



Combustion Sources and Air Pollution Construction Permits

January 2017

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.

Combustion sources will emit criteria pollutants: particulate matter (PM), nitrogen oxides (NO_x), sulfur oxides (SO₂), 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 British Thermal Units (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 25% or 50% of the major source thresholds, these permits allow 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.

What Will the Application Cost?

For Registration and General permits there are no application fees. However, you will pay an annual fee based on which permit you are issued:

- Registration Operation Permits: \$400
- General Construction Permits:
 - \$400 if emissions capped less than 80 TPY
 - \$4100 if at least 80 TPY but less than 100 TPY

When applying for a source-specific construction permit, enclose a check for \$7,500, payable to the Department of Natural Resources, when the application is submitted. Costs associated with the construction permit review process will vary depending on which requirements apply to the proposed project. Some costs are outlined below.

- \$3,000 minor source review;
- \$12,000 major source review;
- \$4,500 or \$12,000 for minor or major modifications (respectively);
- \$2,500 for a stack test of a 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 the 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. If a permit is not required, you may then begin construction. If a permit is required, you must wait until a permit is issued by DNR to begin construction. There is always a possibility that DNR will deny your permit, if you cannot meet all the construction before receiving a permit.

What Are the Permit Review Steps?

For Registration and General Permits, the application process is very simple.

Registration Permits have a simplified process and can be applied for online by answering fewer than 15 questions. To apply, use the Online Application System through DNR's Switchboard (<http://dnr.wi.gov/topic/AirPermits/Apply.html>). A few of the questions require some calculations or collecting information, and the program will time-out if stopped in the middle. It may save time to complete the appropriate Registration Permit Guide prior to starting the online application:

- For Type A ROP <http://dnr.wi.gov/files/PDF/pubs/am/AM539.pdf>
- For Type B ROP <http://dnr.wi.gov/files/PDF/pubs/am/AM546.pdf>

Once the application is completed, print out the final summary page, sign the form and mail to DNR. This process may change once DNR can accept electronic signatures.

General Permits also have simple application forms, but they are not yet available online. For more information, go to: <http://dnr.wi.gov/topic/AirPermits/Options.html> and select the "general" tab.

Applying for a source-specific construction permit is a more extensive process. After a complete application has been submitted, DNR staff goes through the review process, which can take from 20 to 60 days or more depending on the size of the project and the current queue of applications. When the review is completed, the DNR then prepares a preliminary decision to approve or deny the application and publishes a notice in a local paper. The notice gives the public 30 days from the date the paper was published to comment on the proposed project. **This is also the facility's chance to review the permit and provide DNR with comments on elements in the permit.**

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. Once issued, the construction permit is effective for 18 months, with a possibility for a one time 18-month extension upon request.

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 (BHP) 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:

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

OR

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

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 (SCF6). Fuel oil would be measured in thousand gallons or 10^3 gallons (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.

The S in the SO₂ 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

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

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

#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 SO₂ 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 SO₂.

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>.

Additional Assistance

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/>. If you have questions about how to complete the forms you can contact DNR or the SBEAP to help arrange a pre-application meeting. For more information, contact SBEAP staff at 855-889-3021 or DNRSMBEAP@wisconsin.gov or visit their web page (<http://dnr.wi.gov/topic/SmallBusiness/>). Contact information for Air Management Program staff can be found at: <http://dnr.wi.gov/topic/AirQuality/Contacts.html>.

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.

The Wisconsin Department of Natural Resources provides equal opportunity in employment, programs, services and functions under an Affirmative Action Plan. If you have any questions, please write to Equal Opportunity Office, Department of Interior, Washington, DC 20240. This publication is available in alternative format (large print, Braille, audio tape, etc.) upon request. Please contact the Bureau of Air Management, phone 608-266-7718, for more information.



Wisconsin Department of Natural Resources
 Bureau of Air Management
 Box 7921- AM/7
 Madison, WI 53707
 PHONE 608-266-7718 • FAX 608-267-0560
Publication AM-427 2017