

# Combustion Sources and Air Pollution

## Construction Permits

AM-427 2015

*This fact sheet offers specific guidance to combustion sources that may require a construction permit.*

### What is a Combustion Source?

A combustion source is a unit that burns fuels that are in gaseous (natural gas), liquid (fuel oil) or solid (coal or wood) form. An industrial or commercial size combustion source is usually used to create heat or steam but some may actually generate electricity. Some examples of combustion sources: boilers, furnaces, space heaters, emergency or back-up generators, or incinerators.

### Why Should I be Concerned About Combustion Sources?

Combustion sources will emit criteria pollutants: particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>2</sub>), carbon monoxide (CO), and volatile organic compounds (VOCs). Depending on the type of fuel burned, different hazardous air pollutants also may be emitted.

### Combustion Sources and Construction Permits

Are you considering installing a boiler or furnace to heat your building or make process steam? Do you have plans to update your existing boiler or furnace (possibly to increase capacity or improve performance)? If so, you may be required to file an application for an air pollution construction permit with the Wisconsin Department of Natural Resources (DNR).

### Exemptions from Construction Permits

Some small boilers and furnaces may be exempt from the requirement to apply for a construction permit. If the unit you want to install or modify (or if multiple units, each one) has a maximum heat input capacity less than one of these, it would be exempt:

- √ 1 million BTU (mmBTU) per hour of coal, coke or solid fuel;
- √ 5 mmBTU per hour of wood, wood combined with liquid or gaseous fuel, residual or crude fuel oil;
- √ 10 mmBTU per hour of #2 or diesel fuel oil;
- √ 25 mmBTU per hour of natural gas or propane.



### How Do I Apply for a Construction Permit?

If you are not exempt from the construction permit requirements, you then need to review the permit options. There are currently three types of permits available to sources undergoing construction or expansion:

- √ Registration Operation Permits - for those who can limit emissions to less than 25 TPY of each criteria pollutant (listed in the actual emissions exemption), 2.5 TPY of one federal HAP and 6.25 of all federal HAPs, the permit allows you to construct without a permit so long as you meet the eligibility thresholds
- √ General Operation Permits - which are only available for certain industries but also allow construction without a permit if you meet the permit criteria, and
- √ Source-specific construction permits - which are written specific to a facility's operations.



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You may contact the DNR or Small Business Environmental Assistance Program (SBEAP) to get the permit application materials and instructions, or you can go online at: <http://dnr.wi.gov/topic/AirPermits/Apply.html>. If you have questions about how to complete the forms you can contact DNR or the SBEAP to help arrange a pre-application meeting. Once you have completed the application, two copies should be submitted to the main DNR office in Madison. There is a link to the list of DNR Air Program contacts at the end of this fact sheet.

### What Will the Application Cost?

For Registration and General Operation permits, there is no application fee. However, permit holders pay an annual fee based on which permit is issued:

- √ Registration Operation Permits: \$400
- √ General Operation Permits:
  - ❖ \$400 if emissions capped less than 80 TPY
  - ❖ \$4,100 if at least 80 TPY but less than 100 TPY

General construction permits for major sources will require a \$3,000 fee.

If you are applying for a source-specific construction permit, you must enclose a check for \$7,500.00, payable to the Department of Natural Resources, when you submit the application. Other costs associated with the construction permit review process will vary depending on which requirements apply to your proposed project. Some additional costs may include:

- ❖ \$3,000 minor source review;
- ❖ \$2,500 for a stack test of single pollutant, and \$1,250 for each additional pollutant up to 3; maximum of \$6,000 (may not be required in all permits);
- ❖ \$1,000 air quality analysis for minor source;
- ❖ \$5,000 expedited review of a minor source (this speeds up the review of your application).

The application fee will be returned by DNR if the project does not need a construction permit or it will be applied to your final fee if the project does need a permit. A complete list of fees associated with a construction permit review can be found in chapter NR 410, Wis. Adm. Code ([http://docs.legis.wisconsin.gov/code/admin\\_code/nr/400/410.pdf](http://docs.legis.wisconsin.gov/code/admin_code/nr/400/410.pdf)).

If a permit is not required, you may then begin construction. **If a permit is required, DO NOT begin construction until a permit is issued by DNR.** There is always a possibility that DNR will deny your permit, if you cannot meet all the requirements before receiving a permit.

### What Are the Permit Review Steps?

First, the DNR reviews the complete construction permit application, which can take from 20 to 60 days **or more** depending on the size of the project and how many permits are being reviewed by DNR. The DNR then prepares a preliminary decision on whether the application is approved or denied and publishes a notice in your local paper. The notice tells the public they have 30 days from the date that paper was published to comment on the proposed project.

If the public shows significant interest in the proposed project or specifically requests one, the DNR will schedule a public hearing within 60 days after the end of the public comment period. Then DNR will issue or deny the construction permit within 60 days after the close of the public hearing. Note that this means a public hearing could add up to 120 days to the process. If there is minimal interest during public comment, DNR can issue the permit immediately after the 30 days is up.

### Calculating Emissions for the Permit Application

#### Boiler Rating

First, you will need to know the rating of your combustion unit (assume it's a boiler from now on). The rating is also known as the heat input to the boiler. It is often expressed in terms of units of energy input to the boiler for each hour of operation, such as British Thermal Units (BTU), boiler horsepower or pounds of steam per hour. You can get the

rating from the "boilerplate" on the boiler or contact the boiler's manufacturer. There may be different ratings for different fuels.

Whichever units you find the rating in, you'll need to convert to million BTU (mmBTU) for the calculations. Conversions can be calculated by:

- a) 1 boiler horsepower (BHP) = 0.05 mmBTU/hr
- b) 1 pound of steam/hr = 0.0017 mmBTU/hr

**For example:**

**OR**

$$200 \text{ BHP} \times 0.05 \text{ MMBTU/hr} / 1 \text{ BHP} = \mathbf{10 \text{ MMBTU/hr}}$$

$$5800 \text{ lb steam/hr} \times 0.0017 \text{ MMBTU} / 1 \text{ lb steam} = \mathbf{9.9 \text{ MMBTU/hr}}$$

### Fuel Heating Value

Next, you will need to know the heating value or heat content of the fuels you use, including any back up fuel(s). This value is usually measured in units of energy per volume. For natural gas the volume is measured in standard cubic feet (SCF). Usually the volume used is large enough that it's measured in million SCF or  $10^6$  SCF (a.k.a. SCF6). Fuel oil would be measured in thousand gallons or  $10^3$  gallons (a.k.a. GAL3).

If you use fuel oil, you will also need to know the sulfur content in the fuel in units of percent by weight.

**For example:**

A value of 0.5 percent S by weight would be determined from a calculation:

$$0.005 \text{ lbs sulfur} / 1 \text{ lb fuel} \times 100 = \mathbf{0.5 \%}$$

The heating value and sulfur content of your fuel should be available from your fuel supplier and you should be able to request them in the appropriate units. So you wouldn't usually be expected to need the above calculation, just those for MTE shown below.

### Fuel Throughput

The third thing you need to determine is the maximum throughput of your fuels. To figure out your throughput you need to use the boiler rating and the heating value. We'll use a 9.0-mmBTU/hr rating for the boiler, a heating value of 1050 mmBTU/SCF6 for natural gas and 140 mmBTU/GAL3 for the backup #2 fuel oil. The throughput is calculated by dividing BOILER RATING by HEATING VALUE.

$$\text{Natural gas} = 9 \text{ mmBTU/hr} / 1050 \text{ mmBTU/SCF6} = \mathbf{0.0086 \text{ SCF6/hr}}$$

$$\text{\#2 fuel oil} = 9 \text{ mmBTU/hr} / 140 \text{ mmBTU/GAL3} = \mathbf{0.064 \text{ GAL3/hr}}$$

### Maximum Theoretical Emissions

Finally, you need to calculate your Maximum Theoretical Emissions (MTE). MTE is defined as the amount of air pollution you would emit into the air if you operated your equipment at its maximum production capacity for 24 hours a day, 365 days a year without any control device. When you have multiple materials used at a process, you must take the worst case of all materials to determine the MTE.

To calculate your MTE you need the emission factors for each of the types of fuels you burn. Emission factors can be found:

- 1) in an EPA document called AP-42;
- 2) through your trade association; or
- 3) from your fuel supplier.

MTE rates are calculated by multiplying THROUGHPUT by the EMISSION FACTOR.

Emission Factors from AP 42		
Pollutant	Natural Gas (lb/SCF6)	#2 Fuel Oil (lb/GAL3)
PM	12	2
NO <sub>x</sub>	100	20
SO <sub>2</sub>	0.6	142S
CO	21	5
VOC	5.3	0.34

The S in the SO<sub>2</sub> emission factor for #2 fuel oil is the percent sulfur by weight. If we assume use of a low sulfur fuel, where S is 0.05% by weight, the final emission factor is:

$$142 \times 0.05 = 7.1 \text{ lb S/GAL3}$$

#### Natural gas

$$\text{SO}_2 = 0.6 \text{ lb/SCF6} \times 0.0086 \text{ SCF6/hr} = \mathbf{0.005 \text{ lb/hr}}$$

#### #2 Fuel Oil

$$\text{SO}_2 = 7.1 \text{ lb/GAL3} \times 0.64 \text{ GAL3/hr} = \mathbf{0.45 \text{ lb/hr}}$$

So the worst case SO<sub>2</sub> MTE rate you would include in the application is for the #2 fuel oil at 0.45 lb/hr. Comparing this with the MTE general exemption levels, this is less than the 9.0 lb/hr level for SO<sub>2</sub>.

You would continue to do this calculation for each pollutant, determining which fuel has the higher MTE of each pollutant and including that higher rate for the pollutant in the application. The SBEAP has developed a MS Excel spreadsheet that you could use to calculate the emissions: <http://dnr.wi.gov/topic/SmallBusiness/documents/air/EmissionsWorksheet.xls>.

### What Should I Do When I Get My Final Permit?

When you get your permit, you can begin construction. Read the permit CAREFULLY for any specific testing or monitoring requirements, or other deadlines. Mark down deadlines and periodic requirements on a calendar as a reminder. You can use the *Air Permit Compliance Calendar*, available from SBEAP at <http://dnr.wi.gov/topic/SmallBusiness/Compliance.html>, to help manage your reminders.

It is very important to keep track of the deadlines in a construction permit because of its limited life of 18 months. If you cannot meet certain deadlines, talk with your DNR compliance inspectors about extensions. Also, if you cannot complete construction and/or required emissions testing in the construction permit, you should request your one 18-month extension well in advance of the expiration date of the permit.

**DISCLAIMER** — This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.



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