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Air Pollution Guidelines Applicable to Boilers at Federal Establishments

Regulations, Codes and Protocols
Report EPS 1-EC-79-1

Environmental Impact Control Directorate
December 1979

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AIR POLLUTION GUIDELINES APPLICABLE TO BOILERS AT FEDERAL ESTABLISHMENTS

Federal Activities Branch
Environmental Impact Control Directorate
Environmental Protection Service
Environment Canada

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ABSTRACT

These guidelines set forth emission limits for air pollutants discharged from new and existing boilers at federal establishments.

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1 PURPOSE OF GUIDELINES

The Department of the Environment was commissioned by the Government Organization Act, 1970, to ". . . provide and encourage the institution of practices and conduct leading to the better protection and enhancement of environmental quality." This policy was further promoted by the Cabinet Decision of June 8, 1972, entitled "Control and Abatement of Pollution from Federal Activities - Cleanup and Prevention", which calls for the cleanup of existing sources of pollution from federal establishments and for the screening of all new projects initiated by the federal government for potential adverse environmental effects. The purpose of these guidelines is to indicate the air contaminant emission quality that will be applicable to all gases discharged from existing and proposed federal boiler installations. Use of these guidelines is intended to promote a consistent approach towards the cleanup and prevention of air pollution and ensure that the best practicable control technology is used. In addition, the following guidelines have been prepared to cover other associated areas of environmental concern:

- Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments
- Code of Good Practice for Handling Solid Wastes at Federal Establishments
- Code of Good Practice on Dump Closing or Conversion to Sanitary Landfill at Federal Establishments
- Air Pollution Guidelines Applicable to Incinerators at Federal Establishments
- Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments.

2 APPLICATION OF GUIDELINES

These guidelines apply to new and existing boiler facilities at federal establishments under the direct authority of the federal government, as per Schedules A, B, and C in Appendix A. Specifically excluded from these guidelines are prime movers of motor vehicles, ships, trains and aircraft. It is intended to revise and amend these guidelines from time to time in order to reflect new developments in technology and changing circumstances. These guidelines have been developed and are administered by the Environmental Protection Service (EPS) of the Department of the Environment.

The specific limits outlined herein apply primarily to normal boiler operating conditions. In the event that a special or unique situation is encountered, contact should be made with the appropriate Regional or District EPS offices (see Appendix B).

3 POLICY

It is the policy of the federal government to set and maintain a high national standard in keeping with a role of national leadership in environmental protection with respect to its own activities. Facilities requiring air pollution control are to reflect sound engineering and best practicable technology regardless of location. These facilities should comply with the levels set in this guideline and to the standards of other federal or provincial regulatory agencies. Such an approach is designed to demonstrate leadership on the part of the federal government.

4 EMISSION GUIDELINES

4.1 General

All air contaminant emissions from boilers at federal establishments should be limited so that their effect on the ambient air does not:

- endanger the health, safety or welfare of persons,
- intefere with normal enjoyment of life or property,
- endanger the health of animal life,
- cause damage to plant life or to property.

In order to ensure that proposed boiler facilities meet the federal and provincial environmental guidelines, plans and specifications should be submitted prior to tender to the appropriate Regional or District EPS office (see Appendix B) for review.

4.2 Visible Emissions

4.2.1 New Installation. A new installation should be designed and operated so that the opacity of gases emitted into the ambient air does not exceed 5%, as measured in accordance with the method specified in Section 1 of Appendix C. In order to ensure compliance with this limit, the boiler should be tested under design conditions in the presence of a Regional EPS Representative within 90 days of start-up.

4.2.2 Existing Installation. The opacity of gases emitted into the ambient air from an existing installation should not exceed 20%, as measured in accordance with the method specified in Section 1 of Appendix C.

4.2.3 Emission of Heat or Uncombined Water. When the emission of heat or uncombined water is the only reason for failure to meet the requirements of subsections 4.2.1 and 4.2.2, the opacity limits should be considered attained by the boiler; however, under no circumstances should any emissions impair visibility on a public road, airport runway or railway.

4.3 Particulate Emissions

4.3.1 New Installation. A new installation should be designed and operated in a manner which results in the emission to the ambient air of gases containing particulate matter in concentrations not exceeding:

(i) 0.18 kilograms/1,000,000 kilocalories (or 0.1 lb/million BTU) heat input for all units less than or equal to 2,520,000 kilocalories/hr (or 10,000,000 BTU/hr) heat input.

(ii) 0.36 kilograms/1,000,000 kilocalories (or 0.2 lb/million BTU) heat input for all units greater than 2,520,000 kilocalories/hr (or 10,000,000 BTU/hr) heat input.

4.3.2 Existing Installation. The particulate matter emitted into the ambient air from an existing installation should not create a nuisance or air pollution as defined in this guideline. On receiving complaints to this effect, the Regional EPS Representative will contact the facility and ask the owner to modify or replace the boiler or the operating procedures to alleviate the source of these complaints.

4.4 Sulphur Dioxide Emissions

4.4.1 New Installation. A new installation should be designed and operated in a manner which results in the emission to the ambient air of gases containing sulphur dioxide in concentrations not exceeding:

(i) 1.98 kilograms/1,000,000 kilocalories (or 1.1 lbs/million BTU) heat input for all units less than or equal to 2,520,000 kilocalories/hr (or 10,000,000 BTU/hr) heat input.

(ii) 2.96 kilograms/1,000,000 kilocalories (or 1.64 lbs/million BTU) heat input for all units greater than 2,520,000 kilocalories/hr (or 10,000,000 BTU/hr) heat input.

4.4.2 Existing Installation. The sulphur dioxide emitted into the air from an existing installation should not create a nuisance or air pollution as defined in this guideline. On receiving complaints to this effect, the Regional EPS Representative will contact the facility and ask the owner to modify or replace the boiler installation or the operating procedures to alleviate the source of these complaints.

5 BOILER STACK HEIGHT REQUIREMENTS

5.1 New Installation

The stack of a new installation should be designed so that the flue gases, containing air contaminants limited to the levels specified in this guideline, are discharged into the ambient air at sufficient height, velocity and temperature so as to cause a one hour average impingement concentration no greater than:

(i) 450 µgm of sulphur dioxide/cubic metre of air
(ii) 200 µgm of nitrogen dioxide/cubic metre of air
(iii) 120 µgm of particulates/cubic metre of air

5.2 Existing Installation

The stack of an existing installation should be designed so that the flue gases are discharged into the ambient air at sufficient height, velocity and temperature so as to cause a one hour average impingement concentration no greater than:

(i) 900 µgm of sulphur dioxide/cubic metre of air
(ii) 400 µgm of nitrogen dioxide/cubic metre of air
(iii) 240 µgm of particulates/cubic metre of air

5.3 Stack Height Design Method

The stack height design method, to ensure compliance with the one hour average impingement concentrations in this section, should be the "Briggs Method" specified in the report entitled, "Diffusion Estimation for Small Emissions" available from the Regional and District EPS Offices (see Appendix B).

6 EXISTING INSTALLATION BECOMES SUBJECT TO THE LIMITS OF A NEW INSTALLATION

An existing installation should be considered subject to the emission limits of a new installation when the boiler undergoes a major modification.

For the purposes of these guidelines a major modification is defined as:

(i) one which increases the total emission of air contaminants into the boiler flue gases beyond the average hourly operating levels as defined in this guideline, or

(ii) one where the extent of replacement of components of an existing facility is such that the fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable entirely new facility.

7 GLOSSARY

Air Contaminant

A solid, liquid, gas or odour or a combination of any of them that, if emitted into the ambient air, would create or contribute to the creation of air pollution.

Air Pollution

A condition of ambient air, arising wholly or partly from the presence therein of one or more air contaminants, that endangers the health, safety or welfare of persons, that interferes with normal enjoyment of life or property, that endangers the health of animal life or that causes damage to plant life or to property.

Ambient Air

The atmosphere surrounding the earth but does not include the atmosphere within a structure or within any underground space.

Average Hourly Operating Level

The total annual weight of air contaminants divided by the annual hours of operation. (The average hourly operating level is employed in this guidelines on an annual basis because some existing boilers are equipped to burn more than one fuel type).

Boiler

Equipment used in the process of burning fuel for the primary purpose of producing steam or hot water by heat transfer.

Control Equipment

Any device which separates solid, liquid or gaseous material from the flue gas medium in which it is carried.

Federal Establishments

Installations in departments under the authority of the federal government as listed in Appendix A.

Flue Gas

The exhaust gases leaving the boiler via the breeching and the stack.

One Hour Average Impingement Concentration

The concentration of an air contaminant for a one hour averaging period at the point where it first contacts plant, animal or human life, or their life support systems such

as building air intakes and open windows (calculated by the methods referred to in subsection 5.3).

Regional EPS Representative

A person designated by the Department of the Environment of which several are listed by region in Appendix B.

New Installation

A boiler brought into operation on or after February 1, 1980.

Nuisance

The operation of a boiler which results in complaints due to flyash, odours or air contaminant concentrations.

Existing Installation

A boiler brought into operation before February 1, 1980.

Odour

That property of an emission which stimulates the sense of smell.

Opacity

The degree to which emissions reduce the transmission of light and obscure the view of an object in the background.

Particulate Matter

Any material, other than uncombined water, which is suspended in or discharged into the atmosphere as a liquid or solid at standard conditions.

Stack

A flue, chimney, conduit or other device constructed for the purpose of conducting flue gases into the ambient air.

Stack Height

The vertical distance measured in metres between the point of discharge of flue gases from a stack into the atmosphere and the elevation of the land thereunder.

APPENDIX A

FEDERAL ESTABLISHMENTS
SCHEDULE A

Department of Agriculture
Department of Communications
Department of Consumer and Corporate Affairs
Department of Energy, Mines and Resources
Department of External Affairs
Department of Finance
Department of the Environment
Department of Indian and Northern Affairs
Department of Industry, Trade and Commerce
Department of Insurance
Department of Justice
Department of Labour
Department of Manpower and Immigration
Department of National Defence
Department of National Health and Welfare
Department of National Revenue
Post Office Department
Department of Public Works
Department of Regional Economic Expansion
Department of the Secretary of State of Canada
Department of Supply and Services
Department of Solicitor General
Department of Transport
Treasury Board
Department of Veterans Affairs

SCHEDULE B

Agricultural Stabilization Board
Atomic Energy Control Board
Director of Soldier Settlement
Director, Veteran's Land Act
Economic Council of Canada
Fisheries Prices Support Board
Medical Research Council
Municipal Development and Loan Board
National Museums of Canada
National Research Council of Canada
Science Council of Canada
Unemployment Insurance Commission

SCHEDULE C

Atomic Energy of Canada Limited
Canadian Arsenals Limited
Canadian Commercial Corporation
Canadian Dairy Commission
Canadian Film Development Corporation
Canadian Livestock Feed Board
Canadian Patents and Developments Limited
Canadian Saltfish Corporation
Defence Construction (1951) Limited
National Battlefields Commission
National Capital Commission
National Harbours Board
Northern Canada Power Commission
Royal Canadian Mint
Uranium Canada Limited

APPENDIX B

ENVIRONMENTAL PROTECTION SERVICE
REGIONAL AND DISTRICT OFFICES

Regional Director, Atlantic Region
Environmental Protection Service
Department of the Environment
16th Floor, Bank of Montreal Tower
5151 George Street, Halifax, Nova Scotia B3J 1M5

Regional Director, Quebec Region
Environmental Protection Service
Department of the Environment
4th Floor, 1550 de Maisonneuve Blvd. West
Montreal, Quebec H3G 1N2

Regional Director, Northwest Region
Environmental Protection Service
Department of the Environment
Room 804, 9942 - 108th Street
Edmonton, Alberta T5K 2J5

Regional Director, Pacific Region
Environmental Protection Service
Department of the Environment
Kapilano 100, Park Royal
West Vancouver, British Columbia V7T 1A2

Regional Director, Ontario Region
Environmental Protection Service
Department of the Environment
25 St. Clair Avenue East, 7th Floor
Toronto, Ontario M4T 1M2

District Manager, Newfoundland District Office
Environmental Protection Service
Department of the Environment
P.O. Box 5037
St. John's, Newfoundland A1C 5V3

District Manager, New Brunswick District Office
Environmental Protection Service
Department of the Environment
364 Argyle Street
Fredericton, New Brunswick E3B 1T9

District Manager, Prince Edward Island District Office
Environmental Protection Service
Department of the Environment
P.O. Box 115, Dominion Building, Queen Street
Charlottetown, Prince Edward Island C1A 4A9

District Manager, Manitoba District Office
Environmental Protection Service
Department of the Environment
800 Kensington Building
275 Portage Avenue
Winnipeg, Manitoba R3B 2B3

District Manager, Northwest Territories District Office
Environmental Protection Service
Department of the Environment
P.O. Box 2310
Yellowknife, Northwest Territories X0E 1H0

District Manager, Yukon Territory District Office
Environmental Protection Service
Department of the Environment
Room 225
Federal Building
Whitehorse, Yukon Territory Y1A 3A4

District Manager, National Capital District Office
Environmental Protection Service
Department of the Environment
Ontario Regional Office
Bogue Bldg., River Road
Ottawa, Ontario K1A 1C8

District Manager, Saskatchewan District Office
Environmental Protection Service
Department of the Environment
930 Avord Tower - 2002 Victoria Avenue
Regina, Saskatchewan S4P OR7

District Manager, Alberta District Office
Environmental Protection Service
Department of the Environment
Room 804
9942 - 108th Street
Edmonton, Alberta T5K 2J5

APPENDIX C

EMISSIONS TESTS

1 Visible Emissions

The opacity should be measured in accordance with the Environment Canada "Standard Reference Method For Source Testing: Measurement of Opacity of Emissions from Stationary Sources." EPS 1-AP-75-2.

2 Particulate Emissions

The particulate matter emission rate should be measured in accordance with the Environment Canada "Standard Reference Methods for Source Testing: Measurement of Particulates from Stationary Sources" EPS 1-AP-74-1.

3 Sulphur Dioxide Emissions

The sulphur dioxide emission rate should be measured in accordance with the Environmental Canada "Standard Reference Methods for Source Testing: Measurement of Emissions of Sulphur Dioxide from Stationary Sources." EPS 1-AP-74-3.