ACTIVE SMAQMD BACT CLEARINGHOUSE

CATEGORY: **IC ENGINE COMPRESSION-PRIME**

BACT Size: Minor Source BACT **IC ENGINE PRIME POWER**

BACT Determination Number: 165	**BACT Determination Date:** 9/12/2017

Equipment Information

Permit Number: 25331
Equipment Description: IC ENGINE PRIME POWER
Unit Size/Rating/Capacity: All Horsepower: Nonroad Self-Propelled IC Engine
Equipment Location: ZANKER ROAD RESOURCE MGMT, LTD DBA FLORIN PERKINS
4201 FLORIN PERKINS RD
SACRAMENTO, CA

BACT Determination Information

ROCs	**Standard:**	See Comments Below
	Technology Description:	<25 hp: Comply with EPA nonroad regulations & use CARB diesel fuel; >= 25 hp: Comply with the Regulation for In-Use Off-Road Diesel-Fueled Fleets
	Basis:	Achieved in Practice
NOx	**Standard:**	See Comments Below
	Technology Description:	<25 hp: Comply with EPA nonroad regulations & use CARB diesel fuel; >= 25 hp: Comply with the Regulation for In-Use Off-Road Diesel-Fueled Fleets
	Basis:	Achieved in Practice
SOx	**Standard:**	See Comments Below
	Technology Description:	<25 hp: Comply with EPA nonroad regulations & use CARB diesel fuel; >= 25 hp: Comply with the Regulation for In-Use Off-Road Diesel-Fueled Fleets
	Basis:	Achieved in Practice
PM10	**Standard:**	See Comments Below
	Technology Description:	<25 hp: Comply with EPA nonroad regulations & use CARB diesel fuel; >= 25 hp: Comply with the Regulation for In-Use Off-Road Diesel-Fueled Fleets
	Basis:	Achieved in Practice
PM2.5	**Standard:**	See Comments Below
	Technology Description:	<25 hp: Comply with EPA nonroad regulations & use CARB diesel fuel; >= 25 hp: Comply with the Regulation for In-Use Off-Road Diesel-Fueled Fleets
	Basis:	Achieved in Practice
CO	**Standard:**	See Comments Below
	Technology Description:	<25 hp: Comply with EPA nonroad regulations & use CARB diesel fuel; >= 25 hp: Comply with the Regulation for In-Use Off-Road Diesel-Fueled Fleets
	Basis:	Achieved in Practice
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: For all criteria pollutants: < 25 hp: Comply w/EPA nonroad regulations & use CARB diesel fuel; >= 50 hp: Comply with the Regulation for In-Use Off-Road Diesel-Fueled Fleets. This BACT applies to self-propelled diesel fueled IC engines not subject to the portable ATCM. TBACT is equivalent to BACT.

District Contact: Felix Trujillo, Jr. Phone No.: (916) 874 - 7357 email: smosunic@airquality.org

777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.: 165

DATE: 9/12/17

ENGINEER: Felix Trujillo, Jr.

Category/General Equipment Description: IC Engine Compression - Prime

Equipment Specific Description: Non-road, Compression-Ignited, IC Engine, Self-propelling

Equipment Size/Rating: Minor Source, All Horsepower

Previous BACT Det. No.: None

BACT is only required if emission units or stationary sources are subject to the District permit requirements. Health and Safety Code section 42310(a)(1) states that a permit is not required for "any vehicle," and defines vehicle as a device by which people or property may be propelled, moved or drawn on the highway, except devices that use exclusively human power or are operated on stationary rails or tracks. (Health and Saf. Code, § 39060, Vehicle Code § 670.) In addition, the Clean Air Act, Section 216 defines a motor vehicle as any self-propelled vehicle designed for transporting persons or property on a street or highway, and the District permitting requirements only exempt vehicles used to transport passengers or freight (per Rule 201 Section 111.1). Self-propelled engines are remotely controlled, are not equipped with steering wheels or a driver's seat, were not designed to be operated on the streets or highways, and are commonly operated on tracks to transport them from one place to another. Consequently, they do not fit the definition of vehicles that are exempt from the District permitting requirements.

This Best Available Control Technology (BACT) determination for non-road, compression-ignited, self-propelled IC engines is new, because there was previously no BACT determination for this category. The District previously developed a BACT determination for portable engines (BACT #150) that applied to engines that were subject to the Portable Engine Air Toxic Control Measure (ATCM), but the Portable Engine ATCM exempts engines that are used to propel mobile equipment or a motor vehicle of any kind. The Portable Engine ATCM BACT determination does not apply to this equipment because the self-propelled IC engines generally serve a dual purpose: (i) provide power to mobilize the unit, and (ii) when the unit is stationary, provide powerto another process that is mounted on the unit. Examples of such units are track mounted grinders, cranes, and crushers.

This determination includes T-BACT for the Toxic Air Contaminants (TAC) – diesel particulate matter is associated with compression-ignited engines.

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 non-road 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 non-road 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 for compression-ignited engines as discussed below:

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 non-road engines that are not conclusively preempted by section 209(e)(1) new engines less than 175 hp used in farm and construction equipment and 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 *Regulation for In-Use Off-Road Diesel Vehicles (Title 13, CCR Sections 2449-2449.3)*, in lieu of EPA's non-road standards, arguing that California's rule is, in 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)

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**
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 nonroad 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 Nonroad Diesel Engine Emission Standards (40 CFR §1039.101 & 102), g/kWh (g/bhp-hr)						
Engine Power	**Year**	**CO**	**NMHC**	**NMHC+NO_x**	**NO_x**	**PM**
kW < 8 (hp < 11)	2008	8.0 (6.0)	-	7.5 (5.6)	-	0.4[a] (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 RESOURCES BOARD

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.

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

Maximum Engine Power	Model Year	Type	PM	NMHC + NOx	NMHC	NOx	CO
			grams per kilowatt-hour				
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				0.40	
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				0.40	
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				0.40	
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 13, CCR Sections 2449 -2449.3 – Regulation for In-Use Off-Road Diesel Vehicles:

This regulation is to reduce oxides of nitrogen (NOx), diesel particulate matter (PM) and other criteria pollutant emissions from in-use off-road diesel-fueled vehicles. This regulation applies to a person, business or government agency who owns or operates within California any off-road vehicles with a diesel-fueled or alternative diesel fueled compression-ignition

engine with maximum power of 25 horsepower or greater that the vehicle cannot be registered and driven safely on-road or was not designed to be driven on-road, even if it has been modified so that it can be driven safely on-road. Since California obtained a waiver to implement the Regulation for In-Use Off-Road Diesel-Fueled Fleets in lieu of the federal requirements, the ATCM applies to engines 25 hp and greater and the federal non-road requirements apply to engines under 25 hp.

This regulation is very complex and will not be discussed in detail in this analysis. The main requirements of the regulation are:

- Imposes limits on idling, requires a written idling policy and requires a disclosure when selling vehicles;
- Requires all vehicles to be reported to ARB (using the Diesel Off-Road Online Reporting System, DOORS) and labeled;
- Restricts the adding of older vehicles into fleets starting on January 1, 2014; and
- Requires fleets to reduce their emissions by retiring, replacing or repower older engines, or installing Verified Diesel Emission Control Systems, VDECS (i.e., exhaust retrofits).

Discussion on Achieved in Practice Control Technologies:

It is shown above that the EPA and California have certification standards for engines based on their model year and horsepower rating. The Regulation for In-Use Off-Road Diesel-Fueled Fleets goes further by requiring fleets to reduce their emissions by retiring, replacing or repower older engines, or installing exhaust retrofits. Engines less than 25 hp are not subject to this regulation. 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 Non-road 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 SELF-PROPELLED COMPRESSION-IGNITED IC ENGINE RATED LESS THAN 25 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 93115.5.	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 93115.5.	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 93115.5.	US EPA/ CARB

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD SELF-PROPELLED COMPRESSION-IGNITED IC ENGINE RATED LESS THAN 25 HP		
Pollutant	**Standard**	**Source**
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 93115.5.	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 93115.5.	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 93115.5.	US EPA/ CARB

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD SELF-PROPELLED COMPRESSION-IGNITED IC ENGINE RATED AT 25 HP OR GREATER		
Pollutant	**Standard**	**Source**
VOC	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5.	CARB
NOx	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5.	CARB
SOx	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5.	CARB
PM10	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5.	CARB
PM2.5	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5.	CARB

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD SELF-PROPELLED COMPRESSION-IGNITED IC ENGINE RATED AT 25 HP OR GREATER		
Pollutant	**Standard**	**Source**
CO	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5.	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, PM10, PM2.5, and CO will be considered equivalent to what is currently achieved in practice.

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD COMPRESSION-IGNITED IC ENGINE RATED LESS THAN 25 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 93115.5.	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 93115.5.	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 93115.5.	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 93115.5.	US EPA/ CARB

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD COMPRESSION-IGNITED IC ENGINE RATED LESS THAN 25 HP		
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 93115.5.	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 93115.5.	US EPA/ CARB

BEST CONTROL TECHNOLOGIES ACHIEVED – NON-ROAD SELF-PROPELLED COMPRESSION-IGNITED IC ENGINE RATED AT 25 HP OR GREATER		
Pollutant	**Standard**	**Source**
VOC	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5	CARB
NOx	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5	CARB
SOx	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5	CARB
PM10	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5	CARB
PM2.5	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5	CARB
CO	Compliance with the Regulation for In-Use Off-Road Diesel-Fueled Fleets (Title 13 CCR Section 2449) and use of CARB-approved diesel fuel or a fuel that meets the CARB requirements in 17 CCR Section 93115.5	CARB

D. SELECTION OF T-BACT:

The toxic pollutant at issue with this technology is diesel particulate matter. The BACT standard will also control diesel particulate matter. Therefore, BACT controls are also the T-BACT controls.

REVIEWED BY: _____ **DATE:** _____

APPROVED BY: _____ **DATE:** 9/12/17