



United States Environmental Protection Agency
General Permit for New or Modified
Minor Sources of Air Pollution in Indian Country
<http://www.epa.gov/air/tribal/tribalnsr.html>

Background Document: General Air Quality Permits for New or Modified True Minor Source Compression Ignition Engines and Spark Ignition Engines

Version 1.0

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1. Engines Source Category Definition

Engines covered by these proposed general permits¹ are stationary internal combustion engines (ICE) that convert heat energy into mechanical work and are not mobile. This source category does not include combustion turbines or nonroad² engines (mobile ICE) such as forklifts, off-highway mobile cranes, bulldozers, and lawnmowers. Stationary ICE includes reciprocating ICE, rotary ICE, and other ICE, except combustion turbines.

These general permits also cover both non-emergency and emergency stationary ICE. Emergency stationary ICE include any stationary internal combustion engine whose operation is limited to emergency situations and required testing and maintenance. Examples include stationary ICE used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or stationary ICE used to pump water in the case of fire, flood, or other natural disaster. Stationary ICE used to supply power to an electric grid or that supply power as part of a financial arrangement with another entity are not considered to be emergency engines.³

This source category does not cover the manufacturers of engines. The proposed General Air Quality Permits for New or Modified True Minor Source Compression Ignition Engines and Spark Ignition Engines only cover engines that are located at true minor New Source Review (NSR) sources.

2. Source Category Characterization

There are two types of ICE: spark ignition (SI) and compression ignition (CI). A SI engine means a gasoline, natural gas, or any other type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark ignition engines usually use a throttle to regulate intake air flow to control power during normal operation. Dual-fuel engines in which a liquid fuel (typically diesel fuel) is used for CI and a gaseous fuel (typically natural gas) is used as the primary fuel at an annual average ratio of less than 2 parts diesel fuel to 100 parts total fuel on an energy equivalent basis are SI engines. A CI ICE is defined as an engine that is not a SI

¹ The EPA is making available for comment two proposed general permits: one for SI ICE and one for CI ICE.

² As defined in 40 CFR 1068.30, a nonroad engine is used to propel a motor vehicle, aircraft, or a vehicle used solely for competition.

³ The definitions for emergency and stationary engines are adopted from the definitions in 40 CFR 60.4219.

engine and are typically diesel engines where the heat generated from compression is enough to initiate the combustion process, without needing any external spark.⁴

Gasoline, diesel (No.2 fuel oil), and natural gas are the three primary fuels used for engines. Most natural gas-fired reciprocating engines are used in the natural gas industry at pipeline compressor and storage stations and at gas processing plants.⁵ Gasoline and small diesel engines (with capacities equal to or less than 600 horsepower (hp)) cover a wide variety of industrial applications such as generators, pumps, and material handling equipment (such as conveyors). Gasoline is used primarily for mobile and portable engines. Diesel fuel oil is the most versatile fuel and is used in CI engines of all sizes. Substantial differences in engine duty cycles exist.⁶

Large stationary diesel engines (with capacities greater than 600 hp) are often used in oil and gas exploration and production. These engines, in groups of 3 to 5, supply mechanical power to operate drilling (rotary table), mud pumping, and hoisting equipment, and may also operate pumps or auxiliary power generators. Another frequent application of large stationary diesel engines is electricity generation for both base and standby service. Smaller uses include irrigation, hoisting, and nuclear power plant emergency cooling water pump operation.⁷

The primary criteria pollutants from engines are oxides of nitrogen (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC). The formation of NO_x is exponentially related to combustion temperature in the engine cylinder. The other pollutants, CO and VOC, are primarily the result of incomplete combustion. Particulate matter (PM) emissions include trace amounts of metals, non-combustible inorganic material, and condensable, semi-volatile organics which result from volatilized lubricating oil, engine wear, or from products of incomplete combustion. Emissions of sulfur compounds, mainly sulfur dioxide (SO₂), are directly related to the sulfur content of the fuel.

Three generic control techniques have been developed for reciprocating engines: parametric controls (timing and operating at a leaner air-to-fuel ratio); combustion modifications such as advanced engine design for new sources or major modification to existing sources (clean-burn cylinder head designs and pre-stratified charge combustion for rich-burn engines); and post-combustion catalytic controls installed on the engine exhaust system. Post-combustion catalytic technologies include selective catalytic reduction for lean-burn engines, nonselective catalytic reduction for rich-burn engines, and CO oxidation catalysts for lean-burn engines.⁸

3. State NSR Minor Source Permit Programs

The U.S. Environmental Protection Agency (EPA) researched state government websites for general permits for this source category and examined them for applicability to a permit for Indian country. The EPA selected the appropriate elements for the development of the documents and regulations in the general permit for this source category. The EPA identified the following states and local governments that have specific NSR minor programs (such as general permit or general order) for engines or

⁴ The definitions for SI and CI engines are adopted from the definitions in 40 CFR 60.4219.

⁵ AP-42, Chapter 3.2 – Natural Gas-fired Reciprocating Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

⁶ AP-42, Chapter 3.3 – Gasoline And Diesel Industrial Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

⁷ AP-42, Chapter 3.4 – Large Stationary Diesel And All Stationary Dual-fuel Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

⁸ AP-42, Chapter 3.2 – Natural Gas-fired Reciprocating Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

generators: Alaska, Arizona, Florida, New Hampshire, New Jersey, Ohio, Pennsylvania, Rhode Island, Virginia, Washington, and West Virginia. The requirements for the state permitting programs related to engines/generators are summarized in Attachment A. Permits from these states were chosen for examination because of characteristics they possess:

- Readily available;
- Clear throughput limits; and
- Organization of the regulations followed the typical form for federal NSR permits:
 - Limitations and standards, and
 - Monitoring, testing, recordkeeping, and reporting requirements.

For the state permit programs reviewed, the general permits include two major types of engines: emergency engines and non-emergency engines. The state general permit requirements cover the following four areas:

- Emission Limits: Most of the state permit programs, except for the state permit program for Washington, contain emission limits for CO, NO_x, and VOC. The emission limits for NO_x range from 5 tons per year (tpy) to 250 tpy.
- Fuel Limits: Some state permit programs contain fuel usage limits and sulfur content limits. The state permit program for Virginia also includes heat content limits for fuels.
- Operating Hour Limits: For emergency generators, most state permit programs include an operating hour limit of 500 hours/year. For non-emergency generators, there is no operating hour limit.
- Other requirements: Some state permit programs include unit capacity limits (in hp, million British thermal units (MMBtu)/hour, or kilowatt (KW)) and/or stack height requirements.

In addition, all of the state general permits reviewed incorporate the requirements of NSPS, Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines), NSPS, Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines), and NESHAP, Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutant for Reciprocating Internal Combustion Engines).

4. Requirements for General Permit

4.1 Documents for General Permit

The EPA developed a standardized set of permit documents in support of a general permit for engine sources. These consist of the following documents:

- Questionnaire: Assists the facility owner or operator in determining whether they are eligible for a General Air Quality Permit;
- Request for Coverage under the General Air Quality Permit: States the criteria for qualification, gathers information on the source, facility location, and source contact, and requests technical information on facility equipment, throughput, and attainment status;

- Instructions: Guides the applicant in filling out the Request for Coverage under the General Air Quality Permit;
- General Air Quality Permit, Terms and Conditions: Contains the requirements and regulations with which the source must comply. The emission limitations, monitoring, recordkeeping and reporting requirements are in the permit, including requirements for sources located in nonattainment areas; and
- Potential to Emit (PTE) Calculator Spreadsheet: Allows applicants to calculate their PTE, based on owner inputs of the specific equipment present at their source, assuming continuous operation throughout the year. The PTE Calculator spreadsheet generates potential emissions, based on these inputs. The spreadsheet illustrates the correlation between equipment, raw material throughput, and emissions.

4.2 Exemption and Qualification for General Permits

Facilities applying for the proposed general permit must meet the following criteria:

- Must be a true minor NSR source; and
- Be below the emissions limitations established for the general permit.

Facilities with a PTE lower than the minor NSR thresholds specified in Table 1 of Indian Country Minor NSR rule (40 CFR 49.153) are exempt from the minor NSR program. The exemption thresholds for PM and criteria pollutants are listed in Table 1 below. Facilities applying for the proposed general permit will be required to calculate their PTE and may use the PTE calculator provided to determine if they are exempt from the minor NSR program.

Table 1: Minor NSR Thresholds in 40 CFR 49.153

Pollutant	Attainment Area	Nonattainment Area
CO	10 tpy	5 tpy
PM	10 tpy	5 tpy
PM ₁₀	5 tpy	1 tpy
PM _{2.5}	3 tpy	0.6 tpy
SO ₂	10 tpy	5 tpy
NO _x	10 tpy	5 tpy
VOC	5 tpy	2 tpy

Under current EPA policy, only true NSR minor sources qualify for the proposed general permit. Therefore, facilities will be required to compare their PTE to the NSR major source thresholds to determine if they qualify for the proposed general permit. The NSR major source threshold for attainment areas is 250 tpy for any criteria pollutant. The NSR major source thresholds for nonattainment areas are summarized in Table 2 below:

Table 2: NSR Major Source Thresholds for Nonattainment Areas

Pollutant	Nonattainment Classification	NSR Major Source Threshold
Ozone	Marginal	100 tpy of VOC or NO _x
	Moderate	100 tpy of VOC or NO _x

Pollutant	Nonattainment Classification	NSR Major Source Threshold
	Serious	50 tpy of VOC or NO _x
	Severe	25 tpy of VOC or NO _x
	Extreme	10 tpy of VOC or NO _x
PM ₁₀	Moderate	100 tpy
	Serious	70 tpy
CO	Moderate	100 tpy
	Serious	50 tpy
SO ₂ , NO _x , PM _{2.5}	No nonattainment classification	100 tpy

If the facility's PTE is above the NSR major source threshold of 250 tpy, or above the applicable nonattainment area thresholds listed in Table 2 (for any pollutant), then the facility does not qualify for the proposed general permit. The following documents are available to assist sources in the screening and application process:

- Questionnaire; and
- Request for Coverage under the General Air Quality Permit.

The questionnaire and the application for the engines permits contain questions designed to limit the availability of this general permit to true minor source engines. For facilities not exempt from the minor NSR program and having a PTE below the NSR major source thresholds, the facilities will further evaluate if they can meet the throughput limits and operating requirements established in this general permit. The specific requirements for the proposed general permit are discussed in Sections 4.3, 4.4, 4.5, and 4.6. Section 5 provides background on the surrogate emissions limitations provided in the proposed engines general permit.

4.3 Specific Permit Requirements for General Permits

The terms and conditions of the proposed general permit were established according to the required permit content and analyses in the Indian Country Minor NSR rule. The required permit content is listed in 40 CFR 49.155(a) – *What information must my permit include?* Below we describe the basis for the permit conditions.

40 CFR 49.155(a)(1) – General Requirements

The rule establishes general requirements that each permit must identify: the effective date of the permit; the date by which the owner/operator must commence construction in order for the permit to remain valid; the emission units subject to the permit and their associated emission limitations; and monitoring, recordkeeping, and reporting requirements to assure compliance with the emission limitations.

The proposed general permit contains all of this required information, except for the emission units subject to the permit. Because of the nature of general permits we believe it is more appropriate to identify the emission units covered by the general permit in the Approval of the Request for Coverage. The general permit incorporates the Approval of the Request for Coverage into the general permit. Each permit contains a separate section that specifically identifies the emission limitations and standards, monitoring and testing, recordkeeping, and reporting and notification requirements.

40 CFR 49.155(a)(2) – Emission Limitations

The permit must contain the emission limitations determined by the reviewing authority under 40 CFR 49.154(c) for each affected emissions unit. 40 CFR 49.154(c) – *How will the reviewing authority determine the emission limitations that will be required in my permit?* – identifies the case-by-case control technology review that must be used by the reviewing authority to determine the appropriate level of control. In carrying out the case-by-case control technology review, the reviewing authority must consider the following factors:

1. Local air quality conditions;
2. Typical control technology or other emission reduction measures used by similar sources in surrounding areas;
3. Anticipated economic growth in the area; and
4. Cost-effective emission reduction alternatives.

In addition, the reviewing authority must require a numerical limit on the quantity, rate or concentration of emissions for each regulated NSR pollutant emitted by each affected emissions unit, for which such a limit is technically feasible. The emission limitation required may also be included as pollution prevention techniques, design standards, equipment standards, work practices, operational standards or any combination thereof. However, the emission limitations must assure that each affected emission unit will comply with all requirements of 40 CFR parts 60, 61, and 63, as well as any federal or tribal implementation plans that apply to the unit. Finally, the emission limitations required may not rely on a stack height that exceeds good engineering practice or any other dispersion technique, except as allowed by 40 CFR 51.118(b).

To address the requirements for establishing emission limitations, the following considerations were used for setting the limits in the proposed general permit for engines:

1. Local air quality conditions – To address this requirement, the proposed general permits include more stringent engine capacity limits in nonattainment areas because limiting capacity results in sufficient reductions in potential emissions to ensure sources would still be below the major source thresholds. In addition, the CI general permit for engines is not available to sources in extreme or severe ozone nonattainment areas. The SI general permit for engines is not available to sources in serious CO nonattainment areas. The restrictions on capacity in such areas are necessary to keep emissions below major source levels would likely not make the general permits useful to owners/operators. Such facilities will need to obtain site-specific permits.
2. Typical control technology or other emission reduction measures used by similar sources in surrounding areas – For sources locating in attainment areas the EPA looked at the control requirements specified by 40 CFR parts 60, 61 and 63. These regulations establish minimum technology and emission limitations that must be met nationally and also meet the requirements of 40 CFR 49.154(c)(4) to ensure compliance with parts 60, 61, and 63. For this proposed general permit the EPA considered regulations that apply to engines:
 - a. NSPS, Subpart JJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines;
 - b. 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines;

- c. 40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines;
- d. 40 CFR 89 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines;
- e. 40 CFR 90 – Control of Emissions from Nonroad Spark-Ignition Engines at or Below 19 Kilowatts;
- f. 40 CFR 1039 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines;
- g. 40 CFR 1048—Control of Emissions from New, Large Nonroad Spark-Ignition Engines; and
- h. 40 CFR 1054 – Control of Emissions from New, Small Nonroad Spark-Ignition Engines and Equipment.

The General Terms and Conditions in the general permit are a standardized set of boilerplate conditions included with the general permits. The conditions in the Specific Terms and Conditions section of the general permit are developed from the NSR Rule, NSPS, NESHAP, and the state permit examples.

The derivation of the surrogate emissions limitations in the general permit are discussed in Section 5. The minor NSR thresholds are based on provisions of the *Review of New Sources and Modifications in Indian Country* rule at 40 CFR 49.153 and are provided in Table 1.

Under the proposed permit for CI internal combustion engines, each affected non-emergency CI engine, excluding nonroad mobile engines, must comply with the following limitations and standards:

- a. If using distillate fuel, use diesel or biodiesel containing no more than 15 ppm (parts per million) (0.0015 percent) sulfur; and
- b. Each engine shall be model year 2014 or later and certified by the manufacturer to the applicable standards in 40 CFR 1039.101 through 1039.104, for all pollutants, for the same model year and maximum engine power.

The proposed permit for CI internal combustion engines does not allow for the installation of non-emergency engines that do not meet Tier 4 standards. Tier 4 standards require certain non-emergency engines to be equipped with add-on controls for CO and NO_x (and certified by the manufacturer to more stringent standards than previous model year engines).

Non-emergency SI engines must meet certain standards provided in the permit based on the engine type, maximum engine power rating, and date of manufacture. The proposed permit for SI internal combustion engines does not allow for the installation of non-emergency engines that do not meet the most stringent standards in the NSPS for non-emergency engines manufactured after 2010 or 2011, depending on engine size.

The proposed permits for CI and SI engines allow for emergency engines to be either spark or CI engines. Each permit requires that each affected emergency engine shall:

- a. Be equipped with a non-resettable hour meter;
- b. If using distillate fuel oil, use diesel or biodiesel containing no more than 15 ppm

- (0.0015 percent) sulfur;
- c. Meet the following certification requirements for CI emergency engines:
 - i. For model year 2006 and later engines, the engine shall be certified to the applicable standards in 40 CFR part 89;
 - d. Meet the following certification requirements for SI emergency engines manufactured on or after January 1, 2009:
 - i. Engines greater than 50 hp and less than 130 hp shall be certified to the Phase I standards in 40 CFR 90.103;
 - ii. Engines greater than or equal to 130 hp shall be certified to the standards in 40 CFR 1048;
 - iii. All other SI emergency engines greater than 25 hp shall meet the standards for emergency engines in Table 1 to 40 CFR Subpart JJJ; and
 - e. If not required to be certified to the standards in conditions c. or d. above:
 - i. Follow the manufacturer's emission-related operation and maintenance instructions or develop your own maintenance plan which must provide, to the extent practicable, for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions;
 - ii. Change oil and filter and inspect every hose and belt every 500 hours of operation or annually, whichever comes first; and
 - iii. Inspect air cleaner or spark plugs, as applicable, every 1,000 hours of operation, or annually, whichever comes first.
3. Anticipated economic growth in the area – The Reviewing Authority may consider anticipated economic growth when determining whether coverage under the general permit is justifiable. Considering, however, that the general permit sets emission standards that are consistent with what is required for engines across the country in both attainment and non-attainment areas, we expect that this will rarely be a factor.
4. Cost-effective emission reduction alternatives – The general permit sets emission standards that are consistent with what is required for engines across the country. As such, the chosen technologies are considered widely available and consideration of more cost-effective alternatives is not necessary at this time. We intend to periodically review technology costs in the future to determine when more stringent, cost-effective technologies become widely available.

40 CFR 49.155(a)(3) – Monitoring Requirements

The proposed general permit must include monitoring that is sufficient to assure compliance with the emission limitations that apply to the source. For CI engines, the proposed general permit requires: (1) monitoring of fuel use and (2) performance testing for emergency engines that are not certified by the manufacturer. For SI engines, the proposed permit requires: (1) monitoring of fuel use, (2) maintaining any air-to-fuel ratio controller, and (3) performance testing for certain engines that are not certified by the manufacturer

40 CFR 49.155(a)(4) – Recordkeeping Requirements

The proposed general permit must include recordkeeping that is sufficient to assure compliance with the emission limitations and monitoring requirements, including certain statements listed in 40 CFR

49.155(a)(4)(i) and (ii). In addition to the recordkeeping requirements in 40 CFR 49.155(a)(4)(i), under the general permit for CI engines the permittee must maintain records of: (1) the amount of fuel used each month for each engine; (2) for each fuel shipment, fuel supplier certification showing the sulfur content of fuel; (3) for each engine required to be certified or using certification, documentation from the manufacturer that each engine is certified to the applicable standards; (4) the maintenance plan for each engine, including all maintenance activities conducted on a monthly basis; and (5) for emergency engines, maintain a log of the hours of operation, including the date, time, duration, and reason(s) for use. In addition, the results of each performance test must be recorded.

Under the general permit for SI engines, the permittee must maintain records of: (1) the amount of fuel used each month; (2) for each engine required to be certified or using certification, documentation from the manufacturer that each engine is certified to the applicable standards; (3) the maintenance plan for each engine, including all maintenance activities conducted on a monthly basis; and (4) the hours of operation and reason for operation for each emergency engine, on a monthly basis. In addition, the results of each performance test must be recorded.

40 CFR 49.155(a)(5) – Reporting Requirements

The proposed general permit includes the reporting requirements listed in 40 CFR 49.1559(a)(5)(i) and (ii) related to annual reports and reporting of deviations.

40 CFR 49.155(a)(6) – Severability Clause

The proposed general permit includes a severability clause to ensure the continued validity of the other portions of the permit in the event of a challenge to a portion of the permit. This condition is found in the General Provisions of the proposed general permit.

40 CFR 49.155(a)(7) – Additional Provisions

The proposed general permit contains the additional provision required for each permit. These conditions are found in the General Provisions of the proposed general permit.

The questionnaire and the application for the engines permits contain questions designed to limit the availability of this general permit to engines that are stand alone and are not located at sources for which the EPA has also issued a general permit.

4.4 Requirements for Sources Located in Nonattainment Areas

The CI general permit for engines is not available to sources in extreme or severe ozone nonattainment areas. The SI general permit for engines is not available to sources in serious CO nonattainment areas.

4.4 Additional Permit Requirements

The proposed general permits require engines to locate at least 150 feet from the nearest property boundary and 1,000 feet from the nearest residence.

4.6 Requirements of the Endangered Species Act and National Historic Preservation Act

Prior to seeking coverage under this general permit, sources must satisfactorily address the permitting requirements related to the Endangered Species Act and National Historic Preservation Act. Attached to the request for coverage document for the engines general permit, the EPA provides guidance to assist sources in complying with these two statutes.

5. Emission Limitations⁹ and Surrogate Throughput Limits

5.1 Developing the Surrogate Limits and Limitations

Capacity limits as surrogate emissions limitations were established to ensure emissions from sources of engines stay below the thresholds for the major NSR and Title V permitting programs. The emission threshold for sources located in attainment areas is 100 tpy, which is also the threshold for the Title V operating permit program. The emissions thresholds for facilities located in nonattainment areas are set at the thresholds in Table 2 for each pollutant and nonattainment status, which serve as the thresholds for both the major NSR and Title V permitting programs.

In general, internal combustion engines emit a multitude of pollutants, but generally CI engines emit NO_x at levels high enough to make NO_x a controlling pollutant of concern. Generally, SI engines emit CO at levels high enough to make CO a controlling pollutant of concern. For these reasons, we found it necessary to establish capacity limits as surrogate emissions limitations for the engines that are part of a stationary source that correspond to the emissions rates for CO and NO_x, as applicable, in Table 3. Because the major source threshold for NO_x is lower in serious and above ozone nonattainment areas, we found it necessary to establish a lower capacity limit for CI engines at stationary sources in serious ozone nonattainment areas. We are not making the CI general permit available for severe and extreme ozone nonattainment areas. Hence, we are not providing emission rates for severe and extreme ozone nonattainment areas.

For SI engines the capacity limits ensure emissions are below the major source thresholds in all ozone nonattainment areas, since the controlling pollutant is CO. The capacity limits as surrogate emissions limitations do not apply to nonroad engines, such as engines that operate mobile equipment (e.g., trucks and loaders) and portable engines that remain at one location for less than 12 months.

Table 3: Emission Rates used to Determine Emission Limitations for Facilities with Engines

Pollutant of Concern	Attainment, Unclassifiable or Attainment/ Unclassifiable Areas	Nonattainment Areas
NO _x	100 tpy	100 tpy (marginal and moderate ozone areas)
		50 tpy (serious ozone areas)
CO	100 tpy	100 tpy (moderate areas)

⁹ The definition of emission limitation used in this background document is the one provided in the Indian Country Minor NSR rule (described in Section 4.3) and includes requirements established by the reviewing authority that relate to the operation of a source, which allows for the use of production throughput limits.

The proposed general permits include the capacity limits listed in Tables 4 and 5 below for the CI engines and SI engines permits, respectively. The capacity limits are set at levels intended to keep the source's emissions below the emissions rates in Table 3 (NO_x and CO are the controlling pollutants; the capacity limit calculations are provided in Attachment C).

Table 4: Surrogate Capacity Limits for Internal Combustion Engines General Permit (CI)

Capacity Limit	Serious Ozone Nonattainment Areas	Other Areas
Capacity limits for engines and emergency engines	1100 hp for non-emergency engines 750 hp for emergency engines	Option 1: 3800 hp for all non-emergency engines and 1000 hp for all emergency engines; ¹⁰ Option 2: 1900 hp for all non-emergency engines and 2500 hp for all emergency engines

Table 5: Surrogate Capacity Limits for Internal Combustion Engines General Permit (SI)

Capacity Limit	All Areas
Capacity limits for engines and emergency engines	1750 hp for all non-emergency engines 800 hp for all emergency engines

5.2 Emission Limitations

Three considerations form the basis for the emission limitations for the general permit:

1. Are there any EPA regulation-based emission limitations?
2. What do actual emissions data from the 2011 National Emissions Inventory (NEI)¹¹ indicate about the size profile of the source category?
3. Where do state programs establish eligibility limits?

¹⁰ This option is only available when a particular permitted source has non-emergency engines that are all rated greater than 75 hp and any non-emergency engine over 750 hp is equipped with a generator set.

¹¹ For more information, go to: <http://www.epa.gov/ttnchie1/net/2011inventory.html>.

5.2.1 EPA Regulation-Based Emissions Limitations

Facilities in attainment areas with criteria pollutant emissions greater than 100 tpy are subject to Title V operating permit programs. This general permit is not intended to cover Title V major sources. Therefore, the emissions limitations included in the proposed permit are based on the Title V major source threshold of 100 tpy for each criteria pollutant for engines subject to these general permits and located in attainment areas. For facilities located in nonattainment areas, this general permit is not intended to cover NSR major sources. The NSR major source thresholds vary depending on the classification of the nonattainment areas and are provided in Table 2.

5.2.2 Analysis of NEI Data

The EPA analyzed 2011 NEI data for certain types of existing facilities across the entire U.S. that have engines to evaluate the emission limitations established in the general permit. Although the NEI does not include potential emissions information for sources in Indian country, it reflects the actual emissions from facilities with engines in 50 states. In order to analyze facilities whose emissions are similar to those for sources potentially subject to the Indian Country Minor NSR rule, the EPA selected facilities for analysis with the North American Industry Classification System (NAICS) codes listed in Table 6. For sources with these NAICS codes, the EPA selected actual emissions¹² within the ranges listed in Table 7.

Table 6: NAICS Codes Selected for Engines

NAICS Code	Description
2211**	Electric Power Generation, Transmission or Distribution
622110	Medical and Surgical Hospitals

Table 7: Emission Ranges Selected for Facilities with Engines

Criteria Pollutants	NO _x	CO
	Attainment Area	
Min. Emissions (tpy)	10	10
Max. Emissions (tpy)	250	250
Nonattainment Area		
Min. Emissions (tpy)	5	5
Max. Emissions (tpy)	250	250

The EPA analyzed the emissions rates listed in Table 5 that were used to establish the surrogate throughput emissions limitations and selected the facilities with emission levels similar to the facilities potentially subject to the NSR minor program, i.e., the facilities with emissions greater than the minor NSR applicability thresholds in Table 1 of 40 CFR 49.153 ([Indian Country Minor NSR rule](#)) and less than the PSD major source threshold of 250 tpy. For purposes of this analysis, facilities located in nonattainment areas are defined as facilities located in counties that are designated nonattainment for the pollutant being analyzed.

With the NAICS codes listed in Table 6 and the emission ranges defined in Table 7, the EPA identified sources of engines located in attainment and nonattainment areas for NO_x and CO. The EPA is providing

¹² Only point source NEI data were used for this analysis. The point source inventory does not include emissions from nonroad engines.

the number of facilities (and average emissions) under the proposed emissions limitations and above the minor source thresholds.

Table 8: Number of Facilities and Average Emissions for Facilities with Engines Selected

Criteria Pollutants	Number of Facilities
Attainment Areas	
CO	
Facilities > 10 tpy and < 100 tpy	596 (22% of facilities covered)
Average Emissions (tpy)	38
Facilities > 100 tpy and < 250 tpy	245
Average Emissions (tpy)	159
NO_x	
Facilities >10 tpy and < 100 tpy	591 (28% of facilities covered)
Average Emissions (tpy)	38
Facilities > 100 tpy and < 250 tpy	178
Average Emissions (tpy)	156
Nonattainment Areas	
CO (moderate)	
Facilities > 5 tpy and < 100 tpy	133 (17% of facilities covered)
Average Emissions (tpy)	25
Facilities > 100 tpy and < 250 tpy	24
Average Emissions (tpy)	139
NO_x (marginal and moderate)	
Facilities >5 tpy and < 100 tpy	328 (29% of facilities covered)
Average Emissions (tpy)	25
Facilities > 100 tpy and < 250 tpy	60
Average Emissions (tpy)	154
NO_x (serious)	
Facilities >5 tpy and < 50 tpy	5 (36% of facilities covered)
Average Emissions (tpy)	7
Facilities > 50 tpy and < 250 tpy	0
Average Emissions (tpy)	N/A

5.2.3 State Program Limits

The EPA researched similar types of permits developed by the States of Alaska, Arizona, Florida, New Hampshire, New Jersey, Ohio, Pennsylvania, Rhode Island, Virginia, Washington, and West Virginia. The requirements for each state program are summarized in Attachment A. Only the state programs for Arizona, New Jersey, Virginia, and Washington have capacity limits. Arizona limits the capacity of individual CI engines to 3000 hp. New Jersey limits the total capacity of emergency engines to less than 80 MMBtu/hour. Virginia limits the capacity of non-emergency engines in voluntary demand response programs to about 59 MW for CI engines, 61 MW for SI engines and 38 MW for SI engines in nonattainment areas. Virginia limits the capacity of emergency engines to about 24 MW for CI engines and 13 MW for SI engines. Washington limits the capacity of SI emergency engines to 850 hp. .

5.3 Calculating the Capacity Limits

The EPA derived the capacity limits for the engines through back-calculations that yielded emissions at the applicability emission rates listed in Table 3. The capacity limits for non-emergency CI engines are based on the applicable Tier 4 emission standards in 40 CFR 1039 and AP-42 when the NSPS does not establish a limit for a particular pollutant. The capacity limits for non-emergency SI engines are based on the standards in 40 CFR 90, 40 CFR 1054, and Table 1 to 40 CFR 60 Subpart JJJJ, as applicable. AP-42 emission factors were used when the relevant standard did not set an emission standard for a particular pollutant. The capacity limits for emergency engines (SI and CI) are based on AP-42 emission factors. Attachment B contains example calculations showing how capacity limits in Tables 4 and 5 correspond to the emission rates in both ozone attainment and ozone nonattainment areas as shown in Table 3.

References:

40 CFR 49.151 – 40 CFR 49.173, Indian Country Air Quality Planning and Management.

http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr49_main_02.tpl

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

[http://ecfr.gpoaccess.gov/cgi/t/text/text-](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f2c4f71bd50d2a8883adafec36732010&rgn=div6&view=text&node=40:6.0.1.1.1.98&idno=40)

[idx?c=ecfr&sid=f2c4f71bd50d2a8883adafec36732010&rgn=div6&view=text&node=40:6.0.1.1.1.98&idno=40](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f2c4f71bd50d2a8883adafec36732010&rgn=div6&view=text&node=40:6.0.1.1.1.98&idno=40)

40 CFR part 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.

[http://ecfr.gpoaccess.gov/cgi/t/text/text-](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f2c4f71bd50d2a8883adafec36732010&rgn=div6&view=text&node=40:6.0.1.1.1.99&idno=40)

[idx?c=ecfr&sid=f2c4f71bd50d2a8883adafec36732010&rgn=div6&view=text&node=40:6.0.1.1.1.99&idno=40](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f2c4f71bd50d2a8883adafec36732010&rgn=div6&view=text&node=40:6.0.1.1.1.99&idno=40)

40 CFR part 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutant for Reciprocating Internal Combustion Engines (RICE).

[http://ecfr.gpoaccess.gov/cgi/t/text/text-](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div6&view=text&node=40:13.0.1.1.1.1&idno=40)

[idx?c=ecfr&rgn=div6&view=text&node=40:13.0.1.1.1.1&idno=40](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div6&view=text&node=40:13.0.1.1.1.1&idno=40)

AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources.

<http://www.epa.gov/ttn/chief/ap42/index.html>

Federal Register Vol. 76, No. 127, July 1, 2011, Pages 38748-38808, “Review of New Sources and Modifications in Indian Country; Final Rule” (Indian Country NSR Rule).

<https://www.federalregister.gov/articles/2011/07/01/2011-14981/review-of-new-sources-and-modifications-in-indian-country>

Attachment A – Summary of the State Permitting Programs for Engines

State	Permit Type	Emission Limits	Fuel Limit	Operating Hour Limits	Other Requirements	Weblink
AK	General permit for diesel electric generators.	100 tpy < NO _x < 250 tpy.	< 825,000 gallons/year of diesel.	N/A	NSPS, Subpart IIII and NESHAP, Subpart ZZZZ.	http://dec.alaska.gov/air/ap/genperm.htm
AZ	General permit for generators.	CO < 90 tpy; NO _x < 90 tpy; and VOC < 90 tpy.	N/A	N/A	Each unit < 3,000 hp; stack height requirements; NSPS, Subpart IIII; NSPS, Subpart JJJJ; and NESHAP, Subpart ZZZZ.	http://www.azdeq.gov/funcion/forms/appsair.html#source
FL	General permits for reciprocating internal combustion engines.	NO _x < 100 tpy and HAP < 10/25 tpy.	< 20,000 gallons/year of gasoline; < 250,000 gallons/year of diesel; < 1.15 million gallons/year of propane; and < 40 MMcf/year of natural gas.	N/A	NSPS, Subpart IIII NSPS, Subpart JJJJ NESHAP, Subpart ZZZZ	http://www.dep.state.fl.us/air/emission/air_gp.htm
NH	General permit for emergency generators.	PM ₁₀ < 100 tpy; NO _x < 50 tpy; CO < 100 tpy; VOC < 50 tpy; and SO ₂ < 100 tpy.	N/A	< 500 hours/year.	NSPS, Subpart IIII.	http://des.nh.gov/organization/divisions/air/pehb/apps/permits.htm
NJ	General permit for emergency generator.	NO _x < 5 tpy.	No. 2 fuel, diesel, kerosene, natural gas-fired units only; and Sulfur content limits for fuels.	Various operating hour limits based on the size of engines.	Total capacity < 80 MMBtu/hour.	http://www.state.nj.us/dep/aqpp/gp1list.htm
NJ	General permit for SI engines.	NO _x < 10 tpy; CO < 33.3 tpy; and VOC < 10 tpy.	For natural gas- and propane-fired units only.	N/A	Total capacity < 65 MMBtu/hour; Stack height requirements; and NSPS, Subpart JJJJ.	http://www.state.nj.us/dep/aqpp/gp1list.htm

State	Permit Type	Emission Limits	Fuel Limit	Operating Hour Limits	Other Requirements	Weblink
OH	General permit for portable CI diesel engines.	NO _x < 74 tpy; CO < 32.5 tpy; and VOC < 12.33 tpy.	< 500,000 gallons/year and Sulfur content limits.	Various operating hour limits based on the size of engines.	NSPS, Subpart IIII.	http://www.epa.state.oh.us/dapc/genpermit/ciice.aspx
PA	General permit for diesel/no. 2 fuel engines.	NO _x < 90 tpy and NO _x < 22.5 tpy for ozone nonattainment areas	Sulfur content limits.	Various operating hour limits based on the size and the location of engines.	Stack testing requirements.	http://www.dep.state.pa.us/dep/deputate/airwaste/aq/permits/gp.htm
RI	General permit for distributed generators.	PTE < PSD major source thresholds.	N/A	N/A	Compliance with all applicable state regulations.	http://www.dem.ri.gov/pubs/forms.htm#air
RI	General permit for emergency generators.	PTE < PSD major source thresholds.	N/A	N/A	Compliance with all applicable state regulations.	http://www.dem.ri.gov/pubs/forms.htm#air
VA	General permit for voluntary demand response generators.	CO < 100 tpy; NO _x < 40 tpy (attainment); and NO _x < 25 tpy (nonattainment).	< 502,766 gallons/year of diesel; < 554,230 gallons/year of biodiesel fuel; sulfur content limits and heat content limits.	N/A	CI Capacity < 58,886 KW; SI Capacity < 60,970 KW (attainment); and SI Capacity < 37,750 KW (nonattainment).	http://www.deq.state.va.us/Programs/Air/PermittingCompliance/Permitting/TypesofAirPermits.aspx
VA	General permit for emergency generators.	CO < 77 tpy; NO _x < 40 tpy (attainment); CO < 50 tpy; and NO _x < 25 tpy (nonattainment).	Sulfur content limits and heat content limits.	< 500 hours/year.	SI Capacity < 23,535 KW (attainment) and SI Capacity < 13,115 KW (nonattainment).	http://www.deq.state.va.us/Programs/Air/PermittingCompliance/Permitting/TypesofAirPermits.aspx
WA	General order for gas powered emergency generators.	N/A	Fuel: natural gas and propane.	< 500 hours/year.	SI Capacity < 850 hp; Stack height requirement; NSPS, Subpart IIII; and NESHAP, Subpart ZZZZ.	http://www.ecy.wa.gov/programs/air/AOP/Permits/Boiler/GeneralOrders.htm

State	Permit Type	Emission Limits	Fuel Limit	Operating Hour Limits	Other Requirements	Weblink
WV	General permit for emergency generators.	CO < 10 tpy; NO _x < 10 tpy; SO ₂ < 10 tpy; VOC < 10 tpy; and PM < 10 tpy (attainment).	N/A	< 500 hours/year.	NSPS, Subpart IIII; NSPS, Subpart JJJJ; and NESHAP, Subpart ZZZZ.	http://www.dep.wv.gov/daq/permitting/Pages/airgeneralpermit.aspx

Attachment B

Emissions Calculations for Capacity Limits

SI Capacity Limits: 1750 hp for non-emergency engines and 800 hp for emergency engines

- CO is the pollutant of concern for SI engines;
- According to the emission factors in the applicable NSPS requirements, the CO emission factor of 6.7 g/kW-hour for landfill/digester gas represents the worst-case fuel for non-emergency SI engines;
- For emergency engines, the AP-42 emission factor of 5.57 lb/MMBtu CO (23.72 g/kW-hour) was used – applicable to lean burn natural gas or LPG engines; and
- For natural gas auxiliary heaters, the AP-42 emission factor of 100 lb/MMscf CO.

CO Emissions from Non-Emergency SI Engines

$$\begin{aligned} &= \text{capacity (hp)} \times \text{emission factor} \times 8760 \text{ (hours/year)} \times 1 \text{ ton}/2000 \text{ lb} \\ &= 1750 \text{ hp} \times 0.7457 \text{ kW/hp} \times 6.7 \text{ g CO/kW-hour} \times 1 \text{ lb}/453.5928 \text{ g} \times 8760 \text{ hour/year} \times \\ &\quad 1 \text{ ton}/2000 \text{ lbs} \\ &= 84.5 \text{ tpy} \end{aligned}$$

CO Emissions from Emergency Engines

$$\begin{aligned} &= \text{capacity (hp)} \times \text{emission factor} \times 8760 \text{ (hours/year)} \times 1 \text{ ton}/2000 \text{ lb} \\ &= 800 \text{ hp} \times 0.7457 \text{ kW/hp} \times 23.72 \text{ g/kW-hour} \times 1 \text{ lb}/453.5928 \text{ g} \times 8760 \text{ hour/year} \times \\ &\quad 1 \text{ ton}/2000 \text{ lbs} \\ &= 7.80 \text{ tpy} \end{aligned}$$

CO Emissions from Natural Gas Auxiliary Heaters

$$\begin{aligned} &= \text{capacity (MMBtu/hour)} \times \text{emission factor} \times \text{heat content of fuel} \times 8760 \text{ (hours/year)} \times \\ &\quad 1 \text{ ton}/2000 \text{ lb} \\ &= 10 \text{ MMBtu/hour} \times 100 \text{ lb/MMscf} \times 1 \text{ scf}/1020 \text{ Btu} \times 8760 \text{ hour/year} \times 1 \text{ ton}/2000 \text{ lbs} \\ &= 4.3 \text{ tpy} \end{aligned}$$

Total CO Emissions = 96.6 tpy (<100 tpy, the CO emission threshold for attainment areas)

CI Capacity Limits: 1900 hp for non-emergency engines and 2500 hp for emergency engines

- Assume engines meet the requirements for Option 2 identified in Table 4 (the same calculation process was used for Option 1, but used different emission factors based on the applicable NSPS emission limits for generator sets);
- CO is the pollutant of concern for CI engines;

- According to the emission factors in the applicable NSPS requirements, the CO emission factor of 5 g/kW-hour for diesel engines less than 75 hp represents the worst-case emission factor for non-emergency CI engines;
- For emergency engines, the AP-42 emission factor of 5.57 lb/MMBtu CO (23.72 g/kW-hour) was used (applicable to lean burn natural gas or LPG engines); and
- For natural gas auxiliary heaters, the AP-42 emission factor of 100 lb/MMscf CO.

CO Emissions from Non-Emergency Ci Engines

$$\begin{aligned}
 &= \text{capacity (hp)} \times \text{emission factor} \times 8760 \text{ (hours/year)} \times 1 \text{ ton}/2000 \text{ lb} \\
 &= 1900 \text{ hp} \times 0.7457 \text{ kW/hp} \times 5 \text{ g CO/kW-hour} \times 1 \text{ lb}/453.5928 \text{ g} \times 8760 \text{ hour/year} \times 1 \text{ ton}/2000 \text{ lbs} \\
 &= 68.4 \text{ tpy}
 \end{aligned}$$

CO Emissions from Emergency Engines

$$\begin{aligned}
 &= \text{capacity (hp)} \times \text{emission factor} \times 8760 \text{ (hours/year)} \times 1 \text{ ton}/2000 \text{ lb} \\
 &= 2500 \text{ hp} \times 0.7457 \text{ kW/hp} \times 23.72 \text{ g/kW-hour} \times 1 \text{ lb}/453.5928 \text{ g} \times 8760 \text{ hour/year} \times 1 \text{ ton}/2000 \text{ lbs} \\
 &= 24.4 \text{ tpy}
 \end{aligned}$$

CO Emissions from Natural Gas Auxiliary Heaters

$$\begin{aligned}
 &= \text{capacity (MMBtu/hour)} \times \text{emission factor} \times \text{heat content of fuel} \times 8760 \text{ (hours/year)} \times \\
 &\quad 1 \text{ ton}/2000 \text{ lbs} \\
 &= 10 \text{ MMBtu/hour} \times 100 \text{ lb/MMscf} \times 1 \text{ scf}/1020 \text{ Btu} \times 8760 \text{ hour/year} \times 1 \text{ ton}/2000 \text{ lb} \\
 &= 4.3 \text{ tpy}
 \end{aligned}$$

Total CO Emissions = 97.1 tpy (<100 tpy the CO emission threshold for attainment areas)