



REGULATORY SUMMARY California Air Toxic Control Measures for Diesel-Fueled Engines

This document was prepared by NASA's Principal Center for Regulatory Risk Analysis and Communication (RRAC PC). An archive of RRAC PC regulatory information may be accessed on the website at <http://www.rracpc.org>. If you have questions or need further assistance with this matter, please contact Sharon Scroggins/MSFC (256-544-7932, sharon.scroggins@nasa.gov).

Introduction

In 1998, the California Air Resource Board (CARB) identified diesel particulate matter (PM) as a toxic air contaminant (TAC). To reduce public exposure to diesel PM, in 2000, the Board approved the [Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles](#) (Risk Reduction Plan). Integral to this plan is the implementation of control measures to reduce diesel PM. To date, the CARB has established several air toxic control measures (ATCMs) affecting diesel engines. Highlighted in this summary are the ATCMs on stationary engines, portable engines, and off-road engines.

Portable Engines

The [portable diesel engine ATCM](#) became effective on 12 September 2007. The ATCM for diesel-fueled portable engines affects all engines that are 50 horsepower (hp) and larger. Portable engines are those that may be mounted on wheels, skids, carrying handles, dollies, trailers, or platforms. Included are engines that are registered under the CARB's Portable Equipment Registration Program (PERP), engines that are permitted by the air districts, and engines that historically have been exempt from district permits. The ATCM requires all portable engines to be certified to Tier 1, 2, or 3 U.S. Environmental Protection Agency (EPA)/CARB off-road engines standards by 2010. After 2010, all fleets of portable engines are required to meet diesel PM emission averages that become more stringent in 2013, 2017, and 2020. The PM emissions averages are provided in Exhibit 1.

EXHIBIT 1

Portable Diesel Engine ATCM Emission Averages

Fleet Standard Compliance Date	Engines Less Than 175 hp (g/bhp-hr)	Engines Greater Than or Equal to 175 hp (g/bhp-hr)	Engines Greater Than or Equal to 750 hp (g/bhp-hr)
01/01/2013	0.3	0.15	0.25
01/01/2017	0.18	0.08	0.08
01/01/2020	0.04	0.02	0.02

Owners of portable engine fleets will determine compliance with the proposed fleet standard by comparing the fleet's actual weighted diesel PM emission rate with the fleet emission standard. Owners and operators of fleets will have flexibility in determining how the fleet emission

standards are to be satisfied including operating cleaner engines, replacing engines, using add-on control devices, switching to alternative diesel fuels or alternative fuels, and receiving credit for electrification.

Portable engines can be exempt if equipped as of 1 January 2004 with a properly operating selective catalytic reduction (SCR) system, as determined by periodic source tests. Engines used exclusively in emergency applications or used less than 80 hours per year (“low-use”) are exempt from the 2013 and 2017 fleet average requirements. These engines also may be exempt from the 2010 replacement requirement if the owners commit to buying ultraclean (Tier 4) engines by 2015.

There are incentives and credits associated with the ATCM for diesel-fueled portable engines. One incentive allows credit toward satisfying a fleet standard by adding alternative fueled engines to the fleet. To obtain the credit, the engines must operate at least 100 hours annually. The proposed ATCM also allows credit for applications where grid power is used in lieu of a diesel fuel. The credit is granted where more than 200 hours of grid power are used for a given project and the necessary record-keeping and reporting requirements are satisfied. There is also a credit to encourage the purchase of proposed Tier 4 engines, which will be available in the 2011 to 2014 timeframe, when fleet owners purchase Tier 4 engines prior to 1 January 2015. In these cases, the owner can count the Tier 4 engine twice in the calculations for the fleet-weighted diesel PM emission rates for compliance with the 2013 and 2017 diesel PM standards.

The following portable engines are not subject to this ATCM:

- Any engine used to propel mobile equipment or a motor vehicle of any kind
- Any portable engine using an alternative fuel
- Dual-fuel diesel pilot engines that use an alternative fuel or an alternative diesel fuel
- Tactical support equipment
- Portable diesel-fueled engines operated at airports that satisfy the following requirements: the equipment is subject to the South Coast Ground Service Equipment Memorandum of Understanding (MOU); and the participating airlines have demonstrated to the satisfaction of the Executive Officer that the diesel PM reductions achieved by satisfying the requirements of the MOU are equivalent to the reductions achieved by this control measure

Stationary Diesel Engines

The [ATCM for stationary diesel engines](#) includes PM limits for engines based on their size, date of installation, and permitting, and whether the generator is used for emergency standby purposes or prime use. The PM standards for the stationary diesel engine ATCM are outlined in Exhibit 2. The more stringent of the requirements must be achieved.

EXHIBIT 2

Stationary Diesel Engine ATCM Emission Standards

New Stationary Diesel Engines > 50 HP (Installed and permitted on or after 1 January 2005)	
Emergency Standby Generators	Prime
The more stringent of: • Diesel PM limit of < 0.15 g/bhp-hr, or • Off-Road Engine Certification Standard for an off-road engine of the same horsepower rating; and • < 50 hours per year for non-emergency operation. OR The more stringent of: • Diesel PM limit of < 0.01 g/bhp-hr, or • Off-Road Engine Certification Standard for an off-road engine of the same horsepower rating; and • 51 to 100 hours per year for non-emergency operation (upon District approval)	The more stringent of: • Diesel PM limit of < 0.01 g/bhp-hr; or • Off-Road Engine Certification Standard for an off-road engine of the same horsepower rating
In-Use Stationary Diesel Engines > 50 HP (Installed or permitted prior to 1 January 2005)	
Emergency Standby Generators	Prime
• Emergency use: not limited by ATCM • Non-emergency use: - < 20 hours/year: Not limited by the ATCM; - 21 to 30 hours/year: Diesel PM limit of < 0.40 g/bhp-hr; - 31 to 50 hours/year: District approval and Diesel PM limit of < 0.15 g/bhp-hr; - 51 to 100 hours/year: District approval and Diesel PM limit of < 0.01 g/bhp-hr.	• Diesel PM limit of < 0.01 g/bhp-hr; or • Reduce Diesel PM emissions by 85%; or • Reduce Diesel PM emissions by 30% by January 1, 2006, and meet Diesel PM limit of 0.01 g/bhp-hr limit in 2011.
New Stationary Diesel Engines < 50 HP	
Emergency Standby Generators	Prime
New stationary diesel engines less than or equal to 50 horsepower must meet the current Off- Road Engine Certification Standard for an off-road engine of the same horsepower rating.	

The compliance schedule for in-use emergency standby and prime use engines is outlined in Exhibit 3.

EXHIBIT 3

Stationary Diesel Engine ATCM Compliance Dates

	Owns 3 or Fewer Engines	Owns 4 or More Engines¹
Pre-1990 Manufacture Year (MY)	01/01/2006	50% 1/1/07 75% 1/1/08 100% 1/1/09
1990 to 1996 MY	01/01/2007	30% 1/1/07 60% 1/1/08 100% 1/1/09
1996+ MY	01/01/2008	50% 1/1/08 100% 1/1/09
Note: ¹ Minimum percentage of engines required to comply by specified dates		

In addition to diesel PM emission standards and operating requirements, the ATCM establishes emission standards for hydrocarbons (HC), nitrogen oxides (NO_x), non-methane hydrocarbons and NO_x (NMHC+NO_x), and carbon monoxide (CO).

The ATCM also requires the use of clean fuels. As of 1 January 2006, all new and in-use stationary diesel engines will be required to use CARB diesel fuel, alternative diesel fuels, and/or alternate fuels such as compressed natural gas (CNG). Alternative diesel fuels and CARB diesel fuel additives are allowed, provided they meet the requirements of the Verification Procedure.

In addition, the ATCM establishes record-keeping, reporting, and monitoring requirements; emissions data requirements; and test method requirements.

In-use Off-road Equipment

On 26 July 2007, CARB adopted an [ATCM](#) to reduce diesel PM and NO_x emissions from in-use (existing) off-road heavy-duty diesel vehicles in California used in construction and other industrial operations. The ATCM applies to any person, business, or government agency that owns or operates diesel-powered off-road vehicles in California with engines with maximum power of 25 hp or greater. The ATCM applies to self-propelled, diesel-fueled vehicles that cannot be registered and licensed to drive on-road. Examples of equipment at NASA Centers affected by this ATCM include loaders, crawler tractors, backhoes, forklifts, and airstrip ground support equipment. The ATCM requires fleets to install exhaust pollution control retrofits that capture pollutants before they are emitted to the air, and to accelerate turnover of fleets to newer, cleaner engines.

The ATCM establishes fleet average emission rates for PM and NO_x that decline over time. Each year, the ATCM requires each fleet to meet the fleet average emission rate targets for PM or to apply the highest level verified diesel emission control system to 20 percent of its horsepower. In addition, large fleets are required each year to meet the fleet average emission rate targets for NO_x or to turn over a certain percent of their horsepower (8 percent in early years, and 10 percent in later years). "Turnover" means repowering with a cleaner engine, retiring a vehicle, replacing a vehicle with a new or used piece, or designating a dirty vehicle as a low-use vehicle. If retrofits that reduce NO_x emissions become available, they may be used in lieu of turnover as long as they achieve the same emission benefits.

A large fleet is defined as a fleet with a total maximum power greater than 5,000 hp. The regulation requires all vehicles owned by federal agencies to meet the large fleet requirements under the ATCM.

The ATCM also includes the Surplus Off-Road Opt-in for NO_x (SOON) program. Local air districts may opt into the SOON program to reduce NO_x emissions beyond what is required by the ATCM. Larger fleets that operate vehicles in districts participating in the SOON program will be required to apply for incentive money. If incentive money is granted, these fleets must take additional actions to reduce NO_x emissions.

Initial reporting under the ATCM is due for large fleets on 1 April 2009 based on the engines in their fleets as of 1 March 2009. The initial reports must include the owner contact information and a vehicle list that includes the following:

- Vehicle type
- Vehicle manufacturer
- Vehicle model
- Vehicle model year
- Whether the vehicle is:
 - A low-use vehicle
 - A specialty vehicle
 - A dedicated emergency vehicle
 - A dedicated snow removal vehicle
 - Used for agricultural operations for over half of its annual operating hours
 - An electric vehicle that replaced a diesel vehicle
 - One that the owner intends to retire within one year
- For each engine that propels the vehicle, the engine manufacturer, engine family (if any), engine serial number, engine model year, engine maximum power, type of retrofit emission control equipment installed (if any), date installed, and its verification level

All fleets are subject to annual reporting and a compliance certification, as well.

Early Action Can Cut Spending

Early action toward achieving compliance with this ATCM can reduce or distribute compliance costs. The CARB estimates that it is likely fleets will have higher annual costs in the first few years after a fleet's initial compliance date, and the costs will decrease in later years. Certain actions taken by fleets before their initial compliance date will allow them to accrue (bank) carryover retrofit credit, which they can use later to avoid being required to retrofit. The early actions that fleets can use to obtain credits include retrofitting an engine with CARB-verified diesel emission control strategy (VDECS), repowering with a cleaner engine, and retiring a vehicle.

Under the ATCM, fleets must meet diesel PM fleet averages, or must apply the highest level VDECS to 20 percent of their horsepower per year. When a highest-level VDECS is installed onto an engine in any fleet size before 1 March 2009, the fleet will receive carryover retrofit credit equal to double the horsepower of the engine on which the highest-level VDECS is installed. After 1 March 2009, the fleet will receive carryover retrofit credit equal to the horsepower of the engine on which the highest-level VDECS is installed.

For most, the highest-level VDECSs are diesel particulate filters (DPFs). DPFs are exhaust after-treatment devices that reduce diesel PM emissions. The CARB has provided a list of available [VDECSs](#) on their website, along with a partial list of [diesel-emission retrofit device suppliers and installers](#). The CARB also has published a summary of the various [emission standard tiers](#). Employing a newer engine reduces both PM and NO_x, as opposed to retrofitting with a PM-only DPF. Repowering to a Tier 2 or Tier 3 engine and then adding a retrofit further reduces emissions. Credit for early repowers will be given for repowering to a Tier 1 or higher engine before 1 March 2009. After 1 March 2009, to count toward compliance with the ATCM, a repower must be to a Tier 2 level or higher.

Fleets that retire their Tier 0 vehicles at an average rate greater than 8 percent of horsepower per year between 1 March 2006 and 1 March 2009 accumulate early carryover credit.

Applicability to NASA

The NASA Centers in California will need to inventory their diesel engines to determine if they are subject to and must comply with each of these ATCMs.

Steps toward determining applicability and maintaining compliance may include the following:

- Prepare a separate inventory of diesel-fired portable engines, stationary engines, and in-use off-road equipment. The inventory should, at a minimum, include the following:
 - Model year
 - Horsepower rating
 - Emissions or tier certification level
 - Identification of add-on control equipment and level of emissions control
- Calculate current engine fleet emission rates (for portable and in-use off-road equipment) according to the rule requirements.
- Compare current engine fleet emissions to current and future emission limits.
- Assess the effectiveness of implementing early action measures such as installing diesel particulate filters, repowering equipment, or replacing equipment.
- Implement a rule compliance tracking tool that will allow fleet emissions to be compared with rule limitations during the rule implementation time frame (through 2020).
- Implement a compliance calendar to identify and track deadlines to comply with emission standards and to submit initial reports, annual reports, and compliance certifications.

Additionally, Centers may find it advantageous to catalog all diesel-related operations onsite because of recent litigation associated with the potential listing of diesel exhaust as a hazardous air pollutant and EPA's recent Advanced Notice of Proposed Rulemaking ([73 FR 4136](#)) to solicit comment on several options being considered to regulate emissions of pollutants from stationary diesel engines under the Clean Air Act.