



# United States Environmental Protection Agency General Air Quality 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 Minor Source Compression Ignition Engines and Spark Ignition Engines in Indian Country

Version 1.0

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### 1. Engines Source Category Definition

Engines covered by these General Permits<sup>1</sup> 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 nonroad<sup>2</sup> 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 cover non-emergency stationary ICE.<sup>3,4</sup>

This source category does not cover the manufacturers of engines. The General Air Quality Permits for New or Modified Minor Source Compression Ignition Engines and Spark Ignition Engines in Indian Country only cover engines that are located at 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 engine and are typically diesel engines where the heat generated from compression is enough to initiate the combustion process, without needing any external spark.<sup>5</sup>

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<sup>1</sup> The EPA is making available two General Permits for internal combustion engines: one for SI ICE and one for CI ICE.

<sup>2</sup> 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.

<sup>3</sup> This General Permit does not include requirements for emergency generator engines. However, sources can qualify for the General Permit with "exempt" emergency generator engines present at sources pursuant to section 49.153(c) of the Federal Indian Country Minor NSR rule. Under the Federal Indian Country Minor NSR rule, emergency generator engines are "exempt" provided the combined maximum engine power of all emergency generator engines at the permitted source is below 1,000 hp in attainment areas or 500 hp in ozone nonattainment areas classified as serious or lower. There are no exemptions for emergency engines located in ozone nonattainment areas classified as severe or extreme, therefore your source does not qualify for the General Permit if it contains an emergency engine and is located in a severe or extreme ozone nonattainment area.

<sup>4</sup> The definition for stationary engines is adopted from the definition in 40 CFR 60.4219.

<sup>5</sup> The definitions for SI and CI engines are adopted from the definitions in 40 CFR 60.4219.

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.<sup>6</sup> 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.<sup>7</sup>

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.<sup>8</sup>

The primary criteria pollutants from engines are oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), and volatile organic compounds (VOC). The formation of NO<sub>x</sub> 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 (SO<sub>2</sub>), 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.<sup>9</sup>

### **3. State Minor Source Permit Programs**

The U.S. Environmental Protection Agency (EPA) researched state government websites for examples of general permits for these source categories 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 permits or general orders) for engines or generators: Alaska, Arizona, Florida, New Hampshire, New Jersey, Ohio, Pennsylvania, Rhode Island, Virginia, Washington, and West Virginia. The requirements for the state permitting programs

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<sup>6</sup> AP-42, Chapter 3.2 – Natural Gas-fired Reciprocating Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

<sup>7</sup> AP-42, Chapter 3.3 – Gasoline and Diesel Industrial Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

<sup>8</sup> AP-42, Chapter 3.4 – Large Stationary Diesel and All Stationary Dual-fuel Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

<sup>9</sup> AP-42, Chapter 3.2 – Natural Gas-fired Reciprocating Engines, <http://www.epa.gov/ttn/chief/ap42/ch03/>.

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<sub>x</sub>, and VOC. The emission limits for NO<sub>x</sub> 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 (hrs/yr). 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 (hr), 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 the General Permits for engine sources. These consist of the following documents:

- Questionnaires: Assist the facility owner or operator in determining whether they are eligible for the General Permits;
- Request for Coverage Forms under the General Permits: State the criteria for qualification, gathers information on the source, the facility's actual emissions for those sources undergoing modifications, facility location, and source contact, and requests technical information on facility equipment, throughput, and attainment status;
- Instructions: Guide the applicant in filling out the Request for Coverage Forms for the General Permits;

- **General Permits, Terms and Conditions:** Contain 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 Spreadsheets:** 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 spreadsheets generate potential emissions, based on these inputs. The spreadsheets illustrate the correlation between equipment, raw material throughput, and emissions.

#### 4.2 Exemption and Qualification for General Permits

Facilities applying for the General Permits must meet the emissions limitations established for the General Permits.

New facilities with a PTE (or modifications to existing facilities with an increase in potential emissions) lower than the minor NSR thresholds specified in the provisions of the Federal Indian Country Minor NSR rule at 40 CFR 49.153 are exempt from the minor NSR program. The minor NSR thresholds are listed in Table 1 below. Facilities applying for the General Permit may calculate their PTE using the PTE calculator provided to determine if they are below these thresholds and, thus, exempt from the minor NSR program.

**Table 1: Minor NSR Thresholds in 40 CFR 49.153**

Pollutant	Attainment Area	Nonattainment Area
Carbon Monoxide (CO)	10 tpy	5 tpy
PM	10 tpy	5 tpy
PM <sub>10</sub>	5 tpy	1 tpy
PM <sub>2.5</sub>	3 tpy	0.6 tpy
Sulfur Dioxide (SO <sub>2</sub> )	10 tpy	5 tpy
Nitrogen Oxides (NO <sub>x</sub> )	10 tpy	5 tpy
Volatile Organic Compounds (VOC)	5 tpy	2 tpy

Under current EPA policy, true or synthetic NSR minor sources qualify for the General Permits for engines. Facilities will be required to compare their PTE to the NSR major source thresholds to determine if they qualify for the General Permits for engines. 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 <sub>x</sub>
	Moderate	100 tpy of VOC or NO <sub>x</sub>
	Serious	50 tpy of VOC or NO <sub>x</sub>

Pollutant	Nonattainment Classification	NSR Major Source Threshold
	Severe	25 tpy of VOC or NO <sub>x</sub>
	Extreme	10 tpy of VOC or NO <sub>x</sub>
PM <sub>10</sub>	Moderate	100 tpy
	Serious	70 tpy
CO	Moderate	100 tpy
	Serious	50 tpy
SO <sub>2</sub> , NO <sub>x</sub> , PM <sub>2.5</sub>	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 for which the area in which the source is locating or modifying is designated nonattainment), then the facility does not qualify for the General Permits. Sources that will be synthetic minor sources and relying on the conditions in the General Permits to qualify as minor sources should use the conditions in the permits (such as limits on production and throughput) to determine their PTE and eligibility for the General Permits. However, until coverage under the General Permit is obtained, the source is a major source. The following documents are available to assist sources in the screening and application process:

- Questionnaire;
- Request for Coverage under the General Air Quality Permit;
- Instructions for the Request for Coverage under the General Air Quality Permits; and
- PTE calculator.

The questionnaire and the application for the engines permits contain questions designed to limit the availability of these General Permits to minor source engines that are stand alone and are not located at sources for which the EPA has also issued a general permit. 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 meet the throughput limits and operating requirements established in this General Permit. The specific requirements for the General Permit are discussed in Sections 4.3 and 4.4. The emissions associated with the throughput limits are lower than the NSR major source thresholds and were derived as described below in Section 5.

### 4.3 Specific Permit Requirements for General Permits

The terms and conditions of the General Permits were established according to the required permit content and analyses in the Federal 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 General Permit contains all of this required information, except for the emission units subject to the permit. Because of the nature of general permits, it is more appropriate to identify the emission units covered by the General Permits 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 General Permits for engines:

1. Local air quality conditions – To address this requirement, the 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 these General Permits the EPA considered regulations that apply to engines:

- NSPS, Subpart JJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines;
- 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines;
- 40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines;
- 40 CFR 89 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines;
- 40 CFR 90 – Control of Emissions from Nonroad Spark-Ignition Engines at or Below 19 Kilowatts;
- 40 CFR 1039 – Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines;
- 40 CFR 1048—Control of Emissions from New, Large Nonroad Spark-Ignition Engines; and
- 40 CFR 1054 – Control of Emissions from New, Small Nonroad Spark-Ignition Engines and Equipment.

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

The derivation of the surrogate emissions limitations in the General Permits 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 permit for CI internal combustion engines, each affected non-emergency CI engine, excluding nonroad mobile engines, must comply with the following limitations and standards:

- If using distillate fuel, use diesel or biodiesel containing no more than 15 ppm (parts per million) (0.0015 percent) sulfur; and
- 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 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<sub>x</sub> (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 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.

3. Anticipated economic growth in the area – The Reviewing Authority may consider anticipated economic growth when determining whether coverage under the General Permits is justifiable. Considering, however, that the General Permits set emission standards that are consistent with what is required of engines across the country in both attainment and nonattainment areas, we expect that this will rarely be a factor.
4. Cost-effective emission reduction alternatives – The General Permits set 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. The EPA 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 and Testing Requirements

The General Permits must include monitoring that is sufficient to assure compliance with the emission limitations that apply to the source. For CI engines, the General Permits requires monitoring of fuel use. For SI engines, the 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 General Permits 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; and (4) the maintenance plan for each engine, including all maintenance activities conducted on a monthly basis. 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; and (3) the maintenance plan for each engine, including all maintenance activities conducted on a monthly basis. In addition, the results of each performance test must be recorded.

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

The General Permits include 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 General Permits 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 General Permits.



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

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

### **4.3.1 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 Information on Completing Screening Processes that Have to Be Satisfied to Request Coverage under the General Permits**

Prior to obtaining coverage under this General Permit, owners and operators must satisfactorily complete the screening processes for their source that are specified for threatened or endangered species and historic properties. Appendices A and B to the Request for Coverage contain the EPA's guidance to assist source owners and operators in completing these processes.

## **5. Emission Limitations<sup>10</sup> 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 CO and NO<sub>x</sub> at levels high enough to make CO and NO<sub>x</sub> controlling pollutants of concern. Which one "controls" in which area depends on the classification. 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<sub>x</sub>, as applicable, in Tables 3 and 4 for CI and SI engines, respectively.

Table 5 provides four options of limits for engine size and fuel use for CI engines. Table 6 provides limits for engine size and fuel use for SI engines. For SI engines the capacity and fuel 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 7 provides capacity limits for boilers and heaters present at sources where CI or SI engines are also present. The capacity limits are set at levels intended to keep the

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<sup>10</sup> The definition of emission limitation used in this background document is the one provided in the Federal 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.

source's emissions below the emissions rates in Tables 3 and 4 (NO<sub>x</sub> and CO are the controlling pollutants; the capacity limit calculations are provided in Attachment C).

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

<b>Pollutant of Concern</b>	<b>Attainment, Unclassifiable or Attainment/ Unclassifiable Areas</b>	<b>Nonattainment Areas</b>
CO	98.4 tpy	98.4 tpy
NO <sub>x</sub>	40.6 tpy	35.1 tpy (marginal, moderate and serious areas)
SO <sub>2</sub>	0.2 tpy	0.2 tpy
VOC	5.0 tpy	4.9 tpy (marginal, moderate and serious areas)
PM	1.2 tpy	NA
PM <sub>10</sub>	1.6 tpy	1.6 tpy
PM <sub>2.5</sub>	1.3 tpy	1.3 tpy

**Table 4: Emission Rates used to Determine Emission Limitations for Facilities with SI Engines**

<b>Pollutant of Concern</b>	<b>Attainment, Unclassifiable or Attainment/ Unclassifiable Areas</b>	<b>Nonattainment Area</b>
CO	98.3 tpy	98.3 tpy (moderate areas)
NO <sub>x</sub>	11.1 tpy	5.5 tpy (marginal, moderate and serious areas)
		1.3 tpy (severe and extreme areas)
SO <sub>2</sub>	0.1 tpy	0.1 tpy
VOC	0.3 tpy	0.1 tpy (marginal, moderate and serious areas)
		0.0 tpy (severe and extreme areas)
PM	0.7 tpy	NA
PM <sub>10</sub>	1.1 tpy	1.1 tpy
PM <sub>2.5</sub>	0.8 tpy	0.8 tpy

**Table 5: Surrogate Capacity and Fuel Limits for Compression Ignition  
Internal Combustion Engines General Permit**

	<b>Engine Size Limit</b>	<b>Combined Engine Power Limit</b>	<b>Fuel Use Limit</b>
<b>Non-Emergency (Prime) Engines with Generator Sets:</b>			
<i>Option 1 (attainment, unclassifiable, attainment/unclassifiable and marginal, moderate and serious ozone nonattainment areas)</i>			
Each non-emergency engine	Greater than 751 hp	3,450 hp	NA
<i>Option 2 (attainment, unclassifiable, attainment/unclassifiable and marginal, moderate and serious ozone nonattainment areas)</i>			
Each non-emergency engine	Greater than 751 hp	NA	1,650,000 gallons in any 12-month period*
<b>Non-Emergency (Prime) Engines With or Without generator sets:</b>			
<i>Option 3 (attainment, unclassifiable, attainment/unclassifiable and marginal and moderate ozone nonattainment areas)</i>			
Each non-emergency engine	Greater than 75 hp	1,100 hp	NA
<i>Option 4 (attainment, unclassifiable, attainment/unclassifiable and marginal and moderate ozone nonattainment areas)</i>			
Each non-emergency engine	Greater than 75 hp	NA	525,000 gallons in any 12-month period*
<b>Other Non-Emergency (Prime) Engines (with or without generator sets, no individual size restriction):</b>			
<i>Option 5 (attainment, unclassifiable, attainment/unclassifiable and marginal, moderate and serious ozone nonattainment areas)</i>			
Each non-emergency engine	NA	750 hp	NA
<i>Option 6 (attainment, unclassifiable, attainment/unclassifiable and marginal, moderate and serious ozone nonattainment areas)</i>			
Each non-emergency engine	NA	NA	360,000 gallons in any 12-month period*

\*These fuel limits apply only to synthetic minor sources.

**Table 6: Surrogate Capacity and Fuel Use Limits for Internal Combustion Engines  
General Permit (SI)**

Capacity Limit	Sources in All Areas	Option for Areas with Only Natural Gas Engines
Capacity limits for engines	1,800 hp for all non-emergency engines using any fuels	NA
Capacity limits for engines	NA	3,800 hp for all non-emergency engines
Fuel use limits	NA	275 million standard cubic feet (MMscf) in any 12-month period for natural gas engines*

\*This fuel limit applies only to synthetic minor sources.

**Table 7: Surrogate Capacity Limits for Boilers and Heaters at  
Sources with SI or CI Engines**

Capacity Limit	Attainment, Unclassifiable and Attainment/Unclassifiable Areas	Marginal, Moderate or Serious Ozone Nonattainment Areas	Severe or Extreme Ozone Nonattainment Areas
Capacity limit for boilers and heaters	10 MMBtu/hr	5 MMBtu/hr	2 MMBtu/hr*

\*This limit applies only to the General Permit for Spark Ignition Engines.

Attachment B contains example calculations showing how capacity limits in Tables 4, 5 and 6 correspond to the emission rates in both ozone attainment and ozone nonattainment areas as shown in Table 3.

## 5.2 Emission Limitations

Two considerations form the basis for the emission limitations for the General Permit:

1. Are there any EPA regulation-based emission limitations?
2. Where do state programs establish eligibility limits?

### 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. These General Permits are not intended to cover Title V major sources. Therefore, the emissions limitations included in the 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, these General Permits are 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 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 3,000 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.

**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](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-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-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-idx?c=ecfr&rgn=div6&view=text&node=40:13.0.1.1.1.1&idno=40>

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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 <sub>x</sub> < 250 tpy.	< 825,000 gallons (gal)/yr of diesel.	N/A	NSPS, Subpart IIII and NESHAP, Subpart ZZZZ.	<a href="http://dec.alaska.gov/air/ap/genperm.htm">http://dec.alaska.gov/air/ap/genperm.htm</a>
AZ	General permit for generators.	CO < 90 tpy; NO <sub>x</sub> < 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.	<a href="http://www.azdeq.gov/function/forms/app_sair.html#source">http://www.azdeq.gov/function/forms/app_sair.html#source</a>
FL	General permits for reciprocating internal combustion engines.	NO <sub>x</sub> < 100 tpy and HAP < 10/25 tpy.	< 20,000 gal/yr of gasoline; < 250,000 gal/yr of diesel; < 1.15 million gal/yr of propane; and < 40 MMcf/year of natural gas.	N/A	NSPS, Subpart IIII NSPS, Subpart JJJJ NESHAP, Subpart ZZZZ	<a href="http://www.dep.state.fl.us/air/emission/air_gp.htm">http://www.dep.state.fl.us/air/emission/air_gp.htm</a>
NH	General permit for emergency generators.	PM <sub>10</sub> < 100 tpy; NO <sub>x</sub> < 50 tpy; CO < 100 tpy; VOC < 50 tpy; and SO <sub>2</sub> < 100 tpy.	N/A	< 500 hrs/year.	NSPS, Subpart IIII.	<a href="http://des.nh.gov/organization/divisions/air/pehb/apps/permits.htm">http://des.nh.gov/organization/divisions/air/pehb/apps/permits.htm</a>
NJ	General permit for emergency generator.	NO <sub>x</sub> < 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/hr.	<a href="http://www.state.nj.us/dep/aqpp/gp1list.htm">http://www.state.nj.us/dep/aqpp/gp1list.htm</a>

State	Permit Type	Emission Limits	Fuel Limit	Operating Hour Limits	Other Requirements	Weblink
NJ	General permit for SI engines.	NO <sub>x</sub> < 10 tpy; CO < 33.3 tpy; and VOC < 10 tpy.	For natural gas- and propane-fired units only.	N/A	Total capacity < 65 MMBtu/hr; Stack height requirements; and NSPS, Subpart JJJJ.	<a href="http://www.state.nj.us/dep/aqpp/gp1list.htm">http://www.state.nj.us/dep/aqpp/gp1list.htm</a>
OH	General permit for portable CI diesel engines.	NO <sub>x</sub> < 74 tpy; CO < 32.5 tpy; and VOC < 12.33 tpy.	< 500,000 gal/yr and Sulfur content limits.	Various operating hour limits based on the size of engines.	NSPS, Subpart IIII.	<a href="http://www.epa.state.oh.us/dapc/genpermit/ciice.aspx">http://www.epa.state.oh.us/dapc/genpermit/ciice.aspx</a>
PA	General permit for diesel/no. 2 fuel engines.	NO <sub>x</sub> < 90 tpy and NO <sub>x</sub> < 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.	<a href="http://www.dep.state.pa.us/dep/deputate/airwaste/aq/permits/gp.htm">http://www.dep.state.pa.us/dep/deputate/airwaste/aq/permits/gp.htm</a>
RI	General permit for distributed generators.	PTE < PSD major source thresholds.	N/A	N/A	Compliance with all applicable state regulations.	<a href="http://www.dem.ri.gov/pubs/forms.htm#air">http://www.dem.ri.gov/pubs/forms.htm#air</a>
RI	General permit for emergency generators.	PTE < PSD major source thresholds.	N/A	N/A	Compliance with all applicable state regulations.	<a href="http://www.dem.ri.gov/pubs/forms.htm#air">http://www.dem.ri.gov/pubs/forms.htm#air</a>
VA	General permit for voluntary demand response generators.	CO < 100 tpy; NO <sub>x</sub> < 40 tpy (attainment); and NO <sub>x</sub> < 25 tpy (nonattainment).	< 502,766 gal/yr of diesel; < 554,230 gal/yr 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).	<a href="http://www.deq.state.va.us/Programs/Air/PermittingCompliance/Permitting/TypesofAirPermits.aspx">http://www.deq.state.va.us/Programs/Air/PermittingCompliance/Permitting/TypesofAirPermits.aspx</a>



State	Permit Type	Emission Limits	Fuel Limit	Operating Hour Limits	Other Requirements	Weblink
VA	General permit for emergency generators.	CO < 77 tpy; NO <sub>x</sub> < 40 tpy (attainment); CO < 50 tpy; and NO <sub>x</sub> < 25 tpy (nonattainment).	Sulfur content limits and heat content limits.	< 500 hrs/year.	SI Capacity < 23,535 KW (attainment) and SI Capacity < 13,115 KW (nonattainment).	<a href="http://www.deq.state.va.us/Programs/Air/PermittingCompliance/Permitting/TypesofAirPermits.aspx">http://www.deq.state.va.us/Programs/Air/PermittingCompliance/Permitting/TypesofAirPermits.aspx</a>
WA	General order for gas powered emergency generators.	N/A	Fuel: natural gas and propane.	< 500 hrs/year.	SI Capacity < 850 hp; Stack height requirement; NSPS, Subpart IIII; and NESHAP, Subpart ZZZZ.	<a href="http://www.ecy.wa.gov/programs/air/AOP_Permits/Boiler/GeneralOrders.htm">http://www.ecy.wa.gov/programs/air/AOP_Permits/Boiler/GeneralOrders.htm</a>
WV	General permit for emergency generators.	CO < 10 tpy; NO <sub>x</sub> < 10 tpy; SO <sub>2</sub> < 10 tpy; VOC < 10 tpy; and PM < 10 tpy (attainment).	N/A	< 500 hrs/year.	NSPS, Subpart IIII; NSPS, Subpart JJJJ; and NESHAP, Subpart ZZZZ.	<a href="http://www.dep.wv.gov/dag/permitting/Pages/airgeneralpermit.aspx">http://www.dep.wv.gov/dag/permitting/Pages/airgeneralpermit.aspx</a>

## **Attachment B**

### **Emissions Calculations for Capacity Limits**

**SI Capacity Limits:** 1,800 hp for non-emergency engines; 1,000 hp for emergency generator engines; 10 MMBtu/hr for auxiliary boilers and heaters

- CO is the pollutant of concern for SI engines;
- CO emission factor of 5 grams (g)/hp-hr (6.71 g/kilowatt (kw)-hr) for landfill/digester gas represents the worst-case fuel for non-emergency SI engine (based on NSPS emission limit);
- CO emission factor of 3.752 pounds (lbs)/MMBtu (19.04 g/kW-hr) for landfill/digester gas represents the worst-case fuel for emergency SI engines (based on AP-42 data); and CO emission factor of 84 lbs/MMscf for natural gas auxiliary heaters (based on AP-42 data).

#### **CO Emissions from Non-Emergency SI Engines**

$$\begin{aligned} &= \text{capacity (hp)} \times \text{conversion factor (kW/hp)} \times \text{emission factor} \times \text{conversion factor (lb/g)} \times 8,760 \\ &\quad (\text{hrs/year}) \times 1 \text{ ton}/2,000 \text{ lb} \\ &= 1,800 \text{ hp} \times 0.7457 \text{ kW/hp} \times 6.705 \text{ g CO/kW-hr} \times 1 \text{ lb}/453.5928 \text{ g} \times 8,760 \text{ hrs/year} \times \\ &\quad 1 \text{ ton}/2,000 \text{ lbs} \\ &= 86.904 \text{ tpy} \end{aligned}$$

#### **CO Emissions from Emergency SI Engines**

$$\begin{aligned} &= \text{capacity (hp)} \times \text{conversion factor (kW/hp)} \times \text{emission factor} \times \text{conversion factor (lbs/g)} \times 500 \\ &\quad (\text{hrs/year}) \times 1 \text{ ton}/2,000 \text{ lb} \\ &= 1,000 \text{ hp} \times 0.7457 \text{ kW/hp} \times 19.04 \text{ g CO/kW-hr} \times 1 \text{ lb}/453.5928 \text{ g} \times 500 \text{ hrs/year} \times \\ &\quad 1 \text{ ton}/2,000 \text{ lbs} \\ &= 7.825 \text{ tpy} \end{aligned}$$

#### **CO Emissions from Natural Gas Auxiliary Heaters**

$$\begin{aligned} &= \text{capacity (MMBtu/hr)} \times \text{emission factor} \times \text{heat content of fuel} \times 8,760 (\text{hrs/year}) \times \\ &\quad 1 \text{ ton}/2000 \text{ lb} \\ &= 10 \text{ MMBtu/hr} \times 84 \text{ lbs/MMscf} \times 1 \text{ MMscf}/1,020 \text{ MMBtu} \times 8,760 \text{ hrs/year} \times 1 \text{ ton}/2,000 \text{ lbs} \\ &= 3.607 \text{ tpy} \end{aligned}$$

**Total CO Emissions = 98.3 tpy (<100 tpy, the CO emission threshold for attainment areas)**

**CI Capacity Limits:** 3,450 hp for non-emergency engines with generator set

- Assume engines meet the requirements for Option 1 identified in Table 5 (the same calculation process was used for Options 2-6);
- CO is the pollutants of concern for CI engines;

- CO emission factor of 3.5 g/kW-hr (non-emergency (prime), diesel engines, model year 2014 or later, greater than 751 hp, generator set) represents the correct emission factor for non-emergency CI engines for Option 1 (based on NSPS emission limit);
- CO emission factor of 3.752 lb/MMBtu (19.04 g/kW-hr) for landfill/digester gas represents the worst-case fuel for emergency SI engines (based on AP-42 data); and
- CO emission factor of 84 lbs/MMscf for natural gas auxiliary heaters (based on AP-42 data).

**CO Emissions from Non-Emergency CI Engines**

$$\begin{aligned}
 &= \text{capacity (hp)} \times \text{conversion factor (kw/hp)} \times \text{emission factor} \times \text{conversion factor (lb/g)} \times 8,760 \\
 &\quad (\text{hrs/year}) \times 1 \text{ ton}/2,000 \text{ lb} \\
 &= 3,450 \text{ hp} \times 0.7457 \text{ kW/hp} \times 3.5 \text{ g CO/kW-hr} \times 1 \text{ lb}/453.5928 \text{ g} \times 8,760 \text{ hours/year} \times \\
 &\quad 1 \text{ ton}/2,000 \text{ lbs} \\
 &= 83.17 \text{ tpy}
 \end{aligned}$$

**CO Emissions from Emergency CI Engines**

$$\begin{aligned}
 &= \text{capacity (hp)} \times \text{conversion factor (kW/hp)} \times \text{emission factor} \times \text{conversion factor (lb/g)} \times 500 \\
 &\quad (\text{hrs/year}) \times 1 \text{ ton}/2,000 \text{ lbs} \\
 &= 1,000 \text{ hp} \times 0.7457 \text{ kW/hp} \times 19.04 \text{ g CO/kW-hr} \times 1 \text{ lb}/453.5928 \text{ g} \times 500 \text{ hrs/year} \times \\
 &\quad 1 \text{ ton}/2,000 \text{ lbs} \\
 &= 7.825 \text{ tpy}
 \end{aligned}$$

**CO Emissions from Natural Gas Auxiliary Heaters**

$$\begin{aligned}
 &= \text{capacity (MMBtu/hr)} \times \text{emission factor} \times \text{heat content of fuel} \times 8,760 \text{ (hrs/year)} \times \\
 &\quad 1 \text{ ton}/2,000 \text{ lbs} \\
 &= 10 \text{ MMBtu/hr} \times 84 \text{ lbs/MMscf} \times 1 \text{ MMscf}/1,020 \text{ MMBtu} \times 8,760 \text{ hrs/year} \times 1 \text{ ton}/2,000 \text{ lbs} \\
 &= 3.607 \text{ tpy}
 \end{aligned}$$

Total CO Emissions = 98.4 tpy (<100 tpy the CO emission threshold for attainment areas)