FISHBECK, THOMPSON, CARR & HUBER
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EVER EVOLVING ENGINE REGULATIONS

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EAST MICHIGAN AWMA
SEPTEMBER 15, 2016

Overview

- New engines
- Existing engines
- Notifications, recordkeeping and reporting.

focus on
emergency engines

By engines, we do not mean…

Motor vehicles, or to non-road engines, which are:

- self-propelled (tractors, bulldozers)
- propelled while performing their function (lawnmowers)
- portable or transportable (has wheels, skids, carrying handles, dolly, trailer or platform).

- Note: a portable non-road engine becomes stationary if it stays in one location for more than 12 months (or full annual operating period of a seasonal source)

New or existing?

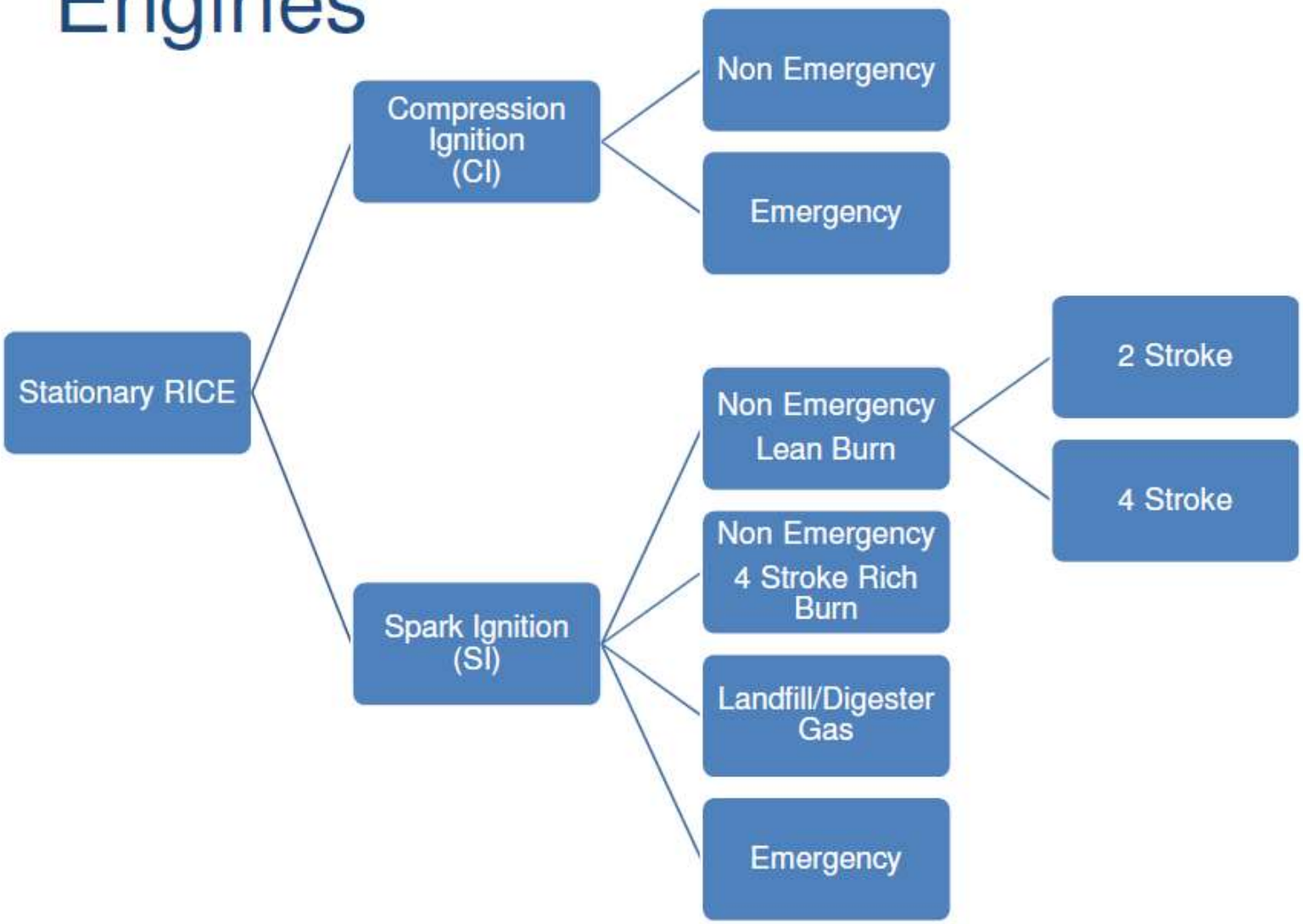
Regulation	New After…
NSPS Subpart JJJJ	June 12, 2006
NSPS Subpart IIII	July 11, 2005
NESHAP ZZZZ	December 19, 2002 (for engines > 500 hp and at major sources)
NESHAP ZZZZ	June 12, 2006 (for engines ≤ 500 hp at a major source and area source engines)

40 CFR Part 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Engines

40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

40 CFR Part 63, Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines

How EPA Regulations Classify Engines



New engine

Engine end use and whether its certified should be considered…

One day Alice came to a fork in the road and saw a Cheshire cat in a tree.

3412 ›

Minimum Rating
638.0 bhp

Maximum Rating
739.0 bhp

Emissions
Non-certified

C18 ACERT™ ›

Minimum Rating
600.0 bhp

Maximum Rating
800.0 bhp

Emissions
U.S. EPA Tier, Tier 2 or non-certified

Emergency engines

- Operated for up to 50 hours per calendar year in non-emergency situations.
- That 50 hours of operation in non-emergency situations are counted as part of the 100 hours per calendar year for maintenance and testing.
- The 50 hours per year for non-emergency situations cannot be used for peak shaving or non-emergency demand response, or to generate income for a facility to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

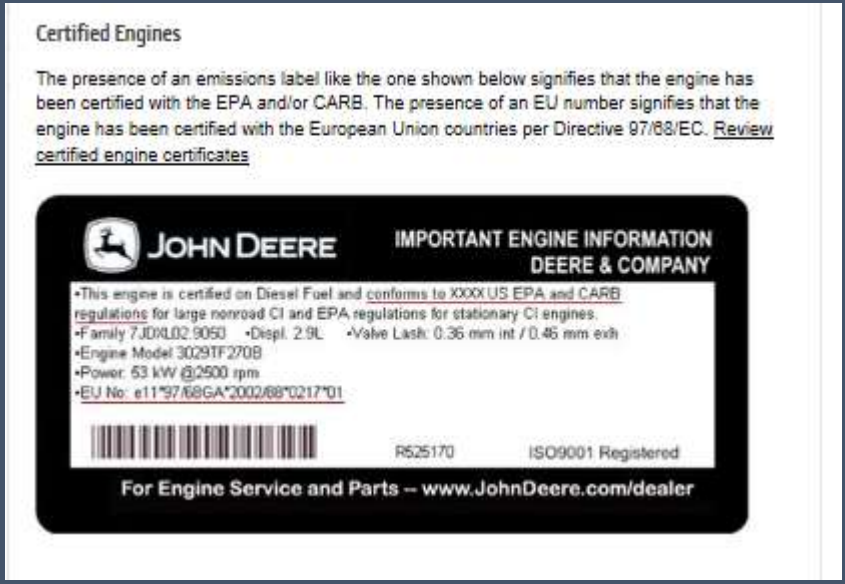
Emergency Engines

- On May 1, 2015 the D.C. Circuit Court vacated the allowance for emergency engines to operate as part of some emergency demand response programs or when voltage or frequency deviates.
- EPA requested a stay until May 1, 2016. Some sources may be changing categories as a result.

Emergency operation

- In an actual emergency, an emergency engine can operate without meeting federal control requirements or emission limits for nonemergency engines.
- Track hours of operation and reason.
- Unless operating restrictions were accepted for other reasons (like BACT).

Certified engines



Certified Engines

The presence of an emissions label like the one shown below signifies that the engine has been certified with the EPA and/or CARB. The presence of an EU number signifies that the engine has been certified with the European Union countries per Directive 97/68/EC. Review certified engine certificates

JOHN DEERE

IMPORTANT ENGINE INFORMATION
DEERE & COMPANY

•This engine is certified on Diesel Fuel and conforms to XXXX US EPA and CARB regulations for large nonroad CI and EPA regulations for stationary CI engines.
•Family 7JDXL02.9050 •Displ. 2.9L •Valve Lash: 0.36 mm int / 0.46 mm exh
•Engine Model 3029TF270B
•Power: 53 kW @2500 rpm
•EU No: e11*97/68GA*2002/88*0217*01

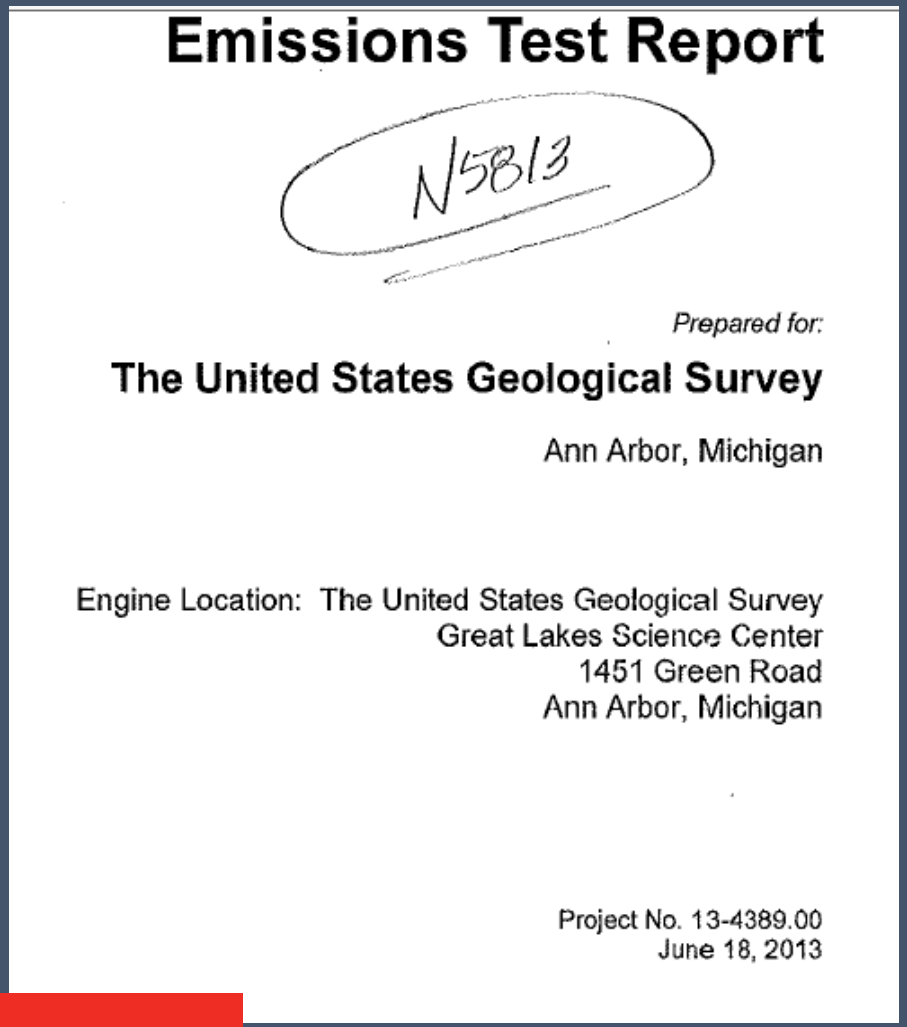
R525170 ISO9001 Registered

For Engine Service and Parts -- www.JohnDeere.com/dealer

Manufacturers must clearly label engines "certified" or "non-certified".

Non-certified engines

- Additional requirements including stack testing - even for emergency engines.
- Initial testing only for engines between 100 and 500 hp.
- Testing every 3 years (or 8760 hr) for engines > 500 hp.
- Require evidence that engine meets emission limits.



Emissions Test Report

N5813

Prepared for:

The United States Geological Survey

Ann Arbor, Michigan

Engine Location: The United States Geological Survey
Great Lakes Science Center
1451 Green Road
Ann Arbor, Michigan

Project No. 13-4389.00
June 18, 2013

Specification Sheet
Model GFGA EPA SI NSPS Compliant Capable

Non-certified engines

"If you do not operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, your engine will be considered a non-certified engine."

Emergency engines...

cannot be operated as non-emergency engines.

EPA CI NSPS for Stationary Engines Standards (60.4201, 60.4202, 60.4204, & 60.4205)

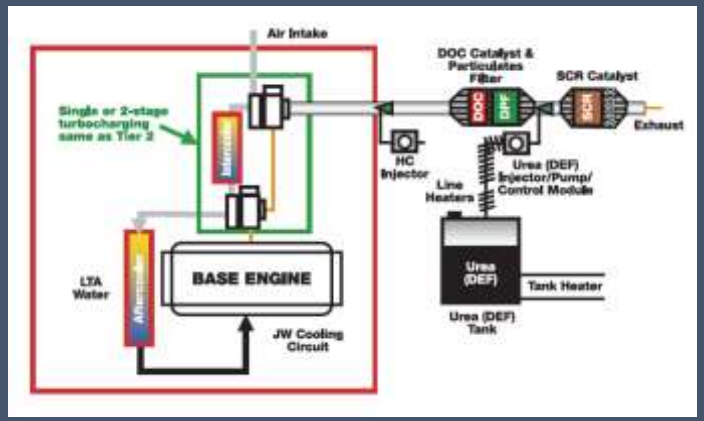
Requirements in **black** are same as nonroad; requirements in **red** are unique for stationary.

NOx/NMHC/CO/PM (g/kW-hr)
(NOx+NMHC)/CO/PM (g/kW-hr) [Conversion: (g/kW-hr) x 0.7457 = g/bhp-hr]

kW	(HP)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0 - 7	(0 - 10)		(7.5)/6.6/0.40									
8 - 18	(11 - 24)											
19 - 36	(25 - 48)		(7.5)/5.5/0.30					(4.7)/5.0/0.03 Emergency: Stay at previous tier				
37 - 55	(49 - 74)		*Opt T4i: 0.30 PM: 37-55 kW*				*Note 1*					
56 - 74	(75 - 99)		(4.7)/5.0/0.40: 37-74 kW				3.4/0.19/5.0/0.02 Emergency: Tier 3			0.40/0.19/5.0/0.02 Emergency: Tier 3		
75 - 129	(100 - 173)		(4.0)/5.0/0.30									
130 - 224	(174 - 301)		(4.0)/3.5/0.20			2.0/0.19/3.5/0.02 Emergency: Tier 3			0.40/0.19/3.5/0.02 Emergency: Tier 3			
225 - 449	(302 - 602)		(4.0)/3.5/0.20									
450 - 560	(603 - 751)		(4.0)/3.5/0.20									
> 560	(> 751)		(6.4)/3.5/0.20 Stationary > 3000 hp: Tier 1			3.5/0.40/3.5/0.10 *0.67/0.40/3.5/0.10*[a] Emergency: Tier 2				3.5/0.19/3.5/0.04 *0.67/0.19/3.5/0.03*[b] Emergency: Tier 2		
		Tier 2	Tier 3			Tier 4 Interim			Tier 4 Final			

a. Applies to non-emergency power gen engines >900kW (>1207 hp)
b. Applies to non-emergency power gen engines >560kW (>751 hp)

(1) Compliance with optional 'Option 1' 0.30 g/kW-hr PM limit in 2008 allows 1-year delay of T4 until 2013. Option 1 engines in 2008 are T4i engines, not T3 engines.
(2) Fire pump requirements for 2007+ generally delayed three years.
(3) Engines ≥ 10 L/cyl must meet T2 marine requirements of 40 CFR 94.8.
(4) There is NO TPEM program for engines in stationary applications.



Control equipment is needed to meet Tier 4 diesel standards.

Emergency engines

- Even small engines have requirements.
- Diesel must be ULSD and have a cetane < 40 or aromatic content ≤ 35%.
- Maintenance must be tracked and recorded (as well as operating hours).

Three emergency diesel generators at the site and located in the fuel supply area. Each is a 10 kW generator with an order date of 10/18/2006 and exempt from R 336.1201(1) pursuant to R 336.1282(b)(ii).

Emission Units: EU-EMERDG_DPRHS, EU-EMERDG_TFRHS, EU-EMERDG_UNLHS

POLLUTION CONTROL EQUIPMENT

NA

I. EMISSION LIMIT(S)

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Monitoring/ Testing Method	Underlying Applicable Requirements
1. CO	6.6 grams per kilowatt-hour	As specified within the test methods and procedures at 40 CFR 60.4212	Applies individually to each emission unit of FG-EMERDG_FSUPPLY	SC VI.1	**40 CFR 60.4205(a), 40 CFR 60.4212 40 CFR 63.6590(c)**
2. NOx + NMHC	9.5 grams per kilowatt-hour	As specified within the test methods and procedures at 40 CFR 60.4212	Applies individually to each emission unit of FG-EMERDG_FSUPPLY	SC VI.1	**40 CFR 60.4205(a), 40 CFR 60.4212 40 CFR 63.6590(c)**
3. PM	0.80 grams per kilowatt-hour	As specified within the test methods and procedures at 40 CFR 60.4212	Applies individually to each emission unit of FG-EMERDG_FSUPPLY	SC VI.1	**40 CFR 60.4205(a), 40 CFR 60.4212 40 CFR 63.6590(c)**
4. SO_2	120 parts per million by volume at 50% excess air	Instantaneous	Applies individually to each emission unit of FG-EMERDG_FSUPPLY	SC VI.2	**R 336.1401(1), Michigan State Implementation Plan**

NSPS requirements for non-emergency engines

NSPS emission standards for NG and lean burn LPG engines ≥ 75 kW (100 hp)

Engine Type	Maximum Power (P)	Date†	Emission Standards					
			NOx	CO[a]	VOC*	NOx	CO[a]	VOC*
-	*hp*	-	*g/hp-hr*			*ppmvd @ 15% O_2*		
SI natural gas and SI lean burn LPG	100 ≤ P < 500	2008.07	2.0	4.0	1.0	160	540	86
		2011.01	1.0	2.0	0.7	82	270	60
SI lean burn natural gas and LPG	500 ≤ P < 1350	2008.01	2.0	4.0	1.0	160	540	86
		2010.07	1.0	2.0	0.7	82	270	60
SI natural gas and SI lean burn LPG (except lean burn 500 ≤ P < 1350)	P ≥ 500	2007.07	2.0	4.0	1.0	160	540	86
		2010.07	1.0	2.0	0.7	82	270	60

† Date of engine manufacture
* VOC emissions do not include formaldehyde
[a] Owners and operators of engines with a site rating ≥ 250 bhp located at a major source that are meeting the NIESHAP requirements (40 CFR part 63, subpart ZZZZ, Table 2a) do not have to comply with the CO standards

- **Affects engines manufactured after July 11, 2005 (CI or IIII) and June 11, 2006 (SI or JJJJ)**
- **Engine emission requirements dependent on date of manufacture and size**

Non-emergency engine in emergencies?

- Qualified emergency situation is one in which the condition of an engine's emission controls poses a significant direct or indirect risk to human life.
- Limited operation without control equipment can take place on Tier 4 engines during a qualified emergency situation.

Existing engines - ZZZZ

- **NSPS compliant generally equals NESHAP compliant**

Important Exceptions to operating and emission limits under NESHAP

Major	**Existing**	> 500 hp	Limited Use	No Requirements									
Major	**Existing**	> 500 hp	Emergency Black start	No other requirements except §63.6640(f)(i)-(iii)									
Major	**Existing**	≤ 500 hp	Emergency Black start			change every 500 hrs* [§63.6602, Table 2c, 63.6625(h)]	inspect every 1,000 hrs [§63.6602, Table 2c]	inspect every 500 hrs [§63.6602, Table 2c]		Yes	Maintenance Plan [§63.6640(f)(i)-(iii)]	Non-ho [§6
				By 70%* [§63.600(b)						Yes If using an		

Important ZZZZ exemption

- **Existing residential, commercial or institutional *emergency* engines (not contractually obligated to operate more than 15 hr/yr in an emergency demand response program or for local reliability) located at an area source.**

ZZZZ requirements

Emission Standards: Existing RICE Located at Area Sources

HP	Engine Subcategory					
	Non-emergency					Emergency or Black Start
	CI	SI 2SLB	SI 4S in remote areas	SI 4S not in remote areas	SI LFG/DG	
≤300	Change oil/filter & inspect air cleaner every 1,000 hours or annually; inspect hoses/belts every 500 hours or annually	Change oil/filter, inspect spark plugs, & inspect hoses/belts every 4,320 hours or annually	Change oil/filter, inspect spark plugs, & inspect hoses/belts every 1,440 hours of operation or annually	Change oil/filter, inspect spark plugs, & inspect hoses/belts every 1,440 hours of operation or annually	Change oil/filter, inspect spark plugs, & inspect hoses/belts every 1,440 hours of operation or annually	Change oil/filter & inspect hoses/belts every 500 hours or annually; inspect air cleaner (CI) or spark plugs (SI) every 1,000 hours or annually
300–500	49 ppm CO or 70% CO reduction*					
>500	23 ppm CO or 70% CO reduction		Change oil/filter, inspect spark plugs, & inspect hoses/belts every 2,160 hours of operation or annually	if engine used >24 hrs/yr: 4SLB: Install oxidation catalyst 4SRB: Install NSCR		

Even emergency engines have requirements.

ZZZZ requirements for existing engines - CI

Diesel Engine Standards (effective May 2013)		
Engine Size	Non-Emergency Engines Located at Major Sources	Non-Emergency Engines Locared at Area Sources
100 to 300 Hp	230 ppmvd CO @ 15% O_2	
300 to 500 Hp	49 ppmvd CO @ 15% O_2 or 70% reduction	49 ppmvd CO @ 15% O_2 or 70% reduction
> 500 Hp	23 ppmvd CO @ 15% O_2 or 70% reduction	23 ppmvd CO @ 15% O_2 or 70% reduction
After Treatment	Burn ULSD and install DOC on non-emergency engines with a site limit of > 300 Hp	
Major Source: Any stationary source or group of stationary sources located within a contiguous area and under common control emits or has the potential to emit considering controls, in the aggregate ≥ 10 TPY of a singe HAP or ≥ 25 TPY of two or more HAPs. Area Source: Not a major source | EPA estimates there are > 900,000 stationary CI engines installed		

Table 1: NESHAP Schedule for Non-Emergency Diesel Engines Source: EPA RICE NESHAP Website, July 2010

- **Existing non-emergency engines may require add-on control equipment**
- **Add-on control equipment suggests emission testing**
- **Add-on control equipment also implies parameter monitoring (CPMS in some cases)**

Notifications and reports

	Non-certified		Certified	
	Emergency	Non-emergency	Emergency	Non-emergency
Construction - NSPS	x	x		
Start-up - NSPS	x	x		x
Performance testing – NSPS	x	x		x
Notification – NESHAP**	x	x	x	x
Semi-annual reports – NESHAP		x		x
Performance testing – NESHAP		x		x

** no notifications required for existing engines that have no numerical emission limits or engines < 100 hp

Reporting – NESHAP subject

- Compliance report.
  - If there are no deviations from the emission limits or operational limits contained in this permit, or if the CPMS was not out-of-control, a statement indicating full compliance shall be submitted. This report shall be submitted semi-annually, in accordance with the requirements of **40 CFR Part 63 Section 63.6650(b).**
  - If there were deviations from the emission limits or operational limitations contained in this permit, or if the CPMS was out-of-control as specified in 40 CFR Part 63 Section 63.8(c)(7). This report shall be submitted semi-annually, in accordance with the requirements of **40 CFR Part 63 Section 63.6650(b).**
- Startup, shutdown or malfunction reports in accordance with 40 CFR Part 63 Section 63.10(d)(5)(i). This report shall be submitted semi-annually, in accordance with the requirements of **40 CFR Part 63 Section 63.6650(b).**
- An immediate startup, shutdown, and malfunction report, if actions addressing the startup, shutdown, or malfunction were inconsistent with the submitted startup, shutdown, and malfunction plan. This report shall be submitted via fax, e-mail, or telephone, within two days of the occurrence.
- Fuel usage report. The permittee shall report the fuel flow rate, and the heating value of the fuel in accordance with 40 CFR Part 63 Section 63.6650. This report shall be submitted on an annual basis.
- Deviations of permit emission limitations or operational limits. The permittee shall report any deviation from permitted emission limitations or operation limits. This report shall be submitted on an annual basis.
- CPMS errors. Any problems or errors with the CPMS shall be submitted on an annual basis.

Records

a. **Engine manufacturer;**
b. **Date engine was manufactured;**
c. **Engine model number;**
d. **Engine horsepower;**
e. **Engine serial number;**
f. **Engine specification sheet;**
g. **Date of initial startup of the engine; and**
h. **Date engine was removed from service at this stationary source.**

2800 Series 2806C-E18TAG3 Diesel Engine – ElectropaK

652 kWm at 1800 rpm

The Perkins 2800 Series is a family of well-proven 6 cylinder 16 and 18 litre in-line diesel engines, designed to address today's uncompromising demands within the power generation industry with particular aim at the standby market sector. Developed from a proven heavy-duty industrial base, the engine offers superior performance and reliability.

The 2806C-E18TAG3 is a turbocharged and air-to-air charge cooled, 6 cylinder diesel engine of 18 litres capacity. Its premium features provide economic and durable operation, low gaseous emissions and advanced overall performance and reliability.

Specification		
Number of cylinders	6 vertical inline	
Bore and stroke	145 x 183 mm	5.7 x 7.2 in
Displacement	18.1 litres	1104 in³
Aspiration	Turbocharged and air-to-air chargecooled	
Cycle	4 stroke	
Combustion system	Direct injection	
Compression ratio	14.5:1	
Rotation	Anti-clockwise, viewed on flywheel	
Total lubricating capacity	62 litres	16.4 US gal
Cooling system	Water-cooled	
Total coolant capacity	61 litres	16.1 US gal

Certified against the requirements of EPA Tier 2 (EPA40CR Part 89 Tier 2) legislation for non-road mobile machinery, powered by constant speed engines.

Even without a permit?

- Engines < 10 mmbtu/hr exempt
- Multiple engine installations could exceed Rule 278(a) thresholds
- ROP-subject and opt-out sources will have permit requirements
- NSPS/NESHAP requirements still apply

Compliance tips

- **Notify, install controls, & complete testing non-emergency RICE with emission limits**
- **Ensure emergency generators are not used more than "emergency" thresholds**
- **Comply with NESHAP & NSPS requirements when in peaking service**

This is not a stationary engine (though nonroad engines have manufacturer certification requirements).

- **Questions?**

https://www3.epa.gov/region1/rice/