

Information for Applicants

Ministry of the Environment Policy Guideline A-9 NO_x Emissions from Boilers and Heaters

March 20, 2001

The Canadian Council of Ministers of the Environment (CCME) **National Emission Guideline for Commercial / Industrial Boilers and Heaters** (CCME Guideline, 1998) has been adopted as **Policy Guideline A-9** of the Ontario Ministry of the Environment for Ontario (“MOE”).

The policy guideline is part of Ontario’s efforts to reduce smog and improve air quality.

PART I

IMPLEMENTATION AND APPLICATION IN ONTARIO OF THE CCME GUIDELINE

Emission Limits - NOx

The CCME Guideline establishes limits for the emission of oxides of nitrogen (“NOx”) from specific boilers and heaters. These boilers and heaters are defined as those that burn oil or gas fuel, and are larger than 10.5 GJ/h, or 10 million Btu/h, (fuel energy input).

MOE Policy Guideline A-9 adopts these emission limits and provides that the Director must be satisfied that the new or modified boiler or heater will emit NOx within the limits specified in the CCME Guideline when issuing a Certificate of Approval.

Accordingly, applications for a CofA for a boiler or heater must be accompanied by a letter signed by a Professional Engineer, registered in the Province of Ontario, verifying that the new or modified boiler or heater will emit NOx within the specified limits. A sample Professional Engineer’s letter is attached to this document.

There are exceptions to the requirement that a CofA be obtained, which are outlined below.

The statutory requirements for the approval of any equipment or process which may discharge to the air are contained in Section 9 of the *Ontario Environmental Protection Act* (EPA). Section 9(1) requires that approval be obtained from the Director before establishing new or modifying existing equipment or processes which may discharge a contaminant to the air.

In regard to the application of the CCME Guideline to Ontario, a “modified” boiler or heater is one that has been altered in such a way that it triggers the approval requirements of Section 9(1) of the EPA.

There are exemptions from this requirement in Section 9(3) of the EPA and Ontario Regulation 524/98 made under the EPA. The two principal relevant exemptions are:

- agriculture
- equipment for combustion of fuel in buildings designed for housing three families or less

The emission limits and acceptable methods of demonstrating compliance with the emission limits are in Part III.

Exceptions

Certificates of Approval for the following equipment will not be governed by the limits and procedures set out in Policy Guideline A-9:

- coal-fired boilers and heaters
- wood-fired boilers and heaters
- pyrolysis heaters (*petrochemical sector*)
- steam reformer heaters (*refining sector*)
- steam cracking heaters (*refining sector*)
- coke ovens (*steel sector*)
- blast furnace stoves (*steel sector*)
- reheat furnaces (*steel sector*)
- by-product fuel boilers and heaters (*multiple sectors*)
- chemical recovery boilers (*pulp and paper sector*)

Policy Guideline A-9 applies only to boilers and heaters which are fired with a primary fuel. It does not apply to boilers and heaters which are fired with a standby fuel (less than 500 hours per year).

Requirement for Record Keeping

If granted a CofA for the boiler or heater, the owner shall maintain the CofA and all supporting documents at the site where the boiler or heater is located, until the boiler or heater ceases operation.

Other Activities

The CCME Guideline mentions other activities in support of energy efficiency and reduced emissions from boilers and heaters. These activities, which are not mandatory in Ontario at this time, include inspection and maintenance of boilers and heaters. However, the Ministry strongly recommends that owners of combustion equipment pursue these activities to reduce operating costs and air emissions.

For further information and assistance, contact:

Ministry of the Environment
Environmental Partnerships Branch
40 St. Clair Ave. W., 14th Floor
Toronto, ON M4V 1M2

Tel: 416-327-1443
Fax: 416-314-7919

E-Mail: markowto@ene.gov.on.ca

PART II

HOW TO FIND A PROFESSIONAL ENGINEER TO VERIFY EMISSIONS

A Professional Engineer is as defined under the *Professional Engineers Act*. Mechanical engineers and environmental engineers with expertise in combustion testing are listed in telephone directories across Ontario. Your natural gas supplier or the supplier of your new boiler or heater may be able to assist you in finding an appropriate contact.

PART III

INFORMATION FOR PROFESSIONAL ENGINEERS AND INDUSTRY PROFESSIONALS

Emission Limits and Calculation Procedures

Emissions of NO_x as nitrogen dioxide, in units of grams NO_x per gigajoule of input fuel energy, from new or modified Ontario boilers and heaters, according to primary fuel, shall not exceed the following:

Capacity	NO_x Emission Limit			
	Gaseous Fuel	Distillate Oil	Residual Oil <0.35% Nitrogen	Residual Oil ≥0.35% Nitrogen
10.5 - 105 GJ/h (10 - 100 MMBtu/h)	26 g/GJ	40 g/GJ	90 g/GJ	110 g/GJ
>105 GJ/h (>100 MMBtu/h)	40 g/GJ	50 g/GJ	90 g/GJ	125 g/GJ

Below is the same table of NO_x Emission Limits, expressed in ppm NO_x by volume (as NO₂) in the flue gas, at 3% O₂ in the flue gas, dry basis.

Capacity	NO_x Emission Limit			
	Gaseous Fuel	Distillate Oil	Residual Oil <0.35% Nitrogen	Residual Oil ≥0.35% Nitrogen
10.5 - 105 GJ/h (10 - 100 MMBtu/h)	49.6 ppm	72.3 ppm	162.7 ppm	198.9 ppm
>105 GJ/h (>100 MMBtu/h)	76.3 ppm	90.4 ppm	162.7 ppm	226.0 ppm

If the O₂ concentration in the flue gas is not 3% at time of measurement, the measured ppm NOx can be converted to equivalent ppm NOx at 3% O₂ by using the following equation:

$$(\text{ppm NOx at 3\% O}_2) = (\text{ppm NOx at measured \% O}_2) \times 17.9 \div (20.9 - \text{measured \%O}_2)$$

Sample Calculation:

*The instrument measures 85.3 ppm NOx and 4.5% O₂ in the flue gas, dry basis.
What is the equivalent ppm NOx, at 3% O₂ ?*

Answer:

$$\begin{aligned} (\text{ppm NOx at 3\% O}_2) &= (\text{ppm NOx at measured \% O}_2) \times 17.9 \div (20.9 - \text{measured \%O}_2) \\ &= (85.3) \times 17.9 \div (20.9 - 4.5) \\ &= 93.1 \end{aligned}$$

The equivalent at 3% O₂, dry basis, is 93.1 ppm NOx.

Acceptable Proof of Compliance with NOx Emission Limits

Compliance with the NOx emission limits specified in Policy Guideline A-9 may be demonstrated using any of the following three methods:

- (1) "Packaged" boilers and heaters already certified as low-NOx by reputable certification agencies in Canada and elsewhere will be deemed to have demonstrated compliance with Policy Guideline A-9 for the purposes of issuance of a CofA, if their certified NOx emissions meet the limits specified in Policy Guideline A-9.

(A "packaged" boiler or heater has the burner, the heat exchanger, the controls, the refractory, the gas supply, the exhaust, the water supply, the electrical connections etc. built together in one pre-engineered, manufactured unit.)

(Please note that some packaged boilers and heaters are certified as low NOx to published standards of USEPA NSPS, American Gas Association, California Air Resources Board, South Coast Air Quality Management District, etc.)

- (2) In the absence of certification as described above, compliance with Policy Guideline A-9 for the purpose of supporting an application for a C of A can be demonstrated if the Applicant provides sufficient supporting information showing that an identical boiler or heater, operating in another location, in a situation identical to the applicant's, has been tested by an independent, reputable agency, using an acceptable test method, and proven in the previous location to meet the NOx emission limits specified by Policy Guideline A-9.

Acceptable test methods include Environment Canada Test Reference Method EPS1/RM/15, CAN/CSA Z223.2-M86, USDOE NSPS Test Method 7E, and SCAQMD Method 100.1.

- (3) New, unique equipment which has not been tested or certified previously will be deemed to have demonstrated compliance with Policy Guideline A-9 for the purposes of supporting an application for a CofA if the Applicant provides sufficient supporting information showing that the equipment's NOx emission rate will be within the limits specified by Policy Guideline A-9.

Variable Firing Rates

The Applicant for a C of A for a new or modified boiler/heater with a variable firing rate must satisfy the Director that the new or modified boiler/heater will meet Policy Guideline A-9's NOx emission limits at full-fire, at minimum firing rate, and at the mid point between full-fire and minimum firing.

Energy Efficiency Credits

Certain high-efficiency equipment is eligible for an efficiency credit, allowing for a higher allowable NOx emission rate.

Similarly, equipment which gains efficiency through heat recovery from exhaust gases is also eligible for an efficiency credit.

If the applicant chooses to apply for energy efficiency credits, the applicant shall provide to the Ministry the necessary calculations and documents.

For details, please see pages 6-8 of the CCME National Emission Guideline for Commercial/Industrial Boilers and Heaters.

Carbon Monoxide Emissions

Policy Guideline A-9 is not intended to regulate emissions of carbon monoxide ("CO"). Ontario Regulation 346 under the Environmental Protection Act regulates CO emissions. In Ontario, the Technical Standards and Safety Authority regulates stack emissions of CO.

Emission Trading

The CCME Guideline refers to NOx emission trading as an alternative approach to reducing NOx emissions. For information about NOx emission trading, please contact the Ministry of the Environment's Air Policy Guideline and Climate Change Branch at (416) 314-6789.

For Further Information

If you want to read a copy of the CCME Guideline, you may contact any District or Regional Office of the Ministry of the Environment, or the:

Environmental Assessment and Approvals Branch
2 St. Clair Avenue West, 14th Floor
Toronto, ON M4V 1L5

Tel: 1-800-461-6290
Fax: 416-314-7030

For an application for a CofA, please contact the Environmental Assessment and Approvals Branch at the above location.

If you want to purchase a copy of the CCME Guideline, please contact the CCME at:

Canadian Council of Ministers of the Environment
c/o Manitoba Statutory Publications
200 Vaughan St.
Winnipeg, MB R3C 1T5

Tel: (204)945-4664
Fax: (204)945-7172
e-mail: spccme@che.gov.mb.ca

Sample Professional Engineer's Letter to accompany Application for CofA

ACME Engineering Ltd.
2000 Xxxxx St.
Yyyyyy, ON X7P 2Y9
Tel: (XXX) xxx-xxxx
Fax: (YYY)yyy-yyyy
e-mail: xxxxxxx@yyyyy.ca

(date)

Ontario Ministry of the Environment
Environmental Assessment and Approvals Branch
2 St. Clair Ave. W., 12th Floor
Toronto, ON M4V 1L5

Attention: Director, Section 9, Environmental Protection Act

Subject: Application for Certificate of Approval No. XXXXXXXX

This letter concerns the new (boiler or heater) which the Zzzzzzzzz Company wishes to install at (street address) , in Qqqqqqq, Ontario.

My Qualifications:

I am a Professional Engineer, registered in the Province of Ontario. My PEO Registration Number is 000000000. My engineering expertise includes environmental testing and monitoring of air emissions from combustion equipment.

The Boiler or Heater:

The boiler or heater will be used to xxxxxxx for a yyyyyyyyyy.
Here is the relevant data about the boiler or heater:

Manufacturer: Bbbbbb Boiler or heater Company, Cccccc, Ontario
Model Number Dddddd/ee/ff
Serial Number: GGGGGGGGGG
Fuel Natural Gas
Firing Rate (Full-fire) HH,H million Btu/h (I.I.IGJ/h)
(Low-Fire) JJ.J million Btu/h (K.KK GJ/h)
(Mid-Fire) QQ.Q million Btu/h (R.RR GJ/h)

Method of Establishing NOx Emission Rate:

This particular boiler or heater model has been certified by the QQQQQ Association, to QQQQQ Standard LLLLLLLL, which includes testing and reporting of NOx emissions. The Certification Number is xxxxxxxxxxxxxxxxx.

NOx Emission Rate:

As reported in QQQQQ Certification Number xxxxxxxxxxxxxxx, the measured NOx emission rates for this particular boiler or heater are as follows:

At Full Fire: xx.x ppm NOx by volume in the flue gas,
dry basis, at 3% O₂
At Mid Fire: yy.y ppm NOx by volume in the flue gas,
dry basis, at 3% O₂
At Low Fire: zz.z ppm NOx by volume in the flue gas,
dry basis, at 3% O₂

These NOx emission rates are within the limits specified in the Ontario Policy Guideline A-9 for a (natural gas-fired) boiler or heater of this capacity.

Yours sincerely,

X.Y.Nnnnnnnn, P.Eng.