California Environmental Protection Agency

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

PROPOSED AMENDMENTS TO THE AIRBORNE TOXIC CONTROL MEASURE FOR STATIONARY COMPRESSION IGNITION ENGINES

(Stationary Diesel Engine ATCM)

Stationary Source Division
Emissions Assessment Branch

September 2010

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State of California
AIR RESOURCES BOARD

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Public Hearing to Consider

PROPOSED AMENDMENTS TO THE AIRBORNE TOXIC CONTROL MEASURE FOR STATIONARY COMPRESSION IGNITION ENGINES

To be considered by the Air Resources Board on October 21-22, 2010, at:

California Environmental Protection Agency
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State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENTS TO THE AIRBORNE TOXIC CONTROL MEASURE FOR STATIONARY COMPRESSION IGNITION ENGINES

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EXECUTIVE SUMMARY

The Air Resources Board (ARB or Board) staff is proposing amendments to the Airborne Toxic Control Measure for Stationary Compression-Ignition Engines (Stationary Diesel Engine ATCM or ATCM). The primary purpose of the proposed amendments is to closely align the emission limits for new emergency standby engines in the ATCM with the emission standards required by the federal Standards of Performance for Stationary Compression-Ignition Internal Combustion Engines (NSPS) which was promulgated on July 11, 2006. (U.S. EPA, 2006) The proposed amendments will reduce the cost of complying with the ATCM while still providing health protective emission limits for new emergency standby engines. The proposed amendments primarily affect the requirements for stationary compression-ignition (diesel) engines used in non-agricultural operations.

Presented below is an overview that briefly discusses the information presented in this document.

1. When was the Stationary Diesel Engine ATCM adopted and what does it require?

The ATCM was initially approved by ARB in 2004 (title 17, CCR section 93115) (ARB, 2003) and was designed to reduce public exposures to diesel particulate matter (diesel PM). The ATCM establishes emission standards and operating requirements for new and in-use stationary diesel engines.[1] Implementation of the ATCM is resulting in a reduction in the emissions of and exposure to diesel PM from stationary diesel engines throughout California. In the majority of cases, compliance with the ATCM results in potential cancer risks being below 10 in a million for people living close to a facility with stationary diesel engines.

The emission limitations in the ATCM are different depending on whether an engine is used as an emergency standby engine (*i.e.*, used only during emergencies such as an electrical outage, flood, or fire) or as a prime engine. Prime engines are not solely used for emergencies but provide prime power for compressors, rock crushing, cranes, etc. Emergency standby engines, since they typically operate no more than 20 to 50 hours a year, have less stringent standards than prime engines which can operate hundreds to thousands of hours annually.

For new emergency standby engines, the ATCM requires the engines to meet a 0.15 grams per brake horsepower hour (g/bhp-hr) diesel PM emission limit and to restrict the number of hours operated for maintenance and testing. In addition, the diesel PM emissions limit is linked to the Board's Off-Road Compression Ignition Engine Standards (Off-Road Standards)(title 13, CCR, section 2423), adopted by ARB such

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[1] When the ATCM was approved in 2004, it included emissions limits for new engines used in agricultural operations. Requirements for in-use engines used in agricultural operations were subsequently added to the ATCM in 2006.

that when the more stringent Tier 4 standards, which are lower than 0.15 g/bhp-hr, become effective new emergency standby engines will have to meet the Tier 4 standards.[2] As a result, under the current ATCM, the diesel PM standard for new emergency standby engines will be as stringent as those for prime engines.

Tier 4 standards more stringent than the 0.15 g/bhp-hr standard for new off-road engines begin implementation in 2011 and mandate significantly more stringent oxides of nitrogen (NOx), hydrocarbon (HC), and PM controls. In most cases, achieving the standards will require addition of catalyzed after-treatment devices such as diesel particular filters (DPF) for PM control and selective catalytic reduction (SCR) devices for NOx control. At the time the ATCM was originally adopted, ARB staff assumed there would be a seamless transition to the Tier 4 standards for new emergency standby engines. We anticipated that these engines would be cost-effective, viable for use in emergency standby applications, and available "off-the shelf" from the engine manufacturers. However, as we will discuss in the following questions and answers, upon further investigation, ARB staff has found that not to be the case.

2. How are stationary emergency standby engines used and how are they typically operated?

Stationary emergency standby engines are engines that remain in one location for 12 months or longer and provide power during an emergency. The most common use of an emergency standby engine is in conjunction with a generator set to provide back-up electrical power during emergencies or unscheduled power outages. Emergency generator engines can range from less than 50 horsepower (hp) to over 6,000 hp, depending on the end users' needs. Emergency standby engines are also used with fire pumps as part of fire suppression systems. Engines used in fire pump applications are usually less than 200 hp. Since emergency standby engines are used primarily for emergency situations, their use is generally limited and most operating hours are used for maintenance and testing to ensure the engines will operate when needed in an emergency. The engines are owned and operated by various facilities and businesses, including hospitals, hotels, banks, office buildings, correctional facilities, airports, retail shopping centers, factories, military installations, schools, waste and water treatment facilities, and many other types of public agencies. Most emergency standby engines are diesel-fueled.

3. Why is staff proposing amendments to the ATCM?

ARB staff is proposing amendments to the ATCM to closely align California's requirements for new emergency standby engines with those in the federal NSPS. These amendments will ensure that the emission reductions from the ATCM are cost-effective, feasible, readily available, and continue to meet health protective requirements.

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[2] The U.S. Environmental Protection Agency has adopted essentially equivalent emissions standards (40 CFR Parts 9,69, et. al. Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel, Final Rule June 29,2004 – "Nonroad Standards") to the ARB's Off-Road Standards.

Subsequent to implementation of the ATCM, the U.S. Environmental Protection Agency (U.S. EPA) promulgated an NSPS for Stationary Compression-Ignition Internal Combustion Engines. The NSPS has different emissions standards for new emergency standby engines as compared to the ATCM in that the NSPS standards do not require new emergency stationary engines to meet the Tier 4 standards that generally require the application of after-treatment devices such as DPFs or SCR. To avoid the application of DPFs and/or SCR devices on engines that operate for relatively few hours each year, under the federal NSPS standards, new emergency standby engines would only be subject to the less stringent Tier 2 or Tier 3 Nonroad Standards depending on the horsepower of the engine.[3]

In July 2009, representatives from the Engine Manufacturers Association (EMA) requested that ARB staff consider harmonizing the requirements for new emergency standby engines in the ATCM with those in the NSPS. (EMA, 2009) EMA contends that, due to the high costs of after-treatment, it is not cost-effective to have DPF or SCR devices used in emergency standby applications that typically operate few hours annually. They expressed concerns about potential operational issues with using these after-treatment devices on emergency standby engines. They also stated that it is not economically viable for manufacturers to produce a unique emergency standby engine platform only for California that meets the ATCM requirements.

In response, ARB staff agreed to investigate the need for amendments to the ATCM to address concerns raised regarding feasibility and cost-effectiveness of after-treatment controls on new emergency standby engines than the ATCM.

4. What are the current requirements in the ATCM for new emergency standby engines and how are they different than the NSPS requirements?

ATCM

As mentioned previously, the existing ATCM requires new stationary emergency standby diesel engines greater than 50 hp to meet a 0.15 g/bhp-hr PM emission limit or the Off-Road Standards for PM, whichever is more stringent. The ATCM does not specify what model year engine must be installed, only that the engine meet the specified emissions limit for PM and the other pollutant standards (*i.e.*, NOx, HC) for the model year of the engine being installed. The ATCM also limits the number of hours a new emergency standby engine can operate for maintenance and testing purposes to no more than 50 hours per year. The ATCM does not limit emergency use hours. The PM emissions standard of 0.15 g/bhp-hr and hours limitation for maintenance and testing were established based on a conservative screening health risk assessment (HRA). (ARB, 2003) The HRA demonstrated a PM emission limit of 0.15 g/bhp-hr and 50 hours of operation would result in a potential cancer risk level of less than 10 in a

[3] The Tier 4 final standards for the less than 25 hp engines and the Tier 4 interim standards for engines greater than or equal to 25 hp and less than 75 hp do not require after-treatment controls.

million for the majority of emergency standby engine applications.[4] In recognition that there might be unique circumstances where the potential cancer risks may be higher, the ATCM allows the local air quality control or air quality management district (district) to establish more stringent requirements either through local rulemaking or on a site-specific basis through the district permitting process.[5]

The Off-Road Standards will become more stringent than the ATCM's 0.15 g/bhp-hr diesel PM standard beginning with Tier 4 engines. The Tier 4 PM emissions standards become more stringent beginning in 2011 for engines greater than 75 hp and in 2013 for engines 50 to 75 hp. To achieve these more stringent Tier 4 emissions limits, engine manufacturers will need to employ DPFs and SCR devices because other emission reduction technologies cannot meet the Tier 4 emissions limits.

The ATCM requires new direct-drive emergency standby fire pump engines to meet the same emissions standards as emergency standby engines. However, a district may approve alternative standards linked to the Off-Road Standards and allow for a three-year extension of the current standards after transition to the next tier occurs. For example, with district approval, an operator may install a Tier 2 direct-drive fire pump engine until three years after the date the Tier 3 standards are applicable for an engine of the same horsepower. This extension allows manufacturers and owners and operators to sell and install a direct-drive fire pump diesel engine that meets the emission standards immediately preceding the transition to a new tiered standard and, more importantly, provides additional time for testing and evaluation necessary for certification of fire pump engines required by the National Fire Protection Association (NFPA).

NSPS

With respect to the NSPS requirements for new emergency standby engines, U.S. EPA staff determined during the development of the NSPS that the high cost of after-treatment devices when compared to the amount of pollutant reduced did not justify requiring after-treatment controls for new stationary emergency standby diesel engines. (U.S. EPA, 2005) As a result, the final rule requires new stationary emergency standby engines to meet the most stringent federal Nonroad Standards that do not require add-on emission controls. It also requires any new emergency standby engine to be a certified 2007 or later model year engine. This means that, under federal regulation, new emergency standby diesel engines are required to meet the Tier 2 or Tier 3 new Nonroad Standards for all pollutants. For engines with horsepower greater than 175 hp, the PM emissions limit is 0.15 g/bhp-hr. For engines in the 50 to 175 hp range, the PM emissions limit ranges from 0.22 g/bhp-hr to 0.30 g/bhp-hr. In addition, the NSPS final rule established deadlines to install stationary diesel engines from a previous model year.

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[4] A survey conducted by ARB staff during the development of the ATCM revealed that on average, emergency standby engines operate 31 hours a year for all purposes *i.e*. maintenance and testing and emergency operation. (ARB, 2003)

[5] Other programs, such as New Source Review and the Toxics Hot Spots Program work in concert with the ATCM to ensure the risks from all stationary diesel engines are mitigated.

For new emergency standby fire pump engines, the NSPS establishes emission standards similar to the NSPS new emergency standby engine standards and includes a three-year extension to comply with the final standards for certain engine power categories. According to U.S. EPA staff, the time extension was added due to the lengthy time needed for these engines to be certified to the federal Nonroad Standards, as well as NFPA specifications, and Underwriters Laboratory (UL) and FM Global (FM) certification.

5. What are the results of ARB staff's analysis concerning the feasibility and costs of meeting Tier 4 standards for new emergency standby engines?

ARB staff conducted an analysis to evaluate the feasibility and availability of emergency standby engines equipped with DPFs and SCR after-treatment devices. ARB staff also investigated the costs and cost-effectiveness for five different scenarios that represented different potential compliance pathways to the Tier 4 standards that would have the DPF and SCR after-treatment devices. Based on the analysis, and those of U.S. EPA, ARB staff believes it is appropriate to closely align the ATCM emissions standards for new emergency standby engines with those in the NSPS. (U.S. EPA, 2006a) However, ARB staff believes it is also important to continue to provide the districts with the ability to impose more stringent conditions on a site-specific basis where the additional controls are warranted.

A summary of the results from the analysis concerning the feasibility and costs of Tier 4 standards for new emergency standby engines is presented below. Additional details are provided in Chapter II and Appendix B.

- Applications of DPF devices on emergency standby engines are technically feasible and there are currently about 300 emergency standby engines in California that have DPFs installed.

- There is very limited application of SCR devices on emergency standby engines. ARB staff is aware of a few applications on larger emergency standby engines in California. However, ARB staff believes that while the current generation of SCR systems may be technically feasible, there are significant economic and operational constraints to the routine use of SCR devices on emergency standby engines. This is because the majority of operating hours for emergency standby engines occur during short 15 to 30 minute maintenance and testing checks at low engine loads. In most cases, the temperature needed for the SCR catalyst to function will not be reached during this operation and the SCR device will not provide the expected NOx reductions.

- Tier 4 engines that rely on after-treatment technology for emergency standby applications will not be available from the original equipment manufacturers. Representatives from the EMA have indicated that it will not be economically viable for engine manufacturers to develop and maintain a Tier 4 emergency standby engine platform for California. Because of this, staff has concluded that Tier 4 engines for emergency standby applications will not be available "off-the-shelf." Therefore, each owner or operator will need to purchase a new Tier 2 or Tier 3 engine that meets a 0.15 g/bhp-hr PM standard and then work with suppliers to retrofit the engine with a DPF and SCR device to meet the Tier 4 emission standards for all pollutants.

- It is not cost-effective to routinely apply DPF or SCR after-treatment technologies on emergency standby engines. The costs of SCR and DPF after-treatment technology are very high and given the low number of hours that a typical emergency standby engine operates, about 31 hours per year, the cost effectiveness is significantly higher than other ARB diesel engine regulations.

6. What amendments are being proposed to the requirements for new emergency standby engines in the ATCM?

ARB staff is proposing the following amendments to the ATCM to closely align with the NSPS Emission Standards:

Emission Limits for New Emergency Standby Engines: For new emergency standby engines, ARB staff is proposing to retain the 0.15 g/bhp-hr PM emissions limit in the ATCM and to align the other pollutant emission standards with the NSPS requirements.[6] This amendment will eliminate the existing requirement in the ATCM that would have required new emergency standby engines to meet the after-treatment based Tier 4 standards when they are more stringent than 0.15 g/bhp-hr. It will also require that any new emergency standby engine must meet the 2007 model year or newer emissions limits in Off-Road Standards for all pollutants. No changes are proposed to the restrictions on the hours of operation for maintenance and testing or to the provisions that allow districts to impose more stringent requirements.

Emission Limits for New Emergency Standby Direct-drive Fire Pump Engines: ARB staff proposes to amend the ATCM to harmonize the PM and other pollutant emission standards with those in the NSPS for new emergency standby direct-drive fire pumps. The NSPS final rule requires stationary fire pump diesel engines to meet emission standards similar to the NSPS stationary emergency standby engine standards with delays in implementation up to three years for most engines. An additional three years is provided to engines between 50 and 600 hp with greater than 2,650 revolutions per minute. This decision was based on the timeframe required for these engines to design, certify, and manufacture an engine to meet NFPA specifications, including UL and FM certification. These amendments will not require new emergency standby direct-drive fire pump engines to meet Tier 4 after-treatment based standards.

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[6] With one exception, this amendment will result in the emissions requirements for emergency standby engines being the same in the ATCM as those in the NSPS. The only exception is for engines with horsepower less than 175 hp. For these engines, the NSPS establishes a PM emissions limit of 0.22 to 0.30 g/bhp-hr depending on the horsepower, while the ATCM will retain a more stringent 0.15 g/bhp-hr PM emissions standard as it represents best available control technology.

Therefore, they will be required to meet either Tier 2 or Tier 3 standards based on the horsepower and model year of the engine.

Tier 4 Emissions Limit and Sell-Through Requirements for Prime Engines: The current ATCM requires new prime engines to meet a 0.01 g/bhp-hr PM emissions limit. This emission limit is the Tier 4 final PM limit for most horsepower ranges. However, for certain horsepower ranges, the Tier 4 final PM emissions limit is 0.02 g/bhp-hr.[7] To address this difference in emissions standards, in an earlier rulemaking, the Board approved an alternative compliance provision for these engines that, in effect, allows engines certified to the 0.02 g/bhp-hr PM emissions standards to be in compliance with the ATCM. To simplify the regulatory language in the ATCM, ARB staff is proposing to align the PM emissions limit for these engines with the NSPS standard of 0.02 g/bhp-hr. In addition, ARB staff is proposing to align with the NSPS final rule deadlines for installing prime engines from a previous model year. This change essentially allows for a two-year sell-through for engines when the new engine standards transition from one tier to the next.

Emissions Limit and Reporting for Less than or Equal to 50 Horsepower Engines: ARB staff proposes to not require direct drive fire pump engines less than or equal to 50 hp to meet the Off-Road Standards and instead rely on the federal NSPS requirements for these engines to mitigate the emissions from this subset of engines. To further align the ATCM with the NSPS, ARB staff also proposes to not require after-treatment based Tier 4 standards for new emergency standby engines less than or equal to 50 hp. In addition, ARB staff proposes to delete the ATCM provision that requires sellers and dealers of less than or equal to 50 hp stationary engines to annually report to the ARB the number of engines sold. This data is no longer needed to support ARB's emission inventory program.

7. What other amendments are being proposed?

ARB staff is proposing amendments to help clarify provisions in the ATCM, address new information or comments from the districts, and remove provisions no longer needed. These amendments are briefly summarized below.

Exemptions: ARB staff is proposing to remove the sell-through provision in the ATCM. This provision was originally included in the regulation to help ensure an adequate supply of complying engines were available and to minimize the adverse economic impacts to dealers as the new engine standards transitioned from one tier to the next. Since the regulation will now require new emergency standby engines to meet a 0.15 g/bhp-hr PM standard (Tier 2 or Tier 3 engines) and engines that meet these standards have been available for several years; the sell-through provision is no longer needed. This is also the case for engines used in agricultural operations. As discussed above, an amended sell-through provision for prime engines, consistent with that in the NSPS, is being proposed as part of this rulemaking.

[7] Engines in the 50 to 75 hp range and those greater than 750 bhp have a 0.02 g/bhp-hr PM emissions limit. These engines are DPF-equipped to meet that limit.

Definitions: ARB staff is proposing to add a new criterion to the "emergency standby engine" definition to make the definition more consistent with the NSPS final rule. Staff is proposing to clarify that any diesel engine that supplies power to an electric grid or that supplies power as part of a financial arrangement with any entity, except for those engines enrolled in a demand response program (DRP) as defined in the ATCM, is not considered an emergency standby engine.

ARB staff is also proposing to modify the definition of "emergency use." The current definition of "emergency use" includes the operation of emergency standby engines on the day of rocket launch tracking performed by the U.S. Department of Defense at Command Destruct sites. This provision was originally included to address engines at Command Destruct sites supporting military operations at the Vandenberg Air Force Base. Vandenberg is now responsible for space plane landing. ARB staff is proposing to amend the definition of emergency use to specify that the operation of emergency standby engines during rocket launch and space plane re-entry/landing be considered emergency use. However, this action will have very little impact on emissions because, according to the districts, the diesel engines at these sites have been or are in the process of being replaced with new diesel engines retrofitted with DPFs.

ARB staff is also proposing to amend the definition of "maintenance and testing" to add "uninterruptible power supply" to the lists of supported equipment that may be tested during maintenance and testing operations.

Other minor amendments to the definitions are being proposed to reflect revised terminology or improve clarity.

Reporting: ARB staff is proposing an amendment to require the owners or operators of emergency standby engines used in demand response programs to annually report information on engines and hours of operation to the district and the Executive Officer of the ARB. The proposed amendment requires an updated inventory to be submitted annually, unless the Executive Officer determines an updated inventory is not needed for any given year. The current ATCM requires this information to be provided to the district upon request. This amendment will ensure that both the ARB and the districts will obtain this data annually and will enable more routine monitoring of the hours that engines are operating during demand response programs.

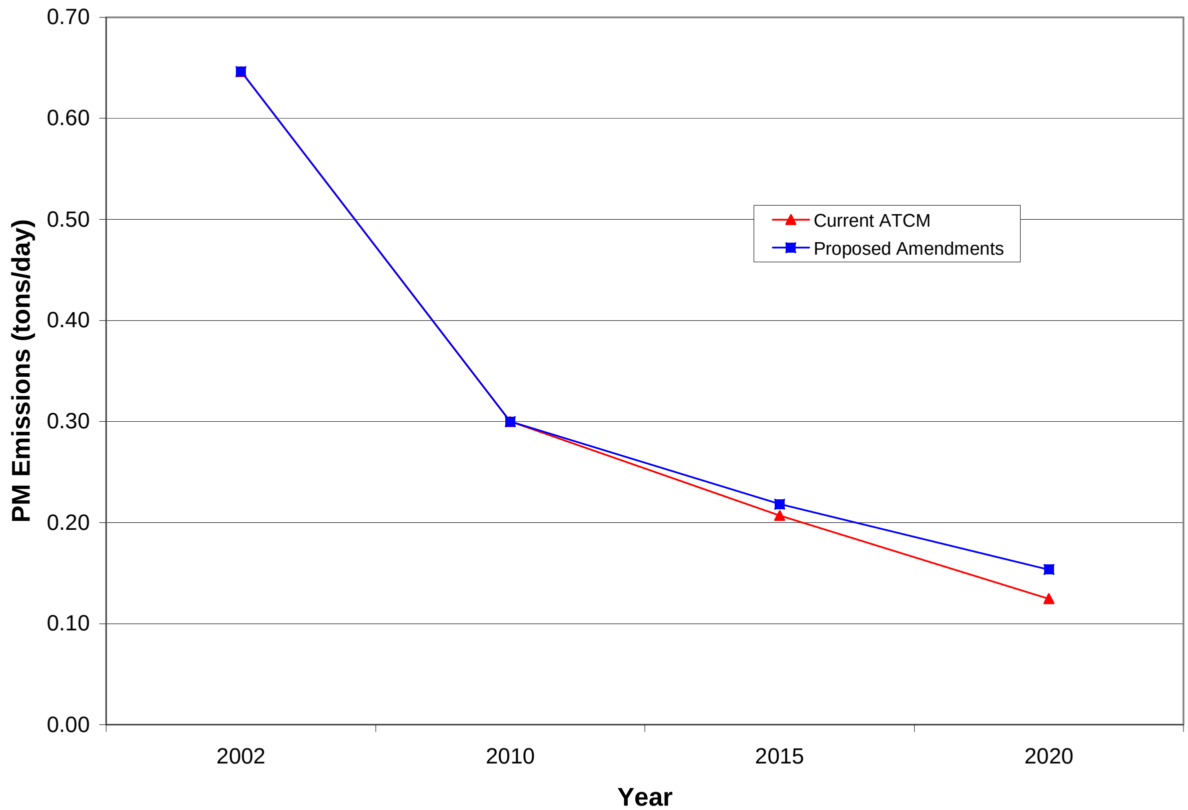
8. What are the environmental impacts of the proposed amendments?

As shown in Figure ES-1, with the proposed amendments, the PM emissions from stationary diesel engines are expected to continue to decline over the next decade.[8] However, the amendments will result in a small loss of projected diesel PM emission reductions of about 0.01 tons per day (T/D) in 2015 and 0.03 T/D in 2020 as compared to the current ATCM. We do not expect this small change in emissions to have a

[8] In Figure ES-1, the emissions represent the combined totals for both prime and emergency standby engines. Of this total, emergency standby engines comprise about 40 percent of the emissions in 2010.

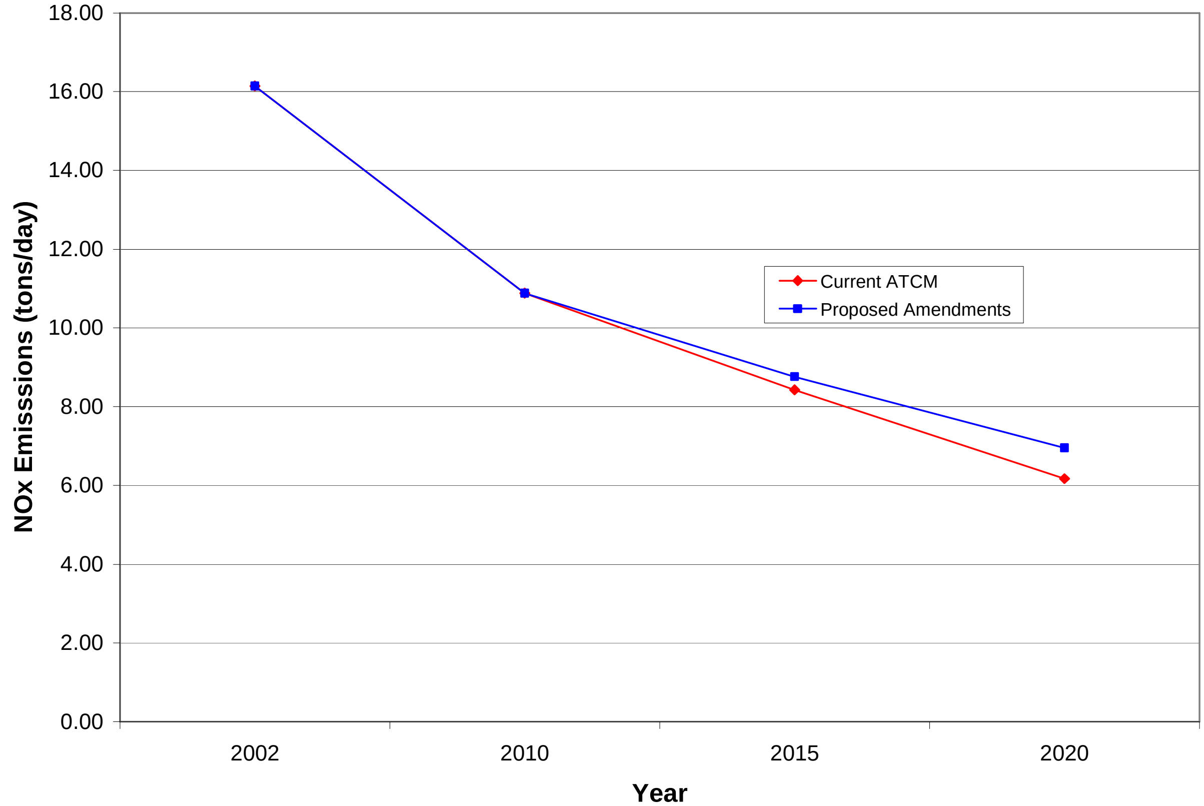
significant impact on projected regional PM emissions. These foregone emission reductions are about one hundredth of one percent (0.01%) of the total Statewide diesel PM emissions in 2015 and four hundredths of one percent (0.04%) in 2020.

Figure ES-1: Comparison of Statewide Stationary Non-Agricultural Diesel Engine PM Emissions with the Current ATCM and the Proposed Amendments



The proposed amendments will also impact the projected emissions of NOx from stationary diesel engines. While the primary focus of the ATCM is to reduce diesel PM, by linking the emissions standards for new engines to the Off-Road Standards, there are some ancillary NOx reductions. Foregoing Tier 4 engines for new emergency standby engines will result in fewer NOx reductions in future years. Figure ES-2 provides a graphic of the projected NOx emissions with the current ATCM emissions standards and with the proposed amendments. In 2015, we forego projected NOx emissions of 0.4 T/D and 0.8 T/D in 2020. This translates into about one hundredth of one percent (0.01%) of total Statewide emissions of NOx in 2015 and three hundredths of one percent (0.03%) in 2020.

Figure ES-2: Comparison of Statewide Non-Agricultural Stationary Diesel Engine NOx Emissions with the Current ATCM and the Proposed Amendments



The proposed amendments are expected to have little impact on emissions of greenhouse gases (GHGs). First, the proposed amendments would affect a relatively small number of engines. In 2010, new stationary emergency standby engines represent only about one percent of the total number of new non-road engines introduced into California. In addition, there are factors that would both slightly increase and decrease GHG emissions under the proposed amendments. To some extent, these factors would cancel each other out. Specifically, SCR and passive DPF's generally require engines to reach higher operating temperatures for best performance. These temperatures can be difficult to reach with normal maintenance and testing procedures. Requiring DPF or SCR after-treatment devices for emergency engines could lead to additional operating time and additional fuel use, with an associated increase in emissions of GHG. However, the proposed amendments would eliminate the need for after-treatment control devices, thus reducing these potential additional GHG emissions. On the other hand, engines equipped with DPFs could achieve greater reductions of "black carbon" PM, which contributes to climate change. Considering all these factors, there should be negligible change in GHG emissions due to the proposed amendments.

9. What are the impacts on potential cancer risk levels?

With the proposed amendments, the ATCM will continue to ensure that the risks from emergency standby engines are minimized. In most all cases, the diesel PM emissions from an emergency standby engine with a diesel PM emission rate of 0.15 g/bhp-hr results in potential cancer risks being below 10 in a million for people living close to emergency standby engines. In those rare cases that a new emergency standby engine results in a potential cancer risk greater than 10 in a million, the ATCM will continue to have a provision that allows the district to establish more stringent emission standards and operating requirements where necessary to protect public health.

In addition, there are other programs implemented by the districts, such as New Source Review and the Air Toxics "Hot Spots" Program (AB 2588), that work in concert with the ATCM to ensure the emissions and risks from stationary engines are adequately mitigated. Like the ATCM, these programs allow districts to address the emissions and risks from diesel engines on a site-specific basis taking into consideration environmental justice programs and any unique circumstances that may require additional controls.

10. What are the economic impacts of the proposed amendments?

ARB staff does not expect any adverse economic impacts associated with the proposed amendments. Rather, the proposed amendments will result in future cost savings to businesses or public entities that will be purchasing new emergency standby engines.

ARB staff estimates the total economic impact from the proposed amendments to the ATCM to affected private businesses and public agencies would be a cost savings of about $460 million between 2010 and 2020 or about $46 million annually. Of this, private businesses and public agencies are each expected to realize cost savings of $230 million or $23 million annually. These cost savings are primarily due to the alignment of the ATCM emissions standards for new emergency standby engines with those in the NSPS, which do not require after-treatment emission standards. Foregoing the application of after-treatment technologies such as DPF and SCR for new emergency standby engines, results in significant capital cost savings of about $118 per hp. This translates to about $71,000 cost savings for a typical 600 hp emergency standby engine.

11. Are there any potential issues that may not be fully addressed by the proposed amendments to the ATCM?

During the development of the proposed amendments, ARB staff began discussions with district staff on the need to address high use emergency standby engines, remotely located engines, or facilities with multiple emergency standby engines. Since the ATCM was originally approved in 2004, there have been some changes in the way emergency standby engines are being used. For example, due to the increase in web-based electronic communications and storage, a number of large server banks are being installed in California to provide electronic data storage. These server banks typically will have multiple large diesel emergency back-up engines to support the servers in the event of an emergency or when there are power fluctuations. In addition, as California transitions to greater reliance on renewable energy, such as solar, there is the possibility of the emergency standby engines used to support these power systems may be called upon to operate more frequently than what is typically seen with a natural gas fired power plant. Because the ATCM does not limit the number of hours for emergency use, there is a possibility that there will be situations where engines are operating a significant number of hours for emergency operations and where additional controls might be warranted. It is also possible that some of these "high-use" emergency standby engines will be located in remote areas, far away from where people work or live. In these situations, the same level of controls applied to an emergency standby engine in a more populated region may not be necessary if the engine is located away from people and in a region that is attainment for the State and federal ambient air quality standards.

While there are mechanisms in place to help address these concerns such as the provision in the ATCM that allows the district to establish more stringent requirements and New Source Review and the Air Toxics "Hot Spots" Program mentioned earlier, ARB staff believes these situations should be more carefully evaluated and quantified. To that end, ARB staff recommends that ARB staff work with the districts to collect information on "high-use" emergency standby engines, to identify situations that may merit additional controls beyond or less than those in the ATCM and to develop permitting guidance, if necessary, to ensure the health and regional impacts from all stationary diesel engines are adequately mitigated.

12. How did staff develop the amendments to the ATCM?

The staff developed the proposed amendments to the ATCM through consultations with industry, government agencies, and members of the public. Over the last year, the staff held two public workshops to discuss the proposed amendments. More than 3,000 companies, organizations, and individuals were notified of these public workshops through email notification. Workshop notices were posted to ARB's website and e-mailed to subscribers of the "diesel risk reduction" electronic list server. Numerous individual meetings also were held with affected stakeholders, including the engine manufacturers and emission control technology providers. ARB staff also held several meetings with district staff while developing the proposal to obtain their input.

Staff also surveyed engine manufacturers to gather current information on the cost and feasibility of developing Tier 4 emergency-standby and fire pump engines. The information provided by survey participants was used to help develop the proposed amendments.

13. What are the impacts on the State Implementation Plan?

The proposed revision will have minor impacts on the State Implementation Plan (SIP) that can be addressed in future plans submitted pursuant to federal Clean Air Act (CAA) planning requirements for nonattainment areas. The emission reductions that would be foregone as a result of this proposal are in all cases a very small portion of the local inventory, and there is no need to identify a specific source of new emission reductions that would compensate for the foregone reductions at this time. If the Board adopts this proposed revision, the impact would be reflected in inventories prepared for future ozone and PM 2.5 attainment demonstration plans, and if necessary, mitigated in the control strategies adopted as part of those plans.

14. What future activities are planned?

After Board consideration and approval of the proposed amendments to the ATCM, ARB staff will work with the districts to implement the revised requirements. After adoption, each district will consider whether to implement the amendments as is, or adopt alternative amendments that are at least equally effective in reducing emissions. ARB staff will also continue to monitor advances in the performance and cost-effectiveness of emission control technologies, the hours of operation for emergency standby engines, changes in the emissions inventory for stationary engines, and any future changes in the federal requirements for these engines. In addition, as discussed in Question number 11, ARB staff will work with district staff to investigate the need for additional measures to address high-use emergency standby engines.

15. What is staff's recommendation?

We recommend that the Board approve the proposed amendments to the ATCM presented in this report (Appendix A). ARB staff believes that the current ATCM restriction on operating hours for emergency standby engines, coupled with a PM level of 0.15 g/bhp-hr represents best available control technology for emergency standby applications. The proposed amendments will closely align the new engine emission standards for emergency-standby and fire pump engines with the federal NSPS standards. The proposal would maintain the vast majority of emission reduction benefits, while significantly improving the cost-effectiveness and feasibility of the ATCM.

I. INTRODUCTION

In this chapter, the Air Resources Board (ARB or Board) staff provides a brief description of the types and uses of stationary diesel engines, an overview of the Airborne Toxic Control Measure for Stationary Compression-Ignition Engines (ATCM or Stationary Diesel Engine ATCM) and the new federal Standards of Performance for Stationary Compression-Ignition Internal Combustion Engines (NSPS). Also included in this chapter is a brief summary of the Engine Manufacturers Association's (EMA) request to align the emission standards in the ATCM with the NSPS standards for stationary emergency standby engines. This chapter concludes with a discussion of the regulatory process and actions the ARB undertook to engage stakeholders in this rulemaking process.

A. Description of Stationary Diesel Engines

The ATCM establishes requirements for stationary diesel engines. Stationary engines are engines that remain in one location at a facility for 12 months or longer. These engines can be divided into two categories: emergency standby engines (including direct-drive fire pump engines) and prime engines. The regulatory requirements for prime engines are more stringent than those for emergency standby engines due to their greater hours of operation. In addition, there are different requirements for direct-drive fire pump engines, which are a special type of emergency standby engine, and agricultural engines.

Emergency Standby Engines

Emergency standby engines are engines installed and used to provide electrical power or mechanical work during an emergency or unscheduled power outage. As such, their use is typically limited to these emergency conditions, and scheduled maintenance and testing operations.

Emergency standby engines can range from less than 50 horsepower (hp) to greater than 6,000 hp, depending on the end user's needs. Based on an ARB survey, about 50 percent of emergency standby engines are in the 175 to 750 hp range.[9] Emergency standby engines represent the majority of all stationary engines (approximately 60 percent). There are over 20,000 diesel emergency standby engines currently in use in California. These engines are owned and operated by various facilities and businesses, including hospital, hotels, banks, office buildings, correctional facilities, airports, retail shopping centers, factories, military installations, schools, water and water treatment facilities, and many other publicly owned facilities and private businesses.

Direct-drive fire pumps are a special type of emergency standby engine. Rather than providing electrical power, these engines are directly coupled to fire pumps used in fire

[9] ARB conducted a survey of in-use emergency standby engines in 2002. Results from the survey are published in the Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure for Stationary Compression-Ignition Engines. (ARB, 2003)

protection systems (building sprinkler systems). Engines used in fire pump applications are usually less than 200 horsepower. These engines are required to be operated for 30 minutes each week, plus additional hours for annual testing, by the National Fire Protection Agency (NFPA).

Prime Engines

Prime engines are stationary engines that are not classified as emergency standby engines. These engines are used in a wide variety of applications, including compressors, cranes, generators, pumps, and grinders/screening units. These engines are owned and operated by a variety of facilities and businesses, including ports, waste and recycling facilities, military installations, electrical generating companies in remote areas without access to the electrical grid, and by some public agencies. The size and operation of prime engines vary with the specific application. Prime engines can range in size from about 50 hp for an engine used to run a conveyor at a sand and gravel operation, to 2,000 hp or more to power a generator at a facility. Annual operation can be as low as 100 hours annually for a prime engine driving a compressor to several thousand hours a year for water pumping facilities. ARB staff estimates that there are approximately 1,100 diesel prime engines currently in use in California for non-agricultural applications.

Agricultural stationary engines are also categorized as prime engines. However, they have different emission standards than non-agricultural prime engines. There are approximately 12,300 stationary agricultural irrigation pump engines in California (for the 2010 year).

B. Regulatory Framework

Stationary engines are subject to regulations on the federal, State, and local levels. On the federal level, the U.S. Environmental Protection Agency (U.S. EPA) promulgated the NSPS emission standards for stationary diesel engines. The NSPS standards are modeled after the U.S. EPA Nonroad Standards for nonroad and marine diesel engines. At the State level, the ARB has adopted the ATCM which establishes emissions standards for stationary diesel engines. As will be discussed below, the ATCM establishes emission limits for PM and other pollutants and links the PM emissions limits to the Off-Road Standards when they become more stringent than those specified in the ATCM. For the other pollutants, CO, NOx, and NMHC, the ATCM generally requires the engines to meet the Off-Road Standards for the model year of the engine. The State Off-Road Standards are substantially equivalent to the federal Nonroad Standards. On the local level, the local air quality control or air quality management districts (districts) permit facilities with stationary engines. As part of this process, the districts implement other programs, such as New Source Review and the Air Toxics "Hot Spots" Program (AB 2588), that work in concert with the ATCM to ensure the emissions and risks from stationary engines are adequately mitigated. Like the ATCM, these programs allow districts to address the emissions and risks from diesel engines on a site-specific basis taking into consideration environmental justice programs and any unique circumstances that may require additional controls. Below, ARB staff provides brief overviews of the ATCM and the NSPS.

Current Stationary Diesel Engine ATCM

The ARB initially approved the ATCM at a public hearing on February 26, 2004, and the ATCM became effective on December 4, 2004 (ARB, 2003). The purpose of the ATCM is to reduce diesel PM and criteria pollutant emissions from stationary diesel engines. This was accomplished by establishing best available control technology requirements based on PM emission performance standards and operational practices for new and in-use stationary diesel engines.

The ATCM established diesel PM emission standards for new stationary emergency standby diesel engines greater than 50 hp based on the annual hours of operation needed for maintenance and testing. New emergency standby engines that do not operate more than 50 hours per year for maintenance and testing purposes are required to meet a 0.15 g/bhp-hr PM emission limit or the Off-Road Compression Ignition Engine Standards (title 13, CCR, section 2423)(Off-Road Standards), whichever is more stringent. Districts can allow emergency standby engines to operate more than 50 hours per year for maintenance and testing if it meets a diesel PM emission rate of less than or equal to 0.01 g/bhp-hr. The ATCM also requires the diesel engine installed to meet the Off-Road CI Engine Standards for HC, NOx, NMHC+NOx, and CO of the model year and maximum hp of the diesel engine installed.

The ATCM allows new direct-drive emergency standby fire pump engines to meet either the ATCM emissions standards for new emergency standby engines, or upon district approval, a three-year extension to meet the new Off-Road Standards applicable for the model year and maximum bhp. The three-year extension allows manufacturers and owners and operators to sell and install a direct-drive fire pump diesel engine that meets the emission standards immediately preceding the transition to a new tiered standard. The three year extension was provided to allow more time for these engines to meet Underwriters Laboratory (UL) and Global FM (FM) certification requirements. However, after the three-year extension only stationary direct-drive emergency standby fire pump engines that meet the Off-Road Standards may be sold and operated in California.

New stationary prime diesel engines greater than 50 hp are required to meet a diesel PM emission rate less than or equal to 0.01 g/bhp-hr, regardless of model year or maximum hp. The ATCM also requires the diesel engine to meet the Off-Road Standards for HC, NOx, NMHC+NOx, and CO of the model year and maximum hp of the diesel engine installed.

National Standards of Performance for Stationary Diesel Engines

The U.S. EPA promulgated the NSPS on July 11, 2006 (U.S. EPA, 2006). The NSPS emission standards are modeled after U.S. EPA's standards for nonroad and marine diesel engines. These standards are phased in over several years (tiered standards) with increasing levels of stringency. Stationary diesel engines whose construction, modification, or reconstruction commenced after July 11, 2005 are subject to the NSPS final rule. However, stationary diesel engines manufactured prior to April 1, 2006, are not subject to the final rule unless the engines are modified or reconstructed after July 1, 2005. Stationary diesel engines that are modified or reconstructed must meet the emission standards for the model year in which the engine was originally new, not the year the engine was modified or reconstructed.

The NSPS final rule requires stationary non-emergency (prime) diesel engines to meet the Tier 4 emission standards for all pollutants. Achieving the Tier 4 emissions standards requires the use of after-treatment devices for NOx and PM; these are likely to be SCR and DPF, respectively. However, U.S. EPA staff determined that the high cost of emission control when compared to the amount of pollutant reduced did not justify requiring manufacturers of stationary emergency standby diesel engines to meet Tier 4 standards if after-treatment devices were needed. As such, depending on the horsepower, the NSPS requires new stationary emergency standby diesel engines to meet either the Tier 2 or Tier 3 emission standards. These emissions standards don’t require the use of after-treatment devices such as DPR or SCR.

For new stationary fire pump diesel engines, the NSPS establishes emission standards similar to the NSPS stationary emergency standby diesel engine standards. Up to a three-year extension to comply with the final standards based on the engine horsepower category is also provided. According to U.S. EPA, the requirements for new stationary fire pump diesel engines was based in part on the minimal increase in emissions to forego higher tier standards, the significant costs to require after-treatment, and the lengthy time needed for these engines to be certified to the federal nonroad new engine certification standards, as well as NFPA specifications and UL/FM certification.

Beyond the general compliance extensions for fire pumps, U.S. EPA also provided an additional three year extension for a limited number of engines within certain horsepower ranges and a rated engine speed greater than 2,650 rpm. According to the representatives of the fire pump industry, these higher speed engines provide greater water pressure in a more economical fire pump package for applications where the higher water pressure is needed, such as tall buildings. The extension will provide time for fire pump manufacturers to adapt lower speed engines for these high water pressure applications.

The NSPS final rule provides 24-months after the beginning of a model year to install stationary non-emergency (prime) diesel engines (except fire pump diesel engines) from a previous tier. The purpose of this 24-month “sell-through” provision is to allow the sale and installation of stationary diesel engines that were manufactured prior to the new or changed standards took effect. The NSPS conditioned this provision to prohibit the stockpiling of engines beyond normal business inventory practices.

Starting in 2011 through 2013, based on the model year and a specific horsepower range, stationary diesel engine manufacturers must add a permanent label to emergency standby diesel engines stating that the diesel engine is for stationary emergency use only. The purpose of this new labeling requirement is twofold: (1) it is intended to clarify that this subset of stationary diesel engines do not have to meet the new engine certification emission standards for non-emergency diesel engines; and (2) these engines do not meet all of the applicable Tier 4 emissions standards for off-road engines.

C. Engine Manufacturers Request

Representatives from the EMA began discussions with ARB staff in mid-2009 expressing their concerns regarding the upcoming Tier 4 emissions limits for new emergency standby engines. (EMA, 2009) EMA representatives stated that the Tier 4 standards would generally require the installation of exhaust after-treatment devices for PM and NOx, and these devices could be problematic for emergency standby engines for the following reasons.

- Emergency standby engines are operated mostly for short maintenance and testing runs, which may not allow the engine to achieve exhaust temperatures sufficient to oxidize the particulate matter that collects in DPFs. This may result in an excess accumulation of trapped particulate matter. Under emergency conditions, when the engine may achieve full exhaust temperatures for the first time, the oxidation of excess particulate matter in the DPF may generate excess heat, causing the device to fail. This would compromise the safety function provided by the engine.

- Engines operated for short maintenance and testing runs may not generate exhaust temperatures high enough to allow for efficient NOx control in SCR systems. Therefore, the expected emission reduction benefits of the devices may not be realized in actual practice.

- Exhaust after-treatment devices for PM and NOx will not be cost-effective for emergency standby engines because the cost of the control devices is high (typically $25,000 to $100,000), relative to the small air quality benefits resulting from engines that are operating very few hours.

- Engine manufacturers have reported that it is not economically feasible to make a California-only engine platform because the California-only market for these engines is too small to generate an adequate return on the investment in research and development and maintenance of a California-only product line.

For these reasons, EMA suggested that the ARB consider harmonizing the emission standards for emergency standby engines in the ATCM with the U.S. EPA NSPS standards, which do not apply Tier 4 emissions standards to emergency-standby engines. It was suggested that the ARB align with the federal NSPS standards either by directly referencing the NSPS standards in the ATCM, or by amending the ATCM to stop at the emissions tier level prior to Tier 4 (e.g., Tier 2 or Tier 3).

D. ARB Actions and Public Process to Develop Amendments

ARB staff agreed to investigate potential amendments and undertook an investigation into the technical feasibility and costs associated with the application of Tier 4 emission standards to new emergency standby engines. The staff conducted the investigation and developed the proposed amendments to the ATCM over the last year through consultations with industry, government agencies, and members of the public. As shown in Table I-1, the staff held two public workshops covering the cost-effectiveness, feasibility, and emission reduction impacts of various proposed amendments to the ATCM. More than 3,000 companies, organizations, and individuals were notified of these public workshops through email notification. Workshop notices were posted to ARB's website and e-mailed to subscribers of the "diesel risk reduction" electronic list server.

Table I-1: Workshops on the Proposed Amendments to the ATCM

Date	Location
March 1, 2010	Cal/EPA Building, Sacramento
June 21, 2010	Cal/EPA Building, Sacramento

As a way of inviting public participation and enhancing the flow of information between ARB and the public, staff maintains the "Stationary Diesel Engines and Portable Diesel Equipment" website (www.arb.ca.gov/diesel/statport.htm). Staff has made documents related to the proposed amendments, including workshop notices, presentations, and proposed draft regulatory language, available on this website. Participating in one or more of the workshops were representatives of the diesel engine manufacturers and suppliers, emission control system manufacturers, districts, utilities, and consultants. Numerous individual meetings also were held with affected stakeholders, including the engine manufacturers and emission control technology providers. In addition, ARB staff held regular meetings with district staff to obtain their input on the amendments and benefit from their knowledge regarding the permitting and operation of stationary diesel engines.

Staff also researched current information on the performance and cost of retrofit control technologies for emergency standby engines. As part of these efforts, ARB staff sent a survey to engine manufacturers in March 2010 to gather current information on the cost and feasibility of developing Tier 4 emergency-standby and fire pump engines. The information provided by survey participants was used to help develop the proposed amendments.

II. TECHNICAL FEASIBILITY AND COSTS OF AFTER-TREATMENT CONTROLS ON NEW EMERGENCY STANDBY ENGINES

As indicated previously, DPF and SCR after-treatment devices will be necessary to meet the Tier 4 Off-Road Standards. For most horsepower ranges, a DPF will be needed to meet the Tier 4 interim (Tier 4i) standards and both a DPF and SCR will be needed to meet the Tier 4 final (Tier 4f) standards. When the ATCM was originally developed, ARB staff investigated the feasibility of DPFs on emergency standby engines but there was little information available on the application of SCR on emergency standby engines. (ARB, 2003) When the regulation was adopted in 2004, ARB staff also did not investigate the incremental costs associated with the transition from Tier 2 or Tier 3 engines without after-treatment controls to the Tier 4 engines. This is because ARB staff expected that as Tier 4 engine technologies and after-treatment technologies were developed for the broad range of off-road applications, Tier 4 engines would also be available for emergency standby applications.

As part of this rulemaking, ARB staff revisited the technical feasibility and operational considerations associated with DPF devices on emergency standby engines and investigated the feasibility and operational considerations of SCR devices. ARB staff also estimated incremental costs associated with the transition from Tier 2 or Tier 3 emergency standby engines to Tier 4 engines. In this chapter, we provide a summary of this investigation and our findings. Additional details on this analysis are provided in Appendix B.

A. Technical Feasibility and Operational Considerations for DPF and SCR Devices on Emergency Standby Applications

<u>Diesel Particulate Filters</u>

DPFs are used in many applications to reduce emissions of diesel PM. In general, a DPF consists of a porous substrate that permits gases in the engine exhaust to pass through the DPF but collects or “traps” the diesel PM. Most DPFs employ some means to periodically remove the collected diesel PM, commonly referred to as regenerating the filter. During regeneration, the trapped PM, which is mostly carbon, is burned off the filter. Diesel PM emission reductions in excess of 85 percent are possible, depending on the associated engine's baseline emissions, fuel sulfur content, and emission test method or duty cycle. In addition, up to a 90 percent reduction in CO and a 95 percent reduction in HC can also be realized with DPFs. (ARB, 2003)

A DPF can collect PM for a set period of time before regeneration is required. The collection time will vary depending on the size and type of DPF but generally it ranges from 240 to 720 minutes (4-12 hours). The manufacturer will stipulate the duration that the engine can operate between regeneration events. For emergency standby engines, this is often identified in terms of the number of cold starts and 30 minute idle sessions that the engine can perform before the DPF needs regeneration. Because typical operation of an emergency standby engine includes either weekly, biweekly, or monthly

30 minute maintenance and testing operations with low or no load to ensure the engine is operating properly, the operator will need to verify that regeneration is occurring within manufacturer specified guidelines. The number of times that an engine can operate for maintenance and testing before regeneration can vary but typically is between 10 and 30 cold starts with 30 minute run sessions.

There are at least 13 manufacturers that have developed DPFs for use in stationary emergency standby applications. Ten manufacturers have DPFs that have been verified through the ARB's Diesel Emission Control Strategies Verification Program for use on emergency standby engines. There are also three manufacturers that provide DPFs for emergency standby applications; however their systems have not been verified by ARB. Under the ATCM, operators are not required to use verified systems; however, the use of verified systems can streamline the permitting process and avoid the costs of emissions testing.

There are about 300 emergency standby engines that have DPFs installed throughout California. In most cases, the DPFs were installed to meet district permit requirements or to address odor complaints from near-by neighbors. ARB staff believes the application of DPFs on emergency standby engines is technically feasible and can achieve significant diesel PM emission reductions. The operational considerations are minimal and can be easily accommodated by small adjustments in the routine monitoring of the engines and normal maintenance and testing procedures.

<u>SCR Technology</u>

SCR technology has been available for many years, primarily used on large power plants to lower NOx emissions. However, SCR is becoming more common in other applications due to the U.S. EPA and ARB on and off-road new compression-ignition diesel engine standards. For off-road applications, the Tier 4 final standards are phased in between 2011 and 2015; most engines greater than 75 hp will require highly effective NOx controls such as SCR.

SCR uses a catalyst (commonly precious metals, vanadium, or zeolites) and injection of a reductant (liquid ammonia or urea) to convert the NOx in the diesel exhaust to water (H_2O) and nitrogen (N_2). The catalyst lowers the reaction temperature that NOx needs to convert to H_2O and N_2. The temperature range is specific to each SCR system but in general is between 260 degrees Celsius (℃) to 540 ℃. Once the exhaust temperature reaches the minimum operating temperature, the catalyst activates and the system begins to inject the reductant into the exhaust stream. The exhaust will then enter the catalyst where the conversion will take place. A well designed system can reduce the NOx emissions up to 95 percent.

There are at least eight manufacturers who have indicated they have SCR systems for installation on stationary diesel engines. These systems are generally used on prime generators and may need adaptation to work on emergency standby engines.

As mentioned above, SCR systems require an operating temperature between 260 ℃ to 540 ℃. Reaching these temperatures may be diff icult for emergency standby engines during typical maintenance and testing operations where the engine is used at low load or for short periods of time. If this temperature is not met while the engine is running, there will be no NOx emission reduction benefits. To circumvent this problem, the engine would need to be operated with higher loads and in many cases for longer periods of time. This could be a challenge for most emergency standby applications as most businesses do not have load banks in house and would have to create a larger load on the engine to get the catalyst up to operational temperature.

SCR systems have not yet seen wide application on emergency standby engines. According to district data, there are about seven facilities in California that have emergency standby engines with SCR. Most of these installations are on large engines greater than 1,000 horsepower. ARB staff believes that while the current generation of SCR systems may be technically feasible, there are significant operational hurdles to overcome before routine use of SCR on emergency standby engines is practical. This is because the majority of operating hours for emergency standby engines occur during short 15 to 30 minute maintenance and testing checks are at low engine loads. In most cases, the temperature needed for the SCR catalyst to function will not be reached during this operation and the SCR will not provide the expected NOx reductions.

B. Costs Associated with DPF and SCR Devices on Emergency Standby Engines

To determine the potential costs associated with the application of DPF and SCR technologies on emergency standby engines, ARB staff investigated the costs associated with five different “compliance pathways” or scenarios that resulted in the application of DPF and SCR devices on emergency standby generator engines (gen-set). Two scenarios were based on the end user retrofitting an existing Tier 2 or Tier 3 gen-set with after-treatment technologies and three scenarios were based on original equipment manufacturers (OEM) providing the gen-set with after-treatment technology installed. The five scenarios are:

Scenario 1. end user aftermarket retrofit of a Tier 2 or Tier 3 gen-set with a DPF;
Scenario 2. end user aftermarket retrofit of a Tier 2 or Tier 3 gen-set with a DPF and SCR;
Scenario 3. OEM supplied new Tier 4 interim (Tier 4i) gen-set (DPF only);
Scenario 4. OEM supplied new Tier 2 or Tier 3 gen-set retrofitted with OEM supplied DPF; and,
Scenario 5. OEM supplied new Tier 4 final gen-set (with DPF and SCR).

In each case, to determine the cost increase, we compared the cost of a new Tier 2 or Tier 3 gen-set with the cost of a gen-set equipped with after-treatment controls via the compliance path specified for each scenario. Estimated costs for end-user retrofit were based on data from after-market technology providers and OEM costs were provided by

EMA members. For specified horsepower ranges, the percent increase in cost for a gen-set with after-treatment compared to a new Tier 2 or Tier 3 gen-set without after-treatment was determined for the average size horsepower engine within each horsepower range. It is important to note that, while EMA members provided estimates of their costs to produce the OEM supplied gen-sets, they also stated that it is not economically viable for them to maintain a California-only platform for these engines and that these engines will not be available “off-the-shelf” from the OEMs.

Table II-1 shows the increased costs associated with Scenarios 1 and 2 that entailed the end user retrofitting a new Tier 2 or Tier 3 gen-set with a DPF or with both a DPF and SCR. For each scenario, the costs are presented as a percentage increase and as the increase in actual dollar amount, relative to a new Tier 2 or Tier 3 gen-set. As can be seen in Table II-1, the costs for an end user to retrofit an emergency standby genset with a DPF range from $4,000 to $100,000 per engine depending on the horsepower. The cost for an end user retrofit with DPF and SCR ranges from $13,000 to $310,000 per gen-set.

Table II-1: End-User Retrofit Scenarios: Cost Increases for Emergency Standby Generator Sets

HP Range	Cost of NewTier 2/3 Gen-Set($)	Scenario 1 End-User Retrofit with DPF		Scenario 2 End-User Retrofit with SCR + DPF	
		% Increase	$ Increase	% Increase	$ Increase
50-174	$29,000	15%	$4,000	46%	$13,000
175-749	$67,000	26%	$18,000	81%	$55,000
750-1206	$141,000	26%	$37,000	82%	$115,000
1207-2000	$309,000	20%	$61,000	61%	$189,000
>2000	$523,000	19%	$100,000	59%	$310,000

The cost increases associated with Scenarios 3, 4, and 5 that relied on OEM provided after-treatment based engines and technologies are provided in Table II-2. The OEM costs for Tier 4i and Tier 4f gen-sets reflect the addition of DPF and SCR after-treatment devices where necessary and any costs the OEMs would incur for research, design, assembly line setups, tooling, inventory storage, engine markup, and other considerations. For Tier 4i, a DPF will be required to meet the PM standards on all engines greater than 75 hp. For engines greater than 1207 hp, SCR systems will also likely be required to meet the Tier 4i NOx standard. For the Tier 4f engines, both DPF and SCR systems will be required on all engines greater than 75 hp.

Table II-2: OEM Scenarios: Cost Increases for Emergency Standby Generator Sets

HP Range	Cost of Tier 2/3 Gen-Set($)	Scenario 3 OEM Supplied Tier 4i Gen-Set[1]		Scenario 4 OEM Supplied Tier 2/3 Gen-Set with DPF Retrofit		Scenario 5 OEM Supplied Tier 4f Gen-Set (DPF+SCR)	
		% Increase	$ Increase	% Increase	$ Increase	% Increase	$ Increase
50-174	$29,000	55%	$16,000	65%	$19,000	95%	$28,000
175-749	$67,000	105%	$71,000	55%	$36,000	125%	$85,000
750-1206	$141,000	100%	$136,000	40%	$57,000	110%	$156,000
1,207-1,999	$309,000	75%	$227,000	30%	$96,000	80%	$248,000
>2,000	$523,000	60%	$303,000	30%	$141,000	65%	$329,000

[1]To meet the Tier 4i PM standards, it is assumed DPFs will be required for all engines greater than 75 hp. In addition, SCR will likely be required for engines greater than 1,207 hp to meet the Tier 4i NOx standard.

As can be seen in Table II-2, the cost increase for an OEM supplied DPF equipped gen-set (Scenario 4), is $19,000 for less than 175 hp engines and about $100,000 for an engine in the 1,207 to 1,999 hp range. The costs for an OEM supplied gen-set equipped with both DPF and SCR (Scenario 5), is estimated to be more than two times the cost of an OEM supplied DPF only equipped gen-set. Comparing the estimated cost increases between the end-user Scenarios 1 and 2 presented in Table II-1 and the OEM Scenarios 3, 4, and 5 in Table II-2, it can be seen that it will be less costly for the end user to retrofit an existing Tier 2 or 3 gen-set than for the OEMs to supply the gen-set. This cost differential helps to support the OEMs contention that it is not economically viable for them to develop and maintain a "California only" emergency standby engine platform with after-treatment controls.

C. Cost-Effectiveness

The OEMs have stated they will not provide Tier 4 emergency standby engines for the California market. In the event the ATCM is not amended, the only reasonable compliance pathway for operators would be to retrofit a new Tier 2 or 3 engine with a DPF and SCR to meet the Tier 4 Offroad Standards. Therefore, using the cost estimates presented above, ARB staff determined the cost-effectiveness associated with the two scenarios (Scenarios 1 & 2) that entailed the end user retrofitting an existing Tier 2 or 3 gen-set to meet the Tier 4 standards. In each case, the cost effectiveness was estimated on a per engine basis by evaluating the emissions and costs impacts for the average size engine within each horsepower range.

To determine the cost-effectiveness, ARB staff calculated the difference in PM and NOx emissions between the new Tier 2 or Tier 3 gen-set and the gen-set described for each scenario. For Scenario 1, which relies on DPF after-treatment technology, the entire cost was applied to PM reductions. For Scenario 2, which has both NOx and PM reductions due to the application of DPF and SCR technologies, the costs were apportioned to the estimated emission reductions based on the contribution of the technology cost to the total costs. For example, the cost of the SCR is about 2/3 of the total costs for an engine with both a DPF and SCR. Using this relationship, for an engine equipped with both a DPF and SCR, 2/3 of the cost was attributed to the NOx reductions and 1/3 of the cost to the PM reductions. Table II-3 provides a summary of the costs and cost-effectiveness for each scenario.

Table II-3: Cost-Effectiveness Associated with the Application of DPF and SCR Devices on Emergency Standby Engines

Regulatory Scenario			HP Range				
			50-174	175-749	750-1206	1207-1999	>2000
	Average Horsepower:		112	462	978	1604	2630
Scenario 1: DPF Retrofit of Tier 2/3 engine	Cost Increase Due to Controls	PM	$4,300	$17,600	$37,200	$60,900	$99,900
		NOx	N/A	N/A	N/A	N/A	N/A
	Emission Reductions (lbs)	PM	8	33	70	115	189
		NOx	N/A	N/A	N/A	N/A	N/A
	Cost Effectiveness ($/lb)	PM	$540	$530	$530	$530	$530
		NOx	N/A	N/A	N/A	N/A	N/A
Scenario 2: DPF/SCR Retrofit of Tier 2/3 engine	Cost Increase Due to Controls	PM	$4,400	$18,200	$38,500	$63,100	$103,400
		NOx	$8,800	$36,300	$76,900	$126,100	$206,900
	Emission Reductions (lbs)	PM	8	33	70	115	189
		NOx	100	413	1456	2280	3740
	Cost Effectiveness ($/lb)	PM	$550	$550	$550	$550	$550
		NOx	$90	$90	$54	$56	$56

Notes: Assume emergency standby engine operates 31 hours per year at 30 percent load; 22 hours for maintenance and testing and 9 for emergency + DRP hours. DPF costs $38/hp and SCR costs $80/hp. 25 year life for DPF and SCR. Cost estimates are different than those in Table II-1 due to rounding.

To provide perspective on these estimates, ARB staff compared the cost-effectiveness for a gen-set in the 175-749 hp range (see second column under "HP Range" and "175-749" heading in Table II-3) to the cost effectiveness of regulations or programs currently being implemented by the ARB to reduce PM and NOx emissions. According to an earlier ARB survey, about 40% of all emergency standby engines are within the 175 to 749 hp range. (ARB, 2003). Table II-4 presents a comparison of the PM cost-effectiveness and Table II-5, the NOx cost-effectiveness. As can be seen, for emergency standby engines, the incremental cost-effectiveness associated with the transition from Tier 2 or 3 emission standards to either a Tier 4 DPF based emissions limit (0.01 - 0.02 g/bhp-hr PM emissions limit) or a Tier 4 SCR based emissions limit (0.3 -0.5 g/bhp-hr NOx emissions limit) is higher than any of the other regulations adopted by the Board. This is primarily due to the low number of hours that emergency standby engines typically operate.

Table II-4: PM Cost-Effectiveness Comparison [1]

Regulation or Airborne Toxic Control Measure	PM Cost Effectiveness ($/lb)
Stationary ATCM Incremental Cost-Effectiveness Tier 2/3 to Tier 4 for New Emergency Standby Engines	$530 -$550
In-Use Off-road Diesel Vehicle Rule[2]	$40
Solid Waste Collection Vehicle Rule	$32
Cargo Handling ATCM	$21
Ship Main/Aux/Boiler Proposal (2008)	$16
Ship Auxiliary Engine Regulation (2005)	$13
Public Fleets Rule	$160

[1] Chart taken from Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels Within California Waters and 24 Nautical Miles of the California Baseline (ARB, 2008)

[2] Attributes all regulation costs associated with diesel emission controls to PM and splits other regulation costs equally between PM and NOx.

Table II-5: NOx Cost-Effectiveness Comparison

Regulation or Airborne Toxic Control Measure	NOx Cost Effectiveness ($/lb)
Stationary ATCM Incremental Cost-Effectiveness Tier 2/3 to Tier 4 for New Emergency Standby Engines	$90
Carl Moyer Limit (2008 guidelines). (ARB, 2008b)	$8
Cargo Handling Equipment Rule. (ARB, 2005b)	$1
In-use Off-Road Diesel Vehicle Regulation. (ARB, 2007)	$2
Commercial Harbor Craft Rule (ARB, 2010)	$1
Portable Engine ATCM. (ARB, 2004)	$2
Public Fleet Rule (ARB, 2005c)	$11

D. Findings

Based on the analysis of the feasibility, costs, and cost-effectiveness associated with the application of DPF and SCR after-treatment devices on emergency standby engines, ARB staff makes the following findings.

- Applications of DPFs on emergency standby engines are technically feasible and there are currently about 300 emergency standby engines in California that have DPFs installed.

- There is very limited application of SCR on emergency standby engines. ARB staff is aware of a few applications on larger emergency standby engines in California. However, ARB staff believes that while the current generation of SCR systems may be technically feasible, there are significant economic and operation constraints to the routine use of SCR devices on emergency standby engines. This is because the majority of operating hours for emergency standby engines occur during short 15 to 30 minute maintenance and testing checks at low engine loads. In most cases, the temperature needed for the SCR catalyst to function will not be reached during this operation and the SCR will not provide the expected NOx reductions.

- Tier 4 engines that rely on after-treatment technology for emergency standby applications will not be available from the original equipment manufacturers. Representatives from the EMA have indicated that it will not be economically viable for engine manufacturers to develop and maintain a Tier 4 emergency standby engine platform for California. Because of this, staff concluded that Tier 4 engines for emergency standby applications will not be available "off-the-shelf." Therefore, each owner or operator will need to purchase a new Tier 2 or Tier 3 engine and then work with suppliers to retrofit the engine with a DPF and/or SCR to meet the Tier 4 emission standards for all pollutants.

- It is not cost-effective to routinely apply DPF or SCR after-treatment technologies on emergency standby engines. The costs of DPF and SCR after-treatment technology are very high and given the low number of hours that a typical emergency standby engine operates, about 31 hours per year, the cost effectiveness is significantly higher than other ARB diesel engine regulations.

Based on the analysis, and those of U.S. EPA (U.S. EPA, 2005), ARB staff believes it is appropriate to closely align the ATCM emissions standards for new emergency standby engines with those in the NSPS that do not require after-treatment based emission standards. However, ARB staff believes it is also important to continue to provide the districts with the ability to impose more stringent conditions on a site-specific basis where the additional controls are warranted.

III. SUMMARY OF EXISTING ATCM REQUIREMENTS AND PROPOSED AMENDMENTS

In this chapter, ARB staff describes the proposed amendments to the ATCM. The proposed amendments to the ATCM are designed to maintain the public health goals of the ATCM while reducing the impacts on engine manufacturers and businesses in California. This chapter is intended to meet the requirements of Government Code section (§) 11343.2 by providing to the public a "plain English" discussion of the proposed amendments.

A. Exemptions

The following amendments are being proposed to two exemptions in the ATCM.

Exemption § 93115.3 (s): Sell-Through Provision

ARB staff is proposing to delete section 93115.3 (s), the "sell-through provision," because it is no longer needed. This exemption allowed, subject to district approval, the limited sale and installation of never-been-used stock engines that do not meet the current Off-Road Standards required by title 13, CCR, section 2423. This exemption was included to help distributors and dealers manage their existing inventory of engines as the Off-Road Standards (tiered standards) transitioned from one tier to the next e.*g.*, Tier 2 to Tier 3.

If the proposed amendments discussed below are approved, then the sell-through provision is no longer needed. This is because for engines greater than 175 hp, the Tier 2 or Tier 3 PM standard of 0.15 g/bhp-hr has been in effect for a number of years so there should be no issue with dealers having new pre Tier 2 or Tier 3 engines in stock. For engines less than 175 hp, the Off-Road Standard PM emissions limit is higher than 0.15 g/bhp-hr. However, ARB staff has determined that there are many engines available that can meet a 0.15 g/bhp-hr emissions limit and these engines have also been available for several years. (ARB, 2010a) As a result, the sell-through provision is no longer necessary for emergency standby diesel engines. However, an amended sell-through provision is being proposed in this rulemaking for non-emergency (i.e., prime) diesel engines, which is consistent with the NSPS final rule. This amendment will be discussed in greater detail later in this chapter.

Exemption § 93115.3 (t): Command Destruct Sites

This exemption applies to emergency standby engines primarily used by the U.S. Department of Defense at "Command Destruct" sites. Due to a change in the mission for these sites, the terminology for these sites is being changed from "Command Destruct" to "Command Transmitter." ARB staff is proposing to amend this exemption to replace "Command Destruct" with "Command Transmitter" to reflect the military's current terminology.

B. Definitions

ARB staff is proposing amendments to four definitions in the ATCM. These definitional changes are proposed to improve the clarity of the ATCM, or to correct grammatical errors.

Definition § 93115.4 (a)(29): Emergency Standby Engine

The definition of emergency standby engine provides criteria and conditions that a diesel engine must meet to be considered a stationary emergency standby engine. The primary purpose of an emergency standby diesel engine is to provide electrical power or mechanical work during an emergency. An emergency standby engine provides backup power and is not the source of primary power for the facility. As defined in the ATCM, their uses are limited to emergency use, compliance testing, required maintenance and testing operations, operating in response to an impending outage, or participating in one of two Demand Response Programs (DRPs) allowed by the ATCM. To align with the NSPS requirements for emergency standby engines, ARB staff is proposing to amend the definition of emergency standby engine to add a new criterion which specifies that an emergency standby engine may not be used to supply power to an electric grid or supply power as part of a financial arrangement with any entity, except as allowed in § 93115.6 (a)(2), (b)(1), or (c). Section 93115.6 (a)(2) and (b)(1) contain criteria that an owner or operator must meet to operate a emergency standby engine in response to an impending rotating outage. Section 93115.6 (c) contains the operating requirements and emission standards for emergency standby engines participating in DRPs.

Definition § 93115.4 (a)(30): Emergency Use

The definition of emergency use identifies what constitutes emergency use under the ATCM. One of the conditions pertains to the use of emergency standby engines at U.S. Department of Defense “Command Destruct” sites. ARB staff is proposing to change the name “Command Destruct” sites to “Command Transmitter” sites to better reflect the mission of these sites primarily operated by the U.S. Department of Defense. In addition, these sites are now not only used in tracking rocket launching but to assist in the landing of space planes. ARB staff is proposing to amend the definition to reflect these changes in operation.[10]

Definition § 93115.4 (a)(47): Maintenance and Testing

The ATCM limits the number of hours emergency standby engines can operate for maintenance and testing. The definition of maintenance and testing describes what

[10]A recent new expansion of military operations requires Vandenberg Air Force Base to use its Command Transmitter sites for re-entry-landings of the military’s new space plane. It is important to note that the stationary emergency standby diesel engines at these sites have been or are in the process of being replaced with the latest tier diesel engine and retrofitted with a verified Level 3 DPF.

operations constitute maintenance and testing activities. One of the identified activities that meet the definition of maintenance and testing is when the engine is operated to evaluate the ability of the engine or its supported equipment to perform during an emergency. Examples of supported equipment include generators, pumps, transformers, switch gears, and breakers. ARB staff is proposing to add "uninterruptable power supply" to the list of examples of supported equipment in the definition of maintenance and testing. An uninterruptible power supply is an electrical apparatus that provides instantaneous or near instantaneous protection from input power disruptions. This proposed change is in response to a request by staff from several districts to clarify that operation of an emergency standby engine to test the ability of uninterruptable power supply is considered to be maintenance and testing operation.

Definition § 93115.4 (a)(73): Stationary Source

In the definition of stationary source, ARB staff is proposing to add an "s" to the term "include" to be more grammatically correct.

C. Emission Standards for New Emergency Standby Engines

ARB staff is proposing to closely align the emission standards for new emergency standby engines to the NSPS emission standards. Below, we summarize the current requirements for new emergency standby engines in the ATCM, the NSPS requirements, and the amendments proposed to the ATCM.

Current ATCM: § 93115.6 (a)(3): Emission Standards for New Emergency Standby Engines

Section 93115.6 contains the operating and emission standards for new emergency standby diesel engines greater than 50 hp. Under the current ATCM, new stationary emergency standby diesel engines are required to meet a 0.15 g/bhp-hr PM emission limit or the Off-Road Standard, whichever is more stringent. The new stationary emergency standby diesel engine must also meet the HC, NOx, NMHC+NOx, and CO standards for the model year and maximum hp rating specified in the Off-Road Standards of the engine installed. If there are no standards, the new stationary diesel engine must meet the Tier 1 standards in the Off-Road Standards for an off-road engine of the same model year and maximum rated power, irrespective of the new stationary emergency standby engine's model year.

A new stationary emergency standby diesel engine must not operate more than 50 hours per year for maintenance and testing purposes. Upon district approval, the new diesel engine may operate up to 100 hours per year for maintenance and testing, provided the diesel PM emission rate is less than or equal to 0.01 g/bhp-hr. The ATCM does not limit engine operation for emergency use or emission testing to show compliance to the applicable emission standards. In addition, the ATCM stipulates a district may establish more stringent emission standards for PM, NMHC+NOx, HC, NOx, and CO, and more stringent limits on hours of operation for maintenance and testing and demonstrating compliance with other district rules and initial start-up testing.

NSPS Final Rule: 40 CFR § 60.4202: Emissions Standards for New Stationary Emergency Standby Diesel Engines

The NSPS requires new stationary emergency engines to meet the most stringent federal Nonroad Standards that do not require add-on emission controls. (U.S. EPA, June 27, 2005) The NSPS also requires manufacturers to certify their 2007 or later model year engines to the certification emission standards in the Nonroad Standards for the same model year and maximum engine power for all pollutants. This means for the majority of engine powers that, under federal regulation, new emergency standby diesel engines are required to meet the Tier 2 or Tier 3 new Nonroad Standards for all pollutants. For engines with horsepower greater than 175 hp, the PM emissions limit is 0.15 g/bhp-hr. For engines in the 50 to 175 hp range, the PM emissions limit ranges from 0.22 g/bhp-hr to 0.30 g/bhp-hr. In addition, the NSPS final rule established deadlines to install stationary diesel engines from a previous model year for emergency standby engines (excluding fire pump diesel engines) and non-emergency engines (prime engines).

Beginning in 2011, the NSPS also requires engine manufacturers to label each new diesel engine that meets all the emission standards for emergency standby diesel engines but do not meet all the emission standards for non-emergency engines. A permanent label must be affixed to the engine stating that the engine is "for stationary emergency use only."

Proposed ATCM Amendments to § 93115.6 (a)(3) Emission Standards for New Stationary Emergency Standby Diesel Engines

For new emergency standby engines, ARB staff is proposing to retain the 0.15 g/bhp-hr PM emissions limit in the ATCM for all horsepower categories. With one exception, this proposed amendment will result in the emissions requirements for emergency standby engines being the same in the ATCM as those in the NSPS. The only exception is for engines less than 175 hp. For these engines, the NSPS establishes a PM emissions limit of 0.22 to 0.30 g/bhp-hr depending on the horsepower, while the ATCM will retain a more stringent 0.15 g/bhp-hr PM emissions standard. ARB staff believes this emissions limit represents best available control technology for this application and many engines less than 175 hp are available that can meet the 0.15 g/bhp-hr PM. ARB staff maintains a website that posts listings of the engines by horsepower and model year that are less than 175 hp and meet the ATCM PM standard for new emergency standby engines. (ARB, 2010a) The other pollutant emission standards would be the same as the NSPS requirements. This amendment will eliminate the existing requirement in the ATCM that would have required new emergency standby engines to meet the after-treatment based Tier 4 standards when they are more stringent than 0.15 g/bhp-hr. It will also prevent the installation of any new emergency standby engine that does not meet the 2007 model year or newer emissions limits in the Off-Road Standards (title 13, CCR, section 2423) for all pollutants. No changes are proposed to the restrictions on the hours of operation for maintenance and testing or to the provisions that allow districts to impose more stringent requirements.

Table III-1 provides a summary of the proposed emission standards for new emergency standby engines.

Table III-1: Proposed Emission Standards for New Stationary Emergency Standby Diesel Engines g/bhp-hr (g/kW-hr)[1]

Maximum Engine Power	Model year(s)	PM	NMHC+NOx	CO
50 ≤ HP < 75 (37 ≤ kW < 56)	2007	0.15 (0.20)	5.6 (7.5)	
	2008+		3.5 (4.7)	3.7 (5.0)
75 ≤ HP < 100 (56 ≤ kW < 75)	2007	0.15 (0.20)	5.6 (7.5)	3.7 (5.0)
	2008+		3.5 (4.7)	
100 ≤ HP < 175 (75 ≤ kW < 130)	2007	0.15 (0.20)	3.0 (4.0)	3.7 (5.0)
	2008+			
175 ≤ HP < 300 (130 ≤ kW < 225)	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
	2008+			
300 ≤ HP < 600 (225 ≤ kW < 450)	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
	2008+			
600 ≤ HP < 750 (450 ≤ kW < 560)	2007	0.15 (0.20)	3.0 (4.0)	2.6 (3.5)
	2008+			
HP > 750 (kW > 560)	2007	0.15 (0.20)	4.8 (6.4)	2.6 (3.5)
	2008+			

[1] Standards are expressed in both grams per brake horsepower hour and grams per kilowatt-hour. Standards may be subject to emission limitations as specified in current applicable district rules, regulations, or policies.

No amendments are being proposed to the limitations on the operating hours or the provision that allows the district to establish more stringent emission standards for PM, NMHC+NOx, NOx, HC, and CO.

D. Emission Standards for Direct-Drive Fire Pumps

Direct-drive fire pumps are diesel engines directly coupled to pumps used in water-based fire protection systems. These fire pumps differ from the majority of fire pumps which are powered by electric motors that use the building's electrical power supply, or in some cases backup electrical power provided by a diesel generator.

In direct-drive fire pumps, the building's water supply is connected to the pump, and in the event of a fire, the engine automatically starts and operates the pump to supply water for the sprinkler systems. In addition, the engines are operated for maintenance and testing purposes as specified in the NFPA 25 guidelines – "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems. These guidelines specify operation of the engine for 30 minutes each week plus additional time for annual testing.

ARB staff is proposing to align the emission standards for new emergency standby direct-drive fire pumps with those in the NSPS. Below, ARB staff describes: (1) the current ATCM requirements for new direct-drive fire pumps; (2) the NSPS requirements; and (3) the proposed amendments to the ATCM.

Current ATCM: § 93115.6 (a)(4): Emission Standards New Direct-Drive Emergency Standby Fire Pump Engines

Under the current ATCM, new fire pumps are subject to either requirements that are specific to direct-drive fire pump engines (under section 93115.6 (a)(4)), or the general requirements for new emergency standby diesel engines (under section 93115.6 (a)(3)). ARB staff believes that most operators have chosen to meet the relatively less stringent requirements specific to fire pumps. These provisions specify that new direct-drive fire pump engines: (1) meet the applicable Off-Road Standards (title 13 CCR, section 2423) three years later than they would be required for other emergency back-up engines; and (2) operate no more than the number of hours necessary to comply with the testing requirements of the National Fire Protection Agency (NFPA) 25 - “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.” Although the requirements for fire pumps under the current ATCM provide a three-year delay in the implementation of the Off-Road Standards, the more stringent Tier 4 standards requiring the use of after-treatment emission control devices would eventually apply to fire pump engines.

The requirements for fire pump engines are different from those for other emergency back-up engines because of the time required to develop and certify these engines to NFPA requirements. Fire pump suppliers work together with engine manufacturers to modify a standard diesel engine for use as a fire pump. This typically involves changes to the software that controls the engine. For example, the engine may be programmed to deactivate engine protection features (such as stopping the engine) during a fire, while activating these features during normal maintenance and testing runs. Electronically-controlled engines may also be supplied with two engine control units to provide redundancy in case one fails. Fire pump engines are also typically designed without a radiator, instead utilizing the water they are designed to pump, creating a constant flow of cooling water through the engine (in addition to the fire suppression system).

In addition to the development time with the engine manufacturer, the fire pump supplier must certify the engine to the requirements of NFPA 20 - “Standard for the Installation of Stationary Pumps for Fire Protection.” Third party certification companies such as Underwriters Laboratories (an independent product safety certification organization) and FM Global (an insurance company) approve (or “list”) products to the NFPA 20 requirements. These organizations certify each component in fire protection systems, including the engine, fire pump, pump control unit, coupling between the engine and pump. For example, the engines used in fire pumps must be certified by the company to ensure that the engine power is at least 10 percent greater than the maximum power required by the pump under any conditions of pump load (among other requirements).

NSPS Final Rule*:* 40 CFR § 60.4202 (d): Emission Standards for New Stationary Emergency Standby Fire Pump Engines

The U.S. EPA NSPS for emergency stationary diesel fire pump engines are shown in Table III-2 for 2007 and later model years.

Table III-2: NSPS Fire Pump Diesel Engine Standards
NMHC+NOx/CO/PM in g/bhp-hr and (g/kW-hr)

Maximum Power	2007	2008	2009	2010	2011	2012	2013	2014	2015+
50≤hp<75[1] (37≤kW<56)	7.8/3.7/0.60 (10.5/5.0/0.80)				Tier 4 interim 3.5/3.7/0.30 (4.7/5.0/0.40)				
75≤hp<100[1] (56≤kW<75)	7.8/3.7/0.60 (10.5/5.0/0.80)				Tier 3 3.5/3.7/0.30 (4.7/5.0/0.40)				
100≤hp<175[2] (75≤kW<130)	7.8/3.7/0.60 (10.5/5.0/0.80)			Tier 3 3.0/3.7/0.22 (4.0/5.0/0.30)					
175≤hp<300[3] (130≤kW<225)	7.8/2.6/0.40 (10.5/3.5/0.54)		Tier 3 3.0/2.6/0.15 (4.0/3.5/0.20)						
300≤hp<600[3] (225≤kW<450)	7.8/2.6/0.40 (10.5/3.5/0.54)		Tier 3 3.0/2.6/0.15 (4.0/3.5/0.20)						
600≤hp≤750 (450≤kW≤560)	7.8/2.6/0.40 (10.5/3.5/0.54)		Tier 3 3.0/2.6/0.15 (4.0/3.5/0.20)						
hp>750 (kW>560)	7.8/2.6/ 0.40 (10.5/3. 5/0.54)	Tier 2 4.8/2.6/0.15 (6.4/3.5/0.20)							

1. For model years 2011–2013, manufacturers, owners and operators of fire pump stationary CI ICE in this engine power category with a rated speed of greater than 2,650 revolutions per minute (rpm) may comply with the emission limitations for 2010 model year engines.
2. For model years 2010–2012, manufacturers, owners and operators of fire pump stationary CI ICE in this engine power category with a rated speed of greater than 2,650 rpm may comply with the emission limitations for 2009 model year engines.
3. In model years 2009–2011, manufacturers of fire pump stationary CI ICE in this engine power category with a rated speed of greater than 2,650 rpm may comply with the emission limitations for 2008 model year engines.

The primary difference between the NSPS standards for fire pumps and non-fire pump emergency engines is that the implementation of the fire pump standards is delayed. Specifically, for fire pump engines between 75 and 750 hp, there is a three year delay in the implementation of the Tier 3 standards relative to non-fire pump engines. For example, as shown in Table III-2 above, for fire pump engines in the 100 to 175 hp range, the Tier 3 standards begin in 2010, while for non-fire pump engines in this power range, the Tier 3 standards began in 2007. For fire pump engines greater than 750 hp, there is a two year delay in the Tier 2 standards relative to non-fire pump engines. And for engines between 50 and 75 hp, there is a three year delay in the implementation of the Tier 4 interim standards.

Proposed ATCM Amendments to § 93115.6 (a)(4) Emission Standards for New Stationary Emergency Standby Direct-Drive Fire Pump Engines

ARB staff proposes to align the emission standards in the ATCM with the NSPS standards for fire pump engines, as listed in Table II-2. Under the proposed amendments, direct-drive fire pump engines would not need to use exhaust after-treatment devices. The amendments would also reflect the delayed implementation of fire-pump engine standards relative to other emergency-standby engines, to allow for the extra time needed to develop and certify these engines to meet NFPA requirements.

E. Miscellaneous Amendments

§ 93115.7 (a): Requirements for Prime Engines

Section 93115.7 (a) prohibits the sale and installation of a new stationary prime diesel engine that has a rated hp greater than 50 unless the engine emits diesel PM at a rate less than or equal to 0.01 g/bhp-hr. This section also requires the new prime diesel engine to meet the HC, NOx, NMHC+NOx, and CO Off-Road Standards for the model year and maximum rated hp of the diesel engine installed to meet the 0.01 g/bhp-hr PM emission standard. This PM emission limit is the Tier 4 final PM limit for most horsepower ranges. However, for certain horsepower ranges, the Tier 4 final PM emissions limit is 0.02 g/bhp-hr.[11] To address this issue, in an earlier rulemaking, the Board approved an alternative compliance provision for these engines that in effect, allows engines certified to the 0.02 g/bhp-hr PM emission standard to be in compliance with the ATCM. To simplify the regulatory language in the ATCM, ARB staff is proposing to align the PM emissions limits for these engines with the Off-Road Standard PM emissions limit of 0.02 g/bhp-hr. ARB staff is also proposing to align with the NSPS final rule deadlines for installing prime engines from a previous model year. Essentially this provision allows 2 years to sell and install engines from the previous tiered standard after transitioning to a new tiered standard.

Table III-3 provides a summary of the proposed emission standards for new stationary prime diesel engines greater than 50 hp.

[11] Engines in the 50 to 75 hp range and those greater than 750 hp have a 0.02 g/bhp-hr PM emissions limit. These engines are DPF-equipped to meet that limit.

Table III-3: Proposed Emission Standards for New Stationary Prime Diesel Engines > 50 HP g/bhp-hr (g/kW-hr)[1]

Maximum Engine Power	Model year(s)	PM	NOx	NMHC +NOx	NMHC	CO
50 ≤ HP <75 (37 ≤ kW <56)	2007	0.01 (0.02)		5.6 (7.5)		3.7 (5.0)
	2008-2012	0.01 (0.02)		3.5 (4.7)		3.7 (5.0)
	2013+	0.02 (0.03)		3.5 (4.7)		3.7 (5.0)
75≤ HP <100 (56≤ kW <75)	2007	0.01 (0.02)		5.6 (7.5)		3.7 (5.0)
	2008-2011	0.01 (0.02)		3.5 (4.7)		3.7 (5.0)
	2012-2014	0.01 (0.02)	2.5 (3.4)		0.14 (0.19)	3.7 (5.0)
	2015+	0.01 (0.02)	0.30 (0.40)		0.14 (0.19)	3.7 (5.0)
100 ≤ HP <175 (75≤ kW <130)	2007-2011	0.01 (0.02)		3.0 (4.0)		3.7 (5.0)
	2012-2014	0.01 (0.02)	2.5 (3.4)		0.14 (0.19)	3.7 (5.0)
	2015+	0.01 (0.02)	0.30 (0.40)		0.14 (0.19)	3.7 (5.0)
175 ≤ HP < 750 (130≤ kW <560)	2007-2010	0.01 (0.02)		3.0 (4.0)		2.6 (3.5)
	2011-2013	0.01 (0.02)	1.5 (2.0)		0.14 (0.19)	2.6 (3.5)
	2014+	0.01 (0.02)	0.30 (0.40)		0.14 (0.19)	2.6 (3.5)
750 < HP ≤ 1,207 (560 < kW ≤ 900) Gen. sets	2007-2010	0.01 (0.02)		4.8 (6.4)		2.6 (3.5)
	2011-2014	0.02 (0.03)	2.6 (3.5)		0.30 (0.40)	2.6 (3.5)
	2015+	0.02 (0.03)	0.50 (0.67)		0.14 (0.19)	2.6 (3.5)
HP > 1,207 (kW > 900) Gen. sets	2007-2010	0.01 (0.02)		4.8 (6.4)		2.6 (3.5)
	2011-2014	0.02 (0.03)	0.50 (0.67)		0.30 (0.40)	2.6 (3.5)
	2015+	0.02 (0.03)	0.50 (0.67)		0.14 (0.19)	2.6 (3.5)

[1] May be subject to additional emission limitations as specified in current district rules, regulations, or policies governing distributed generation.

<u>§ 93115.10: Reporting Requirements for Emergency Standby Diesel Engines Participating in Demand Response Programs</u>

Sections 93115.10 (i) and (j) contain reporting requirements for stationary emergency diesel engines participating in two ATCM-approved Demand Response Programs

(DRPs). One is the Rolling Blackout Reduction Program (RBRP), which exists only in the entire service territory of the San Diego Gas and Electric Company (SDG&E); and the other DRP is the Interruptible Service Contracts (ISC), which are allowed in the entire service territory of any utility distribution company. The ATCM defines a utility distribution company as "one of several organizations that control energy transmission and distribution in California. This includes, but is not limited to, companies such as Pacific Gas and Electric Company, Southern California Edison, Sacramento Municipal Utility District, and the Imperial Irrigation District."

The ATCM currently requires SDG&E to provide an update of their RBRP engines or owners or operators enrolled in an ISC to update the information required by § 93115.10 (i) or (j) to the district only upon request. Staff is proposing to require the SDG&E and the owners or operators of DRP engines to provide a complete and updated inventory annually to the district and the Executive Officer of the ARB. The proposed amendment requires an updated inventory to be submitted annually, unless the Executive Officer determines an updated inventory is not needed for any given year. The affected parties will be notified in writing that a submittal is not necessary for that year or subsequent years.

The purpose of the proposed reporting amendment is to provide ARB staff with a current inventory of stationary emergency standby diesel engines and their associated emissions that participate in DRPs. This information will provide ARB staff the necessary information to evaluate the emissions and potential health impacts associated with DRP hours of operation.

<u>§ 93115.9 and 93115.10 (b): Emission Standards and Reporting Requirements for New Diesel Engines Less Than or Equal to 50 hp</u>

Section 93115.9 prohibits, except as provided in the exemptions section of the ATCM, the sale, lease, or use in California of any stationary diesel-engine that has a rated hp less than or equal to 50, unless it meets the current Off-Road Standards for diesel off-road engines of the same maximum rated power.

ARB staff proposes to not require less than or equal to 50 hp direct-drive fire pump engines to meet the Off-Road Standards and instead rely on the federal NSPS requirements for these engines to mitigate the emissions from this subset of engines. To further align the ATCM with the NSPS, ARB staff also proposes to not require after-treatment based Tier 4 standards for new emergency standby engines less than or equal to 50 hp. In addition, ARB staff proposes to delete the ATCM provision that requires sellers and dealers of less than or equal to 50 hp stationary engines to annually report to the ARB the number of engines sold. This data is no longer needed to support ARB's emission inventory program.

Minor Amendments and Clarifications

Section 93115.6 (a)(3) identifies the requirements that sellers and owners/operators must meet to sell and use new stationary emergency standby diesel engines in California. Staff is proposing to delete the reference in this section to Table 1 and replace it with a reference to section 93115.6 (a)(3). This change is necessary to be consistent with the proposed amendments previously mentioned to this section.

Section 93115.10 (e) identifies the monitoring requirements for new or in-use emergency standby diesel engines subject to sections 93115.6, 93115.7, or 93115.8 (a). Section 93115.10 (e)(2) requires all DPFs installed pursuant to the requirements in these sections to install a backpressure monitor. Unfortunately, section 93115.10 (e)(2) did not reference the aforementioned sections. Staff is proposing to include these sections to ensure the applicability of this subpart and installation of backpressure devices only on stationary diesel engines subject to those sections.

Section 93115.10 (g) contains the reporting requirements for stationary emergency standby diesel engines. Staff is proposing to include a requirement to report DRP engine hours of operation. The current ATCM does not include this requirement. The intent of this provision is to clarify that the owner and operator must keep and report these operations as well for each emergency standby diesel engine.

F. Alternatives to the Proposed Amendments

Government Code section 11346.2 requires ARB to consider and evaluate reasonable alternatives to the proposed amendments to the ATCM and provide the reasons for rejecting those alternatives. ARB staff evaluated three alternative strategies to the current proposed amendments. Based on the analysis, none of the alternative strategies were considered to be more effective than the proposed amendments. Implementation of the proposed amendments is necessary to ensure cost-effective and health protective emission reductions from stationary diesel engines. A description of the alternatives considered and staff's rationale for finding them unsuitable follows below.

Alternative 1: Do Not Adopt the Proposed Amendments and Enforce the Existing ATCM

Under this alternative, ARB staff would not propose amendments to the ATCM; rather the existing ATCM would be implemented. This would result in operators of new emergency standby engines having to install after-treatment devices such as DPFs and SCR. As discussed in Chapter II, because the OEMs will not supply an "off-the-shelf" DPF or SCR equipped emergency standby engine to the California market, the end-user will need to purchase a new Tier 2 or 3 gen-set and retrofit that gen-set engine with a DPF and SCR device as necessary to meet the Tier 4i and Tier 4f emissions limits. These systems significantly increase the cost of the engine. The installation of DPF and SCR devices on a stationary engine increases the cost of the engine by approximately

$118 per hp. In addition, there are technical issues in applying SCR devices on emergency standby engines. Because the SCR catalyst takes time to warm up, during routine maintenance and testing runs, the SCR will not reduce NOx emissions.

The cost-effectiveness for requiring both a SCR system and DPF is very high. This is because the costs for the devices are very high and the emissions benefits are very small due to the fact that emergency standby engines operate, on average, about 31 hours per year. As shown in Table II-3 in Chapter II, the average cost-effectiveness for PM reductions from the DPF is about $530 to $550 per pound of PM. The cost-effectiveness range for the NOx reductions from the SCR system is $54 to $90 per pound of NOx. These cost-effectiveness values are much higher than any regulation previously adopted by the ARB.

This option was rejected due to the high cost-effectiveness, technical issues associated with SCR systems on emergency standby engines, and the unwillingness of the engine manufacturers to provide a viable product to the market.

Alternative 2: Require Retrofit of a New Tier 2 or 3 Engine with an Aftermarket DPF

Another alternative considered is to require an operator to purchase a new Tier 2 or 3 engine that meets a 0.15 g/bhp-hr PM emissions standard and to retrofit that new engine with an aftermarket DPF to meet a diesel PM emission rate of about 0.01 g/bhp-hr. This would retain the PM benefits of the current ATCM. However this alternative would result in foregoing about 0.33 T/D and 0.78 T/D NOx reductions in 2015 and 2020, respectively.

This alternative is less costly than Alternative 1, but it is still very high. As discussed in Chapter II, it will cost end users approximately $38 per hp to add on a DPF device to their emergency standby engines. Because of the low number of annual hours an emergency standby engine operates, the PM cost-effectiveness is still very high. As presented in Table II-3 in Chapter II, the cost-effectiveness to $550 per pound of diesel PM reduced. Due to the high cost-effectiveness, ARB staff rejected Alternative 2 from consideration.

Alternative 3: Require the OEMs to Provide Tier 4i Engines for the California Market

The third alternative considered was to require the OEMs to provide Tier 4i certified engines for the California marketplace. Under the Tier 4i standards, engines greater than 75 hp would require a DPF and some level of NOX control. For the very large horsepower engines, those greater than 750 hp, SCR would most likely be required to achieve the NOx emissions standards. For engines less than 750 hp, other NOx controls will be applied such as exhaust gas recirculation (EGR). With this alternative the diesel PM emission reductions from the current ATCM would be preserved, but there would be a decrease in the expected NOx emissions reductions.

Under this alternative, the costs of a gen-set would increase significantly relative to a Tier 2 or Tier 3 engine. As shown in Table II-2 the costs for a gen-set could increase by over 50 to 105% depending on the horsepower of the engine. This is due to the costs that the OEM would incur if required to provide a Tier 4i emergency standby engine platform for California. However, manufacturers have stated that it is not economically viable for them to provide an emergency standby engine to meet the Tier 4 interim standard just for California.

This option was rejected due to the high costs and the unwillingness of the engine manufacturers to provide Tier 4i emergency standby engines for the California market. In addition, this approach would not be consistent with the overall goal of ARB and U.S. EPA to harmonize on-road and off-road emission standards for new engines.

IV. EMISSIONS AND ENVIRONMENTAL IMPACTS FROM PROPOSED AMENDMENTS

In this chapter, ARB staff describes the potential environmental impacts of the proposed amendments to the ATCM including a brief overview of the emissions from stationary engines and the impacts of the proposed amendments on the projected emissions of stationary diesel engines and the State Implementation Plan (SIP). In addition, the potential public health impacts are also discussed.

A. Legal Requirements

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential environmental impacts of proposed regulations. Because ARB's program involving the adoption of regulations has been certified by the Secretary of Resources pursuant to Public Resources Code section 21080.5, the CEQA environmental analysis requirements may be included in the Initial Statement of Reasons (ISOR) for this rulemaking. In the ISOR, ARB must include a “functionally equivalent” document, rather than adhering to the format described in CEQA of an Initial Study, a Negative Declaration, and an Environmental Impact Report. In addition, staff will respond, in the Final Statement of Reasons for the proposed amendments to the ATCM, to all significant environmental issues raised by the public during the public review period or at the Board public hearing.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following:

- an analysis of reasonably foreseeable environmental impacts of the methods of compliance;
- an analysis of reasonably foreseeable feasible mitigation measures; and
- an analysis of reasonably foreseeable alternative means of compliance with the proposed amendments to the ATCM.

Regarding reasonably foreseeable mitigation measures, CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts described in the environmental analysis.

The ATCM reduces the risk from exposures to diesel PM as required by Health and Safety Code (H&SC) section 39666 and to fulfill the goals of the Diesel Risk Reduction Plan. (ARB, 2000) The proposed amendments to the ATCM reduce the cost of complying with the ATCM while still ensuring the emissions and risks from stationary diesel engines are mitigated.

B. Methodology for Estimating Emissions

To estimate the emissions from stationary diesel engines, ARB staff relied upon the methodology and the emission inventory developed during the initial rulemaking for the ATCM. (ARB, 2003) However, this inventory for stationary engines (2003 ISOR Inventory) was updated and corrected in three ways. First, the emission factors were updated to the current version used in the ARB's OFFROAD model. Second, revised fuel correction factors were incorporated and third, a growth adjustment for the recent economic recession was included. The updated inventory, referred to as the "2010 Inventory Update," was then used to determine the emissions impacts of the proposed amendments. The updated inventory and emissions model, Stationary Commercial Engine Emission Model, is posted on ARB's website at www.arb.ca.gov/diesel/statport.htm. (ARB, 2010b) Below we briefly describe the emission inventory adjustments and present a comparison of the 2003 ISOR Inventory and the 2010 Inventory Update.

Emission Factors

The 2003 ISOR Inventory was revised to include the July 24, 2006 update to large compression-ignited engine emission factors used in the OFFROAD model. (ARB, 2006) The 2003 ISOR Inventory used emission factors generated based on the emission standards for engines with an additional assumption that 50 percent of new engines brought into service would be new and 50 percent would be used. In the updated inventory, these emission factors were replaced with the appropriate new emission factors from the OFFROAD model. Also, the OFFROAD emission factors incorporate improved Tier 4 emission factors which should more accurately reflect actual Tier 4 engine emissions.

Revised Final Corrected Factors

The 2003 ISOR Inventory was also updated using the fuel correction factors released on July 25, 2005. (ARB, 2005) The fuel correction factors contained in the OFFROAD model are dimensionless multipliers applied to the basic exhaust emissions rates that account for differences in the properties of certification fuels compared to those of commercially dispensed fuels. The purpose for the 2005 fuel correction factor update was to align the factors more closely to those used for on-road emission estimates produced by ARB's Emission Factor (EMFAC) model.

Recession Adjustment

The effects of the recent economic recession were incorporated into the 2010 Inventory Update. The adjustment was based on forecasted non-agricultural employment obtained from the University of California at Los Angeles - Anderson Forecast for the Nation and California, June, 2010. (UCLA, 2010) Non-agricultural employment was chosen because ARB staff believes it to be the best surrogate for the population of stationary commercial engines. In a recession, not only are new engines not purchased because of lack of growth and less construction, but existing engines belonging to entities that have gone out of business are taken out of the engine fleet. Non-agricultural employment should be a reasonably good surrogate to cover both of these possibilities.

Three recession recovery scenarios were estimated: 1) a fast recovery, in which the bottom of the recession occurs in 2009 and full recovery from the recession occurs in 2017; 2) a slow recovery, in which the full recovery from the recession never occurs and the old growth rate resumes in 2010; and 3) a medium recovery recession scenario averaging the fast and slow scenarios. The latter (third) scenario was used to adjust projected emissions, with a net recession impact of 8 percent reductions in 2010 emissions, 5 percent in 2015, and 4 percent in 2020.

Table IV-1 summarizes the estimated engine population for prime and emergency standby engines for the years 2010, 2015, and 2020. The estimated total population of stationary non-agricultural engines is expected to increase by about 18 percent between 2010 and 2020.

Table IV-1: Projected Population of Stationary Diesel Engines[1]

Population			
Year	**Prime**	**Standby**	**Total**
2010	1084	20,683	**21,767**
2015	1072	22,607	**23,679**
2020	1044	24,578	**25,622**

1. Population estimate based on the medium economic recovery scenario.

Table IV-2 summarizes the total statewide emissions originally estimated with the 2003 ISOR Inventory and the 2010 Inventory Update. Relative to the 2003 ISOR inventory, in the 2010 Inventory Update, NOx emissions increase by about 15 percent, and PM10 emissions decrease about 30 percent for 2020. The emissions are for stationary diesel engines used in non-agricultural applications. As a reminder, the 2010 Inventory Update reflects the medium recovery recession scenario as discussed above.

Table IV-2: Stationary Diesel Emissions Inventory Comparison: 2003 ISOR Inventory vs. 2010 Inventory Update (tons per day)

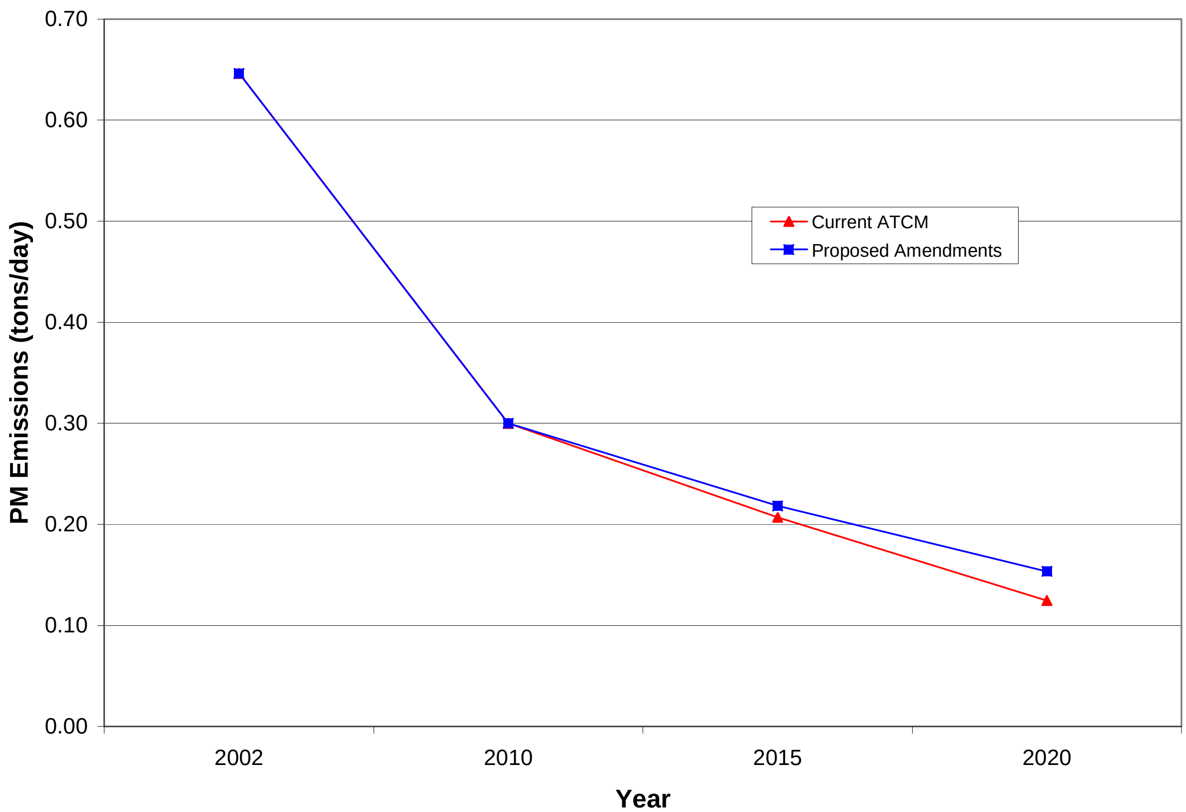
		NO_x	PM_{10}	CO	ROG
2003 ISOR Inventory	**2010**	13.2	0.35	3.0	0.8
	2015	9.0	0.21	2.7	0.6
	2020	5.4	0.17	2.4	0.5
2010 Inventory Update	**2010**	10.9	0.30	2.9	0.7
	2015	8.4	0.21	2.4	0.5
	2020	6.2	0.12	2.3	0.4

C. Emission Impacts of the Proposed Amendments

As shown in Figure IV-1 and Table IV-3 below, with the proposed amendments, the PM emissions from stationary diesel engines are expected to continue to decline over the next decade.[12] However, the amendments will result in a small loss of projected diesel PM emission reductions of about 0.01 tons per day (T/D) in 2015 and 0.03 T/D in 2020 as compared to the current ATCM. We do not expect this small change in emissions to have a significant impact on projected regional PM emissions. These foregone emission reductions are about one hundredth of one percent (0.01%) of the total Statewide diesel PM emissions in 2015 and four hundredths of one percent (0.04%) in 2020.

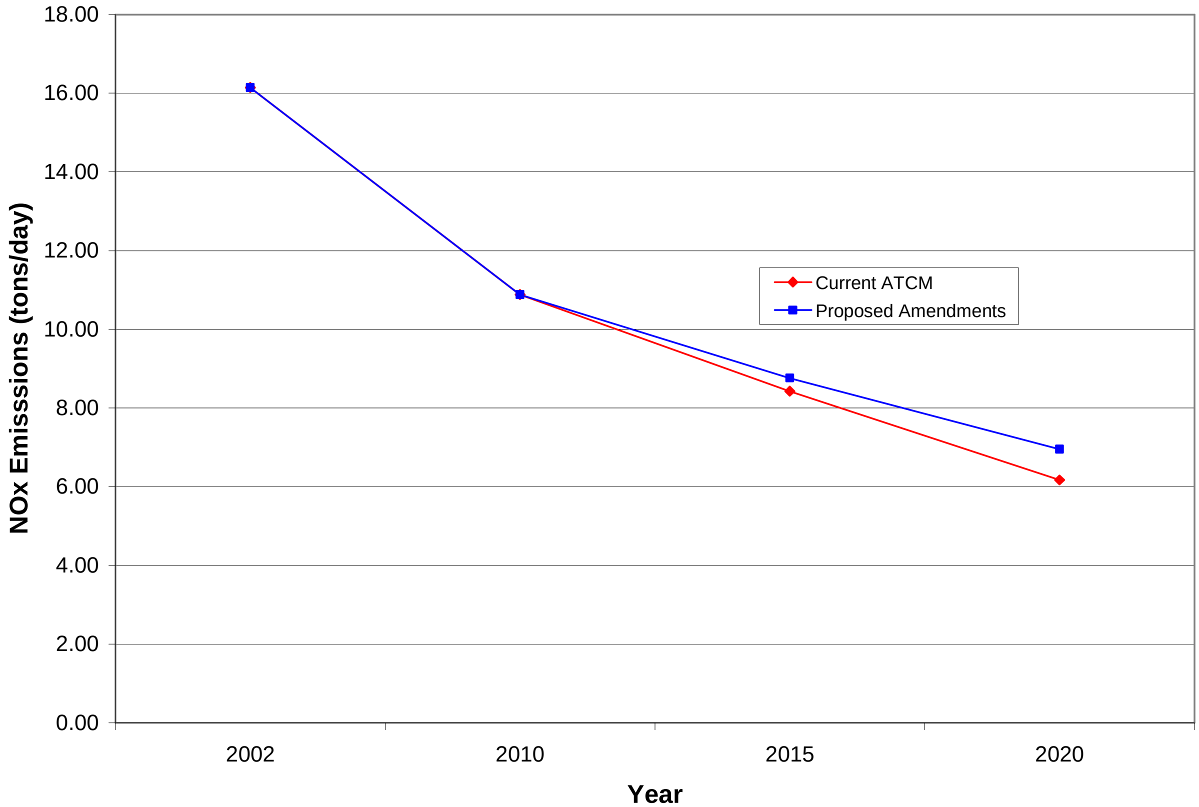
[12] In Figure IV-1 and Table IV-3, the emissions represent the combined totals for both prime and emergency standby engines. Of this total, emergency standby engines comprise about 40 percent of the emissions in 2010.

Figure IV-1: Comparison of Statewide Stationary Non-Agricultural Engine Diesel PM Emissions with the Current ATCM and the Proposed Amendments



The proposed amendments will also impact the projected emissions of NOx from stationary diesel engines. While the primary focus of the ATCM is to reduce diesel PM, by linking the emissions standards for new engines to the off-road engine standards, there are some ancillary NOx reductions. Foregoing Tier 4 engines for new emergency standby engines will result in fewer NOx reductions in future years. Figure IV-2, provides a graphic of the projected NOx emissions with the current ATCM emissions standards and with the proposed amendments. In 2015, we forego projected NOx emissions of 0.4 T/D and 0.8 T/D in 2020. This translates into about one hundredth of one percent (0.01%) of total Statewide emissions of NOx and three hundredths of one percent (0.03%) in 2020.

Figure IV-2: Comparison of Statewide Stationary Non-Agricultural Engine Diesel NOx Emissions with the Current ATCM and the Proposed Amendments



The emissions impacts presented graphically in Figures IV-1 and IV-2 above are also provided in Table IV-3 below.

Table IV-3: Projected Stationary Non-Agricultural Diesel Engine Emissions with Implementation of the Proposed Amendments (tons per day)

		NO_x	PM_{10}	CO	ROG
2010 Inventory Update	**2010**	10.9	0.30	2.9	0.7
	2015	8.4	0.21	2.4	0.5
	2020	6.2	0.12	2.3	0.4
2010 Inventory Update with Proposed Amendments	**2010**	10.9	0.30	2.9	0.7
	2015	8.8	0.22	2.4	0.5
	2020	7.0	0.15	2.3	0.5

With the proposed amendments, the ATCM will continue to ensure that the cancer risks from emergency standby engines are minimized. In most all cases, the diesel PM emissions from an emergency standby engine with a diesel PM emission rate of

0.15 g/bhp-hr results in potential cancer risks being below 10 chances in a million for people living close to a facility with emergency standby engines. In those rare cases that a new emergency standby engine has a potential cancer risk greater than 10 chances in a million, the ATCM will continue to have a provision that allows a district to establish more stringent emission standards and operating requirements where necessary to protect public health.

In addition, there are other programs implemented by the districts, such as New Source Review and the Air Toxics "Hot Spots" Program (AB 2588), that work in concert with the ATCM to ensure the emissions and public health risk from stationary engines are adequately mitigated. Like the ATCM, these programs allow districts to address the emissions and risks from diesel engines on a site-specific basis taking into consideration environmental justice programs and any unique circumstances that may require additional controls

D. State Implementation Plan Impacts

The proposed revision will have minor impacts on the State Implementation Plan (SIP) that can be addressed in future plans submitted pursuant to federal Clean Air Act (CAA) planning requirements for nonattainment areas. The emission reductions that would be foregone as a result of this proposal are in all cases a very small portion of the local inventory, and there is no need to identify a specific source of new emission reductions that would compensate for the foregone reductions at this time. If the Board adopts this proposed revision, the impact would be reflected in inventories prepared for future ozone and PM 2.5 attainment demonstration plans, and if necessary, mitigated in the control strategies adopted as part of those plans. Below, ARB staff summarizes the analysis of the impacts of the proposed amendments on the SIP.

The emission inventories used in the most recent ozone and PM 2.5 attainment demonstration plans submitted to U.S. EPA assume the full implementation of the Stationary Diesel Engine ATCM as adopted in 2004. The 2007 SIP update included PM 2.5 attainment demonstration plans for the South Coast and San Joaquin Valley, and 8-hour ozone attainment demonstration plans for the South Coast, San Joaquin, and six other areas in California. Most of the sources that would be affected by the proposed amendments are located in the South Coast and San Joaquin Valley. The ATCM reductions of ROG and PM 2.5 that would be foregone if the Board adopts the proposed amendments make up a less than one hundredth of one percent of each area’s total baseline inventory for the ozone and PM 2.5 attainment years (2023 and 2014, respectively), as show below in Table IV-4. Similarly, the foregone NOx reductions would compromise less than one-tenth of one percent of NOx emissions in those years. The foregone reductions for the South Coast and the San Joaquin Valley represent approximately half of the potential foregone emission reductions statewide, as an estimated 42 percent of the foregone reductions statewide would occur in the South Coast, and about 10 percent would occur in the San Joaquin Valley. Note that the following table shows emissions as tons per day, the metric used in the SIP calculations. The ARB SIP legal commitment remains unchanged.

Table IV-4: Foregone Emission Reductions Compared to SIP Emissions Inventories for the South Coast and San Joaquin Valley Air Basins (tons per day)

	NOx		ROG		PM2.5
	2014	2023	2014	2023	2014
South Coast Air Basin					
Baseline inventory	650	505	566	534	98
SIP reduction commitments	194	391	57	74	10
Foregone emission reductions	0.1	0.4	<0.01	0.02	<0.01
Percent Loss	<0.01%	<0.1%	<0.001%	<0.01%	<0.01%
San Joaquin Valley Air Basin					
Baseline inventory	420	295	405	410	109
SIP reduction commitments	76	46	23	24	5
Foregone emission reductions	<0.1	0.1	<0.001	<0.01	<0.001
Percent Loss	<0.01%	<0.1%	<0.001%	0.001%	0.001%

E. Reasonably Foreseeable Environmental Impacts as a Result of Potential Compliance Methods

When the ATCM was originally adopted, ARB staff evaluated the reasonably foreseeable environmental impacts associated with compliance with the ATCM. (ARB, 2003) At that time, ARB staff identified and evaluated potential environmental impacts associated with the application of after-treatment controls on stationary diesel engines. Based on the analysis, ARB staff concluded that there were potential adverse environmental impacts from the use of diesel oxidation catalysts and DPFs but that options were available to mitigate these potential adverse impacts. Because the proposed amendments to the ATCM remove the emission limitations that would have resulted in the application of after-treatment controls on new emergency standby engines, ARB staff expects a positive environmental impact on the environment since after-treatment controls will no longer be required for new emergency standby engines.

However, as noted above in section C., the proposed amendments will result in a small loss in projected diesel PM and NOx emission reductions in future years. The magnitude of potential emission increases is very small when compared to the statewide emissions of these pollutants from all sources. Nevertheless, this loss of anticipated future emissions reduction could still constitute an adverse environmental impact.

F. Reasonably Foreseeable Mitigation Measures

CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts. Staff evaluated a number of alternatives to the proposed amendments (see Chapter III). However, staff was not able to identify any feasible alternatives or mitigation measures that would achieve cost-effective emission reductions and, at the same time, substantially reduce the potential adverse impacts of the proposed amendments. As discussed above under "D. State Implementation Plan Impacts," the small emissions increases will be reflected in inventories prepared for future ozone and PM 2.5 attainment demonstration plans, and if necessary, mitigated in the control strategies adopted as part of those plans.

G. Reasonably Foreseeable Alternative Means of Compliance with the Proposed Amendments

Alternatives to the proposed amendments to the ATCM are discussed in Chapter III of this report. ARB staff has concluded that the proposed amendments to the ATCM provides the most effective and least burdensome approach to reducing exposures to diesel PM and other air pollutants emitted from diesel-fueled stationary engines and at the same time ensuring that the action is technically and economically feasible.

V. ECONOMIC IMPACTS OF THE PROPOSED AMENDMENTS

In this chapter, ARB staff discusses the legal requirements that must be satisfied in analyzing the economic impacts of the proposed amendments to the Stationary Diesel Engine ATCM and the methodology used to estimate cost impacts. A discussion on the economic impacts anticipated from the proposed amendments is also provided.

A. Summary

ARB staff does not expect any adverse economic impacts associated with the proposed amendments. Rather, the proposed amendments will result in future cost savings to any businesses or public entities that will be purchasing new emergency standby engines.

ARB staff estimates the total economic impact from the proposed amendments to the ATCM to affected private businesses and public agencies would be a cost savings of about $460 million between 2010 and 2020 or about $46 million annually. Of this, private businesses and public agencies are each expected to realize cost savings of about $23 million annually. These cost savings are primarily due to the alignment of the ATCM emissions standards for new emergency standby engines with those in the NSPS, which do not require after-treatment emission standards. Foregoing the application of after-treatment technologies such as DPF and SCR, results in significant capital cost savings, about $118 per hp. As an example, this translates into a cost savings of $71,000 for a typical 600 hp emergency standby engine.

B. Legal Requirements

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete with businesses in other states.

Also, State agencies are required to estimate the costs or savings to any state or local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any non-discretionary costs or savings to local agencies and the cost or savings in federal funding to the State.

Finally, H&SC section 57005 requires ARB to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding ten million dollars in any single year. Because the estimated cost of the amendments does not exceed ten million dollars in a single year, the proposed amendments do not constitute a major regulation.

C. Methodology for Estimating Costs

In this section, ARB staff describes the methodology used to estimate the economic impacts from the proposed amendments.

The proposed amendments are designed to closely align the emission standards for new emergency standby engines with the federal NSPS emission standards. This will result in the installation of new Tier 2 or Tier 3 emergency standby engines produced by the original equipment manufacturer (OEM) instead of having after-treatment controls (DPF and SCR) retrofitted after purchase by a non-OEM provider. This will result in cost-savings to the end-user.

To estimate the cost savings, ARB staff determined the cost for the end-user to retrofit a new Tier 2 or Tier 3 engine with DPF and SCR devices. ARB staff believes this is the most appropriate comparison as the OEMs have indicated that they will not provide Tier 4 engines to support a "California only" requirement for Tier 4 emergency standby engines (see Chapter II and Appendix B). The total cost savings were then determined by multiplying the retrofit costs per hp by the average horsepower within three defined horsepower ranges times the number of new emergency standby engines expected to come into service within each horsepower range between 2010 and 2020. That is:

$$\text{Total \$ Savings} = \Sigma_h (HP \times N \times C) \qquad (1)$$

Where

h = one of three horsepower ranges (50 hp to 174 hp; 175 hp to 749 hp; 750 hp and above)
HP = average horsepower within each horsepower range
N = number of new engines within a defined horsepower range coming into service between 2010 and 2020, and
C = cost, in dollars per horsepower, to retrofit one engine with a SCR and DPF

The number of new engines expected to come into service was estimated from the projected emissions inventory assuming the medium economic recovery scenario. As shown in Table V-1, it is anticipated that about 600 to 700 new emergency standby engines greater than 50 hp will be put into service each year between 2010 and 2020. Of these engines, about 45 percent are new engines replacing existing engines and 55 percent are new construction. The total number of new engines expected to come into service between 2010 and 2020 is about 7,200 engines. The number of new engines expected within each horsepower range is provided in Table V-1.

Table V-1: Projected New Non-Agricultural Emergency Standby Diesel Engine Population

Engine HP Range	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
50-174	196	200	203	207	211	214	218	222	226	229	233	2,359
175-750	276	281	287	292	297	302	307	313	318	323	328	3,324
>750	128	130	132	135	137	140	142	144	147	149	152	1,536
Standbys Total	600	611	622	633	645	656	667	679	690	702	713	7,218

As discussed in Chapter II and Appendix B of this report, the costs for the end user to retrofit an engine with a DPF and SCR are estimated to be about $118 per horsepower. These costs are summarized in Table V-2 below. The capital costs to install a DPF are estimated to be about $38 per horsepower. This includes both the equipment costs and installation costs. The equipment cost for an end user or after-market retrofit of a SCR system is approximately $80 per hp. As noted in Chapter II and Appendix B, SCR manufacturers indicated that installation costs could increase the capital cost by 50 percent to 150 percent. Thus, the SCR cost assessed for the economic analysis is conservative to the actual capital cost to install an SCR system on an engine.

Table V-2: Estimated Cost for End User Retrofit of SCR and DPF Control Technologies

Technology	Cost ($/hp)	Comments
DPF	$38	Includes the capital cost of equipment and installation.
SCR	$80	Only capital cost of equipment is included in the cost estimate. Does not include the cost of installation.
Total	$118	

D. Economic Impacts of the Proposed Amendments

In this section, ARB staff describes the economic impacts from the estimated cost savings resulting from the proposed amendments to the ATCM, including the impacts on private businesses and public agencies.

<u>Total Industry Cost Savings and Total Annual Cost Savings</u>

As shown in Table V-1 above, between 2010 and 2020 it is anticipated that about 7,200 new emergency standby engines will be brought into service. Using the methodology outlined in section C. of this chapter, ARB staff estimates that the proposed amendments will result in a total cost savings of approximately $460 million between 2010 and 2020. Annually this equates to about $46 million in savings to private and public agencies.

Table V-3: Projected Cumulative Statewide 2010 to 2020 Cost Savings

HP Range	Average Engine Size (HP)	Number of New Engines	Cost ($/HP)	Total Cost Savings
50-174	112	2,359	$118	$30 million
175-749	462	3,324	$118	$180 million
>750	1,375	1,536	$118	$250 million
Total	N/A	7,218	$118	$460 million

<u>Potential Additional Cost Savings</u>

The cost savings estimated above are likely to be greater than estimated. This is because there will also be savings in SCR and DPF maintenance, installation costs for SCR systems, urea for SCR operation, and various other retrofit costs that were not taken into account. Because these costs vary widely with each individual installation it was not feasible to quantify these additional cost savings.

<u>Estimated Cost to Business</u>

Businesses will realize future cost savings from the proposed amendments. Based on a survey conducted previously in support of the original ATCM adoption, the average emergency standby engine size was 600 horsepower. (ARB, 2003) For an operator purchasing a new 600 hp emergency standby engine, the proposed amendments result in a cost savings of about $71,000. The survey also revealed that a typical business had two to three engines with a hp rating of 700 hp. For this typical business, there would be a cost savings of about $207,000 due to the proposed amendments. The average small business that has a diesel emergency standby engine owns one to two engines with an average hp of 500. The owner would save about $89,000 when the engines were replaced. Overall, the proposed amendments to the ATCM will create a cost savings for any business purchasing a new emergency standby engine. Therefore, the proposed amendments will have no additional costs to businesses.

As noted in Chapter III, the proposed amendments make minor changes in the ATCM reporting requirements by having owners and operators annually provide copies of data on DRP engines and operation to the Executive Officer and the district. Since these records are already required to be kept, the amendments will essentially require the operator to provide a copy to the ARB and the district. The costs associated with this transmittal should be very minor.

<u>Potential Business Impacts</u>

The proposed amendments will result in cost savings for any business purchasing a new emergency engine. Based on the survey noted above, private business account for approximately 50 percent of the total emergency standby engine population. Based on this percentage, ARB staff estimates that private businesses will save approximately $23 million annually between 2010 and 2020. These cost savings from the proposed amendments, if invested in productive assets, could result in the creation and expansion of businesses.

Because the proposed amendment to the ATCM will create a cost savings for any business purchasing a new emergency engine, ARB staff believes the proposed amendments will have no adverse impact on business competiveness, employment, business creation, elimination, or expansion. The proposed regulatory action may result in the creation of jobs or businesses, or expansion of businesses if the cost savings are invested in productive assets other than Tier 4 engines.

In addition, the proposed amendments to the ATCM will not adversely affect small businesses because the proposed amendments create a net savings. Based on a survey conducted previously in support of the adoption of the original ATCM, a typical small business owns approximately one to two emergency standby engines of about 500 horsepower. (ARB, 2003) When these engines are replaced, the average cost savings (assuming $118/hp for an SCR and DPF) will be approximately $89,000 per company.

Estimated Cost to Federal, State, and Local Governments

Public entities use approximately half of the stationary engines throughout the State. The federal, State, and local governments use 18 percent, 4 percent, and 27 percent, respectively, of the entire emergency standby engine population according to the 2004 staff report. This equates to approximately 125, 30, and 200 new engines per year, respectively. When the older emergency standby engines are replaced or new ones purchased, the federal government will save approximately $8 million per year from the proposed amendments. The State government will save approximately $2 million per year and local government will save approximately $13 million per year.

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