



**Canadian Nuclear
Safety Commission**

**Commission canadienne
de sûreté nucléaire**

**RECENT CHANGES TO REGULATORY REQUIREMENTS FOR
LOW LEVEL RADIOACTIVE WASTES INCINERATION
AT FUEL FACILITIES IN CANADA**

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By

**David J. Werry, P. Eng.
Processing and Research Facilities Division
Directorate of Nuclear Cycle and Facilities Regulation
Canadian Nuclear Safety Commission
Ottawa, Canada**

Recent Changes to Regulatory Requirements for Low Level Radioactive Wastes Incineration at Fuel Facilities in Canada.

Abstract:

The Canadian Nuclear Safety Commission (CNSC) is the regulatory body that was created by an Act of the Parliament of Canada to regulate the use of nuclear energy and materials to protect health, safety, security and the environment, and to respect Canada's international commitments on the peaceful use of nuclear energy.

This paper will review the changes to Canadian federal and provincial requirements for incineration of combustible materials containing low-level radioactive wastes (LLRW) and its effect on CNSC's licensing of fuel facilities in Ontario, Canada. New provincial (Ontario) emission requirements and Canada-wide standards took effect on January 1, 2007, under the Guidelines A-7¹ and A-8² respectively. Discussion will focus on the timing needed for the changes to be introduced to parties involved. A brief history of recent changes to incineration standards and integration into CNSC's licensing of such facilities involving incinerators will be included.

¹ *Guideline A-7: Combustion and Air Pollution Control Requirements for New Municipal Waste Incinerators (2004).*

² *Guideline A-8: Guideline for the Implementation of Canada-wide Standards for Emissions of Mercury and of Dioxins and Furans, and Monitoring and Reporting Requirements for Municipal Waste Incinerators Biomedical Waste Incinerators Sewage Sludge Incinerators Hazardous Waste Incinerators Steel Manufacturing Electric Arc Furnaces Iron Sintering Plants (2004).*

1. INTRODUCTION

Canadian Nuclear Safety Commission's Background, History, and Mandate

The Canadian Nuclear Safety Commission is an independent federal agency responsible for the regulation of all aspects of nuclear energy in Canada. With the passage of the *Atomic Energy and Control Act* in 1946, the Atomic Energy Control Board (AECB) was created.

In May 2000, the *Act* was updated and replaced by the *Canadian Nuclear Safety and Control Act* (NSCA), for the purposes of modernizing Canada's nuclear regulatory regime. At that time, the AECB was replaced by the Canadian Nuclear Safety Commission (CNSC), reflecting the changing historical and regulatory environment that had taken place in Canada since the original *Act* was passed.

After approximately 55 years in existence, the CNSC has a new name supported by a refreshed regulatory framework, with an updated mandate, which follows below.

CNSC's Mandate

"To regulate the development, production and use of nuclear energy, nuclear substances, prescribed equipment, and prescribed information in order to:

- Prevent unreasonable risk to the environment and to the health and safety of persons;
- Prevent unreasonable risk to national security; and
- Achieve conformity with measures of control and international obligations to which Canada has agreed."

Regulatory Bodies and Responsible Authorities

To achieve its goal as an effective regulator of the nuclear industry in Canada, the CNSC involves a number of other federal and provincial regulatory authorities to insure efficiency while striving to avoid regulatory duplication. Its objective is to provide a transparent regulatory regime and to regulate the use of nuclear energy and materials to protect health, safety, security and the environment and to respect Canada's international commitments on the peaceful use of nuclear energy. Examples of regulatory agencies that the CNSC works closely with to achieve this goal are: Environment Canada, Human Resources and Skills Development Canada (HRSDC), Ontario Ministry of Environment (MOE, Ontario), to name a few. These are typically separated into two groups:

Federal Authorities: Environment Canada,
Human Resources and Skills Development Canada; and

Provincial Authorities: Ministry of Environment, Ontario (MOE, Ontario)

A brief explanation and description of these regulatory bodies' mandates are as follows:

(a) Human Resources and Skills Development Canada (HRSDC) sets the regulatory framework within which employers must operate in Canada. The regulations that affect the federal sites are provided by the NCSA and those granted authority by HRSDC.

Specifically, these are provided under the Canada Labour Code, Part II. Under Canada's Labour Code, Part II, federal facilities must meet several requirements, these include such items as provisions for fire protection, safety standards, building code requirements and other items such as the Workplace Hazardous Information Management System (WHIMS). The items mentioned are but a brief list of the requirements needed to satisfy all the regulatory needs.

(b) Environment Canada's mandate is to preserve and enhance the quality of the natural environment, conserve Canada's renewable resources; conserve and protect Canada's water resources; forecast weather and environmental change; enforce rules relating to boundary waters; and coordinate environmental policies and programs for the federal government.

(c) The Ontario Ministry of Environment (MOE) is responsible for protecting clean and safe air, land and water to ensure healthy communities, ecological protection and sustainable development for present and future generations of Ontarians.

The brief summary of regulatory bodies is but a few of the organizations that have input to how facilities are governed in Ontario and elsewhere in Canada. In addition, the CNSC manages all nuclear facilities on a risk-based approach. This topic will not be discussed in detail here. However, another CNSC staff's paper being presented during this workshop describes this approach and considerations in more details.

2. INCINERATION AND RECENT REGULATORY CHANGES

Incineration is a process that employs decomposition via thermal oxidation at high temperature to destroy the organic waste. Incineration, which is capable of the highest degree of waste destruction, is considered to be able to destroy the broadest range of hazardous waste. However, incineration may produce residuals in the ash and emit undesired trace amounts of unburned hazardous waste, incomplete combustion by-products, metals, and particulates.

CNSC provides the licensing and regulatory oversight on nuclear matters in Canada. Authority has been granted to the CNSC through Canadian 'Acts of Parliament', and such legislative works as the NSCA, *Nuclear Safety Regulations*, Guides, Standards, Licences and IAEA documents, provide a means for the legal structure to be initiated and enforced.

The CNSC's approach to introduce changes in its regulatory requirements is to have pre-consultation workshops with stakeholders including the licensees and to provide guidance as needed to meet the changing regulatory framework. This entails initiating promotion campaigns to introduce new regulatory direction and setting time frames in place for regulatory changes that are reasonable. Policy decisions are undertaken and initiated at the federal level to provide for better management of the nuclear resources with the objective of providing a better 'safety envelope' for their use.

With a changing regulatory framework based on continual improvement, the CNSC routinely conducts promotion workshops to update its licensees and the public with the information requirements as it becomes available. In this regard, the CNSC makes efforts to ensure that its licensees know and understand the changes to combustion and air pollution control requirements for new and existing waste incinerator standards that were introduced into law effective January 01, 2007.

In 2002 and 2003, Environment Canada undertook to make tighter limits for mercury, dioxins, and furans emissions. As this was being performed, the Ontario MOE elected to make their provincial limits more stringent. The overall effect of both of these bodies working together was the issuance of Guideline A-7¹, Combustion and Air Pollution Control Requirements for New Municipal Waste Incinerators, and A-8², Guideline for the Implementation of Canada-wide Standards for Emissions of Mercury and of Dioxins and Furans, etc.

The Ontario MOE introduced these new guidelines, A-7 and A-8 in 2004 after consultation with the public. In order to provide for a reasonable time for introduction, engineering assessment and process changes for those affected municipal waste incinerators burning hazardous wastes, the Ontario MOE elected to choose January 01, 2007 as the enforcement date.

In the case of the CNSC's regulated facilities, this time frame was adopted to permit the nuclear fuel facilities' licensees to apply to the Commission for an amendment of their operating licences so that the necessary upgrades to the existing incinerators could take place. The Commission is the tribunal that oversees the regulatory regime provided by the NSCA and grants licences for fixed periods of time and with varied conditions under which to operate.

In the case Low Level Radioactive Wastes (LLRW) incineration at nuclear fuel facilities, the licenses issued by the CNSC previously contained air emission limits for uranium and total particulates for the existing waste incinerators. These limits needed to be revised as a result of the changes to the air emission standards being imposed. It is the changes to these specific limits that are affected by the guidelines issued by the Ontario MOE.

Changes to Air Contaminant Emission Limits for Incinerators

Both, the uranium refining and conversion facilities had a LLRW incinerator in operation since 1980. These incinerators were designed and operated to handle solid combustible wastes in accordance with the CNSC and the Ontario MOE's licensing requirements. These requirements included the primary and secondary combustion chambers, minimum combustion temperature, residence time and excess air for complete combustion, emission limits for uranium, particulates and opacity and bottom ash removal system equipped and operated with an air filtering baghouse system. In addition to periodic manual stack emissions monitoring, continuous source emission monitoring systems for opacity and temperature was required to comply with the licensing limits. Both licensees, with the proper maintenance and operation of the incinerators were in compliance with the CNSC's and the Ontario MOE's regulatory requirements.

As mentioned previously, effective the first of January 2007, new Canada-wide regulations were enforced for the operation of the hazardous waste incinerators including the LLRW incinerators at nuclear fuel facilities in Canada. The new regulations involve improvements to regulatory requirements for controlling the releases of hazardous and nuclear substances to the environment and incinerator stack emission monitoring.

Table 1, outlines the new emission limits effective January 01, 2007 as set out in Ontario MOE's Guideline A-7 and is referenced in Guideline A-8. These are given legal authority under Legislation granted by *Environmental Protection Act*, Part V, Section 27, and Part II, Section 9; Ontario Regulation 347, General – Waste Management Regulation; Ontario Regulation 346, General - Air Pollution; and Ontario Regulation 512/95.

Table 1: List of Contaminants and Emission Limits by the January 2007

Contaminant	New Emission Limit
Particulate Matter	17 mg/Rm ³
Cadmium	14 ug/Rm ³
Lead	142 ug/Rm ³
Mercury	20 ug/Rm ³
Dioxins and Furans	80 pg/Rm ³ as ITEQ
Hydrochloric Acid	18 ppmv (27 mg/Rm ³)
Sulphur Dioxide	21 ppmv(56 mg/Rm ³)
Nitrogen Oxides	110 ppmv
Organic Matter	100 ppmv undiluted (expressed as equivalent methane)

Notes:

mg/Rm³ means milligrams per cubic meter of Reference flue gas conditions.

ug/Rm³ means micrograms per cubic meter of Reference flue gas conditions.

pg/Rm³ as ITEQ means picograms per reference cubic meter at Reference flue gas conditions. The toxicity equivalent concentration of dioxins and furans shall be calculated in accordance with the international schemes set out in the References, or the latest calculation method established by the Ontario MOE, whichever comes later.

ppmv means parts per million by volume

Once the incinerator modernization is complete, the licensee will be required to demonstrate its ability to meet the new regulatory requirements by conducting a manual stack sampling survey in accordance with the CNSC's and the Ontario MOE's approved methodology. The results of the stack survey will be submitted to the regulators for review and acceptance. If there is sufficient interest, the CNSC or the licensee may provide follow up information regarding the facility experience upon completion of commissioning and operational experience.

References

1. Guideline A-7: Combustion and Air Pollution Control Requirements for New Municipal Waste Incinerators February 2004
2. Guideline A-8: Guideline for the Implementation of Canada-wide Standards for Emissions of Mercury and of Dioxins and Furans, and Monitoring and Reporting Requirements for Hazardous Waste Incinerators. August 19, 2004