinary piece of nonroad equipment could be used in an emergency situation. Others would include bulldozers repairing a levee or a crane removing debris.

The Tier 4 standards have resulted in much of this equipment being equipped with SCR catalysts that require a reductant. The reductant is typically supplied as a urea water solution known as diesel exhaust fluid (DEF). The engines in this equipment generally include controls that limit the function of the engines if they are operated without urea. Such controls are generally call ''inducements'', because they induce the operator to supply urea to the equipment. While we are confident that DEF is now widely and easily available in the United States, we are concerned that in emergency circumstances there may be a possibility of a temporary supply shortage. We believe that in such situations, temporary flexibilities may be appropriate because the possibility of risk to human life sufficiently outweighs the temporary emissions increases that may occur if SCR-equipped engines are used without DEF. As indicated below, this flexibility is very narrow and

[36] *See* 40 CFR 1039.125(a)(5).

[37] *See* 76 FR 32886 (June 7, 2011) and related inducement criteria, *see also* Note 32 above regarding inducements for emergency vehicles and engines.

contains several provisions to ensure the need for the relief. We do not believe it can or will be used in situations where there is no critical need for such relief.

B. Proposed Regulatory Action

(1) General Requirements

We are proposing a new section 1039.665 that would specify provisions that allow for AECDs that are necessary to ensure proper function of engines and equipment in emergency situations. AECDs approved under this section would not be defeat devices. The section would include the following provisions:

- Manufacturers would be allowed to ask for approval at any time. Still, we would encourage manufacturers to obtain preliminary approval before submitting an application for certification. And in unusual circumstances, we could allow manufacturers to apply an approved emergency AECD to engines and equipment that have already been placed into service as a ''field fix''.
- The manufacturer would be required to keep records to document requests for and use of emergency AECDs under this section and submit a report to EPA within 60 days of the end of each calendar year in which it authorizes use of the AECD
- We would approve an AECD only where we determine certain criteria are met, as described below.

We are proposing to address such AECDs as part of certification and would only authorize the certifying manufacturer to activate them.

(2) Approval Criteria

Approval of AECDs under the proposed regulations would be based on certain general and specific criteria. A general criterion is that the AECD would need to be consistent with good engineering judgment. When used in our regulations, the phrase ''good engineering judgment'' has a specific meaning as described in 40 CFR 1068.5. By specifying that the AECD be consistent with good engineering judgment, we address unforeseen technical details that may arise.

We are also proposing three specific criteria that must be met. Each of these criteria is intended to ensure that any adverse environmental impacts are minimized. These criteria are:

- The AECD must be designed so that it cannot be activated without the specific permission of the certificate holder. We would specify that the AECD must require the input of a temporary code or equivalent security feature.
- The AECD must become inactive within 24 engine hours of becoming active (or other period we approve in unusual circumstances).
- The manufacturer must show that the AECD deactivate emission controls (such as inducement strategies) only to the extent necessary to address the expected emergency situation.

(3) Allowable Use of Emergency AECDs

This allowance is intended generally to address SCR-equipped engines operating in emergency situations when DEF is unavailable. In such cases, inducement strategies could result in a loss of power of the engine which could effectively prevent the equipment from functioning. Under this provision, a manufacturer could include a dormant feature in the engine's control software that could be activated to disable inducement strategies.

We are also proposing to allow this for other types of controls, where a manufacturer can clearly demonstrate that this relief could be needed. We are requesting comment about whether we should specifically identify such other controls or leave the regulatory text more open ended.

Finally, we are requesting comment about the circumstances under which we should allow the AECD to be activated. Should emergency situations include only those circumstances where human life is at stake? Should it be allowed automatically whenever a federal disaster is declared?

VII. Economic, Environmental, and Health Impacts of Proposed Rule

A. Economic Impacts

(1) Economic Impacts of Emergency Vehicle Proposal

EPA expects the economic effects of this proposal to be small, and to potentially have benefits that are a natural result of easing constraints.

(a) Costs to Manufacturers

Due to the optional and voluntary nature of this proposal, there are no direct regulatory compliance costs to engine manufacturers. To the extent manufacturers elect to develop and deploy upgrades to engines for emergency vehicles, they may voluntarily incur some degree of costs associated with the following:

- Design and testing to determine effectiveness of potential AECDs.
- Education & outreach to intermediate vehicle manufacturers and end users.
- Deployment of AECDs onto new and in-use emergency vehicles.
- Labeling costs.

EPA expects any fixed costs would be small, and any variable costs would apply only to the engines sold for installation in emergency vehicles or emergency equipment, which comprise less than one percent of the heavy-duty on-road fleet, and an even smaller fraction of the nonroad fleet. As per standard practice, manufacturers would be free to set a fair market price for any approved AECD or field modification they offer, to offset the costs incurred in its development.

(b) Operational Costs

Depending on the type of AECD or field modification that a manufacturer voluntarily elects to deploy, some operational costs could increase and some could decrease.

(i) Maintenance and Warranty Costs

When an emergency vehicle is experiencing frequent plugging of its DPF, this increases maintenance costs for owners and warranty costs for manufacturers. Maintenance costs can include service calls for a technician-controlled regeneration, towing fees where on-site regeneration cannot be achieved, and costs to deploy reserve vehicles while the impaired vehicle is being serviced. These costs are expected to decrease with this proposal, and are discussed further below.

Manufacturers incur warranty costs when a vehicle under warranty must be returned for service. Because this proposed action would allow manufacturers the flexibility to improve the reliability of their engines, EPA expects warranty costs for emergency vehicles and engines in emergency vehicles would decrease as a result of this action.

Should an AECD be deployed that allows manual active regenerations at more frequent intervals, this could increase the total number of regenerations, exposing the DPF substrate to more frequent thermal stress and general wear & tear. However, while it is expected that the frequency of regenerations would increase, the duration of each regeneration would decrease because the total soot loading of the DPF would likely remain unchanged or be reduced due to other control strategies within the approved AECD. Because manufacturers are held to strict standards related to the warranty, maintenance and durability of these systems, EPA expects that measures will be taken to ensure that any AECD that is deployed would not decrease the ash cleaning interval or otherwise decrease the durability of the emission control system.[38]

With this proposal, manufacturers would have the flexibility to design alternate calibrations to reduce soot loading to the DPF and extend the interval between regenerations. There would also be more flexibility to enable more passive and automatic active regenerations, which both expose the DPF to less thermal stress than do manual active regenerations. In summary, EPA does not expect any warranty or maintenance costs would increase due to this proposal, and it is very likely that these would decrease. Furthermore, EPA believes that the potential for reduced warranty costs may help to offset the cost to produce and deploy any optional AECDs. Similarly, EPA believes the potential for reduced maintenance and operational costs may offset the cost to owners for obtaining requested AECDs.

(ii) Fuel Costs From Dosing

Where DPF systems employ fuel dosing to enable active automatic regenerations, it is uncertain whether liberalizing the parameters for initiating regenerations would affect fuel consumption. Operators have reported that vehicles burn more fuel during regenerations, though the quantity varies among vehicles.

Where automatic active regenerations employ fuel dosing, it is uncertain whether fuel consumption would increase with an increased number of regenerations during a given operating period. If all else were to remain the same, it is likely that the duration of each automatic active regeneration may be decreased. To the extent regenerations are enabled with other means besides fuel, or demand for regenerations is reduced through recalibration, then any potential increase in fuel use from dosing would be mitigated.

As an illustration, we have estimated the additional fuel use for a truck with a dosing strategy where its regeneration interval is decreased from 25 hours to eight hours, due to the increased availability of operator-commanded regenerations. In this example, we assume a single regeneration consumes approximately half a gallon of supplemental fuel. If the vehicle has average engine operating hours of 1,200 per year, then its number of regeneration events would increase from about 50 per year to 150 per year, under the above assumptions. If the amount of supplemental fuel use remained unchanged under the new regime (a conservative assumption) then potentially the vehicle could consume an additional 50 gallons of fuel per year from the increased frequency of regenerations alone. Considering current costs of ultra low sulfur diesel fuel, this could translate to about $200 per vehicle in additional annual fuel costs.

As explained above, EPA does not believe this is a likely scenario, as the amount of fuel used per regeneration event would likely decrease with increasing frequency, and engine manufacturers would be likely to adjust combustion parameters to avoid placing additional thermal stress on the DPF. A more detailed analysis of fuel use and potential costs associated with dosing strategies is included in a memo to the docket associated with this rulemaking.[39]

(c) Societal Costs

Because this proposal eases constraints on the development of robust DPF systems, the economic impacts can only improve with this action. It is presumed that the benefits to society of enabling first responders to act quickly when needed outweigh the costs to society of any temporary increase in emissions from this small segment of vehicles.

(2) Economic Impacts of SCR Maintenance Proposal

This action would codify previously published final agency actions regarding SCR maintenance intervals. No new regulatory burdens would be imposed. Rather, by codifying former decisions that were based on administrative petitions and of limited applicability, EPA is providing regulatory certainty that will allow affected manufacturers to plan their product development accordingly.

(3) Economic Impacts for Nonroad Engines Used in Emergency Situations

EPA expects the economic effects of this proposal to be small, and to potentially have benefits that are a natural result of easing constraints. Due to the optional and voluntary nature of this proposal, there are no direct regulatory compliance costs to engine manufacturers. To the extent manufacturers elect to develop and deploy upgrades to engines for emergency vehicles, they may voluntarily incur some degree of costs. We do not expect there to be any operator costs for this allowance, other than the potential cost associated with sending written confirmation of an emergency situation to the certificate holder. However, since this option would be activated rarely (or perhaps not at all), total costs to operators would be negligible.

B. Environmental Impacts

(1) Environmental Impacts of Emergency Vehicle Proposal

We expect any environmental impacts from this proposal would be small. By promulgating these amendments, it is expected that the emissions from this segment of the heavy-duty fleet would not change significantly.

(a) Fleet Characterization and Emission Inventory

EPA estimates that on-road emergency vehicles comprise less than one percent of the national heavy-duty fleet. According to the International Council on Clean Transportation (ICCT), less than one percent of all new heavy-duty truck registrations in 2003 to 2007 were for emergency vehicles (includes class 8 fire trucks plus other class 3–8 emergency vehicles).[40] On average, the ICCT's data suggest that approximately 5,700 new emergency vehicles are sold in the U.S. each year; about 0.8 percent of the 3.4 million new heavy-duty trucks registered between 2003 and 2007. The available information indicates that the emergency vehicles included in the scope of this rulemaking have lower annual vehicle miles traveled than average non-emergency vehicles. Therefore, we conclude that they contribute less than 1% of the annual air emissions from the heavy-duty diesel truck fleet.

(b) Emission Impacts From Auxiliary Emission Control Devices on Emergency Vehicles

Due to the optional and voluntary nature of this action, it is difficult to estimate its overall emissions impact accurately. The proposed amendments offer many options to manufacturers, and the emissions impacts will depend on which options and strategies are employed, and for how many vehicles.

(i) NO_X Emissions Impacts

During both automatic active and manual active regenerations, emission rates increase for some pollutants, especially NO_X when post-DPF after-treatment devices are not present. The

[38] EPA prohibits engine manufacturers from requiring repair or replacement of particulate traps on heavy heavy-duty diesel engines more than once every 150,000 miles. 40 CFR 86.004–25(b)(4)(iii).

[39] *See* memo dated May 4, 2012, "Fuel Use With Dosing for DPF Regeneration," Docket ID EPA–HQ–OAR–2011–1032.

[40] ICCT, May 2009, "Heavy-Duty Vehicle Market Analysis: Vehicle Characteristics & Fuel Use, Manufacturer Market Shares."

higher than normal combustion chamber temperatures during active regeneration with high rates of oxidation occurring across the catalyst can create conditions conducive to NO_X formation. From certification data for 2008 model year engines, the difference between the NO_X emission rate during normal operation and the rate during active regeneration can range from an undetectably small difference to a five-fold increase. The magnitude of the NO_X increase is only part of the story, however. As part of their certifications, engine manufacturers may provide frequency factors that adjust for the average excess emissions during DPF regeneration. As used in engine certification, the frequency factor indicates the percent of test cycles during which DPF regeneration is expected to occur. From certification data for 2008 and 2011 model year engines, DPF regeneration frequency factors for heavy-duty engines range from near zero to nearly 20 percent. Overall, the certification data indicate that the higher the increase in NO_X during a DPF regeneration event, the less often active regeneration occurs on that engine, especially over the transient test cycle. A summary of this information is presented in a memo to the docket associated with this rulemaking.[41]

As a result of this proposed action, it is possible that some engine manufacturers will submit applications for AECD's with liberalized parameters under which automatic active and/or manual active regenerations may occur, for emergency vehicles. Under these liberalized parameters, several outcomes are possible, depending on the engineering design. While the NO_X emission rate during DPF regeneration could increase above the rate of the current certified configuration, it is also possible that the duration of each event could decrease. While the frequency of manual active regenerations could increase if the engine controls permitted operators to initiate parked regeneration at any soot loading, it is also possible the frequency of automatic or manual active regenerations could decrease with the new designs, making wider use of passive regeneration strategies. Given that it is difficult to estimate how popular each option may be, and what other actions may be taken to alter engines and/or emission control systems, EPA has provided examples of possible emission scenarios due to this proposal in a memo to the docket.[42]

(ii) PM Emissions Impacts

In the comment letters EPA received urging swift action providing relief for emergency vehicles, it was often cited that the pollution from a structural fire is far worse than the tailpipe emissions of a fire truck. To provide some perspective on this, EPA is providing a brief discussion of PM emissions in this section.

A rough method for estimating emissions from structural fires is obtained by multiplying a national average factor of 2.3 fires per 1,000 residents by the national population, along with a PM emission factor of 10.8 lb per ton burned, and an average fuel loading of 1.1 tons burned per fire. Using these estimates, EPA calculates just under 5,000 tons of PM is emitted in the U.S. each year from structural fires. A more detailed analysis of PM emissions from structural fires in relation to PM emissions from emergency vehicles is included in a memo to the docket associated with this rulemaking.[43]

We expect manufacturers who choose to develop optional AECDs for emergency vehicles to employ strategies that prevent the occurrence of abnormal conditions of the emission control system. Where preventive strategies alone are not demonstrated to be failsafe, EPA expects there may be instances where it is justified to provide engine exhaust backpressure relief, either mechanical or through other means. While we expect this will not be a widespread solution, there may be cases where a relief valve may be employed on a vehicle whose DPF became plugged frequently, allowing temporary emission control bypass to occur as a last resort to prevent engine failure. An example of possible PM emissions changes due to this proposal is presented in a memo to the docket associated with this rulemaking.[44]

(iii) Fuel Use From Dosing

As described above in Section IV.C, only some control systems employ fuel dosing as a strategy to initiate active regeneration. In a memo to the docket associated with this rulemaking, EPA estimates the potential increase in fuel use due to more frequent operator-commanded regenerations with dosing at an average of about 50 gallons per year per vehicle, if other measures to reduce the need for regenerations are not taken.[45] The emissions associated with this supplemental fuel use are discussed above. EPA requests comment on the impact of this proposed action on fuel consumption in emergency vehicles whose active regeneration strategies include fuel dosing.

(2) Environmental Impacts of SCR Maintenance Proposal

EPA believes that the likelihood of emissions-related maintenance occurring in use would remain unchanged as a result of this action. Therefore, there are no anticipated adverse environmental impacts.

(3) Environmental Impacts for Nonroad Engines Used in Emergency Situations

EPA does not expect any significant environmental effects as a result this proposal. This option would be activated rarely (or perhaps not at all) and would only affect emissions for a very short period.

C. Health Effects

EPA's clean diesel standards are already providing substantial benefits to public health and welfare and the environment through significant reductions in emissions of NO_X, PM, nonmethane hydrocarbons (NMHC), carbon monoxide, sulfur oxides (SO_X), and air toxics. We project that by 2030, the on-highway program alone will reduce annual emissions of NO_X, NMHC, and PM by 2.6 million, 115,000 and 109,000 tons, respectively. These emission reductions will prevent 8,300 premature deaths, over 9,500 hospitalizations, and 1.5 million work days lost. All told, the monetized benefits of the on-highway rule plus the nonroad diesel Tier 4 rule total over $150 billion. A sizeable part of the benefits in the early years of these programs has come from large reductions in the amount of direct and secondary PM emitted by the existing fleet of heavy-duty engines and vehicles, by requiring the use of the higher quality diesel fuel in these vehicles. While this proposed action may slightly increase some emissions, as explained in the previous section, we do not expect that these small increases will significantly diminish the health benefits of our stringent clean diesel standards.

VIII. Public Participation

We request comment by July 27, 2012 on all aspects of this proposal. This section describes how you can participate in this process.

[41] *See* memo dated May 4, 2012, ''NO_X Emissions from DPF Regeneration,'' Docket ID EPA–HQ–OAR–2011–1032.

[42] *See* NO_X Memo, Note 41, above.

[43] *See* Memo dated May 4, 2012, ''PM Emissions Impacts,'' Docket ID EPA–HQ–OAR–2011–1032.

[44] *See* PM memo, Note 43, above.

[45] *See* Fuel Dosing Memo, Note 39, above.

A. How do I submit comments?

We are opening a formal comment period by publishing this document. We will accept comments through July 27, 2012. If you have an interest in the program described in this document, we encourage you to comment on any aspect of this rulemaking. We request comment on various topics throughout this proposal.

Your comments will be most useful if you include appropriate and detailed supporting rationale, data, and analysis. If you disagree with parts of the proposed program, we encourage you to suggest and analyze alternate approaches to meeting the goals described in this proposal. You should send all comments, except those containing proprietary information, to our Air Docket (see **ADDRESSES**) before the end of the comment period.

If you submit proprietary information for our consideration, you should clearly separate it from other comments by labeling it ''Confidential Business Information (CBI).'' You should send CBI directly to the contact person listed under **FOR FURTHER INFORMATION CONTACT** instead of the public docket. This will help ensure that no one inadvertently places proprietary information in the docket. If you want us to use your confidential information as part of the basis for the final rule, you should send a non-confidential version of the document summarizing the key data or information. We will disclose information covered by a claim of confidentiality only through the application of procedures described in 40 CFR part 2. If you do not identify information as confidential when we receive it, we may make it available to the public without notifying you.

EPA is also publishing a Direct Final Rule (DFR) addressing the emergency vehicle provisions described in Section IV of this document. If we receive adverse comments on the emergency vehicle provisions in this proposal by July 9, 2012, we will publish a timely withdrawal in the **Federal Register** informing the public that the direct final rule will not take effect, and we will complete the process of responding to comments and issuing a final rule.

EPA is publishing the DFR to expedite the deployment of solutions that will best ensure the readiness of the nation's emergency vehicles. We request that commenters identify in your comments any portions of the emergency vehicle proposed action described in Section IV above with which you agree and support as proposed, in addition to any comments regarding suggestions for improvement or provisions with which you disagree. In the case of a comment that is otherwise unclear whether it is adverse, EPA would interpret relevant comments calling for more flexibility or less restrictions for emergency vehicles as supportive of the direct final action. In this way, the EPA will be able to adopt those elements of the DFR that are fully supported and most needed today, while considering and addressing any adverse comments received on the proposed rule, in the course of developing the final rule.

Note that Docket Number EPA–HQ–OAR–2011–1032 is being used for both the DFR and this Notice of Proposed Rulemaking (NPRM).

B. Will there be a public hearing?

We will hold a public hearing at the EPA's National Vehicle and Fuels Emission Laboratory, 2565 Plymouth Road in Ann Arbor, Michigan on June 27, 2012. The hearing will start at 10:00 a.m. and continue until everyone has had a chance to speak.

If you would like to present testimony at the public hearing, we ask that you notify the contact person listed above under **FOR FURTHER INFORMATION CONTACT** at least ten days before the hearing. You should estimate the time you will need for your presentation and identify any needed audio/visual equipment. We suggest that you bring copies of your statement or other material for the EPA panel and the audience. It would also be helpful if you send us a copy of your statement or other materials before the hearing.

We will make a tentative schedule for the order of testimony based on the notifications we receive. This schedule will be available on the morning of the hearing. In addition, we will reserve a block of time for anyone else in the audience who wants to give testimony. We will conduct the hearing informally, and technical rules of evidence won't apply. We will arrange for a written transcript of the hearing and keep the official record of the hearing open for 30 days to allow you to submit supplementary information. You may make arrangements for copies of the transcript directly with the court reporter.

IX. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This action is not a ''significant regulatory action'' under the terms of Executive Order (EO) 12866 (58 FR 51735, October 4, 1993) and is therefore not subject to review under Executive Orders 12866 and 13563 (76 FR 3821, January 21, 2011).

B. Paperwork Reduction Act

This action does not impose any new information collection burden. The proposed regulatory relief for emergency vehicles would be voluntary and optional, and the proposed revisions for engine and vehicle maintenance would merely codify existing guidelines. However, the Office of Management and Budget (OMB) has previously approved the information collection requirements contained in the existing regulations under the provisions of the *Paperwork Reduction Act,* 44 U.S.C. 3501 *et seq.* and has assigned OMB Control Numbers 2060–0104 and 2060–0287. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of this rule on small entities, small entity is defined as: (1) A small business primarily engaged in shipbuilding and repairing as defined by NAICS code 336611 with 1,000 or fewer employees (based on Small Business Administration size standards); (2) a small business that is primarily engaged in freight or passenger transportation on the Great Lakes as defined by NAICS codes 483113 and 483114 with 500 or fewer employees (based on Small Business Administration size standards); (3) a small business primarily engaged in commercial and industrial machinery and equipment repair and maintenance as defined by NAICS code 811310 with annual receipts less than $7 million (based on Small Business Administration size standards); (4) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (5) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's proposed rule on small entities, I certify that proposed rule would not have a significant economic impact on a substantial number of small entities.

In determining whether a rule has a significant economic impact on a substantial number of small entities, the impact of concern is any significant adverse economic impact on small entities, since the primary purpose of the regulatory flexibility analyses is to identify and address regulatory alternatives ''which minimize any significant economic impact of the rule on small entities.'' 5 U.S.C. 603 and 604. Thus, an agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, or otherwise has a positive economic effect on all of the small entities subject to the rule.

This proposed rule provides regulatory relief related to emergency vehicles and codifies existing guidelines related to engine and vehicle maintenance. As such, we anticipate no costs and therefore no regulatory burden associated with this rule. We have concluded that this rule will not increase regulatory burden for affected small entities.

D. Unfunded Mandates Reform Act

This proposal contains no Federal mandates under the regulatory provisions of Title II of the UMRA for State, local, or tribal governments. The proposal imposes no enforceable duty on any State, local or tribal governments. EPA has determined that this proposal contains no regulatory requirements that might significantly or uniquely affect small governments. The agency has determined that this proposal does not contain a Federal mandate that may result in expenditures of $100 million or more for the private sector in any one year. Manufacturers have the flexibility and will likely choose whether or not to use optional AECD's based on their strategies for complying with the applicable emissions standards. Similarly, manufacturers may choose to use DEF maintenance intervals longer than the minimums proposed in this action, and manufacturers may elect to use SCR strategies that consume lower amounts of DEF. Thus, today's proposal is not subject to the requirements of sections 202 and 205 of the UMRA.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

This proposed action does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This proposed rule would apply to manufacturers of heavy-duty diesel engines and not to state or local governments. Thus, Executive Order 13132 does not apply to this action.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between the agency and State and local governments, the agency specifically solicits comment on this proposed action from State and local officials.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action does not have tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). This proposal will be implemented at the Federal level and would impose compliance costs only on affected engine manufacturers depending on the extent to which they take advantage of the flexibilities offered. Tribal governments would be affected only to the extent they purchase and use vehicles with regulated engines. Thus, Executive Order 13175 does not apply to this proposed rule. EPA specifically solicits additional comment on this proposed action from tribal officials.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

Executive Order 13045: ''Protection of Children From Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the agency.

EPA interprets Executive Order 13045 as applying only to those regulatory actions that are based on health or safety risks, such that the analysis required under section 5–501 of the Order has the potential to influence the regulation. This proposed rule is not subject to Executive Order 13045 because it does not establish an environmental standard intended to mitigate health or safety risks.

H. Executive Order 13211: Energy Effects

This proposed action is not subject to Executive Order 13211 (66 FR 28355 (May 22, 2001)), because it is not a significant regulatory action under Executive Order 12866.

I. National Technology Transfer Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials, specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This action does not involve technical standards. Therefore, EPA is not considering the use of any voluntary consensus standards.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 (59 FR 7629 (Feb. 16, 1994)) establishes federal executive policy on environmental justice. Its main provision directs federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

EPA has determined that this proposed rule would not have disproportionately high and adverse human health or environmental effects on minority or low-income populations. This action is expected to increase the level of environmental protection for all affected populations because this proposed rule increases the ways that manufacturers can demonstrate compliance with heavy-duty engine standards.

List of Subjects

40 CFR Part 85

Confidential business information, Imports, Labeling, Motor vehicle pollution, Reporting and recordkeeping requirements, Research, Warranties.

40 CFR Part 86

Administrative practice and procedure, Confidential business information, Motor vehicle pollution, Reporting and recordkeeping requirements.

40 CFR Part 1039

Environmental Protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Labeling, Penalties, Reporting and recordkeeping requirements, Warranties.

Dated: May 23, 2012.

Lisa P. Jackson,

Administrator.

For the reasons set forth in the preamble, the Environmental Protection Agency proposes to amend title 40, chapter I of the Code of Federal Regulations as follows:

PART 85—CONTROL OF AIR POLLUTION FROM MOBILE SOURCES

1. The authority citation for part 85 continues to read as follows:

Authority: 42 U.S.C. 7401–7671q.

Subpart R—[Amended]

2. Add § 85.1716 to subpart R to read as follows:

§ 85.1716 Approval of an emergency vehicle field modification (EVFM).

This section describes how you may implement design changes for an emergency vehicle that has already been placed into service to ensure that the vehicle will perform properly in emergency situations. This applies for any light-duty vehicle, light-duty truck, or heavy-duty vehicle meeting the definition of *emergency vehicle* in 40 CFR 86.004–2 or 86.1803. In this section, ''you'' refers to the certifying manufacturer and ''we'' refers to the EPA Administrator and any authorized representatives.

(a) You must notify us in writing of your intent to install or distribute an emergency vehicle field modification (EVFM). In some cases you may install or distribute an EVFM only with our advance approval, as specified in this section.

(b) Include in your notification a full description of the EVFM and any documentation to support your determination that the EVFM is necessary to prevent the vehicle from losing speed, torque, or power due to abnormal conditions of its emission control system, or to prevent such abnormal conditions from occurring during operation related to emergency response. Examples of such abnormal conditions may include excessive exhaust backpressure from an overloaded particulate trap, or running out of diesel exhaust fluid for engines that rely on urea-based selective catalytic reduction. Your determination must be based on an engineering evaluation or testing or both.

(c) You may need our advance approval for your EVFM, as follows:

(1) Where the proposed EVFM is identical to an AECD we approved under this part for an engine family currently in production, no approval of the proposed EVFM is necessary.

(2) Where the proposed EVFM is for an engine family currently in production but the applicable demonstration is based on an AECD we approved under this part for an engine family no longer in production, you must describe to us how your proposed EVFM differs from the approved AECD. Unless we say otherwise, your proposed EVFM is deemed approved 30 days after you notify us.

(3) If we have not approved an EVFM comparable to the one you are proposing, you must get our approval before installing or distributing it. In this case, we may request additional information to support your determination under paragraph (b) of this section, as follows:

(i) If we request additional information and you do not provide it within 30 days after we ask, we may deem that you have retracted your request for our approval; however, we may extend this deadline for submitting the additional information.

(ii) We will deny your request if we determine that the EVFM is not necessary to prevent the vehicle from losing speed, torque, or power due abnormal conditions of the emission control system, or to prevent such abnormal conditions from occurring, during operation related to emergency response.

(iii) Unless we say otherwise, your proposed EVFM is deemed approved 30 days after we acknowledge that you have provided us with all the additional information we have specified.

(4) If your proposed EVFM is deemed to be approved under paragraph (c)(2) or (3) of this section and we find later that your EVFM in fact does not meet the requirements of this section, we may require you to no longer install or distribute it.

PART 86—CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY VEHICLES AND ENGINES

3. The authority citation for part 86 continues to read as follows:

Authority: 42 U.S.C. 7401–7671q.

Subpart A—[Amended]

4. Section 86.004–2 is amended as follows:

a. By adding a definition for ''Ambulance'' in alphabetical order.

b. By revising the definition for ''Defeat device''.

c. By adding definitions for ''Diesel exhaust fluid'', ''Emergency vehicle'', and ''Fire truck'' in alphabetical order.

§ 86.004–2 Definitions.

* * * * *

Ambulance has the meaning given in § 86.1803.

Defeat device means an auxiliary emission control device (AECD) that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use, unless:

(1) Such conditions are substantially included in the applicable Federal emission test procedure for heavy-duty vehicles and heavy-duty engines described in subpart N of this part;

(2) The need for the AECD is justified in terms of protecting the vehicle against damage or accident;

(3) The AECD does not go beyond the requirements of engine starting; or

(4) The AECD applies only for engines that will be installed in *emergency vehicles,* and the need is justified in terms of preventing the engine from losing speed, torque, or power due abnormal conditions of the emission control system, or in terms of preventing such abnormal conditions from occurring, during operation related to emergency response. Examples of such abnormal conditions may include excessive exhaust backpressure from an overloaded particulate trap, and running

out of diesel exhaust fluid for engines that rely on urea-based selective catalytic reduction.

Diesel exhaust fluid (DEF) has the meaning given in § 86.1803.

Emergency vehicle means a vehicle that is an ambulance or a fire truck.

Fire truck has the meaning given in § 86.1803.

* * * * *

5. Section 86.004–25 is amended as follows:

a. By revising paragraph (b)(4) introductory text.

b. By adding paragraph (b)(4)(v).

c. By revising paragraph (b)(6)(i) introductory text and (b)(6)(i)(H).

d. By adding paragraph (b)(6)(i)(I).

§ 86.004–25 Maintenance.

* * * * *

(b) * * *

(4) For diesel-cycle heavy-duty engines, emission-related maintenance in addition to or at shorter intervals than the following specified values will not be accepted as technologically necessary, except as provided in paragraph (b)(7) of this section:

* * * * *

(v) For engines that use selective catalytic reduction, the replenishment of diesel exhaust fluid shall occur according to the following schedule:

(A) For heavy-duty engines in vocational vehicles such as dump trucks, concrete mixers, refuse trucks and similar applications that are typically centrally fueled, at an interval, in miles or hours of vehicle operation, that is no less than the vehicle's fuel capacity.

(B) For all other heavy-duty engines, at an interval, in miles or hours of vehicle operation, that is no less than twice the vehicle's fuel capacity.

* * * * *

(6)(i) The following components are defined as critical emission-related components:

* * * * *

(H) Components comprising the selective catalytic reduction system (including diesel exhaust fluid tank).

(I) Any other component whose primary purpose is to reduce emissions or whose failure would commonly increase emissions of any regulated pollutant without significantly degrading engine performance.

* * * * *

6. Section 86.0004–28 is amended by revising paragraph (i) introductory text to read as follows:

§ 86.004–28 Compliance with emission standards.

* * * * *

(i) Emission results from heavy-duty engines equipped with exhaust aftertreatment may need to be adjusted to account for regeneration events. This provision only applies for engines equipped with emission controls that are regenerated on an infrequent basis. For the purpose of this paragraph (i), the term ''regeneration'' means an event during which emission levels change while the aftertreatment performance is being restored by design. Examples of regenerations are increasing exhaust gas temperature to remove sulfur from an adsorber or increasing exhaust gas temperature to oxidize PM in a trap. For the purpose of this paragraph (i), the term ''infrequent'' means having an expected frequency of less than once per transient test cycle. Calculation and use of adjustment factors are described in paragraphs (i)(1) through (5) of this section. If your engine family includes engines with one or more AECDs for emergency vehicle applications approved under paragraph (4) of the definition of ''defeat device'' in § 86.004–2, do not consider additional regenerations resulting from those AECDs when calculating emission factors or frequencies under this paragraph (i).

* * * * *

7. Section 86.095–35 is amended by revising paragraph (a)(3)(iii)(O) to read as follows:

§ 86.095–35 Labeling.

(a) * * *

(3) * * *

(iii) * * *

(O) For engines with one or more approved AECDs for emergency vehicle applications under paragraph (4) of the definition of ''defeat device'' in § 86.004–2, the statement: ''THIS ENGINE IS FOR INSTALLATION IN EMERGENCY VEHICLES ONLY.''

* * * * *

Subpart B—[Amended]

8. Section 86.131–00 is amended by adding paragraph (g) to read as follows:

§ 86.131–00 Vehicle preparation.

* * * * *

(g) You may disable any AECDs that have been approved solely for emergency vehicle applications under paragraph (4) of the definition of ''defeat device'' in § 86.004–2. The emission standards do not apply when any of these AECDs are active.

Subpart N—[Amended]

9. Section 86.1305–2010 is amended by adding paragraph (i) to read as follows:

§ 86.1305–2010 Introduction; structure of subpart.

* * * * *

(i) You may disable any AECDs that have been approved solely for emergency vehicle applications under paragraph (4) of the definition of ''defeat device'' in § 86.004–2. The emission standards do not apply when any of these AECDs are active.

10. Section 86.1370–2007 is amended by adding paragraph (h) to read as follows:

§ 86.1370–2007 Not-To-Exceed test procedures.

* * * * *

(h) *Emergency vehicle AECDs.* If your engine family includes engines with one or more approved AECDs for emergency vehicle applications under paragraph (4) of the definition of ''defeat device'' in § 86.004–2, the NTE emission limits do not apply when any of these AECDs are active.

Subpart S—[Amended]

11. Section 86.1803–01 is amended as follows:

a. By adding a definition for ''Ambulance'' in alphabetical order.

b. By revising the definition for ''Defeat device''.

c. By adding definitions for ''Diesel exhaust fluid'', ''Emergency vehicle'', and ''Fire truck'' in alphabetical order.

§ 86.1803–01 Definitions.

* * * * *

Ambulance means a vehicle used for emergency medical care that provides all of the following:

(1) A driver's compartment.

(2) A patient compartment to accommodate an emergency medical services provider and one patient located on the primary cot so positioned that the primary patient can be given intensive life-support during transit.

(3) Equipment and supplies for emergency care at the scene as well as during transport.

(4) Safety, comfort, and avoidance of aggravation of the patient's injury or illness.

(5) Two-way radio communication.

(6) Audible and visual traffic warning devices.

* * * * *

Defeat device means an auxiliary emission control device (AECD) that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use, unless:

(1) Such conditions are substantially included in the Federal emission test procedure;

(2) The need for the AECD is justified in terms of protecting the vehicle against damage or accident;

(3) The AECD does not go beyond the requirements of engine starting; or

(4) The AECD applies only for *emergency vehicles* and the need is justified in terms of preventing the vehicle from losing speed, torque, or power due to abnormal conditions of the emission control system, or in terms of preventing such abnormal conditions from occurring, during operation related to emergency response. Examples of such abnormal conditions may include excessive exhaust backpressure from an overloaded particulate trap, and running out of diesel exhaust fluid for engines that rely on urea-based selective catalytic reduction.

* * * * *

Diesel exhaust fluid (DEF) means a liquid compound used in conjunction with selective catalytic reduction to reduce NO_X emissions. *Diesel exhaust fluid* is generally understood to conform to the specifications of ISO 22241.

* * * * *

Emergency vehicle means a vehicle that is an ambulance or a fire truck.

* * * * *

Fire truck means a vehicle designed to be used under emergency conditions to transport personnel and equipment and to support the suppression of fires and mitigation of other hazardous situations.

* * * * *

12. Section 86.1807–01 is amended by adding paragraphs (h) and (i) to read as follows:

§ 86.1807–01 Vehicle labeling.

* * * * *

(h) Vehicles powered by model year 2007 through 2013 diesel-fueled engines must include permanent readily visible labels on the dashboard (or instrument panel) and near all fuel inlets that state ‘‘Use Ultra Low Sulfur Diesel Fuel Only’’ or ‘‘Ultra Low Sulfur Diesel Fuel Only’’.

(i) For vehicles with one or more approved AECDs for emergency vehicles under paragraph (4) of the definition of ‘‘defeat device’’ in § 86.1803, include the following statement on the emission control information label: ‘‘THIS VEHICLE HAS A LIMITED EXEMPTION AS AN EMERGENCY VEHICLE.’’

13. Subpart S is amended by removing § 86.1807–07.

§ 86.1807–07 [Removed]

14. Section 86.1834–01 is amended as follows:

a. By revising paragraph the introductory text of (b)(4).

b. By adding paragraph (b)(4)(iii).

c. By revising paragraph (b)(6)(i)(H).

d. By adding paragraph (b)(6)(i)(I).

§ 86.1834–01 Allowable maintenance.

* * * * *

(b) * * *

(4) For diesel-cycle vehicles, emission-related maintenance in addition to, or at shorter intervals than the following will not be accepted as technologically necessary, except as provided in paragraph (b)(7) of this section:

* * * * *

(iii) For vehicles that use selective catalytic reduction, the replenishment of diesel exhaust fluid shall occur at an interval, in miles or hours of vehicle operation, that is no less than the scheduled oil change interval.

* * * * *

(6) * * *

(i) * * *

(H) Components comprising the selective catalytic reduction system (including diesel exhaust fluid tank).

(I) Any other component whose primary purpose is to reduce emissions or whose failure would commonly increase emissions of any regulated pollutant without significantly degrading engine performance.

* * * * *

15. Section 86.1840–01 is amended by revising paragraph (c) to read as follows:

§ 86.1840–01 Special test procedures.

* * * * *

(c) Manufacturers of vehicles equipped with periodically regenerating aftertreatment devices must propose a procedure for testing and certifying such vehicles, including SFTP testing, for the review and approval of the Administrator. The manufacturer must submit its proposal before it begins any service accumulation or emission testing. The manufacturer must provide with its submittal sufficient documentation and data for the Administrator to fully evaluate the operation of the aftertreatment devices and the proposed certification and testing procedure.

* * * * *

PART 1039—CONTROL OF EMISSIONS FROM NEW AND IN-USE NONROAD COMPRESSION-IGNITION ENGINES

16. The authority citation for part 1039 continues to read as follows:

Authority: 42 U.S.C. 7401–7671q.

Subpart B—[Amended]

17. Section 1039.115 is amended by adding paragraphs (g)(4) and (5) to read as follows:

§ 1039.115 What other requirements apply?

* * * * *

(g) * * *

(4) The auxiliary emission control device applies only for engines that will be installed in emergency equipment and the need is justified in terms of preventing the equipment from losing speed or power due to abnormal conditions of the emission control system, or in terms of preventing such abnormal conditions from occurring, during operation related to emergency response. Examples of such abnormal conditions may include excessive exhaust backpressure from an overloaded particulate trap, and running out of diesel exhaust fluid for engines that rely on urea-based selective catalytic reduction. The emission standards do not apply when any AECDs approved under this paragraph (g)(4) are active.

(5) The auxiliary emission control device operates only in emergency situations as defined in § 1039.665 and meets all of the requirements of that section, and you meet all of the requirements of that section.

18. Section 1039.125 is amended by adding paragraphs (a)(2)(iii) and (a)(3)(iii) to read as follows:

§ 1039.125 What maintenance instructions must I give to buyers?

* * * * *

(a) * * *

(2) * * *

(iii) For SCR systems, the minimum interval for replenishing the diesel exhaust fluid is the number of engine operating hours necessary to consume a full tank of fuel based on normal usage starting from full fuel capacity for the equipment.

(3) * * *

(iii) For SCR systems, the minimum interval for replenishing the diesel exhaust fluid is the number of engine operating hours necessary to consume a full tank of fuel based on normal usage starting from full fuel capacity for the equipment.

* * * * *

19. Section 1039.130 is amended by revising paragraph (b)(3) to read as follows:

§ 1039.130 What installation instructions must I give to equipment manufacturers?

* * * * *

(b) * * *

(3) Describe the instructions needed to properly install the exhaust system and any other components. Include instructions consistent with the requirements of § 1039.205(u). Also describe how to properly size diesel

exhaust fluid reservoirs consistent with the specifications in § 1039.125(a) if applicable.

* * * * *

20. Section 1039.135 is amended by adding paragraph (c)(15) to read as follows:

§ 1039.135 How must I label and identify the engines I produce?

* * * * *

(c) * * *

(15) For engines with one or more approved auxiliary emission control devices for emergency equipment applications under § 1039.115(g)(4), the statement: ''THIS ENGINE IS FOR INSTALLATION IN EMERGENCY EQUIPMENT ONLY.''

* * * * *

Subpart F—[Amended]

21. Section 1039.501 is amended by adding paragraph (g) to read as follows:

§ 1039.501 How do I run a valid emission test?

* * * * *

(g) You may disable any AECDs that have been approved solely for emergency equipment applications under § 1039.115(g)(4).

22. Section 1039.525 is amended by revising the introductory text to read as follows:

§ 1039.525 How do I adjust emission levels to account for infrequently regenerating aftertreatment devices?

This section describes how to adjust emission results from engines using aftertreatment technology with infrequent regeneration events. For this section, ''regeneration'' means an intended event during which emission levels change while the system restores aftertreatment performance. For example, exhaust gas temperatures may increase temporarily to remove sulfur from adsorbers or to oxidize accumulated particulate matter in a trap. For this section, ''infrequent'' refers to regeneration events that are expected to occur on average less than once over the applicable transient duty cycle or ramped-modal cycle, or on average less than once per typical mode in a discrete-mode test. If your engine family includes engines with one or more AECDs for emergency equipment applications approved under § 1039.115(g)(4), do not consider additional regenerations resulting from those AECDs when calculating emission factors or frequencies under this section.

* * * * *

Subpart G—[Amended]

23. Add § 1039.665 to subpart G to read as follows:

§ 1039.665 Special provisions for use of engines in emergency situations.

This section specifies provisions that allow for AECDs that are necessary to ensure proper functioning of engines and equipment regulated under this part in emergency situations. For purposes of this section, an emergency situation is one in which the functioning (or malfunctioning) of emission controls poses a significant risk to human life. For example, a situation in which a feature of emission controls inhibits the performance of an engine being used to rescue a person from a life-threatening situation would be an emergency situation. AECDs approved under this section are not defeat devices.

(a) Manufacturers may ask for approval under this section at any time; however, we encourage manufacturers to obtain preliminary approval before submitting an application for certification. We may allow manufacturers to apply an approved emergency AECD to engines and equipment that have already been placed into service.

(b) We will approve an AECD where we determine the following criteria are met:

(1) Activation of the AECD cannot occur without the specific permission of the certificate holder, and must require the input of a temporary code or equivalent security feature.

(2) The AECD must become inactive within 24 engine hours of becoming active.

(3) The AECD may deactivate emission controls as necessary to address the emergency situation. For purposes of this paragraph (b)(3), inducement strategies related to operating SCR-equipped engines without reductant are considered to be emission controls.

(4) The AECD's design is consistent with good engineering judgment.

(c) The certificate holder must keep records to document requests for and use of emergency AECDs under this section.

(1) The operator (or other person responsible for the engine/equipment) must send a written request to the certificate holder prior to use, or a written confirmation of a verbal request within 30 days of making the request, including a description of the emergency situation, the reason for the use of the AECD, and a signature from an official acknowledging the conditions of the emergency situation (such as a county sheriff, fire marshal, or hospital administrator). Such requests are deemed to be submissions to EPA. Where written confirmation is not submitted by the operator, we will deem operation of the engine with an activated emergency AECD to be a violation of 40 CFR 1068.101(b)(1).

(2) If the operator does not submit the applicable confirmation within 30 days, the certificate holder must send written notification to the operator that failure to submit written confirmation may subject the operator to penalties under 40 CFR 1068.101.

(3) Within 60 days of the end of each calendar year in which the certificate holder authorizes use of the AECD, the certificate holder must send a report to the Designated Compliance Officer to summarize such use, including a description of the emergency situation precipitating each use, and copies of the written confirmation provided by operators (or statements that the operator did not provide confirmation). We may require more frequent reporting if we find that the certificate holder does not collect or attempt to collect written confirmation for each situation.

(d) We may set other reasonable conditions to ensure that this provision is not used to circumvent the emission standards of this part.

24. Add § 1039.670 to subpart G to read as follows:

§ 1039.670 Approval of an emergency equipment field modification (EEFM).

This section describes how you may implement design changes for emergency equipment that has already been placed into service to ensure that the equipment will perform properly in emergency situations.

(a) You must notify us in writing of your intent to install or distribute an emergency equipment field modification (EEFM). In some cases you may install or distribute an EEFM only with our advance approval, as specified in this section.

(b) Include in your notification a full description of the EEFM and any documentation to support your determination that the EEFM is necessary to prevent the equipment from losing speed, torque, or power due to abnormal conditions of its emission control system, or to prevent such abnormal conditions from occurring during operation related to emergency response. Examples of such abnormal conditions may include excessive exhaust backpressure from an overloaded particulate trap, or running out of diesel exhaust fluid (DEF) for engines that rely on urea-based selective catalytic reduction. Your determination must be based on an engineering evaluation or testing or both.

(c) You may need our advance approval for your EEFM, as follows:

(1) Where the proposed EEFM is identical to an AECD we approved under this part for an engine family currently in production, no approval of the proposed EEFM is necessary.

(2) Where the proposed EEFM is for an engine family currently in production but the applicable demonstration is based on an AECD we approved under this part for an engine family no longer in production, you must describe to us how your proposed EEFM differs from the approved AECD. Unless we say otherwise, your proposed EEFM is deemed approved 30 days after you notify us.

(3) If we have not approved an EEFM comparable to the one you are proposing, you must get our approval before installing or distributing it. In this case, we may request additional information to support your determination under paragraph (b) of this section, as follows:

(i) If we request additional information and you do not provide it within 30 days after we ask, we may deem that you have retracted your request for our approval; however, we may extend this deadline for submitting the additional information.

(ii) We will deny your request if we determine that the EEFM is not necessary to prevent the equipment from losing speed, torque, or power due abnormal conditions of the emission control system, or to prevent such abnormal conditions from occurring, during operation related to emergency response.

(iii) Unless we say otherwise, your proposed EEFM is deemed approved 30 days after we acknowledge that you have provided us with all the additional information we have specified.

(4) If your proposed EEFM is deemed to be approved under paragraph (c)(2) or (3) of this section and we find later that your EEFM in fact does not meet the requirements of this section, we may require you to no longer install or distribute it.

Subpart I—[Amended]

25. Section 1039.801 is amended by adding definitions for ''Diesel exhaust fluid'' and ''Emergency equipment'' in alphabetical order to read as follows:

§ 1039.801 What definitions apply to this part?

* * * * *

Diesel exhaust fluid (DEF) means a liquid compound used in conjunction with selective catalytic reduction to reduce NO_X emissions. *Diesel exhaust fluid* is generally understood to conform to the specifications of ISO 22241.

* * * * *

Emergency equipment means either of the following types of equipment:

(1) Specialized vehicles used to perform aircraft rescue and fire-fighting functions at airports, with particular emphasis on saving lives and reducing injuries coincident with aircraft fires following impact or aircraft ground fires.

(2) Wildland fire apparatus, which includes any apparatus equipped with a slip-on fire-fighting module, designed primarily to support wildland fire suppression operations.

* * * * *

26. Section 1039.805 is amended by adding abbreviations for ''DEF'', ''EEFM'', ''ISO'', and ''SCR'' in alphabetical order to read as follows:

§ 1039.805 What symbols, acronyms, and abbreviations does this part use?

* * * * *

DEF Diesel exhaust fluid.

EEFM Emergency equipment field modification.

* * * * *

ISO International Organization for Standardization (see *www.iso.org*).

* * * * *

SCR Selective catalytic reduction.

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