

## UPDATED INFORMATIVE DIGEST

### AMENDMENTS TO THE CALIFORNIA OFF-ROAD EMISSIONS REGULATION FOR COMPRESSION-IGNITION ENGINES AND EQUIPMENT

**Sections Affected:** Amendment of title 13, California Code of Regulations (CCR), sections 2420, 2421, 2423, 2424, 2425, 2426, and 2427, along with the incorporated documents “California Exhaust Emission Standards and Test Procedures for New 2000 and Later Tier 1, Tier 2, and Tier 3 Off-Road Compression-Ignition Engines, Part I-B” (formerly “California Exhaust Emission Standards and Test Procedures for New 2000 and Later Off-Road Compression-Ignition Engines, Part I-B,” adopted January 28, 2000), and “California Exhaust Emission Standards and Test Procedures for New 1996 and Later Tier 1, Tier 2, and Tier 3 Off-Road Compression-Ignition Engines, Part II” (formerly “California Exhaust Emission Standards and Test Procedures for New 1996 and Later Off-Road Compression-Ignition Engines, Part II,” adopted May 12, 1993). Adoption of title 13, CCR, section 2425.1, and the incorporated document “California Exhaust Emission Standards and Test Procedures for New 2008 and Later Tier 4 Off-Road Compression-Ignition Engines, Part I-C.”

**Background:** Compression-ignition (diesel) engines are used in a variety of off-road applications such as tractors, excavators, portable generators, transport refrigeration units (TRUs), irrigation pumps, and a wide array of other agricultural, construction, and general industrial equipment. Although locomotives and commercial marine vessels are also propelled by diesel engines, the requirements of this rulemaking do not apply to them. Only new land-based off-road diesel engines and equipment, and recreational marine engines less than 37 kilowatts, are subject to this regulation.

Section 209(e)(2)(A) of the federal Clean Air Act authorizes California to adopt and enforce emission standards, and other requirements for off-road engines and equipment not subject to federal preemption so long as the California standards “will be, in the aggregate, at least as protective of public health and welfare as applicable Federal standards. Health and Safety Code sections 43013 and 43018 direct the Air Resources Board (ARB or Board) to set emission control requirements for off-road mobile source categories. Off-road diesel engines and equipment are covered by this mandate.

In January 2000, ARB adopted amendments to the off-road emissions regulation for 2000 and later compression-ignition engines and equipment. Those amendments established more stringent exhaust standards for particulate matter (PM), oxides of nitrogen (NO<sub>x</sub>), and non-methane hydrocarbon (NMHC) than were previously required. Furthermore, the amendments harmonized California’s off-road diesel requirements with those of the United States Environmental Protection Agency (U.S. EPA). The 2000 standards are ongoing, and staff estimates that the statewide emissions inventory will be reduced by 8 tons per day particulate matter (PM), 83 tons per day Oxides of Nitrogen (NO<sub>x</sub>), and 18 tons per day non-methane hydrocarbons (NMHC) in 2010 because of them. The Board also adopted in-use durability requirements and an autonomous recall/warranty program in 2000 that invested California with full

enforcement authority to ensure the regulatory compliance of off-road diesel engines throughout their entire useful lives.

Despite the significant improvements to air quality resulting from the 2000 and later requirements, many regions in California still routinely experience unhealthy air quality and will be in violation of federal ambient air quality standards beyond attainment due-dates if additional measures are not taken.

On December 9, 2004, the Board conducted a public hearing to consider the staff's proposal to further amend California's existing off-road diesel regulations through the adoption of more stringent exhaust standards and enhanced test procedures. At the conclusion of the hearing, the Board adopted Resolution 04-43, in which the Board approved the adoption of the proposed regulations with the modifications presented by staff at the hearing and directed staff to work with industry to finalize the regulatory package through use of the 15-day modified text process.

Staff's revised regulations and test procedures, with the modified text clearly indicated, were made available to the public for a supplemental 45-day comment period on July 14, 2005. Several written comments were received during the 45-day supplemental comment period, and in response, a second "Notice of Public Availability of Modified Text" was issued on September 29, 2005. Staff has responded to all comments received during the regulatory process, including those submitted in response to the notice of September 29, 2005, in its Final Statement of Reasons regarding this rulemaking.

**Description of Regulatory Action:** On December 9, 2004, the Board amended California's existing off-road diesel regulations to harmonize with the U.S. EPA requirements for nonroad diesel engines and equipment as set forth on June 29, 2004, in Title 40, Code of Federal Regulations, Part 1039 (40 CFR 1039). This included the adoption of more stringent exhaust standards and enhanced compliance provisions to ensure a greater degree of emission reductions from non-preempted off-road diesel engines in California by enabling the ARB to independently enforce compliance with the regulation, as necessary.

The exhaust standards are based on the use of advanced exhaust after-treatment technologies (e.g., particulate filters, NOx adsorbers, etc.) and will reduce PM and NOx emissions from new engines by up to 95 percent, as compared to previous emission requirements. Furthermore, harmonization serves the interest of the off-road industry in that resources would not have to be invested to comply with separate State and federal requirements.

The exhaust emission standards are presented in Table 1 below.

**Table 1 – Tier 4 Exhaust Emission Standards  
(grams per kilowatt-hour)**

MAXIMUM ENGINE POWER	MODEL YEAR	TYPE	PM	NMHC+ NOX	NMHC	NOX	CO
			grams per kilowatt-hour				
kW<8 <sup>1</sup> 8≤kW<19 <sup>1</sup>	2008 and later	FINAL	0.40 <sup>2</sup>	7.5	-	-	8.0
							6.6
19≤kW<37 <sup>1</sup>	2008-2012	INTERIM	0.30	7.5	-	-	5.5
	2013 and later	FINAL	0.03	4.7			
37≤kW<56 <sup>3</sup>	2008-2012	INTERIM	0.30	4.7	-	-	5.0
	2013 and later	FINAL	0.03				
56≤kW<75	2012-2014 <sup>4</sup>	PHASE-IN	0.02	-	0.19	0.40	5.0
		PHASE-OUT		4.7	-	-	
		or/ ALT NOX		-	0.19	3.4 <sup>5</sup>	
	2015 and later	FINAL		-	0.19	0.40	
75≤kW<130	2012-2014 <sup>4</sup>	PHASE-IN	0.02	-	0.19	0.40	5.0
		PHASE-OUT		4.0	-	-	
		or/ ALT NOX		-	0.19	3.4 <sup>5</sup>	
	2015 and later	FINAL		-	0.19	0.40	
130≤kW≤560	2011-2013	PHASE-IN	0.02	-	0.19	0.40	3.5
		PHASE-OUT		4.0	-	-	
		or/ ALT NOX		-	0.19	2.0	
	2014 and later	FINAL		-	0.19	0.40	
560 kW<GEN <sup>6</sup> ≤900 kW	2011-2014	INTERIM	0.10	-	0.40	3.5	3.5
	2015 and later	FINAL	0.03		0.19	0.67	
GEN>900 kW	2011-2014	INTERIM	0.10	-	0.40	0.67	3.5
	2015 and later	FINAL	0.03		0.19		
ELSE <sup>7</sup> >560 kW	2011-2014	INTERIM	0.10	-	0.40	3.5	3.5
	2015 and later	FINAL	0.04		0.19		

Notes:

- 1 Propulsion marine compression-ignition engines below 37 kW are not subject to Tier 4 standards or requirements. All previously adopted requirements remain applicable for these engines.
- 2 The Tier 4 PM standard for hand-start, air cooled, direct injection engines below 8 kW is 0.60 g/kW-hr, but is not required until 2010.
- 3 Engine families in this power category may alternately meet Tier 3 PM standards from 2008-2011 in exchange for introducing final PM standards in 2012.
- 4 Manufacturers have the option of complying with the Tier 4 standards over a two year period at 50% per year using banked Tier 2 credits or over a three year period at 25% per year without the use of Tier 2 credits. The three year phase-in period is shown. The 2014 model year cannot extend beyond December 30, 2014, when the 3 year phase-in option is used.
- 5 Manufacturers may comply with the standards during the transitional implementation years using either a phase-in / phase-out approach or by using the Alternate NOx approach. The three year 25% alternate NOx standard is shown in the table. The two year 50% phase-in NOx standard would be 2.3 g/kW-hr.
- 6 "GEN" refers to generator engines only.
- 7 "ELSE" refers to all mobile machinery excluding generator engines.

In addition to the standards, the Board adopted provisions that mirror other aspects of the adopted federal rule including requirements for not-to-exceed (NTE) limits, incentives to engine and equipment manufacturers for the early introduction of engines with advanced exhaust after-treatment, new test procedures and test cycles, and extended compliance assistance for engine and equipment manufacturers. As a package, these requirements help to assure that the air quality benefits of the adopted standards are achieved and that engines remain clean in-use for a longer period than previously. The harmonization of compliance programs such as averaging, banking, and trading, and equipment manufacturer flexibility should ease administrative burdens and allow industry to maintain focus on the technical aspects of emission reductions.

The Board also adopted supplemental measures to the federal rule that are intended to provide additional safeguards for a successful implementation of the off-road diesel program in California. The majority of these supplemental requirements pertain to the labeling of rebuilt and flexibility engines. Flexibility engines, which do not have to meet current year emission standards, are permitted under the transitional relief provisions of the regulation for equipment manufacturers. Both of these requirements have been revised in response to comments provided at the Board hearing and in response to the two public notices of modified text that were provided on July 14, 2005, and September 29, 2005. The latter notice also incorporated the revisions to the regulation and test procedures finalized by U.S. EPA on July 13, 2005, as part of the Omnibus Technical Amendments package.

Additionally, the Board adopted a requirement such that all flexibility engines beginning in 2007 must be covered by an executive order. This was necessary for ARB to exercise its enforcement authority regarding flexibility engines, which under the federal regulation, are treated as exempt equipment.

The California regulation also provides for more descriptive labeling content on rebuilt and flexibility engines than promulgated federally and should help minimize the potential for abuse by providing ARB investigators a means to verify that the affected engines have been correctly placed in service.

The Board also adopted other non-substantive modifications to the off-road diesel engine and equipment regulations and test procedures to clarify or simplify existing language.

### **COMPARABLE FEDERAL REGULATIONS**

On June 29, 2004, U.S. EPA promulgated the Tier 4 regulation (40 CFR 1039) and associated test procedures for new off-road diesel engines. The requirements of this rulemaking have most recently been updated on July 13, 2005, as part of the federal Omnibus Technical Amendments package. The Board generally harmonized ARB's regulation with the federal rule on December 9, 2004, and provided the Executive Officer with discretionary authority to incorporate the Omnibus Technical Amendments, as applicable, while preserving specific features needed by California. Harmonized

requirements include the alignment of standards, implementation schedules, compliance procedures, and test procedures.

California's final off-road diesel regulation differs from the current U.S. EPA regulation in the following ways:

1. Expanded labeling requirement for engines used in the equipment manufacturer flexibility program to include the engine family name beginning in 2007.
2. Prohibition on removing or replacing labels after engine rebuilding beginning in 2007.
3. Clarification on the need for engines used in the equipment manufacturer flexibility program to be covered by an executive order.
4. Preservation of ARB authority to enforce the regulation independently of the federal government.

The differences that remain between the two programs are justified by the benefit to human health, public welfare, and the environment. In addition, the differences from the federal program are authorized by Health and Safety Code sections 43013 and 43018.

### **BENEFITS OF THE PROPOSAL**

The combined statewide benefits of staff's proposal and the federal has been modeled to be approximately 6.9 tons per day PM, 72.8 tons per day NOx, and 3.0 tons per day NMHC in 2020 based on current off-road emissions inventory data. The estimated California cost-effectiveness associated with adoption of staff's proposal is approximately \$0.58 per pound of combined NMHC and NOx reduced, and \$7.55 per pound of PM reduced. These estimates are based on the federal calculation of cost-effectiveness. In actuality, however, there are no costs to the State associated with the Boards action because U.S. EPA's estimates are nationwide and already include California.