



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 Permit for New or Modified True Minor Source Boilers

Version 1.0

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1. Boilers Source Category Definition

This permit covers steam generating units located at commercial facilities and industrial facilities which combust fossil fuels such as natural gas and petroleum liquids. A boiler is a device in which water typically is heated to provide steam to drive turbines or engines, supply heat, or process materials. This permit does not cover boilers located at electric utilities or boilers used for the burning of other fuels such as coal and wood. This source category does not cover the manufacturers of boilers. The proposed General Air Quality Permit for New or Modified True Minor Source Boilers only covers boilers that are located at true minor New Source Review (NSR) sources.

2. Source Category Characterization

The equipment and operation of fuel oil and natural gas boilers are described in AP 42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources.¹ Information on fuel oil boilers and natural gas boilers is covered in Chapters 1.3 and 1.4, respectively.

Boilers designed to burn fuel oil primarily combust distillate oils and residual oils.² Distillate and residual oils are distinguished by grade numbers, with Nos. 1 and 2 being distillate oils; Nos. 5 and 6 (also known as Bunker C) being residual oils; and No. 4 being either distillate oil or a mixture of distillate and residual oils. Distillate oils, which are more volatile and less viscous than residual oils, have negligible nitrogen and ash contents and usually contain less than 0.3 percent sulfur (by weight). Distillate oils include kerosene and diesel fuels and are used mainly in domestic and small commercial applications. The heavier residual oils contain significant quantities of ash, nitrogen, and sulfur and are used in industrial and large commercial applications.

These boilers can be of watertube, firetube, cast iron, or tubeless design. Watertube boilers are used in a variety of applications ranging from supplying large amounts of process steam to providing space heat for industrial facilities. In a watertube boiler, combustion heat is transferred to water flowing through tubes which line the furnace walls and boiler passes. The tube surfaces in the furnace (which houses the burner flame) absorb heat primarily by radiation from the flames. The tube surfaces in the boiler (adjacent to the primary furnace) absorb heat primarily by convective heat transfer. Firetube boilers are used primarily for heating systems, industrial process steam generators, and portable power boilers. In firetube boilers, the hot combustion gases flow through the tubes while the water being heated circulates outside of the tubes. A cast iron boiler is one in which combustion gases rise through a vertical heat exchanger and out through an exhaust duct. Water in the heat exchanger tubes is heated as it

¹ AP-42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources, <http://www.epa.gov/ttn/chief/ap42/ch01/index.html>.

² AP-42, Chapter 1.3 – Fuel Oil Combustion, <http://www.epa.gov/ttn/chief/ap42/ch01/index.html>.

moves upward through the tubes. Cast iron boilers produce low pressure steam or hot water, and generally burn oil or natural gas. They are used primarily in the residential and commercial sectors. Tubeless boilers incorporate nested pressure vessels with water in between the shells. Combustion gases are fired into the inner pressure vessel and are then sometimes recirculated outside the second vessel.

Natural gas combustion boilers are used to generate industrial electric power, produce industrial process steam and heat, and heat residential and commercial space.³ Natural gas is generally more than 85 percent methane with varying amounts of ethane, propane, butane, and inert gases (typically nitrogen, carbon dioxide, and helium). Natural gas combustion boilers may be of watertube, firetube, or cast iron design. Watertube boilers can be distinguished either as field erected units or packaged units; the former are built onsite in either wall-fired or tangential-fired configurations and generally have heat input levels exceeding 100 million British thermal units (MMBtu)/hour (hr), while the latter are shipped where needed, are always wall-fired, and generally have heat input levels less than 100 MMBtu/ hr.

Liquefied petroleum gas (LPG) combustion boilers use processes similar to those of natural gas combustion. Liquid petroleum gas consists of propane, propylene, butane, and butylenes.⁴ The three grades of LPG used as heating fuels are commercial-grade propane, engine fuel-grade propane (also known as HD-5 propane), and commercial-grade butane. Commercial-grade propane and HD-5 propane typically have heating values of about 90,500 Btu/gallon, while commercial-grade butane's heating value is 97,400 Btu/gallon. Liquefied petroleum gas is fired as a primary and backup fuel in small commercial and industrial boilers and space heating equipment and can be used to generate heat and process steam for industrial facilities and in most domestic appliances that typically use natural gas. Additional information on LPG boilers can be found in Chapter 1.5 of AP-42.⁵

The emissions from fuel oil-fired boilers include particulate matter (PM), sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), small amounts of volatile organic compounds (VOC), and trace elements. The emissions from natural gas-fired and liquefied petroleum gas-fired boilers include NO_x, CO, carbon dioxide, methane, nitrous oxide, VOCs, trace amounts of SO₂, and PM.

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 minor NSR programs (such as general permit or general order) for boilers: Arizona, Delaware, Indiana, Maryland, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, and Washington. The requirements for the state permitting programs related to boilers not subject to New Source Performance Standard (NSPS) requirements are summarized in Table 9. Permits from these states were chosen for examination because of characteristics they possess:

- Readily available;
- Clear throughput limits; and

³ AP-42, Chapter 1.4 – Natural Gas Combustion, <http://www.epa.gov/ttn/chief/ap42/ch01/index.html>.

⁴ AP-42, Chapter 1.5 – Liquefied Petroleum Gas Combustion, <http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s05.pdf>.

⁵ Ibid.

- Organization of the regulations followed the typical form for federal NSR permits:
 - Limitations and standards, and
 - Monitoring, testing, recordkeeping, and reporting requirements.

The state general permits and permits by rule for boilers vary from the streamlined (Indiana at four pages) to the extremely detailed and complex (Arizona at 48 pages).

The state boiler permits have either fuel input limits, heat input capacity limits, or limits on emissions. These vary by state. The assumptions and methodology for arriving at the fuel and heat input capacity limitations are not discussed in the permit application documents. The technical support documents used in developing the production limits, boiler/heater size, and engine displacement limits are not readily available for most states, with the exception of the Washington state general permit⁶ for small boilers. The EPA assumes that each state is calculating the capacity limits and fuel input limits based on differences in the desired amount of air emissions. This is exemplified by the Oregon boiler permit,⁷ which has two different particulate emission limits, one for attainment counties and one for PM₁₀ non-attainment counties. Ohio issues seven different general permits for boilers,⁸ ranging in capacity from 10 MMBtu to 45 MMBtu.

All of the state boiler permits examined restrict issuance to true minor sources whose potential to emit (PTE) of criteria pollutants is less than 100 tons per year (tpy). These permits contain limits on fuel usage or boiler capacity/heater size, and the effect of the limits keeps emissions below the major source thresholds. The boiler permits also limit fuel sulfur content as a means to keep SO₂ emissions below the major source thresholds.

Visible emissions and opacity requirements are in all of the state permits, but they vary from state to state. Setbacks and stack height requirements are present in the Michigan⁹ and Washington¹⁰ state permits. Michigan requires that stacks be 50 feet from the property line and 150 feet from a residence, while Washington requires that boiler stacks be 100 feet from the property line.

The Oregon and Arizona¹¹ state boiler permits incorporate the requirements of NSPS Subpart Dc into the text of the permit. The Washington state boiler permit incorporates the requirements of Subpart Dc by reference. Oklahoma is unique in that it issues a general permit for true minor source facilities subject to an NSPS or National Emission Standards for Hazardous Air Pollutants. The requirements of 40 CFR 63, Subpart JJJJJ are applicable to new and existing area source boilers that burn petroleum liquids, and are included in the Oklahoma permit.¹² Other state permits do not mention the federal requirements.

⁶ Washington Department of Ecology, Air Quality, Air Permits, General Orders of Approval, http://www.ecy.wa.gov/programs/air/AOP_Permits/Boiler/GeneralOrders.htm.

⁷ Oregon Department of Environmental Quality, Air Quality, General Air Contaminant Discharge Permits, <http://www.deq.state.or.us/aq/permit/acdp/general.htm>.

⁸ Ohio Environmental Protection Agency, General Permit Program, Boilers, <http://www.epa.ohio.gov/dapc/genpermit/gensources.aspx#boilers>.

⁹ Michigan Department of Environmental Quality, Air Quality Division, http://www.michigan.gov/documents/deq/deq-aqd-pti-boiler_applicability_spec_cond_356451_7.pdf.

¹⁰ Washington Department of Ecology, op. cit.

¹¹ Arizona Department of Environmental Quality, General Permits, <http://www.azdeq.gov/environ/air/permits/download/gnblrpermit.pdf>.

¹² Oklahoma Department of Environmental Quality, General Permits and Permits by Rule, <http://www.deq.state.ok.us/aqdnew/permitting/genperm.htm>.

Table 9 in Section 5.2.3 contains a summary of the boiler permit requirements by state.

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 boilers located in Indian country. 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, capacity, 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
- 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 capacity, type of fuel, 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;
- Must be minor source for hazardous air pollutants (HAPs); and
- Be below the maximum heat input capacity limitations established for the general permit.

New facilities with a PTE or modifications to existing facilities with an emissions increase lower than the minor NSR thresholds specified in Table 1 of the 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
VOCs	5 tpy	2 tpy

Under current EPA policy, only true minor NSR 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
	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 boilers permit contain questions designed to limit the availability of this general permit to true minor source boilers. 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 emission limitations 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 boilers general permit.

Facilities with HAP emissions at or above the major source thresholds are not eligible for a general permit under the minor NSR program. The major source thresholds for HAPs are 10 tpy for a single HAP and 25 tpy for any combination of HAPs. If, after construction or modification, a facility's HAP emissions exceed the major source thresholds, the applicant will need to apply for a site-specific 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, 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. In this general permit for boilers, limits on the maximum heat input capacity of the boilers are used to limit emissions of all criteria pollutants to below the NSR major source thresholds. Permit limits on concentrations of NO_x and CO are also included, as these are the primary pollutants emitted by boilers. 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 boilers:

1. Local air quality conditions – To address this requirement, the proposed general permit includes more stringent heat input capacity limits in nonattainment areas because limiting the total heat input capacity of all boilers at a source resulted in sufficient reductions in potential emissions to ensure sources would still be below the major source thresholds. Also, the proposed general permit include more stringent limits on emissions of NO_x and CO because limiting the NO_x and CO emissions results in sufficient reductions in potential emissions to ensure sources can locate in nonattainment areas without contributing to violations of the National Ambient Air Quality Standards (NAAQS).
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. Permittees must also meet the requirements of 40 CFR 49.154(c)(4) to ensure compliance with parts 60, 61, and 63. For sources locating in nonattainment areas, the EPA looked at the control requirements specified by the South Coast Air Quality Management District.¹³ For this proposed general permit, the EPA considered the following regulations that apply to boilers:
 - a. 40 CFR Part 60, Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units;
 - b. 40 CFR Part 60, Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units;
 - c. 40 CFR Part 63, Subpart JJJJJ - NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources;
 - d. South Coast Air Quality Management District (SCAQMD), Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters;
 - e. 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines;
 - f. 40 CFR 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines; and
 - g. 40 CFR 63 Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines.

The conditions in the Emission Limitations and Standards section of the general permit are developed from the NSR Rule, NSPS, NESHAP, SCAQMD Rule 1146, and the state permit

¹³ South Coast Air Quality Management District, Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1146.HTM>.

examples. The derivation of the surrogate emissions limitations in the general permit are discussed fully 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 boilers, each affected boiler must comply with the following limitations and standards:

- a. Setbacks – The proposed general permit requires the exhaust from each boiler or heater to be located a minimum of 50 feet from the nearest property line and 150 feet from any adjacent residential or commercial establishment or place of public assembly;
- b. Total Capacity - The total heat input capacity of all gas-fired boilers onsite shall be less than 160 MMBtu/hr, and less than 120 MMBtu/hr for liquid-fired boilers (this requirement varies by classification of ozone nonattainment area);
- c. Individual Boiler Capacity - The capacity of each individual boiler shall be less than 100 MMBtu/hr;
- d. Combined Boiler Capacity – The combined maximum rated capacity of all boilers and process heaters at the permitted source must not exceed certain capacity levels as laid out in the permit and that vary depending on are classification/designation;
- e. Auxiliary Heaters – The maximum rated capacity of any individual process heater at this facility shall be:
 - i. Less than 10 MMBtu/hr if located at a permitted source in an ozone attainment, unclassifiable or attainment/unclassifiable area;
 - ii. Less than 10 MMBtu/hr if located at a permitted source in a marginal, moderate or serious ozone nonattainment areas;
 - iii. Less than 2 MMBtu/hr if located at a permitted source in a severe or extreme ozone nonattainment area;
 - iv. A process heater may exceed the above size limitations if it meets the emission limitations applicable to boilers;
- f. Emergency Engines –Each emergency engine must be equipped with a non-resettable hour meter and, if using fuel oil, use diesel or biodiesel containing no more than 15 parts per million (ppm) (0.0015 percent) sulfur by weight. The engines must also meet the following:
 - i. Newer emergency engines – model year 2006 or later for compression ignition engines and 2009 or later for spark ignition engines – must meet certain certification or emission requirements that are specified in the EPA emissions standards at 40 CFR Part 89, 40 CFR Part 90 and 40 CFR Part 1048 or Table 1 to 40 CFR Part 60, Subpart JJJ, as applicable;
 - ii. Older emergency engines are required to meet certain routine maintenance requirements, and must follow the manufacturer’s emission-related operation and maintenance instructions or the permittee must develop a 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;

- g. NO_x Limits – For boilers over 10 MMBtu/hr, NO_x emissions shall not exceed 30.0 parts per million, dry volume (ppm_{dv}) at 3% O₂ or 0.037 pounds (lbs)/MMBtu;
 - h. CO Limits – For boilers over 10 MMBtu/hr, CO emissions shall not exceed 400.0 ppm_{dv} at 3% O₂ or 0.30 lbs/MMBtu;
 - i. Fuel Type/Sulfur Limit – Each affected boiler, heater, or engine burning liquid fuels shall use diesel or biodiesel and the sulfur content of diesel and biodiesel shall not exceed 0.0015 ppm by weight;
 - j. Boiler Restrictions – Each boiler stack must be above the buildings in the vicinity, discharge vertically, and have no obstructions to gas flow such as rain caps, except for hinged rain caps
 - k. Opacity Limit – Boiler emissions shall be limited to 5 percent opacity or greater averaged over a six consecutive minute;
 - l. Boilers Tune-Ups – Boilers must undergo biennial tune-ups; and
 - m. Severe or Extreme Ozone Nonattainment Areas – Boilers located in these areas are subject to more stringent regulations.
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 boilers 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 boilers 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 intends 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 proposed general permit must include monitoring that is sufficient to assure compliance with the emission limitations that apply to the source. For boilers, the proposed general permit requires that a visible emissions survey is conducted on a weekly basis, and initial and continuing performance testing to verify compliance with the NO_x and CO emission limitations.

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 boilers the permittee must maintain records of: fuel supplier certifications, emergency engine fuel use, visible emission surveys, the concentration of CO in the boiler exhaust, emissions before and after the tune-up of each boiler, and any corrective actions taken as part of a tune-up of a boiler. The permittee must also maintain records of: (1) emergency engine maintenance activities; (2) emergency engine hours of operation, including the date, time, duration, and reason(s) for use; and (3) the results of each performance test.

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, Changes to this General Permit, and Obtaining Coverage under this General Permit sections of the proposed general permit.

4.4 Requirements for Sources Located in Nonattainment Areas

The EPA has included additional requirements for sources locating in ozone nonattainment areas. These requirements vary depending upon the severity of the location's ozone nonattainment classification. The requirements specify lower capacity limits on liquid-fired boilers located in severe ozone nonattainment areas, lower capacity limits on natural gas-fired boilers located in severe and extreme ozone nonattainment areas, lower horsepower limits on generators located in severe and extreme ozone nonattainment areas, a prohibition on oil-fired boilers in extreme ozone nonattainment areas, and lower emission limits for all boilers located in severe or extreme ozone nonattainment areas. The limits on capacity will ensure that the general permit only applies to true minor sources locating in these nonattainment areas.

4.5 Additional Permit Requirements

The proposed general permit requires the exhaust from each boiler or heater to be located a minimum of 50 feet from the nearest property line and 150 feet from any adjacent residential or commercial establishment or place of public assembly.

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 boilers general permit, the EPA provides guidance to assist sources in complying with these two statutes.

5. Emission Limitations¹⁴ and Surrogate Heat Input Capacity Limits

5.1 Developing the Surrogate Limits for the Emissions Limitations

The draft general permit includes heat input capacity limits for boilers and combined maximum horsepower limits for emergency generators that combined serve as surrogate emissions limitations for

¹⁴ 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.

both gaseous and liquid fueled boilers (see tables 4 and 5). The heat input capacity limits for boilers vary depending upon the particular ozone attainment or nonattainment classification in the area in which the source will locate. The capacity limits were established as surrogate emissions limitations in order to limit emissions below the thresholds for the Title V and major NSR permitting programs.

The horsepower limits were included in the permit because many facilities that have boilers, such as manufacturing facilities, hotels, educational institutions, and public services, also have emergency generators. Thus, the general permit includes an allowance for emissions from any generator engines that may be onsite. As was done with boilers, power output limits for generator engines were established as a surrogate for emission limits. These limits are based on 500 hours of operation per year. The proposed general permit includes the combined maximum power output limits for all emergency engines onsite as listed in Table 5 below. As with boilers, the power output limits are set at levels intended to keep the source’s combined emissions below the NO_x and greenhouse gas (GHG) major source thresholds.

The heat input capacity limits (combined with the horsepower limits) in the general permit for sources located in attainment areas correspond to the source-wide PTE at which a source would become a major source and subject to Title V permitting (referred to hereafter as “the Title V major source threshold”). In attainment areas, the Title V major source threshold is 100 tpy for any criteria pollutant, 10 tpy for a single HAP, and 25 tpy for any combination of HAPs. The Title V major source threshold in nonattainment areas varies by the pollutant and the nonattainment classification. The major source 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.

Boilers emit a multitude of pollutants, but generally boilers emit NO_x at levels high enough to make NO_x a controlling pollutant of concern. However, in this case EPA also considered GHG emissions to ensure sources applying for the general permit are not subject to regulation as a major source for GHGs (as defined in 40 CFR 71.2 and 40 CFR 52.21) for the Title V and Prevention of Significant Deterioration (PSD) programs. GHGs emissions (as CO₂ (carbon dioxide) equivalent or CO₂e) were determined to be the pollutant of concern for sources locating in attainment areas, as well as in marginal and moderate nonattainment areas. For this reason, the EPA found it necessary to establish heat input capacity limits (and horsepower limits) as surrogate emissions limitations for the boilers and engines that are part of a stationary source that correspond to the emissions rates for NO_x and CO₂e in Table 3. This ensures that sources granted coverage under this proposed general permit are not subject to major source NSR or Title V for GHG emissions because those emissions are kept below 100,000 tpy. In serious, severe, and extreme areas, because the major source threshold for NO_x is lower, the EPA established a lower limit for boilers located at stationary sources in those areas to, again, assure that emissions for sources eligible for this proposed general permit are below major source levels.

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

Pollutant of Concern	Attainment, Unclassifiable or Attainment / Unclassifiable Areas	Nonattainment Areas
NO _x	100 tpy	10 tpy (extreme ozone areas)

Pollutant of Concern	Attainment, Unclassifiable or Attainment / Unclassifiable Areas	Nonattainment Areas
		25 tpy (severe ozone areas)
		50 tpy (serious ozone areas)
		100 tpy (marginal and moderate ozone areas)
CO ₂ e	100,000 tpy	100,000 tpy

The EPA evaluated the emission rates at which a new or modified source would become a major source under Title V. This is 100 tpy for PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, and CO in attainment areas and 100,000 tpy for GHGs. The EPA estimates the potential emissions of a boiler based on the boiler's maximum heat input capacity, fuel used, 8,760 hours of operation, and emissions factors for the type of burner in the boiler. In order to limit emissions to below the NSR major source thresholds, the EPA has chosen to limit the heat input capacity of the boiler. This capacity limit varies according to the type of fuel burned, and the NAAQS¹⁵ attainment status of the area where the boiler will be located.

In attainment areas, the calculations indicate that GHGs are the limiting pollutant. The EPA back-calculated the boiler capacity and type of fuel used that yielded emissions at these limits by using 8,760 hours of operation and emission factors from AP 42, Chapters 1.3 and 1.4. These results are shown in Table 4 below. Sample calculations for GHG emissions from a site with a 160 MMBtu/hr natural gas-fired boiler, a 20 MMBtu/hr natural gas-fired auxiliary heater, and a 1,500 horsepower diesel emergency generator are shown below. GHG emissions were calculated using carbon dioxide (CO₂) emissions. Potential emissions of other GHGs (e.g. NO₂) are considered negligible for this calculation and the resulting combined CO₂ emissions are sufficiently below 100,000 tpy to ensure there is not a potential to exceed the 100,000-tpy CO₂e threshold.

160 MMBtu/hr Boiler (natural gas):

$$160 \text{ MMBtu/hr} \times 1 \text{ MMscf}/1020 \text{ MMBtu} \times 120,000 \text{ lb CO}_2/\text{MMscf} \times 8,760 \text{ hrs/year} \times 1 \text{ ton}/2,000 \text{ lbs} = 84,113 \text{ tons CO}_2/\text{year}$$

20 MMBtu/hr Heater (liquid-fueled):

$$20 \text{ MMBtu/hr} \times 1 \text{ MMscf}/\text{MMBtu} \times 120,000 \text{ lb CO}_2/\text{MMscf} \times 8,760 \text{ hrs/year} \times 1 \text{ ton}/2,000 \text{ lbs} = 10,306 \text{ tons CO}_2/\text{year}$$

1,500 Hp Emergency Generator:

$$1,500 \text{ Hp} \times 1.15 \text{ lb CO}_2/\text{hp-hr} \times 500 \text{ hrs/year} \times 1 \text{ ton}/2,000 \text{ lbs} = 431 \text{ tons CO}_2/\text{year}$$

¹⁵ EPA, National Ambient Air Quality Standards, <http://www.epa.gov/air/criteria.html>.

Total CO₂ emissions = 94,850 tons CO₂/year

Table 4: Combined Maximum Heat Input Capacity Limits for Boilers Located in Ozone Attainment and Nonattainment Areas

Emission Units	Ozone Attainment Classification			
	Attainment, Unclassifiable or Attainment/ Unclassifiable	Marginal, Moderate, or Serious	Severe	Extreme
All Natural Gas-fired Boilers Rated ≥ 10.0 MMBtu/hr	160 MMBtu/hr	160 MMBtu/hr	100 MMBtu/hr	100 MMBtu/hr
All Natural Gas-fired Boilers and Auxiliary Heaters Rated < 10.0 MMBtu/hr	20 MMBtu/hr	20 MMBtu/hr	20 MMBtu/hr	20 MMBtu/hr
All Liquid-fueled Boilers* Rated ≥ 10.0 MMBtu/hr	120 MMBtu/hr	120 MMBtu/hr	100 MMBtu/hr	NA**
All Liquid-fueled Boilers* and Auxiliary Heaters Rated < 10.0 MMBtu/hr	20 MMBtu/hr	20 MMBtu/hr	20 MMBtu/hr	NA**

* A boiler that typically burns both liquid and gaseous fuels is limited as if burning exclusively liquid fuels. A natural gas unit may use fuel oil as a backup emergency fuel for up to 500 hours per year without being limited as if it were a liquid-fueled unit.

** The permit does not allow liquid-fueled boilers in extreme ozone nonattainment areas.

Table 5: Combined Maximum Horsepower Limits for Emergency Generators Located in Ozone Attainment and Nonattainment Areas

Emission Units	Ozone Attainment Classification			
	Attainment, Unclassifiable or Attainment/ Unclassifiable	Marginal, Moderate, or Serious	Severe	Extreme
All Emergency Generators (All Fuels)	1500 hp	1500 hp	1000 hp	750 hp

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)¹⁶ indicate about the size profile of the source category?
3. 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. This general permit is not intended to cover Title V major sources.

¹⁶ For more information, go to: <http://www.epa.gov/ttnchie1/net/2011inventory.html>.

Therefore, the surrogate emissions limitations provided as heat input capacity limits and horsepower limits included in the proposed permit are based on keeping GHG emissions of sources below the Title V major source threshold of 100,000 tpy of GHGs for boilers subject to this general permit and located in attainment areas. Keeping emissions of boilers subject to this general permit below the GHG Title V threshold also prevents the source's GHG emissions from exceeding 100,000 tpy which would make the source subject to the major source PSD program.

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 and are expressed as emission rates in Table 3. The surrogate emission limitations established in the proposed permit as heat input capacity limits and horsepower limits are based on the emission rates. For marginal and moderate ozone nonattainment areas the surrogate emissions limitations are based on keeping GHG emissions of sources below the Title V major source threshold of 100,000 tpy of GHGs for boilers subject to this general permit and located in those areas. Keeping emissions of boilers subject to this general permit below 100,000 tpy for GHGs also prevents the source's emissions from exceeding the 100 tpy Title V threshold for other pollutants. As noted above, in serious, severe, and extreme areas, because the major source threshold for NO_x is lower, the EPA established a lower limit for boilers located at stationary sources in those areas to assure that emissions for sources eligible for this proposed general permit are below major source levels.

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 boilers 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 boiler facilities 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 emissions¹⁷ within the ranges listed in Table 7.

Table 6: NAICS Codes Selected for Boilers

NAICS Code	Description
11****	Agriculture, Greenhouses
2211**	Electric Power Generation
311***	Food Manufacturing
321***	Wood Product Manufacturing (except sawmills)
327***	Nonmetallic Mineral Product Manufacturing (except ready-mix concrete)
424***	Wholesale Trade, Nondurable Goods
611110	Elementary And Secondary Schools
611210	Junior Colleges
611310	Colleges, Universities, And Professional Schools
62****	Health Care And Social Assistance
721120	Casino Hotels
813110	Religious Organizations
92****	Public Administration

¹⁷ Only point source NEI data were used for this analysis.

Table 7: Emission Ranges Selected for Facilities with Boilers

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

The 2008 NEI data does not include emissions information for total PM. The EPA analyzed the emissions rates listed in Table 5 that were used to establish the surrogate 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 the boiler facilities located in attainment and nonattainment areas for NO_x. The EPA is providing the number of facilities (and average emissions) under the proposed emissions rates and above the minor source thresholds.

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

Criteria Pollutants	Number of Facilities
Attainment Areas	
NO_x	
Facilities >10 tpy and < 100 tpy	1,036 (26% of facilities covered)
Average Emissions (tpy)	32
Facilities > 100 tpy and < 250 tpy	166
Average Emissions (tpy)	158
Nonattainment Areas	
NO_x (marginal and moderate)	
Facilities >5 tpy and < 100 tpy	0 (0% of facilities covered)
Average Emissions (tpy)	N/A
Facilities > 100 tpy and < 250 tpy	0
Average Emissions (tpy)	N/A
NO_x (serious)	
Facilities >5 tpy and < 50 tpy	0 (0% of facilities covered)
Average Emissions (tpy)	N/A
Facilities > 50 tpy and < 250 tpy	0
Average Emissions (tpy)	N/A
NO_x (severe)	
Facilities >5 tpy and < 25tpy	0 (0% of facilities covered)

Criteria Pollutants	Number of Facilities
Average Emissions (tpy)	N/A
Facilities > 25 tpy and < 250 tpy	0
Average Emissions (tpy)	N/A
NO_x (extreme)	
Facilities >5 tpy and < 10 tpy	0 (0% of facilities covered)
Average Emissions (tpy)	N/A
Facilities > 10 tpy and < 250 tpy	0
Average Emissions (tpy)	N/A

5.2.3 State Program Limits

Table 9 presents the limits in general permits and permits by rule issued by the states. These state permits limit emissions by limiting fuel usage, fuel sulfur content, boiler capacity, or by imposing direct limitations on emissions for criteria pollutants. The upper limits in state permits vary considerably. Most of the state permits limit either: fuel throughput and emissions, or total capacity and emissions, while several (Arizona, Michigan, Oregon, Pennsylvania, South Carolina, and Washington) place limits on fuel usage/sulfur content, pollutant emissions, and boiler capacity. Several states require that applicants calculate the PTE of criteria pollutants. A comparison of requirements for attainment and nonattainment areas is not possible; most state programs, with the exception of Pennsylvania, do not specify distinct requirements for nonattainment areas.

Table 9: State Program Limits

State	Fuel Usage Limits	Criteria Pollutant Emission Limitations	Boiler Capacity Limits	Visible Emissions Limits
Arizona: non-NSPS boilers	Natural gas or diesel fuel.	SO ₂ : 1lb/MMBtu and PM: 1.02 x (MMBtu) ^{0.769} .	< 100 MMBtu.	< 15% opacity.
Arizona: NSPS boilers	Natural gas, LPG, and diesel fuel.	SO ₂ : fuel=0.5% sulfur and PM: 1.02(MMBtu) ^{0.769} .	10-100 MMBtu constructed after 6/9/89.	< 20% opacity for diesel-fueled.
Delaware	Natural gas, diesel, and No.6 fuel oil.	Entire source must be true minor.	Natural gas boiler > 15 MMBtu needs permit and fuel oil boiler > 10 MMBtu needs permit.	N/A

State	Fuel Usage Limits	Criteria Pollutant Emission Limitations	Boiler Capacity Limits	Visible Emissions Limits
Indiana	Natural gas: 0.3 to <10 MMBtu: 1,000 MMCF/year; natural gas: 10 to 100 MMBtu: 714 MMCF/year; natural gas: > 100 MMBtu: 181 MMCF/year; fuel oil #1 and #2: 1,408 Kgals/year; and LPG: 5,263 MMCF/year.	N/A	Capacity limit depends upon unit size.	< 20% opacity.
Maine	Liquid fuel: < 2.0% sulfur.	PTE < 100 all criteria pollutants; PTE < 50 VOC; PTE < 10 single HAP; PTE <25 total HAP; and PM: 0.2 lb/MMBtu.	> 10 MMBtu needs permit.	Natural gas: <10% opacity; No. 2 fuel oil: < 20% opacity; and Nos. 4, 5, 6 fuel oil: < 30% opacity.
Maryland	Natural gas, LPG, or diesel fuel: < 0.3% sulfur.	Rotary cup burners prohibited.	From 1 to 10 MMBtu.	< 20% opacity and 0% opacity in certain counties.
Michigan	Natural gas or propane only and use < 1,400 MMscf/year.	NO _x : < 0.05lb/MMBtu and Low-NO _x burner required.	< 100 MMBtu.	150 foot setback from nearest residence < 20% opacity.
Ohio – general permit for 10-17.9 MMBtu/hr	Fuel: < 0.5% sulfur and use < 700,000 gallons of No. 2 fuel oil per year.	PM < 0.014 lb/MMBtu and 0.92 tpy; VOC < 0.011 lb/MMBtu and 0.85 tpy; NO _x < 0.14 lb/MMBtu and 9.88 tpy; CO < 0.082 lb/MMBtu and 6.46 tpy; and SO ₂ < 0.50 lb/MMBtu and 24.87 tpy.	N/A	<10 % opacity.
[Ohio issues five other General Permits for boilers in the capacity range of 18 - 39.9 MMBtu/hr]				
Ohio – general permit for 40-45 MMBtu/hr	Fuel: < 0.5% sulfur and use < 700,000 gallons of No. 2 fuel oil per year.	PM < 0.014 lb/MMBtu and 1.80 tpy; VOC < 0.011 lb/MMBtu and 2.13 tpy; NO _x < 0.14 lb/MMBtu and 21.52 tpy; CO < 0.082 lb/MMBtu and 16.23 tpy; and SO ₂ < 0.50 lb/MMBtu and 24.87 tpy.	N/A	<10 % opacity.
Oklahoma	N/A	PTE < 100 tpy for criteria pollutants; PTE < 10/ 25 for HAPs; and actual Emissions < 40 tpy.	N/A	<20% opacity.

State	Fuel Usage Limits	Criteria Pollutant Emission Limitations	Boiler Capacity Limits	Visible Emissions Limits
Oregon	No.1 fuel oil: < 0.3% sulfur; No.2 fuel oil : < 0.5% sulfur; residual oil : < 1.75% sulfur; and used oil: < 0.5% sulfur.	Source-wide Emission Limits: PM < 24 tpy PM ₁₀ < 14 tpy SO ₂ < 39 tpy NO _x < 39 tpy CO < 99 tpy VOC < 39 tpy PM ₁₀ <4.5 tpy for Medford-Ashland AQMA; PM Emissions Less than 0.1 grains/dry standard cubic foot (dscf) at 12% CO ₂ , but stricter for certain counties; and NSPS standard: PM emissions less than 0.03 lb/MMBtu.	Oil: >10 MMBtu; natural gas, propane, and butane: > 30 MMBtu; and total: 10 to 250 MMBtu.	<20% opacity.
Pennsylvania	Natural gas, LPG, or No. 2 fuel oil only Fuel oil sulfur content of 0.3% or 0.2%, depending upon region	PTE < major source thresholds PTE of VOC < 50 tpy exempt if PTE is below certain levels; stack test for NO _x and CO required BACT: natural gas: 30 ppm _{dv} NO _x at 3% O ₂ ; No.2 fuel oil: 90 ppm _{dv} NO _x at 3% O ₂ ; No.2 fuel oil: 300 ppm _{dv} CO at 3% O ₂ ; and PM: less than 0.4 lb/MMBtu.	< 50 MMBtu and units with capacity > 10 MMBtu must utilize low-NO _x burners, flue gas recirculation, and low NO _x fuel.	<20% opacity.
South Carolina	Natural gas, propane, No.2 fuel oil, diesel, or biodiesel only and fuel sulfur content of 0.05% or less.	Facility-wide PTE < major source thresholds; install low-NO _x burners, biannual tune-up; and natural gas and propane: 0.036 lbs NO _x /MMBtu Fuel oil: 0.15 lbs NO _x /MMBtu 0.6 lbs PM/MMBtu 2.3 lbs SO ₂ /MMBtu.	Total capacity < 100 MMBtu and maximum size for a boiler not burning natural gas or propane is 30 MMBtu.	<20% opacity.

State	Fuel Usage Limits	Criteria Pollutant Emission Limitations	Boiler Capacity Limits	Visible Emissions Limits
Washington	Natural gas, LPG, propane, and diesel only.	Facility-wide PTE < major source thresholds; not a PSD modification; PM: 0.02 grains/dscf at 3% O2 Natural gas or LPG: NO _x : 9 parts per million volume (ppmv) CO: 50 ppmv SO ₂ : pipeline quality gas; Propane: NO _x : 30 ppmv CO: 100 ppmv SO ₂ : 8.1 grains sulfur/100 scf fuel; and Diesel: NO _x : 35 ppmv CO: 100 ppmv SO ₂ : Diesel: 40 CFR 80.520.	Natural gas, LPG, propane: 4 to 50 MMBtu total and diesel: 1 to 50 MMBtu total.	100 ft setback to property line; stack height must be 1.06 to 1.3 times the height of the nearest roof within 100 feet of the stack; and < 5% opacity.

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