

CATEGORY:

IC ENGINE COMPRESSION

BACT Size: Minor Source BACT

IC ENGINE NON-ROAD/PORTABLE

BACT Determination Number: 238	BACT Determination Date: 10/18/2019
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Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: IC ENGINE NON-ROAD/PORTABLE
Unit Size/Rating/Capacity: ALL SIZES
Equipment Location:

BACT Determination Information

ROCs	Standard:	See Comment Below
	Technology Description:	< 50 hp: Comply w/ EPA nonroad regulations & use CARB diesel fuel, >= 50 hp: Comply with the ATCM for portable CI engines
	Basis:	Achieved in Practice
NOx	Standard:	See Comment Below
	Technology Description:	< 50 hp: Comply w/ EPA nonroad regulations & use CARB diesel fuel, >= 50 hp: Comply with the ATCM for portable CI engines
	Basis:	Achieved in Practice
SOx	Standard:	See Comment Below
	Technology Description:	< 50 hp: Comply w/ EPA nonroad regulations & use CARB diesel fuel, >= 50 hp: Comply with the ATCM for portable CI engines
	Basis:	Achieved in Practice
PM10	Standard:	See Comment Below
	Technology Description:	< 50 hp: Comply w/ EPA nonroad regulations & use CARB diesel fuel, >= 50 hp: Comply with the ATCM for portable CI engines
	Basis:	Achieved in Practice
PM2.5	Standard:	See Comment Below
	Technology Description:	< 50 hp: Comply w/ EPA nonroad regulations & use CARB diesel fuel, >= 50 hp: Comply with the ATCM for portable CI engines
	Basis:	Achieved in Practice
CO	Standard:	See Comment Below
	Technology Description:	< 50 hp: Comply w/ EPA nonroad regulations & use CARB diesel fuel, >= 50 hp: Comply with the ATCM for portable CI engines
	Basis:	Achieved in Practice
LEAD	Standard:	
	Technology Description:	
	Basis:	

Comments: For all criteria pollutants : < 50 hp: Comply w/ EPA nonroad regulations & use CARB diesel fuel, >= 50 hp: Comply with the ATCM for portable CI engines

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BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NOS.: 238
DATE: 10/18/19
ENGINEER: Joe Carle

Category/General Equip Description: I.C. Engine Compression
Equipment Specific Description: I.C. Engine Non-Road/Portable
Equipment Size/Rating: All Horsepower
Previous BACT Det. No.: 150

This Best Available Control Technology (BACT) determination will replace BACT Determination 150 for compression ignited, non-road/portable, internal combustion engines.

This determination includes T-BACT for the Toxic Air Contaminants (TAC) – diesel particulate matter is associated with compression-ignited engines. Therefore, BACT for PM10 and PM2.5 will be considered T-BACT.

The Clean Air Act (CAA) Section 209(e) states that no State or any political subdivision thereof shall adopt or attempt to enforce any standard or other requirement relating to the control of emissions from new or in-use nonroad engines. This section does allow the EPA to grant the state of California a waiver to this preemption allowing California to set standards and requirements for certain new and in-use nonroad engines. Because of this preemption, this BACT determination will not include a review of BACT determinations or rules from local air districts.

BACT/T-BACT ANALYSIS

A. ACHIEVED IN PRACTICE (Rule 202, §205.1a):

The following control technologies are currently employed as BACT/T-BACT compression ignited non-road/portable IC engines by the following agencies:

US EPA

RULE REQUIREMENTS:

[40 CFR 89 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines:](#) The Federal Clean Air Act allows California to seek an authorization of the federal preemption that prohibits states and local jurisdictions from enacting emission standards and other emission-related requirements for new and in-use nonroad engines that are not conclusively preempted by section 209(e)(1), new engines less than 175 hp used in farm and construction equipment, vehicles, and new engines used in new locomotives and locomotive engines. (CAA section 209(e)(2)). The ARB serves as the representative of California in filing authorization requests with U.S. EPA. California filed a written request for an authorization to

enforce its own rule, the *Airborne Toxic Control Measures (ATCM) for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater (Title 17, CCR Sections 93116-93116.5)*, in lieu EPA's nonroad standards, arguing that California's rule is, in the aggregate, at least as protective of public health and welfare as the applicable federal standards and it is necessary to meet compelling and extraordinary conditions. EPA approved California's rule.

Since California obtained a waiver from EPA, the requirements of 40 CFR 89 are not applicable for engines greater than or equal to 50 hp (37 KW). The following table shows the emission standards for non-road compression-ignited engines under 50 hp (37 Kw) based on their specified model year and maximum engine power (40 CFR 89.112)

EPA Tier 1-3 Non-road Diesel Engine Emission Standards (40 CFR §89.112), g/kWh (g/bhp-hr)							
Engine Power	Tier	Year	CO	HC	NMHC+NOx	NOx	PM
kW < 8 (hp < 11)	Tier 1	2000	8.0 (6.0)	-	10.5 (7.8)	-	1.0 (0.75)
	Tier 2	2005	8.0 (6.0)	-	7.5 (5.6)	-	0.8 (0.6)
8 ≤ kW < 19 (11 ≤ hp < 25)	Tier 1	2000	6.6 (4.9)	-	9.5 (7.1)	-	0.8 (0.6)
	Tier 2	2005	6.6 (4.9)	-	7.5 (5.6)	-	0.8 (0.6)
19 ≤ kW < 37 (25 ≤ hp < 50)	Tier 1	1999	5.5 (4.1)	-	9.5 (7.1)	-	0.8 (0.6)
	Tier 2	2004	5.5 (4.1)	-	7.5 (5.6)	-	0.6 (0.45)

[40 CFR 1039 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines](#): The following table shows the emission standards for non-road compression-ignited engines under 50 hp (37 KW) based on their specified model year and maximum engine power (40 CFR 1039.101 and 1039.102).

Tier 4 Non-road Diesel Engine Emission Standards (40 CFR §1039.101 & 102), g/kWh (g/bhp-hr)						
Engine Power	Year	CO	NMHC	NMHC+NOx	NOx	PM
kW < 8 (hp < 11)	2008	8.0 (6.0)	-	7.5 (5.6)	-	0.4 (0.3)
8 ≤ kW < 19 (11 ≤ hp < 25)	2008	6.6 (4.9)	-	7.5 (5.6)	-	0.4 (0.3)
19 ≤ kW < 37 (25 ≤ hp < 50)	2008	5.5 (4.1)	-	7.5 (5.6)	-	0.3 (0.22)
	2013	5.5 (4.1)	-	4.7 (3.5)	-	0.03 (0.022)

California Air Resource Board (CARB)

RULE REQUIREMENTS:

[13 CCR Section 2423 Exhaust Emission Standards and Test Procedures – Off-Road Compression Ignition Engines](#): New off-road compression ignition engines must meet the following exhaust emission standards according to its model year and maximum rated power.

Exhaust Emission Standards – Off-Road Compression Ignition Engines (13 CCR §2423)							
Maximum Engine Power	Model Year	Type	PM	NMHC + NOx	NMHC	NOx	CO
			grams per kilowatt-hour				
kW<8	2008 and later	Final	0.40	7.5	-	-	8.0
8≤kW<19							6.6
19≤kW<37	2008-2012	Interim	0.30	7.5	-	-	5.5
	2013 and later	Final	0.03	4.7			
37≤kW<56	2008-2012	Interim	0.30	4.7	-	-	5.0
	2013 and later	Final	0.03				
56≤kW<75	2012-2014	Phase-In	0.02	-	0.19	0.40	5.0
		Phase-Out		4.7	-	-	
		or/ Alt NOx		-	0.19	3.4	
	2015 and later	Final		-	0.19	0.40	
75≤kW<130	2012-2014	Phase-In	0.02	-	0.19	0.40	5.0
		Phase-Out		4.0	-	-	
		or/ Alt NOx		-	0.19	3.4	
	2015 and later	Final		-	0.19	0.40	
130≤kW≤560	2011-2013	Phase-In	0.02	-	0.19	0.40	5.0
		Phase-Out		4.0	-	-	
		or/ Alt NOx		-	0.19	2.0	
	2014 and later	Final		-	0.19	0.40	
Generators: 560<kW≤900	2011-2014	Interim	0.10	-	0.40	3.5	3.5
	2015 and later	Final	0.03		0.19	0.67	
Generators: kW>900	2011-2014	Interim	0.01	-	0.40	0.67	3.5
	2015 and later	Final	0.03		0.19		
Other engines: kW>560	2011-2014	Interim	0.10	-	0.40	3.5	3.5
	2015 and later	Final	0.04		0.19		

[Title 17, CCR Sections 93116-93116.5 - ARB Airborne Toxic Control Measures \(ATCM\) for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater](#): This ATCM applies to portable diesel-fueled engines greater than 50 hp. Since California obtained a waiver to implement the ATCM in lieu of the federal requirements, the ATCM applies to engines 50 hp and greater and the federal nonroad requirements apply to engines under 50 hp.

CARB adopted amendments to the ATCM on November 30, 2018. The amendments remove the requirement for fleet averaging standards and instead require Tier 1, 2, and 3 engines be removed from operation by specific phase-out dates as shown in the table below.

Engine Certification	Engines rated 50 to 750 bhp		Engines rated >750 bhp
	Large Fleet	Small Fleet	
Tier 1	1/1/2020	1/1/2020	1/1/2022
Tier 2 built prior to 1/1/2009	1/1/2022	1/1/2023	1/1/2025
Tier 2 built on or after 1/1/2009	NA	NA	1/1/2027
Tier 3 built prior to 1/1/2009	1/1/2025	1/1/2027	NA
Tier 3 built on or after 1/1/2009	1/1/2027	1/1/2029	NA
Tier 1, 2, and 3 flexibility engines	December 31 of the year 17 years after the date of manufacture. This provision shall not apply to any engine operation before the effective date of this regulation.		

Large fleets that submitted a written request to the Executive Officer no later than June 30, 2019 have the option of compliance through fleet averaging standards, shown in the table below, in lieu of compliance with the phase-out dates.

Compliance Date	Fleet PM Standard (g/bhp-hr)
1/1/2020	0.10
1/1/2023	0.06
1/1/2027	0.03

Engines designated as emergency-use or as low-use (less than 200 total hours operated per year) are exempt from phase-out or the optional fleet averaging standards. Additionally, the regulation contains provisions that prohibit sale of engines of a specific tier past a specified date.

Summary of Achieved in Practice Control Technologies

As described above the EPA and California have certification standards for engines based on their model year and horsepower rating. The CARB ATCM for portable engines goes further by requiring phase-out of older in-use engines by particular dates. Engines less than 50 hp

are not subject to the ATCM. As mentioned before, the District is preempted from setting emission standards although can still require the use of a specific fuel type (Appendix A to Subpart A of Part 89—State Regulation of Nonroad Internal Combustion Engines). Therefore, the following control technologies have been identified as the most stringent, achieved in practice control technologies:

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD COMPRESSION-IGNITED IC ENGINES RATED LESS THAN 50 HP		
Pollutant	Standard	Source
VOC	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
NOx	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
SOx	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
PM10	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
PM2.5	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
CO	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD COMPRESSION-IGNITED IC ENGINES RATED AT 50 HP OR GREATER		
Pollutant	Standard	Source
VOC	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
NOx	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
SOx	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
PM10	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD COMPRESSION-IGNITED IC ENGINES RATED AT 50 HP OR GREATER		
Pollutant	Standard	Source
PM2.5	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
CO	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB

B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.):

Technologically Feasible Alternatives:

Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

Staff was unable to identify any technologically feasible alternatives, beyond what is achieved in practice that did not conflict with CAA Section 209(e), which restricts air districts from adopting emission standards or other requirements relating to the control of emissions for non-road engines.

C. SELECTION OF BACT:

Based on the above analysis, BACT for VOC, NOx, SOx, PM, and CO will be considered at what is currently achieved in practice.

BACT FOR NON-ROAD/PORTALBE, COMPRESSION-IGNITED, IC ENGINES, RATED LESS THAN 50 BHP		
Pollutant	Standard	Source
VOC	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
NOx	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
SOx	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
PM10	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB

BACT FOR NON-ROAD/PORTALBE, COMPRESSION-IGNITED, IC ENGINES, RATED LESS THAN 50 BHP		
Pollutant	Standard	Source
PM2.5	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB
CO	Compliance with applicable EPA non-road regulations (40 CFR part 89 and/or 1039) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93116.3(a).	US EPA/ CARB

BACT FOR NON-ROAD/PORTALBE, COMPRESSION-IGNITED, IC ENGINES, RATED AT 50 BHP OR GREATER		
Pollutant	Standard	Source
VOC	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
NOx	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
SOx	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
PM10	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
PM2.5	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB
CO	Compliance with the CARB ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	CARB

APPROVED BY: Brian J. Hunt DATE: 10-18-19