Summary of Federal and State Regulations Controlling Air Emissions from Industrial, Commercial, and Institutional Boilers

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Introduction

The New Hampshire Department of Environmental Services (DES) has developed these guidelines to provide boiler owners and operators in New Hampshire with information about the federal and state regulations that pertain to boilers in an attempt to simplify and clarify both the regulatory and permitting requirements associated with boilers. The scope of this guidance document is limited to the regulatory requirements that pertain to boilers located at industrial, commercial and institutional facilities and not with rules associated with electric utility steam generating units that burn coal or other fossil fuels to generate electricity.

What is a boiler?

A boiler uses controlled flame combustion to burn coal and other substances such as gas, oil or biomass to produce steam or hot water, which is used for energy or heat.

Why regulate air emissions from boilers?

There are more than 10,000 industrial, commercial and institutional boilers used to generate heat and/or hot water in New Hampshire. While the individual emissions from these units may be small, the total emissions from all boilers are significant. Air pollution from boilers includes sulfur dioxide (SO_2), nitrogen oxide (NOx), particulate matter (PM), carbon monoxide (CO), hazardous air pollutants (HAPs), hydrochloric acid, mercury and trace amounts of other heavy metals. Health effects include a range of health issues, especially asthma among children and seniors.

What are the federal rules that apply to boilers?

There are several federal boiler rules that apply to industrial (e.g., manufacturing, printing, greenhouses), commercial (e.g., laundries, apartments, hotels), and institutional (e.g., schools, churches, medical centers, municipal buildings) boilers. Many of the federal rules, specifically the New Source Performance Standards (NSPS), are designed to limit air emissions such as SO_2 and NOx from new boilers where "new" is defined differently in each rule. The NSPS rules have been in effect since the 1970s, although they have been changed periodically since intial adoption. These rules apply to boilers that are required to hold air permits in New Hampshire and are incorporated in existing permits.

There are also federal rules designed to reduce emission of HAPs from both new and existing boilers. These new federal boiler rules have just recently been adopted and apply to boilers of all sizes, regardless of individual state permitting thresholds. Therefore, new and existing boilers, both those that have been previously permitted and those that have never held a permit to operate, are subject to requirements in these regulations. This guidance document will further explain the requirements of these new federal regulations.

Applicability

What are hazardous air pollutants?

Hazardous air pollutants are pollutants that have the potential to cause severe human health effects or ecosystem damage. A list of the HAPs specifically regulated under Section 112 of the Clean Air Act Amendments of 1990 (CAAA) can be found at: www.epa.gov/ttnatw01/orig189.html. Examples of HAPs include dioxins, benzene, arsenic, beryllium, mercury, vinyl chloride, asbestos, and

polychlorinated biphenyls. The public may be exposed to these substances through direct inhalation, absorbed through the skin, or ingested by consuming food contaminated from toxins deposited on soil or into waterways.

What is the difference between a major and an area source of HAPs?

A *major source* is a facility that emits, or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs. An *area source* is any stationary source that is not a major source of HAPs.

Where can I find the new federal boiler rules?

On December 20, 2012, the EPA Administrator signed final changes to the federal boiler rules originally promulgated on March 21, 2011 aimed at reducing the emissions of HAPs from existing and new industrial, commercial, and institutional boilers located at major and area source facilities. These rules are:

- *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters* [40 CFR Part 63, National Emissions Standard for Hazardous Air Pollutants (NESHAP), Subpart DDDDD] otherwise known as "Boiler MACT (Maximum Achievable Control Technology)"; and
- *National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers* [40 CFR Part 63, NESHAP, Subpart JJJJJJ] otherwise known as the "Boiler Area Source Rule."

Changes to the Boiler MACT and to the Boiler Area Source Rule were published in the Federal Register on January 31, 2013 and February 1, 2013, respectively. Most air emission sources in New Hampshire are area sources and would be subject to the Boiler Area Source Rule if they operate an affected boiler. Therefore, the remainder of this guidance document is focused on the regulatory requirements of the Boiler Area Source Rule. Questions regarding Boiler MACT can be directed to DES.

EPA has put together comprehensive website (www.epa.gov/boilercompliance/) to address the specifics of the Boiler Area Source Rule. Both regulations can be found at www.epa.gov/airquality/combustion/actions.html#dec12.

Which boilers are <u>not</u> affected by the Boiler Area Source Rule[1]?

- Gas-fired boilers
- Hot water heaters
- Temporary boilers
- Waste heat boilers or heat recovery steam generators
- Residential boilers
- Electric boilers
- Electric utility steam generating units subject to 40 CFR Part 63 Subpart UUUUU
- Boilers used as control devices for other NESHAP or NSPS standards
- Boilers subject to other NESHAP or CAA Section 129 standards
- Hazardous waste boilers - unless the unit does not combust hazardous waste
- Boilers used for research and development

[1] Please refer to definitions below for further clarification of these exemptions.

Federal Requirements

What does the Boiler Area Source Rule require?

The rule sets emission limits, work practice standards, emission reduction measures, and management practices for seven subcategories[2]:

- coal
- biomass
- oil
- seasonal boilers
- limited-use boilers
- boilers with heat input capacity ≤5 MMBtu (Million Metric British Thermal Units)/hr that burn oil
- boilers that use a continuous oxygen trim system that maintains an optimum air-to-fuel ratio, that would otherwise be subject to a biennial tune-up

Table 1: Summary of Boiler Area Source Rule Emission Limits and Work Practice Requirements Existing Boilers[3]

Fuel Type	Boiler Size	Summary of Requirements
Coal	Existing boilers[4] (<10 MMBtu/hr)	• Conduct initial tune-up and biennially[5] thereafter
	Existing boilers[6] (≥10 MMBtu/hr)	• Emission limits for mercury (Hg) & CO • One-time energy assessment
Biomass	Existing boilers[7] (all sizes)	• Conduct initial tune-up and biennially[4] thereafter
	Existing boilers[5] (≥10 MMBtu/hr)	• One-time energy assessment
Oil	Existing boilers (≤5 MMBtu/hr)	• Conduct initial tune-up and every 5 years[7] thereafter
	Existing boilers[8] (>5 MMBtu/hr)	• Conduct initial tune-up and biennially[4] thereafter
	Existing boilers[5] (≥10 MMBtu/hr)	• One-time energy assessment
Coal, Biomass or Oil	Existing seasonal or limited-use boilers or existing coal- biomass- or oil-fired boilers with an oxygen trim system that maintains an optimum air-to-fuel ratio that would otherwise be subject to biennial tune-up	• Conduct initial tune-up and every 5 years[6] thereafter

2 Coal subcategory includes any boiler that burns any solid fossil fuel and no more than 15 percent biomass on an annual heat input basis. Biomass subcategory includes any boiler that burns any biomass and is not in the coal subcategory. Oil subcategory includes any boiler that burns any liquid fuel and is not in either the biomass or coal subcategories. See definition section below for further clarification of other subcategories of boilers.

3 An existing boiler is one that commenced construction or reconstruction on or before June 4, 2010. An existing dual-fuel fired boiler meeting the definition of gas-fired boiler, that meets the applicability requirements of this subpart after June 4, 2012 due to a fuel switch from gaseous fuel to solid fossil fuel, biomass, or liquid fuel is considered to be an existing source as long as the boiler was designed to accommodate the alternate fuel prior to June 4, 2010.

4 Provided the device does not meet the definition of a limited-use boiler or use an oxygen trim system that maintains an optimum air-to-fuel ratio.

5 No more than 25 months after the previous tune-up.

6 Provided the device does not meet the definition of a limited-use boiler.

7 No more than 61 months after the previous tune-up.

8 Provided the device does not meet the definition of a limited-use boiler or seasonal boiler or use an oxygen trim system that maintains an optimum air-to-fuel ratio

Table 2: Summary of Boiler Area Source Rule Emission Limits and Work Practice Requirements New Boilers[9]

Fuel Type	Boiler Size & Construction/Reconstruction Date	Summary of Requirements
Coal	New boiler[3] (<10 MMBtu/hr)	• Conduct tune-up biennially[4] starting no more than 25 months after initial startup of the boiler
	New boilers[5] (≥10 MMBtu/hr)	• Emission limits for Hg, CO, and filterable PM
Biomass	New boilers[7] (all sizes)	• Conduct tune-up biennially[4] starting no more than 25 months after initial startup of the boiler
	New boilers[10] (≥10 MMBtu/hr)	• Emission limits for filterable PM
Oil	New boilers (≤5 MMBtu/hr)	• Conduct tune-up every 5 years starting no more than 61 months after initial startup of the boiler
	New boilers[7] (>5MMBtu/hr)	• Conduct tune-up biennially[4] starting no more than 25 months after initial startup of the boiler
	New boilers[9] (≥10 MMBtu/hr)	• Emission limits for filterable PM, or units may combust low sulfur oil (≤ 0.50 wt%) provided no PM or SO_2 post combustion controls (except a wet scrubber)
Coal, Biomass or Oil	New seasonal or limited-use boilers or new coal- biomass- or oil-fired boilers with an oxygen trim system that maintains an optimum air-to-fuel ratio that would otherwise be subject to biennial tune-up	• Conduct tune-up every 5 years starting no more than 61 months after initial startup of the boiler

9 A new boiler is one that commenced construction or reconstruction after June 4, 2010.

10 Provided the device does not meet the definition of limited-use boiler or seasonal boiler.

Table 3: Boiler Area Source Rule Emission Limits

Subcategory	Final Emission Limits			
	Hg (lb/MMBtu)	**CO (ppm)** (by volume on a dry basis corrected to 3 percent oxygen (3-run average or 10-day rolling average)	**Filterable PM (lb/MMBtu)**	
	≥10 MMBtu/hr	**≥10 MMBtu/hr**	**10 – 30 MMBtu/hr**	**≥30 MMBtu/hr**
New Coal[11]	.000022	420	0.42	0.03
New Biomass[12]	-	-	0.07	0.03
New Oil[11]	-	-	0.03	0.03
Existing Coal	.000022	420	-	-
Existing Biomass	-	-	-	-
Existing Oil	-	-	-	-

All new and existing boilers must also comply with the General Duty Clause contained in the NESHAP regulations.

What is the General Duty Clause?

Facilities that are subject to NESHAPs are also subject to the General Duty Clause. The General Duty Clause states that at all times, the owner or operator must operate and maintain the boiler in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require owners or operators to make any further efforts to reduce emissions if levels required by the NESHAP have been achieved. Determination of whether such operation and maintenance procedures are being used will be based on information available to EPA that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the source.

What is required to be done as part of a Boiler Area Source Rule tune-up?

Since almost all existing boilers and most new boilers will, at some point, have to conduct a tune-up of the boiler, it is important to explain what EPA requires of the tune-up. The intent of the tune-up is for the owners or operators of the boiler to operate the unit as efficiently as possible to reduce fuel usage.

- First of all, the tune-up must be conducted while burning the type of fuel (or fuels in the case of boilers that routinely burn two types of fuels at the same time) that provided the majority of the heat input to the boiler over the 12 months prior to the tune-up. In addition, the following steps, as applicable, must be followed during a tune-up.

[11] Provided the device does not meet the definition of a limited-use boiler.
[12] Provided the device does not meet the definition of limited-use boiler or seasonal boiler.

- Inspect the burner, and clean or replace any components of the burner as necessary.[13]
- Inspect the flame pattern and adjust the burner as necessary to optimize the flame pattern. The adjustment should be consistent with the manufacturer's specifications, if available.
- Inspect the system controlling the air-to-fuel ratio and ensure that it is correctly calibrated and functioning properly.[14]
- Optimize total emissions of CO. This optimization shall be consistent with the manufacturer's specifications, if available, and with any NOx requirement to which the unit is subject.
- Measure the concentrations in the effluent stream of CO in parts per million, by volume, and oxygen in volume percent, ***before*** and ***after*** the adjustments are made.[15]

What is required to be done for the Boiler Area Source Rule energy assessment?

Existing coal, biomass, and oil-fired boilers with a design heat input capacity of 10 MMBtu/hr or greater must conduct a one-time energy assessment performed by a qualified energy assessor by March 21, 2014. An energy assessment completed on or after January 1, 2008, that meets or is amended to meet the energy assessment requirements of the rule, satisfies the energy assessment requirement. Energy assessor approval and qualification requirements are waived in instances where past or amended energy assessments are used to meet the energy assessment requirements.

A facility operating under an energy management program compatible with ISO 50001 that includes affected units also satisfies the energy assessment requirement. While the energy assessment must include the following items, the energy conservation measures identified during the assessment are not required by the rule to be implemented. Instead, it is hoped that owners or operators will voluntarily chose to implement those measures that are most beneficial to the facility. The on-site technical hours required, as specified in Table 4 below, are appropriate for the extent of the evaluation.

- A visual inspection of the boiler system (e.g. cracks, corrosion, leaks, insulation).
- An evaluation of operating characteristics of the affected boiler systems, specifications of energy use systems, operating and maintenance procedures, and unusual operating constraints.
- An inventory of major systems consuming energy (e.g., energy use systems) from affected boiler(s) and which are under the control of the boiler owner or operator.
- A review of available architectural and engineering plans, facility operation and maintenance procedures and logs, and fuel usage.
- A list of major energy conservation measures that are within the facility's control.

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[13] The inspection may be delayed until the next scheduled unit shutdown, not to exceed 36 months from the previous inspection for boilers subject to biennial tune-ups and 72 months from the previous inspection for boilers subject to 5-year tune-ups. Units that produce electricity for sale may delay the inspection until the first outage, not to exceed 36 months from the previous inspection.

[14] The inspection may be delayed until the next scheduled unit shutdown, not to exceed 36 months from the previous inspection for boilers subject to biennial tune-ups and 72 months from the previous inspection for boilers subject to 5-year tune-ups. Units that produce electricity for sale may delay the inspection until the first outage, not to exceed 36 months from the previous inspection.

[15] Measurements may be either on a dry or wet basis, as long as it is the same basis before and after the adjustments are made. Measurements may be taken using a portable CO analyzer.

- A list of the energy savings potential of the energy conservation measures identified.
- A comprehensive report detailing the ways to improve efficiency, the cost of specific improvements, benefits, and the time frame for recouping those investments.

The energy assessment applies to boilers and associated components (e.g., the boiler system), and energy use systems that meet certain energy production thresholds as identified in Table 4 below.

Table 4: Energy Assessment Duration Requirements

Boiler Annual Heat Input (Trillion Btu/yr)	The length of the energy assessment, on-site technical labor hours, need not exceed	And should include any on-site energy use systems that account for this percent of the energy production from these affected boilers
Less than 0.3	8 hours	At least 50%
0.3 to 1	24 hours	At least 33%
Greater than 1.0	24 hours for the first TBtu/yr plus 8 hours for every additional TBtu/yr, not to exceed 160 hours	At least 20%

What stack testing or monitoring requirements do I need to know about in the Boiler Area Source Rule if I install a new biomass or oil-fired boiler subject to emission limits?

If you install a new biomass or oil-fired boiler ≥10 MMBtu/hr, not only is the device subject to a PM emission limit (except as noted below) based on the size and fuel type used in the boiler, but there are additional requirements in the rule associated with ensuring initial and continued compliance with the limits. These requirements include:

- Within 180 days after startup, the owner or operator must conduct an initial stack test of the boiler to ensure that it complies with the PM limit.
- The stack test must be done while burning the type of fuel or mixture of fuels that have the highest emission potential for each regulated pollutant.
- During the stack test, the owner or operator must establish the operating limits for the boiler and/or control equipment as outlined in the rule.
- If the results of the initial stack test demonstrate that the PM emissions are equal to or less than half of the PM emission limit, no further performance testing is required, but the owner or operator must continue to comply with all applicable operating limits and monitoring requirements established during the initial test.
- If the results of the initial stack test demonstrates that the PM emissions are greater than half of the PM emission limit, the boiler must be stack tested every 3 years (triennially) thereafter (no more than 37 months after the previous performance test).
- The owner or operator must also develop a site-specific monitoring plan for the use of any continuous monitoring systems, including continuous emission monitoring systems,

continuous opacity monitoring systems or continuous parameter monitoring system, as required to be operated as a result of the regulation.

If you are installing a new oil-fired boiler ≥10 MMBtu/hr and it will only combust oil that contains no more than 0.50 weight percent sulfur oil and does not use a post-combustion technology (except a wet scrubber) to reduce PM or SO_2 emissions, you are not subject to the PM emission limit in Table 3 provided you monitor and record on a monthly basis the type of fuel combusted. If you switch to burning a new type of fuel or fuel mixture that does not meet this exemption, you must conduct a stack test within 60 days of burning the new fuel.

What happens if I make a change to the boiler and the applicability of the Boiler Area Source Rule for my existing boiler changes?

If the owner or operator makes any of the following changes, there are notification requirements and potential different rule requirements depending on the circumstance:

- Switches fuels or makes a physical change which results in the applicability of a different subcategory within the Boiler Area Source Rule;
- Switches fuels or makes a physical change which results in the boiler becoming subject to the Boiler Area Source Rule;
- Switches to 100 percent natural gas which results in the boiler no longer being subject to the Boiler Area Source Rule; or
- Takes a permit limit that results in the facility being subject to the rule.

In some of these cases, the facility needs to request a permit prior to making the change. In other cases, where there is an existing dual-fuel fired boiler allowed to burn oil and natural gas and the device is currently exempt from the rule because it meets the definition of a gas-fired boiler, the owner or operator can switch to burning more oil than is allowed or for reasons not allowed in the gas-fired boiler definition. In this case, the owner or operator shall:

- Provide notice to EPA of the date upon which the fuel switch, physical change or permit issuance within 30 days of the change. The notification must identify:
  - → The name of the owner or operator of the affected source, the location of the source, the boiler(s) that have switched fuels, were physically changed, or took a permit limit, and the date of the notice; and
  - → The date upon which the fuel switch, physical change, or permit limit occurred.
- Within 180 days of the effective date of the fuel switch or the physical change, the owner or operator shall conduct a tune-up of each affected boiler and shall conduct a one-time energy assessment, if applicable.

What are the compliance dates?

All facilities that have determined that the Boiler Area Source Rule applies to their boilers must submit an initial notification of applicability to EPA and DES. The due date of the initial notification, along with other notifications, compliance deadlines and reporting requirements is outlined in Table 5 for existing boilers and Table 6 for new boilers. Sample initial notification forms, a sample form that can be used to collect necessary tune-up data during the boiler tune-ups, and notification of compliance status reports for tune-ups and the one time energy assessment can be found at www.des.nh.gov/organization/divisions/air/boiler-rule/index.htm.

Table 5: Notifications, Compliance and Reporting Timeline Existing Boilers

Boiler Category	Initial Notification Date	Initial Compliance Date	Initial Tune-up	One Time Energy Assessment	Initial Compliance Testing Date	Notification of Intent to Conduct a Performance Test	Initial Notification of Compliance Status Report
<10 MMBtu/hr							
Coal-fired	1/20/2014	By 3/21/2014	By 3/21/2014	NA	NA	NA	By 7/19/2014
Biomass-fired							
Oil-fired							
Seasonal							
With O_2 trim system							
Limited Use							
≥10 MMBtu/hr							
Coal-fired	1/20/2014	By 3/21/2014	NA	By 3/21/2014	By 9/17/2014	At least 60 days before performance stack test is scheduled to begin	Within 60 days of completing the performance stack test
Biomass-fired			By 3/21/2014		NA	NA	By 7/19/2014
Oil-fired							
Seasonal							
With O_2 trim system							
Limited Use				NA			

Existing boilers subject to the tune-up requirements must show continuous compliance by conducting the subsequent tune-ups in a timely manner as outlined in Table 1.

Table 6: Notifications, Compliance and Reporting Timeline New Boilers

Boiler Category	Initial Notification Date	Initial Compliance Date	Initial Tune-up[16]	One Time Energy Assessment	Initial Compliance Testing Date	Notification of Intent to Conduct a Performance Test	Initial Notification of Compliance Status Report
<10 MMBtu/hr							
Coal-fired	Within 120 days of startup	Upon startup		NA	NA	NA	NA[17]
Biomass-fired							
Seasonal			NA				
Limited Use							
≥10 MMBtu/hr							
Coal-fired (excluding limited-use boilers)	Within 120 days of startup	Upon startup	NA	NA	Within 180 days of the initial compliance date	At least 60 days before performance stack test is scheduled to begin	Within 60 days of completing the initial compliance demonstration
Biomass-fired (excluding seasonal boilers and limited-use boilers)			NA				
Oil-fired (excluding seasonal boilers and limited-use boilers)[18]			NA				
≥30 MMBtu/hr							
Seasonal boilers and limited-use boilers	Within 120 days of startup	Upon startup	NA	NA	NA	NA	NA

New boilers subject to the tune-up requirements must show continuous compliance by conducting the subsequent tune-ups in a timely manner as outlined in Table 2.

What records are required?

- For boilers subject to emission limits, record that the owner/operator conducted startups and shutdowns according to the manufacturer's recommended procedures.

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16 A new boiler is not subject to an initial tune-up requirement. For a new boiler subject to a biennial tune-up, the first biennial tune-up must be no later than 25 months after initial startup. For a new boiler subject to a 5-year tune-up, the first 5-year tune-up must be no later than 61 months after initial startup.

17 A new boiler is not subject to an initial tune-up requirement and therefore EPA's intent is that those sources would not be required to submit a Notification of Compliance Status.

18 If the new oil-fired boiler combusts only oil that contains no more than 0.50 weight percent sulfur or a mixture of 0.50 weight percent sulfur oil with other fuels not subject to a PM emissions limit under Subpart JJJJJJ and that do not use a post-combustion technology (except a wet scrubber) to reduce PM or SO_2 emissions, the boiler is NOT subject to the PM emission limitation and is NOT subject to performance testing requirements.

- Records of all required notifications and reports, with supporting documentation.
- Records that demonstrate compliance with applicable emissions and operating limits, tune-ups, and the energy assessment including:

  → For boilers subject to the ***tune-up requirement***, records must:

  - Identify each boiler,
  - The date of the tune-up,
  - The procedures followed for tune-up,
  - The manufacturer's specifications to which the boiler was tuned,
  - Records of the concentrations of CO in the effluent stream in parts per million, by volume and oxygen in volume percent, measured at high fire or typical operating load, before and after the tune-up of the boiler,
  - A description of any corrective actions taken as a part of the tune-up of the boiler,
  - The type and amount of fuel used over the 12 months prior to the tune-up of the boiler but only if the unit was physically and legally capable of using more than one type of fuel during that period. Units sharing a fuel meter may estimate the fuel used by each unit.

  → For boilers required to conduct an ***energy assessment***, a copy of the energy assessment report.

  → For boilers subject to ***emission limits***, record monthly types/amount of fuel used and keep records of each performance stack test conducted, fuel sample analyses, and monitoring records necessary to demonstrate compliance.

- For ***seasonal boilers***, record days of operation per year.
- For ***limited-use boilers***, keep a copy of the federally enforceable permit that limits the annual capacity factor to less than or equal to 10 percent and record fuel use for the days the boiler is operating.
- For boilers that demonstrate compliance through fuel analysis, a copy of all calculations and supporting documentation that were done to demonstrate compliance with the mercury emission limit.
- Records of the occurrence and duration of each malfunction of the boiler, or of the associated air pollution control and monitoring equipment if applicable.
- Records of actions taken during periods of malfunction to minimize emissions in accordance with the general duty clause to minimize emissions including corrective actions to restore the malfunctioning boiler, air pollution control, or monitoring equipment to its normal or usual manner of operation.
- Records of all inspection and monitoring data.
- For units that have a bag leak detection system, records of bag leak detection system output, bag leak detection system adjustments, and bag leak detection system alarms.
- For units that combust non-hazardous secondary materials that have been determined not to be solid waste, maintain records showing how the secondary material meets the legitimacy criteria.

- For units that combusted a fuel that has been processed from a discarded non-hazardous secondary material, maintain records as to how the operations that produced the fuel satisfies the definition of processing and the legitimacy criteria.
- For fuel that received a non-waste determination through the petition process, maintain records that document how the fuel satisfies the requirements of the petition process.
- For units that combust non-hazardous secondary materials, maintain records documenting that the material is a listed non-waste.

What definitions do I need to know to understand the Boiler Area Source Rule?

- ***Boiler system*** means the boiler and associated components, such as, the feedwater systems, combustion air systems, fuel systems including burners, blowdown systems, combustion control systems, steam systems, and condensate return systems, directly connected to and serving the energy use systems.
- ***Energy use system*** includes the following systems located on the site of the affected boiler that use energy provided by the boiler:
  - → Process heating; compressed air systems; machine drives such as motors, pumps, or fans; process cooling; facility heating, ventilation, and air conditioning systems; hot heater systems; building envelope, and lighting; or
  - → Other systems that use steam, hot water, process heat, or electricity, provided by the affected boiler.
  - → Energy use systems are only those systems using energy clearly produced by affected boilers.
- ***Gas-fired boiler*** includes any boiler firing gaseous fuels not combined with any solid fuels. Gaseous fuels include, but are not limited to: natural gas, process gas, landfill gas, coal-derived gas, refinery gas, hydrogen, and biogas. A gas-fired boiler that burns liquid fuels only during periods of gas curtailment, gas supply interruption, startups, or periodic testing (not to exceed a combined total of 48 hours per calendar year) is still considered a gas-fired boiler.
- ***Hot water heater*** means a closed vessel with a capacity of no more than 120 U.S. gallons in which water is heated by combustion of gaseous, liquid, or biomass fuel and hot water is withdrawn for use external to the vessel. Also included in this definition are hot water boilers that do not generate steam that combust gaseous, liquid or biomass fuel with a heat input capacity of less than 1.6 MMBtu/hr and tankless units that provide on-demand hot water.
- ***Limited-use boiler*** means any boiler that burns any amount of solid or liquid fuels and has a federally enforceable average annual capacity factor of no more than 10 percent.
- ***Oxygen trim system*** means a system of monitors that is used to maintain excess air at the desired level in a combustion device. A typical system consists of a flue gas oxygen and/or carbon monoxide monitor that automatically provides a feedback signal to the combustion air controller.
- ***Qualified energy assessor*** means:
  - → Someone who has demonstrated capabilities to evaluate energy savings opportunities for steam generation and major energy using systems, including, but not limited to:
    - – Boiler combustion management,

- Boiler thermal energy recovery, including (A) conventional feed water economizer, (B) conventional combustion air preheater, and (C) condensing economizer,
- Boiler blowdown thermal energy recovery,
- Primary energy resource selection, including (A) fuel (primary energy source) switching, and (B) applied steam energy versus direct-fired energy versus electricity,
- Insulation issues,
- Steam trap and steam leak management,
- Condensate recovery, and
- Steam end-use management;

→ Capabilities and knowledge includes, but is not limited to:

- Background, experience, and recognized abilities to perform the assessment activities, data analysis, and report preparation,
- Familiarity with operating and maintenance practices for steam or process heating systems,
- Additional potential steam system improvement opportunities including improving steam turbine operations and reducing steam demand,
- Additional process heating system opportunities including effective utilization of waste heat and use of proper process heating methods,
- Boiler-steam turbine cogeneration systems,
- Industry specific steam end-use systems.

- ***Residential boiler*** means a boiler used to provide heat and/or hot water and/or as part of a residential combined heat and power system. This definition includes boilers located at an institutional facility (e.g. university campus, military base, church grounds) or commercial/industrial facility (e.g. farm) used primarily to provide heat and/or hot water for:

  → A dwelling containing four or fewer families, or
  → A single unit residence dwelling that has since been converted or subdivided into condominiums or apartments.

- ***Seasonal boiler*** means a boiler that undergoes a shutdown for a period of at least 7 consecutive months (or 210 consecutive days) each 12-month period due to seasonal conditions, except for periodic testing. Periodic testing shall not exceed a combined total of 15 days during the 7-month shutdown. This definition only applies to boilers that would otherwise be included in the biomass or oil subcategories.

- ***Temporary boiler*** means any gaseous or liquid fuel boiler that is designed to, and is capable of, being carried or moved from one location to another by means of wheels, skids, carrying handles, dollies, trailers, or platforms. A boiler is not a temporary boiler if any of the following conditions exists:

  → The equipment is attached to a foundation;
  → The boiler or a replacement remains at a location within the facility and performs the same or similar function for more than 12 consecutive months, unless the regulatory agency approves an extension. Any temporary boiler that replaces a temporary boiler at a location within the facility and performs the same or similar function will be included in calculating the consecutive time period unless there is a gap in operation of 12 months or more;

→ The equipment is located at a seasonal facility and operates during the full annual operating period of the seasonal facility, remains at the facility for at least 2 years, and operates at that facility for at least 3 months each year; and

→ The equipment is moved from one location to another within the facility but continues to perform the same or similar function and serve the same electricity, steam, and/or hot water system in an attempt to circumvent the residence time requirements of this definition.

State Requirements

In addition to the federal requirements outlined above for industrial, commercial and institutional boilers, the State of New Hampshire also has regulations that pertain to the permitting and operation of these boilers. These rules can be found in the New Hampshire Code of Administrative Rules *Env-A 100 et seq., New Hampshire Rules Governing the Control of Air Pollution.*

Does my boiler require an air permit?

There are many criteria that would trigger the need for an owner or operator of an industrial, commercial and institutional facility to obtain an air permit from DES. Further information regarding all of the air permitting requirements can be found in fact sheet ARD-17 *FAQs About New Hampshire's Air Permit Program*. Specifically for owners and operators of boilers in New Hampshire, the following table details the device threshold limits that trigger the requirement for obtaining an air permit from DES.

Table 7: Boilers That Require Air Permits in New Hampshire

Device	Design Gross Heat Input Rating	Fuel
External Combustion Device (Boiler)	≥ 10 MMBtu/hr	Gaseous fuel, liquefied petroleum gas, distillate weight liquid fuel, including but not limited to #2 fuel oil or diesel fuel oil, or any combination thereof
	≥ 4 MMBtu/hr	#4 fuel oil
	≥ 2 MMBtu/hr	Solid fuel (i.e. coal or biomass fuel), residual weight liquid fuel, used oil, or any combination thereof

What permits are required?

There are five types of permits that DES issues: temporary permits, state permits to operate, general state permits, Title V operating permits and permit-by-notifications. **For boilers, only temporary permits, state permits to operate and Title V operating permits apply**. The following explains under which conditions each type of permit is issued.

Temporary Permits

A temporary permit is issued prior to the commencement of construction or installation of any new or modified source or device. A temporary permit is issued for a period no longer than 18 months and contains terms and conditions establishing the parameters under which the source or device is constructed or operated. A temporary permit is issued to sources or devices based on

several criteria including the source or device type, design ratings, levels of production, and annual emission levels. A temporary permit will contain conditions to confirm that the source or device can operate as proposed and in compliance with applicable air standards and regulations, including such conditions as stack testing, monitoring, and recordkeeping requirements. A temporary permit is the first step toward obtaining either a state permit to operate or a Title V operating permit.

State Permits to Operate

A state permit to operate is issued once a source has been constructed, started operation, and shown that it can operate in compliance with all applicable air regulations. A state permit to operate is issued for a period not to exceed five years and contains the emission limits and any other conditions the source is required to meet to ensure that the operation of the source will not result in a violation of any air quality standard or regulation. State permits to operate are issued to sources or devices that were required to hold temporary permits and are not subject to the Title V operating permit program.

Title V Operating Permits

The Title V operating permit program, effective June 30, 1995, is a requirement of Title V of the CAAA. Title V operating permits are issued to sources, called "major sources," which emit or have the potential to emit the following pollutants at the levels specified:

- 10 tons per year (TPY) or more of any one hazardous air pollutant.
- 25 TPY or more of any combination of hazardous air pollutants.
- 50 TPY or more of VOCs.
- 100 TPY or more of any criteria pollutant, e.g., sulfur dioxide, nitrogen oxide, etc. In Hillsborough, Merrimack, Rockingham, or Strafford Counties.the PTE for nitrogen oxides is 50 TPY or more.

Other sources, including area sources, may also be required to obtain Title V operating permits if they are subject to federal requirements relating to NSPS, NESHAPs, or acid rain control.

What Fees Are Required for an Air Permit?

- For facilities that apply for a temporary permit and have not had any air permit with DES in the past, there is a permit application review fee of $2,000.
- For all sources that are subject to the permit application review fees that require air dispersion modeling as part of the application review, there is a modeling fee of $2,500 which can be discounted to $1,875 for applications that include consultant prepared modeling.
- If a temporary permit is issued to a facility and there is associated stack testing required in the permit, the facility will be charged a stack testing and monitoring fee for DES oversight of testing and monitoring conducted.
- Each year, the owner or operators of those facilities, for which a temporary permit, state permit to operate or Title V operating permit has been issued, are required to calculate the actual emissions of regulated air pollutants from their devices and pay an annual emission-based fee based on those calculations. The amount of the fee changes yearly. Permit holders are notified of the emission-based fee each year. The total emission-based fee payment for a source is calculated by multiplying together total actual emissions (maximum of 6,000 tons per pollutant per facility) by the emission-based fee rate.

For example:

If the emission-based fee is $205.27 and a facility reports total actual emissions for a calendar year as follows:

Table 8: Calculation of Emission-Based Fees

Pollutant	Tons
Nitrogen Oxides (NOx)	25
Sulfur Dioxide (SO_2)	71
Carbon Monoxide (CO)	6.25
Particulate Matter (PM)	2.5
Volatile Organic Compounds (VOCs)	0.25
Total Emissions	**105**

Total emission-based fee payment for the facility = 105 X $205.27 = $21,553.35

Permitted sources whose total actual emissions are less than one ton are charged a one-ton minimum fee. For example, a facility that calculates their total emissions equal to 0.45 tons would pay an emission-based fee of $205.27. Emission-Based Fees are due by April 15 of the following year.

For more information on Annual Emission-Based Fees please visit: http://des.nh.gov/organization/divisions/air/pehb/apps/crss/emissions-fees-notice.htm.

How do I calculate my total actual emissions in order to pay the annual fee?

Calculating actual emissions to determine not only how much a permitted facility owes for the annual emission-based fee, but also so they are aware of their contribution to air emissions, is not always an easy endeavor. Guidance documents, forms and links to emission factors can be found at the DES website at: http://des.nh.gov/organization/divisions/air/cb/cmdps/eis/index.htm.

Below is an example of the method to calculate emissions for a typical boiler that is small (<100 MMBtu/hr) and burning distillate #2 fuel oil at 0.40 weight percent sulfur content. Emission factors are based on EPA AP-42 emission factor tables for this type of device and fuel. For combustion devices, the regulated air pollutants for which the calculations are done include SO_2, NOx, PM, CO and VOCs.

Table 9: Sample Actual Emission Calculations for a Small Industrial Boiler

Pollutant	Fuel Used (gallons/year)	Emission Factor (lbs/1,000 gallons)	Quantity Emitted	
			(lbs/yr)	(TPY)
NOx	2,500,000	20	50,000	25
SO_2	2,500,000	142 * (0.40)	142,000	71
CO	2,500,000	5	12,500	6.25
PM	2,500,000	2	5,000	2.5
VOCs	2,500,000	0.2	500	0.25
Total				**105**

When calculating actual emissions for your facility, you would change the amount of fuel used by your boiler(s) for the given year (Column 2) and the emission factors, including sulfur content, for your specific application. Please refer to the guidance documents and AP-42 link on our Air Emissions Inventory and Reporting webpage (www.des.nh.gov/organization/divisions/air/cb/cmdps/eis/index.htm) or contact DES for further guidance.

I don't have an air permit for my boiler since my boiler is too small. Do I need to worry about New Hampshire state requirements for boilers?

There are some requirements that are applicable to boilers even if they are not subject to the state permitting program. For industrial, commercial and institutional boilers, New Hampshire regulations limit the visible emissions and PM that can be emitted from the exhaust stack as well as the sulfur concentration in the fuel burned as outlined in Table 10.

Table 10: New Hampshire State Regulations for Combustion Devices

Pollutant	Regulatory Citation	Limitation	Corresponding Monitoring/Recordkeeping
PM	Env-A 2000	Devices installed on or prior to May 13, 1970 shall not exceed 0.60 lb/MMBtu	None
		Devices (<10 MMBtu/hr) installed after May 3, 1970, but before January 1, 1985 shall not exceed 0.60 lb/MMBtu Devices (≥10 MMBtu/hr) must calculate the PM emission limit	
		Devices installed on or after January 1, 1985 shall not exceed 0.30 lb/MMBtu	
Opacity	Env-A 2000	Devices installed on or prior to May 13, 1970 shall not exceed 40% for any continuous 6-minute period	None
		Devices installed after May 13, 1970 shall not exceed 20% for any continuous 6-minute period	
Sulfur Content	Env-A 1600	The sulfur content of #2 oil shall not exceed 0.40% sulfur by weight	Conduct testing in accordance with appropriate ASTM test methods or retain delivery tickets in order to demonstrate compliance with the sulfur content limitation for liquid fuels or maintain fuel delivery tickets that contain the following information: {for #6 and used oil} • The date of delivery;
		The sulfur content of #6 oil shall not exceed 2.0% (2.2% in Coos county) sulfur by weight	

Pollutant	Regulatory Citation	Limitation	Corresponding Monitoring/Recordkeeping
			• The quantity of delivery; • The name, address and telephone number of the company making the delivery; and • The maximum weight percentage of sulfur. {for other liquid fuels} A written statement from the fuel supplier that the sulfur content of the fuel as delivered does not exceed state or federal standards for that fuel.
		Gaseous fuels shall contain no more than 15 grains of sulfur per 100 cubic feet of gas at standard temperature and pressure.	Conduct testing to determine the sulfur content in grains of sulfur per 100 cubic feet, of gaseous fuels or maintain one of the following: • Sulfur content as percent sulfur by weight or in grains per 100 cubic feet of fuel; • Documentation that the fuel source is from a utility pipeline; or • Documentation that the fuel meets state sulfur limits
All Pollutants	Env-A 900	None	Type and amount of fuel burned per month

For More Information and Assistance

Information and copies of the federal boiler regulations and other materials can be found at the EPA's website: www.epa.gov/boilercompliance. Additional information and guidance for New Hampshire sources can also be found at www.des.nh.gov, then go to "A to Z LIST" and click on "Boiler Rule," or by calling the DES Air Permitting Program at (603) 271-1370.