CCME

Canadian Council of Ministers of the Environment | Le Conseil canadien des ministres de l'environnement

CANADA-WIDE STANDARDS FOR MERCURY

A REPORT ON COMPLIANCE AND EVALUATION

Mercury from Dental Amalgam Waste

A REPORT ON PROGRESS

Mercury Emissions and Mercury-Containing Lamps

October 2007

INTRODUCTION

This report presents the overall compliance and evaluation of the Canada-wide Standard on Mercury for Dental Amalgam. This repost also presents updates on the status of the implementation of two other Canada-wide standards for Mercury:

- Mercury Emissions; and
- Mercury Containing Lamps.

More information on the Canada-wide Standards for Mercury may be found on the CCME website at www.ccme.ca.

COMPLIANCE AND EVALUATION OF MERCURY FOR DENTAL AMALGAM WASTE

Background

The Mercury Problem

Mercury is a naturally occurring substance as well as a toxic pollutant originating from various human activities. Levels in soils, water and fish vary across the country depending on the geology of the rocks and soils and the amount of pollution. Once mercury is released into the air**,** it can circle the globe several times before being deposited into lakes, streams, forests and fields. In some water bodies the present levels of mercury in fish are unsafe for fish-eating wildlife, such as loons and otters. Fish in many areas of North America cannot be eaten safely by humans. Elevated levels of mercury in the fish eaten by women of child-bearing age can pose a threat to the health of their newborns, which are much more sensitive than adults.

Mercury levels in fish, typically in remote areas, have an impact on recreational and subsistence fish consumption in most jurisdictions, and affect First Nations' traditional way of life and food sources. These impacts are significant across northern Canada, though the source of most of the mercury is attributed to human activities resulting in the emission of mercury to the atmosphere in the industrialized south.

Concerns about the release of mercury to the water from dental amalgam particles discharged from dental clinics have resulted in efforts to improve the capture and management of these particles.

The Dental Amalgam Issue

The Canadian Council of Ministers of the Environment (CCME) determined that environmental levels of mercury across Canada warrant efforts to reduce atmospheric and waterborne emissions of mercury and mercury compounds, derived from both deliberate uses and from incidental releases.

Dental amalgam remains a well-suited material for the restoration of dental health in Canada, which is important to the health and well-being of its citizens. Though it has been in use for 150 years, the development of synthetic resins and other substitutes has resulted in a decline in the use of amalgam. Nevertheless, a substantial number of dental fillings are placed and replaced each year. The removal of old fillings and shaping/polishing of new fillings generates a mercury-containing waste being vacuumed from the mouth, and discharged to sewage systems. A substantial portion of this is collected by simple traps and filters and should be disposed of appropriately. The remaining portion may be discharged to the environment if not re-captured.

A Voluntary Approach to Manage Mercury for Dental Amalgam Waste

In 2001, the CCME endorsed the Canada-wide Standard on Mercury for Dental Amalgam Waste (CWS) to address mercury releases from dental facilities in a nationally consistent manner (http://www.ccme.ca/assets/pdf/cws_merc_amalgam_e.pdf). The CWS calls for the installation of ISO 11143 certified separators and other best management practices to reduce releases of mercury from dentistry in Canada by 95% by 2005, from a baseline of 2000. Canadian and international studies have confirmed that placement and repair of dental amalgam fillings may contribute mercury-containing wastes to sewage systems, to municipal garbage and landfills, and to biomedical waste. While some amalgam wastes are currently recycled, this standard seeks to optimize and harmonize the removal of this mercury waste from municipal waste streams throughout Canada.

USE AND FATE OF DENTAL AMALGAM IN CANADA

In 2003 and 2007, two National Surveys of Dentists were carried out in all Provinces and Territories in Canada to collect information about the use of dental amalgam. In 2003, it was estimated that all 17,967 registered dentists removed amalgam restorations containing 2,472 Kg of mercury and placed amalgam restorations containing 2,314 Kg of mercury. Twenty seven percent (27%) of dentists used ISO certified separators. Therefore, it was estimated that 1,046 Kg of the mercury contained in this amalgam would enter the wastewater stream. (see Table 1)

In 2007, it was estimated that all 18,705 dentists removed amalgam restorations containing 2703 kg of mercury and placed amalgam restorations containing 2,051 Kg of mercury. Because 70% of dentists use ISO separators it was estimated that 452 kg of the 2703 kg of Hg in the amalgam that was removed would enter the wastewater stream, a reduction of 57% from 2003. (see Table 1)

Table 1 – Comparison between data collected from the 2003 and 2007 National Survey of Dentists.

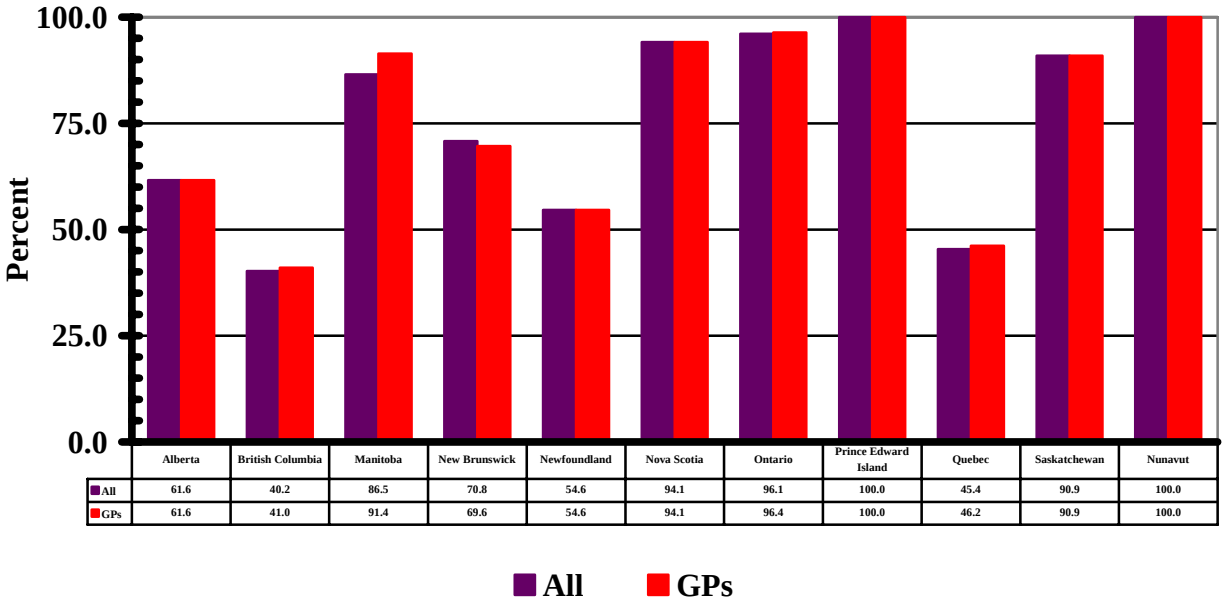
	2003	2007	2003 vs 2007
Total amount of Hg used in dental amalgam	5352 kg	4665 kg	- 13%
Quantity of Hg being placed in teeth	2314 kg	2051 kg	- 11%
Quantity of Hg present in removed dental amalgam restorations	2472 kg	2703 kg	+ 9%
Quantity of Hg trapped in solids separators[1]	989 kg	1081 kg	+ 9%
% of dentists using ISO certified separators[2]	27%	70%	+ 43%
Quantity of Hg being released to the environment from removed dental amalgam restorations	1046 kg	452 kg	- 57%
% of dentist who had engaged a licensed waste carrier to manage amalgam appropriately3	N/A	71.2 %	-

[1] Conventional solids separators at the chair-side and vacuum pump.

[2] A high efficiency amalgam separator that meets ISO 11143:1999 standards (International Standard Organization 1999).

[3] Appropriate management may include landfilling in an approved, confined, engineered landfill with leachate collection systems, such as a hazardous waste landfill, recycling to either produce reusable materials such as mercury, silver and copper, or for stabilization/immobilization in a form that may be retired permanently.

Figure 1
Percent of respondents in each province who placed and replaced restorations who practiced in an office equipped with a separator that meets ISO standards, in 2007



	Alberta	British Columbia	Manitoba	New Brunswick	Newfoundland	Nova Scotia	Ontario	Prince Edward Island	Quebec	Saskatchewan	Nunavut
All	61.6	40.2	86.5	70.8	54.6	94.1	96.1	100.0	45.4	90.9	100.0
GPs	61.6	41.0	91.4	69.6	54.6	94.1	96.4	100.0	46.2	90.9	100.0

Several provinces and territories, such as Prince Edward Island, Nunavut, Ontario and Nova Scotia (5% error margin) have achieved the target set in the CWS (see Figure 1).

DISCUSSION

Achievement of the CWS

The CWS is the application of "Best Management Practices" to achieve a 95% national reduction in mercury releases from dental amalgam waste discharges to the environment, by 2005, from the base year 2000.

If reduction in mercury releases corresponds to removing mercury from the dental stream, it is determined that a dentist who uses an ISO certified amalgam separator and other best management practices as well as appropriately managing the mercury-containing waste has achieve an estimate of 100% reduction of mercury releases. The 2007 Survey of Dentists has concluded that 70% of dentists in Canada use an ISO certified amalgam separator and 71.2% of Canadian dentists who place and remove restorations had engaged a licensed waste carrier to remove amalgam waste, meaning that 1.2% of dentists have their dental amalgam waste removed by a licensed waste carrier but are not using an ISO certified amalgam separator. Since the CWS

calls for a 95% reduction of mercury releases across Canada, it is concluded that the CWS on Mercury for Dental Amalgam Waste **has not been achieved**.

RECOMMENDATIONS

The mercury Canada-wide Standard for dental amalgam waste target of 95% reduction of releases was not achieved, however the percentage of dentists with ISO 11143 certified separators has increased from 27% nationally to 70% . It is recommended that Environment Canada take further actions under the Canadian Environmental Protection Act to assist jurisdictions in achieving the Canada-wide Standard target.

PROGRESS REPORT - Mercury Emissions and Mercury Containing Lamps

PROGRESS ON CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

Canada-wide Standards (CWSs) for Mercury Emissions were endorsed by the Canadian Council of Ministers of the Environment (CCME) in 2000. The standards are for the waste incineration and base metal smelting sectors and address both existing, new and expanding facilities. The waste incineration sector includes hazardous waste, sewage sludge, municipal waste, and medical waste.

The report in 2005 addressed compliance by the hazardous waste incineration sector and presented an overview of actions by governments towards implementation in all incineration sectors, where available. This report will address compliance by all incineration sectors and progress for base metal smelting. A third report in 2010 will include an overall evaluation of compliance for all standards and any recommendations for revisions.

Report on Compliance

The CWS for hazardous waste incineration for existing, new, or expanding facilities of any size, is application of best available pollution prevention and control techniques, such as a mercury waste diversion program, to achieve a maximum concentration in the exhaust gases of 50 µg Rm^3 by 2003.

Six of seven reporting hazardous waste incinerators were in compliance with the standard in the compliance year, 2003. The cause of the one anomalous test result, which took the one facility out of compliance, was suspected to be the incineration of a mercury-containing item, such as a battery or switch. This highlights the need for rigorous screening of hazardous streams. Since the 2005 report one hazardous waste facility has closed and in 2006 one facility was not in compliance, but was compliant in 2007.

The federal government is currently gathering information for mercury emissions at its federally owned hazardous waste incineration facilities. This includes verification of federally owned hazardous waste incinerators and collection of information pertaining to mercury emissions. Emission concentration data will be provided in the future based on this information gathering exercise.

CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

The Canada-wide Standard (CWS) for Mercury-Containing Lamps was endorsed by the Canadian Council of Ministers of the Environment (CCME) in 2000. The intent of the CWS is to reduce releases of mercury to the environment from mercury-containing lamps.

The CWS is a 70% reduction by 2005 and an 80% reduction by 2010 in the average content of mercury in all mercury-containing lamps sold in Canada, from a 1990 baseline.

This report documents intermediate progress by manufacturers in reducing mercury content in lamps and presents an overview of actions by governments, where available. A 2012 report will include an evaluation of this standard and a recommendation on whether changes should be considered.

Report on Progress

In its October 19, 2004 update on mercury reduction, Electro-Federation Canada reported that the average mercury content of all mercury-containing lamps sold in 2003 was 11.4 mg per lamp. This represents a 73.5% reduction from the 1990 baseline of 43 mg per lamp, and exceeds the 2005 CWS target of 70% reduction.

The "average mercury content per lamp" industry number was calculated by dividing the total mercury content of all fluorescent and HID lamps sold in Canada by Electro-Federation members by the total number of fluorescent and HID lamps sold in Canada by Electro-Federation members for a specified year.

Electro-Federation Canada members include the following lamp manufacturers: GE Lighting; OSRAM Sylvania Ltd.; Panasonic Canada Inc.; and Philips Lighting. These members produce over 90% of the Fluorescent and High Intensity Discharge lamps sold in Canada.

JURISDICTIONAL REPORTS

ALBERTA

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

Alberta Progress Update
As the Canada-wide Standard for dental amalgam waste was primarily a voluntary initiative through a Memorandum of Understanding (MOU) between Environment Canada and the Canadian Dental Association (February 18, 2002), Alberta did not pursue any formal initiative in respect of the standard. To achieve the goals of the standard, the Canadian Dental Association was to promote the use of dental amalgam separators to Canadian dentists, and Environment Canada was to assist by providing dentists with information and technical support. Alberta agreed to provide support for any federal actions on dental amalgam that applied nationally. Alberta actions in support of this standard included the following:

* Alberta Environment helped to promote the standard by meeting with the Alberta Dental Association and College (ADA&C) on several occasions to review the standard and look at measures to help promote the implementation by Alberta dentists.
* In response, the ADA&C developed a best management practices guide that detailed appropriate handling and disposal methods for dental amalgam. This guide, published in 2002, aimed to increase awareness of the dental amalgam issue in the dental community and promote sound management of dental amalgam waste. The ADA&C also advised dentists in several publications and oral presentations to comply voluntarily with the placement of amalgam separators by the end of 2005.
* Alberta Environment also met with major municipalities (i.e. Edmonton, Calgary, Red Deer) to educate them on the standard and request assistance in implementing measures at the local level.

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

The three incinerator facilities in Alberta are the Swan Hills Treatment Center, the Beiseker Waste Incineration Plant, and the Wainwright Regional Waste to Energy Incineration Facility. The Swan Hills Hazardous Waste Treatment Center burns hazardous waste while the latter two facilities burn biomedical and municipal waste. The two incinerators for municipal and medical wastes were both designed to accommodate feed values in excess of 120 tonnes per year. The Swan Hills Hazardous Waste Treatment Center, Beiseker Waste Incineration Plant and Wainwright Regional Waste to Energy Incineration Facility Compliance Reports are included below.

Swan Hills Hazardous Waste Treatment Center Compliance Report

As per approval 1744-02-00, specifically sections 4.1.27, 4.1.28, and Table 4.1-D, the concentration and emission rate for heavy metals emitted from the FBD and C.E. Raymond incinerator stacks are to be monitored and reported once for each calendar year. Mercury is specified under the broad heading of heavy metals in Table 4.1-D, however no emission standard for mercury is listed in the approval. The effective date for the above approval was November 30, 2005. A mercury emission standard for hazardous waste incineration of 50 $\mu g/Rm^3$ had been developed through the Canada Wide Standard (CWS) and existing facilities were to be in

compliance with this standard by 2003. Any new or expanding facilities were to comply immediately upon commencement of normal full-scale operation. The CWS for Mercury Emissions had been previously supported by the CCME in 2000.

An inventory of mercury emission rates and concentrations from 2005 to 2007 is shown in Table 1 below. Tables 1 and 2 detail the mercury emissions data for the Swan Hills Hazardous Waste Treatment Center from 2005 – 2007.

Swan Hills Hazardous Waste Treatment Center (FBD Kiln Stack)					
Parameter	Year	Test 1	Test 2	Test 3	Average
Mercury Concentration ($\mu g/m^3$)* at 11 % Oxygen	2005	11.77	2.22	3.27	5.75
	2006	66.88	75.71	84.24	75.61
	2007	6.90	5.28	0.48	4.22
Mercury Emission Rate (g/h)	2005	0.489	0.103	0.158	0.250
	2006	2.544	2.851	3.238	2.878
	2007	0.261	0.204	0.022	0.162

*Reference Conditions are 25^{o}C and 760 mmHg

Table 1. Swan Hills Treatment Center Mercury Concentrations and Emission Rates for the FBD Kiln Stack for 2005 to 2007

Swan Hills Hazardous Waste Treatment Center (CE Raymond Kiln Stack)					
Parameter	Year	Test 1	Test 2	Test 3	Average
Mercury Concentration ($\mu g/m^3$) * at 11 % Oxygen	2005	18.93	16.69	9.57	15.07
Mercury Emission Rate (g/h)	2005	0.305	0.255	0.128	0.229

*Reference Conditions are 25^{o}C and 760 mmHg

Table 2. Swan Hills Treatment Center Mercury Concentrations and Emission Rates for the CE Raymond Kiln Stack for 2005

Samples were collected and analyzed following the protocols in Method 29 – "Determination of Metals Emissions from Stationary Sources" of the EPA Code of Federal Regulations (40 CFR, Pt. 60). Stack samples were analyzed for mercury with cold vapor atomic absorption spectroscopy. Maxxam Analytics Inc conducted the stack testing from 2005 to 2007.

The stack test for the FBD Kiln Stack in 2005 was in compliance with the CCME CWS of 50 $\mu g/Rm^3$ but the stack test in 2006 showed a mercury concentration above the standard set out by the CWS. In 2007, mercury concentrations determined from the stack test indicate that emissions were back in line with 2005 levels and in compliance with the CCME CWS target for mercury.

Stack test results from the CE Raymond Kiln in 2005 indicate that mercury concentrations were in compliance with the CCME CWS. The unit is currently offline.

Beiseker Waste Incineration Plant Progress Report

The Beiseker Waste Incineration Plant was issued an Environmental Protection Order (EPO) on July 31st, 2006. The Beiseker Waste Incineration Plant failed to comply with this order and as a result was shut down on January 31, 2007. The facility remains shut down and will remain so until it can be operated in compliance with their approval.

Wainwright Regional Waste to Energy Incineration Facility Compliance Report

As per approval 9846-01-00, specifically section 4.1.13 and Table 4.1-C, a limit of 0.0200 mg/Rm^3 was placed on mercury emissions from the baghouse exhaust stack following the incinerator. This limit was placed into the approval to reflect the mercury emission standard of 20 $\mu g/Rm^3$ developed through the CCME CWS. The CCME CWS of 20 $\mu g/Rm^3$ was set for compliance by 2006.

Sections 4.1.15, 4.1.16, and Table 4.1-D of approval 9846-01-00 (effective February 1, 2007) require that the concentration and emission rate for mercury emitted from the incinerator stack are to be monitored and reported once for each calendar year. A mercury emission standard for municipal waste incineration of 20 $\mu g/Rm^3$ had been developed through the Canada Wide Standard (CWS) and existing facilities were to be in compliance with this standard by 2006. Any new or expanding facilities were to comply immediately upon commencement of normal full-scale operation. The CWS for Mercury Emissions had been previously supported by the CCME in 2000.

An inventory of mercury emission rates and concentrations from 2004 to 2007 is shown in Table 3 below. Table 3 details the mercury emissions data for the Wainwright Regional Waste to Energy Incineration Facility from 2004 – 2007.

Wainwright Regional Waste to Energy Authority Incineration Facility					
Parameter	Year	Test 1	Test 2	Test 3	Average
Mercury Concentration ($\mu g/m^3$)* at 11 % Oxygen	2004	1.50	4.50	2.90	2.97
	2005	0.89	0.38	0.28	0.52
	2006	4.57	8.79	3.49	5.62
	2007	34.1	21.5	21.3	25.6
Mercury Emission Rate (g/h)	2004	0.014	0.041	0.026	0.027
	2005	0.0082	0.0034	0.0025	0.0047
	2006	0.0381	0.0719	0.0286	0.0462
	2007	0.255	0.150	0.148	0.184

*Reference Conditions are 25°C and 760 mmHg

Table 3. Wainwright Regional Waste to Energy Incineration Facility Mercury Concentrations and Emission Rates for 2004 to 2007

Samples were collected and analyzed following the protocols in Method 29 – "Determination of Metals Emissions from Stationary Sources" of the EPA Code of Federal Regulations (40 CFR, Pt. 60. LEHDER Environmental Services Limited conducted the stack testing from 2004 to 2007.

Emissions between 2004 and 2006 were in compliance with their approval and the CCME CWS target for Mercury. However, the facility was above their approval limit of 20 µg/Rm^3 in 2007. The Wainwright Regional Waste to Energy Authority reported the contravention of their approval to Alberta Environment. The compliance team will review the contravention and the level of compliance action will be determined.

There are no sewage sludge incineration facilities and no base metal smelters in Alberta.

CANADA WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

Alberta Environment is no longer running a fluorescent lamp program. It was originally a voluntary program for companies and municipalities to enlist. Since then, companies and municipalities have now committed to recycling their FLTs voluntarily. As a result, Alberta Environment no longer tracks or collects information similar to that previously submitted in 2004. Additional information on fluorescent bulbs can be accessed from the Alberta Environment website at:

http://environment.gov.ab.ca/info/posting.asp?assetid=5707&searchtype=asset&txtsearch=Fluorescent_Bulbs

BRITISH COLUMBIA

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

The Canadian Dental Association and Environment Canada signed a Memorandum of Understanding (MOU) committing to actions for the voluntary implementation of the CWS and outlining Best Management Practices for dental offices. The Canadian Dental Association agreed to make determined efforts to ensure that dentists take action to achieve the objectives of the CWS. Progress in the reduction of dental amalgam in BC has primarily been pursued via federal tracking of the dental industry commitments.

British Columbia has also worked closely with the Greater Vancouver Regional District and the Capital Regional District to develop source control by-laws which restrict mercury from dental amalgams.

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CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

There are no biomedical waste, hazardous waste or sewage sludge incineration facilities in British Columbia.

Municipal Waste Incineration

British Columbia has one large municipal waste-to-energy facility that processes 285,000 tons of municipal solid waste per year. This facility is equipped with activated carbon injection controls that remove mercury to levels near or below 5 micrograms per cubic metre.

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Base Metal Smelting

British Columbia's overall approach to new BMS facilities, should such additional facilities be constructed in the province, will be to incorporate the CWS requirements into the facility's permit or a regulation issued under the *Environmental Management Act*.

In British Columbia, there is one base metal smelter. Based on mercury emissions monitoring and 2005 refined zinc and lead production, the emission rate for this smelter is calculated to be 0.434 g/tonne of production.

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CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

In British Columbia, fluorescent lamp tubes that qualify as "leachable toxic waste" are subject to the Hazardous Waste Regulation. The Ministry of Environment is considering designating all fluorescent lamp tubes as hazardous waste.

A fluorescent lamp tube recycling operation is located in Langley and has operated there for several years. British Columbia encourages municipalities, businesses and homeowners to use such services wherever possible.

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MERCURY SWITCHES

The British Columbia Ministry of Environment (MOE) has been supporting the Mercury Switch-Out program administered by the Clean Air Foundation since 2005. This is a voluntary program developed to encourage the removal of mercury switches from end of life vehicles. To date 21,845 switches have been collected in BC, representing the equivalent of over 19 kg of mercury safely recovered from the environment.

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CANADA

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

The Canadian Dental Association and Environment Canada signed a Memorandum of Understanding (MOU) committing to actions for the voluntary implementation of the CWS and outlining Best Management Practices for dental offices. The Canadian Dental Association agreed to make determined efforts to ensure that dentists take action to achieve the objectives of the CWS, and Environment Canada agreed to support these efforts.

Environment Canada has undertaken several activities to implement the commitments in the MOU. These have included:

- collaborating with the CDA on the determination of the number of Canadian dentists affected by the CWS;
- providing support for the assessment of the amount of amalgam waste generated and an evaluation of the adoption of best management practices in 2003 and 2007;
- providing support for the development of a technology verification protocol for amalgam separators equivalent to the criteria stated in the ISO 11143;
- compiling information on jurisdictional management requirements relative to the management of amalgam waste from dental practitioners;
- writing an article that was published in the CDA's journal on the background and rationale for the MOU and the CWS amalgam waste issue;
- working with the Ontario Dental Association, the Ontario Ministry of the Environment, and other stakeholders in the Ontario region on the development of technical guidance documents to help dental practitioners in implementing Best Management Practices; and
- continuing with outreach and education efforts directed to the dental community, through the Mercury and the Environment (www.ec.gc.ca/mercury) web site and through presentations and exhibits at dental conferences on Best Management Practices.

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

Base Metals Smelting Sector

Status of Federal Actions:

On April 29, 2006, Environment Canada published in the *Canada Gazette,* Part I a *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans in respect to Specified Toxic Substances Released from Base Metals Smelters and Refineries and Zinc Plants*. Among its factors to consider, the Notice include the Canada-wide Standard for Mercury Emissions and a site-specific mercury target for the Hudson Bay Mining and Smelting facility in Flin Flon, Manitoba, the only base metals smelting facility not currently meeting the CWS.

Environment Canada also published an *Environmental Code of Practice for Base Metals Smelters and Refineries* dated March 2006. The Code contains a series of guidelines, criteria, and recommended practices, including the Canada-wide Standard for Mercury Emissions.

Conformance with the Code's guidelines, criteria, and recommended practices is also a factor to consider of the Notice.

All of the 11 facilities subject to the Notice have sent their Declaration that a Pollution Prevention has been developed and is being implemented and their First Interim Progress Report. Environment Canada is reviewing the documents and monitoring the results expected and achieved to date

The Base Metals Smelting Sector is also one of the industrial sectors targeted under the *Regulatory Framework for Industrial Air Emissions* which propose that substances to be regulated include mercury.

Hazardous and Non-Hazardous Waste Incineration

Environment Canada completed a study in 2005 of small incineration units burning non-hazardous waste at selected federal facilities. Where data was available, it was concluded that existing routine waste management practices at the facilities were being carried out in a responsible manner. Biologically inert waste materials were being diverted from disposal where possible and practical. The Mercury-containing Product Stewardship Manual for Federal Facilities was being followed.

A similar study of selected small incinerators at federal facilities burning hazardous and bio-hazardous waste was completed by Environment Canada in 2006 with similar results.

In both the above studies, there were no data available on trace mercury levels in the waste, so it was not possible to provide an estimate of the annual loading of mercury to the environment from these facilities.

In addition, Environment Canada is currently examining ways in which existing federal efforts to meet the Canada-wide Standard for mercury from incineration could be further enhanced.

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CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

Environment Canada will continue to monitor industry compliance with the reductions stipulated in the standard and to receive updates from Electro-Federation Canada. Environment Canada will also continue to monitor mercury emissions from lamp manufacturing operations through reporting under the National Pollutant Release Inventory.

Environment Canada will work with other federal departments to encourage new mercury reduction and energy conservation purchasing considerations for lighting of federal buildings. *The Mercury-containing Product Stewardship Manual for Federal Facilities* has been developed

by Environment Canada to promote the lifecycle management of mercury-containing products, and in particular fluorescent lamps. The manual emphasizes activities to plan and implement appropriate procurement, handling and disposal practices to minimize environmental releases.

Work is underway to promote this manual and to include considerations for lamps and other mercury-containing products in initiatives such as Environmental Management Systems and pollution prevention and sustainable development activities.

In December 2006, Environment Canada published a Risk Management Strategy (RMS) for Mercury-containing Products. The risk management objective is to reduce mercury releases to the environment from consumer products to the lowest possible level by prohibiting, or limiting where appropriate, mercury content in new consumer products; and, preventing releases from end-of-life mercury-containing products. In accordance with the RMS, Environment Canada has developed draft risk management instruments for mercury-containing products. Environment Canada will be initiating multi-stakeholder consultations on the proposed instruments in the fall of 2007.

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MANITOBA

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

Manitoba had worked closely with the Manitoba Dental Association during the course of the development of the CWS for mercury dental amalgam waste. The Manitoba Dental Association (MDA) has agreed to voluntarily implement this CWS as a precautionary and preventative measure. Though a specific update is not available at this time, the MDA reported previously that, as of November 2004, more than 97% of Manitoba dental practices had already installed and were utilizing amalgam separators. Based on this information, Manitoba believes that this CWS has been fully implemented in the province.

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CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

There are no hazardous waste or sewage sludge incineration facilities in Manitoba.

Municipal Waste Incineration

Manitoba's overall approach to both new and existing municipal waste incinerators is to integrate both the mercury and dioxins/furans CWS requirements into the relevant regulatory process. New proposed incinerators that are a part of a 'manufacturing and industrial plant', as defined in Manitoba Regulation 164/88 under the Environment Act, would be subject to environmental Licencing. Achievement of the CWS limits would be included as a requirement within the facility Licence.

There are no large existing municipal waste incinerators in the province. However, there are a number of very small units, typically at schools, commercial or industrial establishments, that technically could meet the criteria for being considered "municipal" waste incinerators. Volumes of waste incinerated are very small, and Manitoba is addressing these facilities on a case-by-case basis.

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Medical Waste Incineration

Since the dioxin/furan and mercury CWS for incinerators came into effect, no new or expanded biomedical waste incinerators have been installed in Manitoba. In the event that new incinerators are established, Manitoba's approach will be to integrate both the mercury and

dioxin/furan CWS requirements into the relevant regulatory process. Achievement of the CWS would be included as a requirement within the facility licence.

Manitoba Health, with the support of Manitoba Conservation, has been successfully working with the Regional Health Authorities (RHA) to reduce the incineration of biomedical waste at the existing incinerators in Manitoba. For example, the Winnipeg Regional Health Authority, which services over 60% of the province's population has significantly reduced its biomedical waste generation and no longer incinerates that waste at any of its hospitals. The waste generated, now less than 200 tonnes per year, is shipped to an approved incinerator in the United States for disposal.

The remaining biomedical waste generated in the province is currently disposed of by many small incinerators (~32). These remaining incinerators are widely dispersed throughout the rest of the province with many being located in remote, isolated communities. Although these incinerators have not been tested, they are most likely not in compliance with the mercury and dioxin/furan CWS for incinerators. Manitoba Health, however, is continuing to work with the RHAs to develop and implement a comprehensive provincial strategy for the management of biomedical waste, including waste minimization, handling and disposal.

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Base Metal Smelting

Since the mercury CWS for base metal smelters came into effect, no new or expanded facilities have been placed into operation in Manitoba. Manitoba's overall approach to new BMS facilities, should such additional facilities be constructed in the province, will be to incorporate the CWS requirements into the facility's Environment Act Licence or to include the requirements in a regulation specific to the facility.

In Manitoba, the Hudson Bay Mining and Smelting Co., Limited (HBM&S) zinc-copper facility in Flin Flon has been identified as releasing mercury emissions to the atmosphere. With the commissioning of its pressure leaching process for zinc in 1993, significant reductions in mercury emissions were achieved. Additional, smaller incremental reductions in mercury releases have been achieved in recent years with releases in 2006 being reported as 0.912 tonnes, equivalent to an emission rate of 4.4 grams per tonne of total metal production. (Source sampling for mercury prior to 2004 only captured particulate-phase mercury, whereas recent sampling using US EPA Method 29 measures total mercury. Consequently, the mercury releases reported for previous years were probably understated.) Manitoba's other base metal smelter, CVRD INCO Thompson, processes ores that contain very low levels of mercury and, therefore, emissions of mercury are very low from this smelter.

HBM&S, as part of its "determined efforts" for CWS achievement within the context of best available pollution prevention and control techniques, technically and economically achievable, is undertaking a number of projects to further reduce its mercury releases including:

- improvements have been completed to its mill to improve the separation of the copper and zinc streams thereby reducing zinc (and mercury) contamination of its copper stream and consequently reducing the release of mercury to the air from the copper plant
- engaging an external consultant, as part of its pollution prevention planning, to measure mercury in the gas handling streams so as to better track mercury in these various processes
- co-operating with researchers from the University of Toronto to investigate the feasibility of using alternate materials for removing mercury from the HBM&S gas stream
- completing other process improvements, including ore selection, to minimize mercury input into its operation

Contact
Pollution Prevention Branch, Manitoba Conservation
Tel 204-945-8443; Fax 204-945-1211

CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

The Manitoba Government has approved a long-term strategy based on extended producer responsibility which would see the establishment of industry led stewardship programs for tires, paper and packaging, household hazardous waste and electronics. The regulatory model is based on Manitoba's successful Used Lubricating Products Stewardship Program and puts the onus on industry to manage waste generated from the products they produce. Regulations under the Waste Reduction and Prevention (WRAP) Act are in development.

The *Hazardous or Prescribed Household Material Stewardship Regulation* would address the management of materials that meet the criteria for waste household hazardous materials set out in the Canadian Standards Association (CSA) Standard Z752-03, *Definition of Household Hazardous Waste,* as well as automotive anti-freeze; automotive lead acid batteries, consumer paint products, fluorescent lighting tubes and compact fluorescent lights, pesticides and pharmaceuticals.

Rechargeable batteries, televisions, computers, computer monitors and printers, personal digital assistants and other similar handheld devices, cellular and other telephones, microwave ovens, and parts and components for any of these items are included under the *Electrical and Electronic Equipment Stewardship Regulation.* Video display equipment, video cassette recorders and players, digital video players and recorders, audio equipment, facsimile machines, photocopy machines, digital cameras, video cameras, and parts and components for these items are to be included at a later date.

Contact
Pollution Prevention Branch, Manitoba Conservation
Tel 204-945-8443; Fax 204-945-1211

NEWFOUNDLAND AND LABRADOR

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

Newfoundland and Labrador Department of Environment and Conservation have been working with the Newfoundland and Labrador Dental Association to achieve a 95% reduction in mercury releases from dental amalgam waste. A number of face to face meetings were held with the dental association and a mail-out survey to all registered dentists was conducted in December 2005. At that time we received responses from 70 out of 158 registered dentists. Follow-up letters were then sent to the remaining 88 dentists that didn't respond to the original survey. An additional 67 responses were received for a total response rate of 86.7% (137 of 158). Of the 137 responses 19 (13.9%) did not use/remove mercury. Of the remaining 118 dentists that use/remove mercury, 72 (61.0%) have installed ISO 11143 certified amalgam separators and 32 (27.1%) had indicated that they were planning on installing ISO 11143 certified amalgam separators in the near future. Compliance will be achieved through the Memorandum of Understanding between Environment Canada and the Canadian Dental Association.

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

Currently, Newfoundland and Labrador does not have any base metal smelters. Voisey's Bay Nickel Company (VBNC) are still planning on proceeding with a hydromet facility to process their nickel ore from Labrador.

Currently, Newfoundland and Labrador does not have any coal-fired power plants.

Currently, Newfoundland and Labrador are in the process of phasing out all conical waste combustors in our province. To date, 24 of the 53 municipal waste incinerators have been decommissioned resulting in a 52% reduction (based on population serviced) in mercury releases to the atmosphere. The objective is to close all remaining conical waste combustors by 2010.

CANADA-WIDE STANDARDS FOR MERCURY-CONTAINING LAMPS

There are no manufacturers of mercury-containing lamps in Newfoundland and Labrador. Since reductions in mercury content within the lamp is to be done through manufacturers of fluorescent lamps, which will be tracked at the federal level, there will be no provincial accounting of mercury contents in the lamps done in our province. Consequently, the province has focused its efforts on promoting the proper disposal of mercury-containing lamps.

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Department of Environment and Conservation
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NEW BRUNSWICK

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

A Letter of Understanding between the New Brunswick Department of the Environment and Local Government and the New Brunswick Dental Society was signed to promote better management of dental amalgam waste. There are a total of 279 dental practices in New Brunswick and as of February 2007, 223 (or 80%) of these dental practices have installed amalgam separators.

Contact: Mark Glynn – (506) 453-4463

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

There are no hazardous waste, sewage sludge, or municipal waste incineration facilities in the Province of New Brunswick.

Medical Waste Incineration

There is currently one medical waste incineration facility in operation in New Brunswick. Stericycle, Inc. owns and operates the medical waste incineration facility located in Moncton, New Brunswick, which was formerly owned by Mr. Shredding Waste Management Ltd. The facility incinerates approximately 800 tonnes of medical waste per year and is equipped with extensive pollution control equipment, including a high temperature afterburner chamber, a wet scrubber, an activated carbon injection system and a fabric filter baghouse.

Results from recent stack testing indicate that mercury emissions are below the CWS emission limit of 20 micrograms/cubic metre ($\mu g/m^3$) for existing facilities incinerating more than 120 tonnes of medical waste per year, with test results averaging 5 $\mu g/m^3$.

Low emissions of mercury from New Brunswick's medical waste incinerator can be attributed to both the pollution control equipment in place and the efforts made by hospitals to segregate mercury containing wastes from the medical waste stream that is destined for incineration.

Stack testing of mercury emissions is a requirement of the Approval to Operate issued pursuant to New Brunswick's *Air Quality Regulation*, in order to ensure the incineration facility remains in compliance with the CWS.

Contact: Mark Glynn – (506) 453-4463

Base Metal Smelting

There is one base metal smelter operating in New Brunswick. Falconbridge Limited operates a lead smelter (formerly owned by Noranda Inc.) located in Belledune, New Brunswick.

Results of stack testing conducted over several years indicate that emissions have consistently been below the CWS emission limit of 2 g Hg/tonne of production of finished metals for existing facilities, with results ranging from 0.40 to 1.00 g Hg/tonne of finished metals produced.

In order to track emissions and ensure that the facility remains in compliance with the CWS, annual stack testing of mercury emissions at the Falconbridge Limited smelter is a requirement of the Approval to Operate, issued pursuant to New Brunswick's *Air Quality Regulation.*

Contact: Mark Glynn – (506) 453-4463

CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

There are no facilities that manufacture mercury-containing lamps in the Province of New Brunswick.

All of the regional solid waste commissions in New Brunswick provide the public with access to household hazardous waste depots for the disposal of hazardous materials, including mercury-containing products such as fluorescent lamps. This service is provided to the public free-of-charge.

Contact: Mark Glynn – (506) 453-4463

NORTHWEST TERRITORIES

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

The NWT Guideline for Management of Biomedical Waste, adopted under the NWT *Environmental Protection Act,* states that dental office mouth wash and aspiration equipment should be equipped with ISO certified amalgam traps capable of a 95% capture rate. The NWT Dental Association has endorsed the dental amalgam waste protocols under the Canada-Wide Standards.

There are 13 Dental Clinics, approximately 15 Dentists and an unknown number of Dental Therapists practicing in the NWT. Many of these dentists no longer use dental amalgam restoration.

The Department of Environment and Natural Resources accepts time expired and waste dental amalgam from dental therapists for disposal and recycling.

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

The NWT Guideline for Management of Biomedical Waste incorporates the CCME CWS Emission Limits for Dioxins, Furans and Mercury.

Standard operating procedures for NWT municipal solid waste facilities developed by the Government of the NWT includes a provision that prohibits the open burning of unsegregated municipal solid waste. This practice has been virtually eliminated on Commissioners Lands (GNWT) in the NWT. Most major industrial developments, including mining and oil and gas sites are on federal lands are therefore under the jurisdiction of Indian and Northern Affairs Canada.

Biomedical Waste Incineration

The Northwest Territories has one operating biomedical waste incinerator located at the Fort Smith Regional Hospital that services the local area. This new incinerator is equipped with a secondary combustion chamber and wet scrubber. Stack testing has demonstrated compliance with the NWT Biomedical Waste Guideline emission criteria (same as CWS). Biomedical waste generated in the rest of the NWT is shipped south for disposal.

It is noteworthy that the Inuvik Region is the first region in the NWT where healthcare facilities are now mercury-free. All mercury and mercury-containing instruments and devices have been removed from service and shipped south for disposal.

CANADA-WIDE STANDARDS FOR MERCURY-CONTAINING LAMPS

Disposal of fluorescent tubes and mercury vapour lamps at municipal landfill sites is not permitted. A fluorescent tube disposal guide that lists packaging procedures and recyclers is available.

The Department of Environment and Natural Resources has a lamp disposer that is made available to municipalities, businesses and industry for the recovery of mercury from fluorescent tubes, on a cost recovery basis, as an incentive for the proper management of waste fluorescent tubes. Recovered mercury is shipped south for disposal and residual glass is landfilled.

Other Mercury Containing Devices

A Guideline for the Management of Waste Institutional, Commercial and Industrial Chemicals is being developed for adoption under the Environmental Protection Act. This guideline will address the management of mercury from the remaining institutional and commercial sources.

Contact:

Environmental Protection Division
Department of Environment and Natural Resources
(867)873-7654

NOVA SCOTIA

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

In August of 1999 the Nova Scotia Dental Association signed a Memorandum of Understanding (MOU) with the Nova Scotia Department of the Environment. This voluntary partnership was intended to assist dentists with the minimization of waste and the consumption of resources in dental practices. A one-time collection program for bulk elemental mercury from all dental offices was completed. This resulted in minimizing the risk of mercury spills or improper disposal. In addition, a guide titled, "Best Management Practices for Hazardous Dental Waste Disposal", was developed for dentists, which includes information regarding the ISO11143 certified amalgam separators such as suppliers, contact information, unit specifications and approximate costs. This guide also includes a copy of the MOU and is available on the Nova Scotia Dental Association website.

There are approximately 200-225 dental practices in the province. The Nova Scotia Dental Association 2003 Members Survey demonstrated that 25 percent of the dentists had installed the appropriate amalgam separators. No additional surveys were conducted. Anecdotal information from the Nova Scotia Dental Association currently indicates that the number of dental practices with amalgam separators is near 100 percent. However, this has not been confirmed through surveys or inspections.

Contacts:

Information regarding Mercury Canada-Wide Standards:
Sharon Vervaet, P.Eng., Engineering Specialist
Ph: (902) 424-2546
Fax: (902) 424-0503

Mercury Disposal Information:
Gerard Chisholm, Hazardous Substance Management Specialist
Ph: (902) 424-2539
Fax: (902) 424-0503

Information Associated with MOU with Nova Scotia Dental Association:
Lynda Rankin, Pollution Prevention Specialist
Ph: (902) 424-2578
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CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

Emissions from Incineration of Municipal Solid Waste & Biomedical Waste

Spreadsheet Data:

Year Total Emissions (based on single annual stack test event of 3 test average)

Year	**Total Sector Release (kg /yr)**
2000	1.2
2001	2.1
2002	2.3
2003*	
2004	0.62
2005*	

*insufficient testing

Stack Test Results (single annual stack test event of 3 test average)

Year	Stack #1 Mercury Concentrations (µg /Rm^{3**})	Stack #2 Mercury Concentrations (µg /Rm^{3**})
2000	4.8	2.9
2001	11.2	2.42
2002	10.3	6.1
2003***		2.59
2004	1.93	1.64
2005****	1.70	

**conditions at 25°C, 101.3kPa, 11% Oxygen, dry basis
***construction modifications to Stack #1 prevented testing.
**** The incinerator closed on December 31, 2005. Operating problems prevented testing of Stack #2 in the fall of 2005.

Number of Annual Stack Tests exceeding the 20/µg /Rm^3(@25°C, 101.3kPa, 11% oxygen):

Year	Stack Tests (average of 3 individual)
2000	0
2001	0
2002	0
2003	0
2004	0
2005	0

Number of Samples:

Nova Scotia had one municipal solid waste/biomedical waste incinerator unit with two stacks. Each stack (with the exception of Stack #1 in 2003, and Stack #2 in 2005) of the unit had one annual stack test (average of 3 individual tests) for a total of 10 tests over 6 years. This facility which closed December 31, 2005, processed approximately 36,500 tonnes/yr of municipal solid waste and approximately 2200 tonnes/year of biomedical waste, when operating.

Stack Sampling Parameters and Test Methodology:

Each stack underwent annual stack sampling for total suspended particulate, metals, hydrogen chloride, dioxins and furans, sulfur dioxide, carbon monoxide and nitrogen oxides as part of their requirements for their Approval to Operate the facility. Mercury levels were tested in accordance with US EPA 40 CFR Part 60, Method 29. The test results were expressed in relation to dry cubic metres of flue gas at 25°C and 101.3 kPa and the degree of dilution air in the gas stream was defined at 11% oxygen.

Explanatory Text

There are no existing hazardous waste or sewage sludge incinerators located in Nova Scotia. Historical stack test results of the single municipal solid waste/biomedical waste incinerator, which closed December 31, 2005, had consistently met the 20µg /Rm^3.

Base Metal Smelting

There are no existing base metal smelters located in Nova Scotia.

Contact:
Information regarding Mercury Canada-Wide Standards:
Sharon Vervaet, P.Eng., Engineering Specialist
Ph: (902) 424-2546
Fax: (902) 424-0503

CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

There are no manufacturers of mercury-containing lamps in Nova Scotia. Therefore, the province has focused its efforts on the handling and disposal of waste mercury-containing lamps. Past efforts of the province in the establishment of a program to address the issue have proven ineffective due to relatively small volumes of mercury-containing lamps and a disperse population base. As such, the Nova Scotia Department of Environment and Labour is re-examining its plan with the intent of providing a more practical program to safely manage the mercury waste.

Contacts

Sharon Vervaet, P.Eng., Engineering Specialist
Ph: (902) 424-2546
Fax: (902) 424-0503
(Information regarding Mercury Canada-Wide Standards)

Gerard Chisholm, Hazardous Substance Management Specialist
Ph: (902) 424-2539
Fax: (902) 424-0503
(Mercury Disposal Information)

NUNAVUT

CANADA WIDE STANDARDS FOR MERCURY EMISSIONS

Nunavut does not incinerate hazardous wastes, and/or sewage sludge. Opening burning is carried in smaller communities. There is no open burning in Iqaluit.

There are no base metal smelters in Nunavut.

Biomedical Waste Incineration

Nunavut has three biomedical waste incinerators, which are operated at the Baffin, Rankin and Cambridge Bay Regional Hospital. These units were installed in 2004 and 2005 and are equipped with secondary combustion chambers and wet scrubbers.

CANADA-WIDE STANDARDS FOR MERCURY-CONTAINING LAMPS

Nunavut uses two disposal options for the mercury-containing lamps. One option includes shipment to approved recyclers. The other involves crushing of fluorescent tubes, collecting and shipping the material to disposal facilities.

Disposal of fluorescent tubes and mercury vapour lamps are not permitted at municipal landfill sites.

CANADA-WIDE STANDARDS ON MERCURY FOR DENTAL AMALGAM WASTE

Nunavut is a signatory to the Canada-Wide Standard on Mercury for Dental Amalgam Waste. The Department of Environment promotes the collection of dental amalgam wastes at clinics across Nunavut.

Alternative filling practices have reduced the use of mercury in dental practices. Mercury is still being used and as a result DOE has spoken with the dental clinics in regard to their practices. DOE contacted the Dental Association and outlined our position and stressed the need to follow methods that would meet the Mercury Canada-wide Standard.

ONTARIO

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

Ontario has implemented the CWS in using the following instrument:

Amalgam Waste Disposal - Ontario Regulation 196/03 made under the Dentistry Act and amending Ontario Regulation 205/94 (*http://www.e-laws.gov.on.ca/navigation?file=home&lang=en*)

This regulation (O.Reg. 196/03) requires dental offices in Ontario maintained by a member of the Royal College of Dental Surgeons of Ontario (RCDSO) that place, repair or remove dental amalgam to have a properly installed dental amalgam device that meets or exceeds the International Organization for Standardization (ISO) standard for dental amalgam separators by November 15, 2003.

The regulation also requires that members of the RCDSO who place, repair or remove dental amalgam to comply with their Standard of Practice of the Profession for Amalgam Waste Disposal (*http://www.rcdso.org/*).

The RCDSO, the regulatory body for the dental profession, is monitoring compliance with this regulation and feedback from the 2006 member's survey indicates that approximately 98% are in compliance. This result is consistent with University of Toronto's survey of all Ontario dentists that reported more than 96% have installed an amalgam separator.

Ontario has worked with the Federal government and other dental stakeholders to produce a Best Management Practices Guide and Dental waste management flow charts (*http://www.rcdso.org/*).

In addition to the actions of the provincial government, several municipalities in Ontario, such as Toronto, Ottawa and North Bay have pro-actively passed bylaws that address mercury releases from dental clinics.

Contact
John Steele (416) 314-6666

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS
Hazardous Waste Incineration

The Certificates of Approval for all operating hazardous waste incinerators in Ontario include the mercury CWS limit.

As part of the conditions in their Certificates of Approval, hazardous waste incinerators are required to perform annual stack testing for mercury. In 2006 one facility was closed and the stack test results for the remaining five are listed below. All five facilities are below the CWS of 50 ug/Rm^3.

2006 Stack-testing Results:

Facility	A	B	C	D	E
Mercury (ug/Rm^3)	0.668	7.33	39.9	0.023	4.93

New and expanded hazardous waste incineration facilities will have to comply with *Guideline A8 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*.

Contact
John Steele (416) 314-6666

Sewage Sludge Incineration

Ontario has four sewage sludge incinerators that are currently operating. All facilities have had their Certificates of Approval amended to include the CWS mercury limit.

All operating sewage sludge incinerators are required, by their Certificates of Approval, to perform annual stack testing for mercury. The 2006 stack test results shown below demonstrate that all facilities are below the CWS of 70 ug/Rm^3.

2006 Stack-testing Results:

Facility	A	B	C	D
Mercury (ug/Rm^3)	41.9	17.8	42.68	50.65

Contact
John Steele (416) 314-6666

Municipal Waste Incineration

Ontario currently has two operating municipal waste incinerators. Both facilities have the CWS limit of 20 ug/Rm^3 incorporated into their Certificates of Approval and are required to perform annual stack testing for mercury. One of the two incinerators was started up and tested in the spring of 2007. The preliminary results indicate that the facility was below the mercury CWS. The results for the other facility are shown below.

Stack Testing Results:

Year	Mercury (µg/Rm^3)
2002	14
2003	7.93
2004	8.7
2005	8.21
2006	5.75

Ontario also has a pilot plasma arc facility that is in the process of starting up in 2007 and is expected to perform its first stack test on emissions in the fall of 2007. The Certificate of Approval for this facility requires annual stack testing and compliance with the mercury CWS limit of 20 ug/Rm^3 .

Any new municipal solid waste incineration facilities must comply with Guidelines A-7 and A-8 that incorporate the CWS for incineration.

Contact
John Steele (416) 314-6666

Medical Waste Incineration

Ontario has one commercial biomedical incinerator currently operating and stack testing results from this facility indicate that the CWS limit of 20 ug/Rm^3 for mercury was exceeded two times over the past 6 years. The two exceedances, 2005 and 2006, are anomalously high in comparison to historical mercury emissions. An investigation found that a change in the mercury control material had occurred. The facility took corrective action by returning to the original control material. The preliminary result from the July 2007 stack test was 0.47 µg/Rm^3 and confirmed that the corrective measure was effective. This facility is required to perform annual stack testing.

Ontario closed all existing hospital incinerators by December 6, 2003 under regulation (O. Reg. 323/02).

Stack-testing Results:

Year	Mercury (µg/Rm^3)
2001	0.44
2002	1.76
2003	N/R
2004	0.86
2005	62.4
2006	22.1

Ontario has *Guideline A-1: Combustion, Air Pollution Control and Monitoring Requirements for Biomedical Waste Incinerators in Ontario* that sets the emission limits, including the CWS, for new and existing biomedical incinerators.

Contact
John Steele (416) 314-6666

Base metal Smelting

Ontario has three base metal smelters that are covered by the mercury CWS for base metal smelting. All three Ontario smelters meet the CWS limits for existing facilities of 2 g Hg/tonne total production of finished metals.

Ontario Base Metal Smelters
NPRI Mercury Releases to Air
(g mercury per tonne of finished product)

Year	A	B	C
2004	0.019	0.042	N/A
2005	0.080	0.043	0.003
2006	0.065	0.049	0.003

The emission rates are based on the data as reported to the National Pollutant Release Inventory.

CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

Ontario Ministry of the Environment has funded lamp recycling projects in recent years, including pilot programs administered by the City of Windsor and the Recycling Council of Ontario. To date over 14,000 lamps have been recycled and over 400 grams of mercury has been captured through such initiatives supported by the government of Ontario.

The Recycling Council of Ontario's pilot project was based on a voluntary stewardship program that involved several partners including school boards, lamp manufacturers, distributors and a local mercury recycler. This pilot project was launched in early 2007 and collected and recycled just under 13,000 fluorescent lamps from schools in seven months. In the summer of 2007 the Ontario Ministry of the Environment entered into an agreement with the RCO to expand the stewardship pilot to the industrial, commercial and institutional sector across the province.

In addition, there has been a lamp recycling program for several government buildings in place since 2002 that collected an estimated total of 21,995 lamps in 2006

Waste Diversion Ontario (WDO) is a non-crown corporation whose mandate is to develop, implement and operate waste diversion programs. The Waste Diversion Act enables the WDO to use Extended Producer Responsibility (EPR) to finance the diversion programs. WDO has cited fluorescent lamps as a product that may be designated in the future.

Contact
John Steele (416) 314-6666

MERCURY SWITCHES

The Ontario Ministry of the Environment has supported the Mercury Switch-Out program administered by the Clean Air Foundation (CAF) since 2001.

Switch Out is a voluntary program that encourages autorecyclers to remove mercury switches from end of life vehicles before they are recycled in an electric arc furnace. The majority of mercury in cars is found in mercury switches that were used for convenience lighting in hoods and trunks, as well as in anti-lock brakes. Car manufacturers no longer use mercury tilt switches in vehicles.

Since 2001 the switch out program has collected over 68,000 switches (containing more than 57 kg of mercury) in Ontario.

Contact
John Steele (416) 314-6666

MERCURY THERMOSTATS

The Ontario Ministry of the Environment has partnered with Clean Air Foundation to launch Switch the 'Stat, a voluntary program that encourages homeowners to replace their old mercury-containing thermostat with a newer more energy-efficient programmable model and safely dispose of the old one and its mercury switches.

Switch the 'Stat started out as a pilot project in Ontario during spring of 2006, built on the infrastructure already developed by Clean Air Foundation's Switch out program. Most old thermostats – the ones that the majority of Ontarians have in their homes – have one or two mercury switches and contain approximately 2.5 grams of mercury. To date, the program has effectively diverted mercury thermostat switches from landfills by collecting 4,000 mercury-containing thermostats. This translates into the safe recovery and storage of over 10 kilograms of mercury.

Contact
John Steele (416) 314-6666

PRINCE EDWARD ISLAND

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

The Dental Association of Prince Edward Island has 64 dentists licensed to practice on P.E.I.. There are currently 34 dental clinics in P.E.I. that perform mercury amalgam restoration work. A number of these offices are located in rural areas that are not serviced by central sewer systems. The majority of the clinics are located in Charlottetown, which are serviced by a municipal sewer system.

P.E.I. is a signatory of the CCME Canada-wide Standard on Mercury for Dental Amalgam Waste which required dentists to achieve a 95% reduction in mercury releases from dental amalgam discharges to the environment by 2005. To date, 95% of dental clinics in P.E.I. have installed dental amalgam separators and our Department is working with the remaining 5% to ensure compliance is achieved in the near future.

Inspections of all dental offices were conducted in the spring of 2006 to confirm the installations of separators and to inquire as to the disposal methods of waste amalgam. These inspections showed that only 11 offices were disposing of waste amalgam in a proper manner. The remaining 23 offices were using various methods, including disposal in sharps containers and regular waste. After the survey, the P.E.I. Dental Association informed members of the proper manner to dispose of dental amalgam waste.

Contact: Glenda MacKinnon-Peters
PEI Department of Environment, Energy and Forestry
(902)-368-5047

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

There are no hazardous waste or sewage sludge waste incineration facilities and no base metal smelters in Prince Edward Island.

PEI Municipal Solid Waste Incineration

Prince Edward Island has one municipal solid waste incinerator that processes an average of 30,000 tonnes/year. The plant has a third party testing agency perform annual source emissions testing for total particulate matter, metals (including mercury), hydrogen chloride, semi-volatile organic compounds and combustion gases, during normal working conditions. Testing for dioxins and furans is performed every second year. The incinerator is equipped with a dry scrubber system (hydrated lime and powdered activated carbon) and a pulse-jet fabric filter (baghouse). It is currently meeting the applicable Canada-wide Standards.

Contact: Glenda MacKinnon-Peters
PEI Department of Environment, Energy and Forestry
(902)-368-5047

PEI Medical Waste Incineration

Prince Edward Islands overall management strategy for new medical waste incinerators incorporates the CWS into the terms and conditions of permits to operate issued pursuant to the Environmental Protection Acts Air Quality Regulations. Existing medical waste incinerators in the province are small capacity burning less than 120 tonnes per year. The terms and conditions associated with the permits to operate these small units will require waste audit and diversion planning. The province is currently investigating other methods of waste destruction for future emissions reductions.

Contact: Glenda MacKinnon-Peters
PEI Department of Environment, Energy and Forestry
(902)-368-5047

CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

Prince Edward Island=s strategy for emission reductions from mercury-containing lamps is a function of an Island wide waste disposal concept called "Waste Watch". The program is administered by a crown corporation called the Island Waste Management Corporation. All waste on PEI must be sorted into the following categories: waste,compost, and recyclables. Mercury-containing lamps, including compact florescent lamps, cannot be placed curbside. Home owners must deliver the lamps to one of six Waste Watch Drop-off Centers in the province where they are collected for proper disposal. As part of source separation, mercury-containing lamps must be removed from buildings prior to demolition. Contractors have been notified that mercury-containing waste cannot be disposed of at construction and demolition sites. Owners/managers of industrial, commercial and institutional buildings are also being notified of the requirements for proper removal and recycling/disposal.

Contact: Glenda MacKinnon-Peters
PEI Department of Environment, Energy and Forestry
(902)-368-5047

SASKATCHEWAN

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

A voluntary approach to the CWS was implemented in Saskatchewan with support from the College of Dental Surgeons of Saskatchewan. Saskatchewan dentists were asked to voluntarily apply "best management practices" to effectively prevent the release of mercury into the environment. An important component of "best management practices" is to connect all dental units to an amalgam separator that meets or exceeds ISO 11143 standards. Amalgam separators help reduce and aid in reporting on the amount of mercury waste entering the wastewater stream.

A 2003 national survey funded by Environment Canada to assess the use and fate of dental amalgam in Canada showed that, by the end 2003, 27 per cent of respondents had ISO certified amalgam separators. The survey estimated that, nationally, approximately 1046 kg of the mercury amalgam waste entered the wastewater stream in 2003.

A 2007 national survey funded by Environment Canada to assist in the development of the progress report requirement of the CWS, showed 69 per cent of respondents had ISO certified amalgam separators, with Saskatchewan respondents achieving 91 per cent. The survey estimated that nationally, approximately 452 kg of mercury amalgam waste entered the wastewater stream in 2007.

The national and provincial percentages fall short of the 95 per cent CWS target however, this is a major increase from the 2003 report. Saskatchewan considers the CWS a success and will continue its efforts to reduce mercury releases from dental amalgam waste.

Saskatchewan has made significant progress on the dental amalgam waste implementation plan and will continue to promote the appropriate management of dental amalgam waste. Saskatchewan will continue to work with the College of Dental Surgeons of Saskatchewan and the Canadian Council of Ministers of the Environment to reduce the amount of mercury entering the wastewater stream.

* 27 per cent is a national percentage; data was not available to determine provincial percentages

Contact - Jeff Paterson (306) 787-9764

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

There are no provincially regulated hazardous waste, sewage sludge, municipal waste incineration facilities or base metal smelters in Saskatchewan.

Saskatchewan's overall approach to managing emissions from new waste incineration facilities is to incorporate the Canada-Wide Standards (CWS) into the conditions of "permits to operate" issued pursuant to Saskatchewan's Clean Air Act and Clean Air Regulations. If the construction of a new waste incineration facility is considered a "development", management of mercury emissions will be introduced through The Environmental Assessment Act processes. These

provisions will apply to municipal waste incineration, medical waste incineration, hazardous waste incineration and sewage sludge incineration as defined within the CWS.

Medical Waste Incineration

Prior to the introduction of the CWS there were 13 medical incinerators holding permits and operating in Saskatchewan. As of 2006, only two of those 13 incinerators are still operating (one hospital and one veterinary clinic). The discontinued use of the other incinerators has lowered the overall emission of mercury from this sector. This reduction does not include further reductions realized by "determined efforts."

Saskatchewan's overall approach to managing mercury emissions from the two remaining medical incinerators is to incorporate the CWS into the conditions of permits to operate issued pursuant to Saskatchewan's Clean Air Act and Clean Air Regulations. Since the two incinerators are relatively small, loading of less than 120 tonnes per year, permit conditions will provide for choice of pollution control upgrading and stack testing or "determined efforts" including diversion planning and waste audits. Existing sources that have not been identified will be subject to the same requirements as described above and will require permits according to The Clean Air Regulations.

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CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

At the present time, there are no manufacturers of mercury-containing lamps in Saskatchewan. Reductions in mercury content in the lamps will be done through manufacturers and tracked federally. Therefore, the province focuses its efforts on the recycling/disposal of mercury-containing lamps.

Saskatchewan promotes the recycling of mercury-containing lamps where the infrastructure and capacity are sufficient to make it relatively cost effective. Large facilities such as hospitals, office towers, etc. are examples where sufficient lamps are managed to make recycling cost-effective however, the dispersed nature of Saskatchewan's population may make this difficult in some areas.

As part of the governments Green Strategy, in 2007 the government will be delivering a household hazardous waste day pilot program in some communities, which will give residents the ability to properly dispose of mercury-containing lamps. This is an interim step by government to provide residents an opportunity to responsibly manage lamps containing mercury.- Residents may also use a fee for service waste disposal company to dispose of lamps containing mercury. The Government of Saskatchewan's Property Management agency is leading by example by recycling lamps containing mercury that are being replaced during the government's energy retrofit initiatives.

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YUKON

CANADA-WIDE STANDARD ON MERCURY FOR DENTAL AMALGAM WASTE

As a signatory to the *Canada-Wide Standard on Mercury for Dental Amalgam Waste* (CWS), the Yukon Government is dedicated to helping dental clinics reduce the amount of mercury entering the environment. The Government of Yukon encourages dental clinics to voluntarily conform to the Memorandum of Understanding (MOU) between Environment Canada and the Canadian Dental Association (CDA). Steps to encourage voluntary compliance include ensuring clinics are familiar with the MOU and CWS and sending copies to those who are not.

A three-part survey was conducted in January 2004 which sought to identify the level of amalgam use in Yukon dental clinics, the current methods of mercury amalgam handling and disposal, and the use of Best Practices in the clinics. A follow-up report to the survey was sent to all dental clinics summarizing the results along with some background information on mercury.

Since 2004, several clinics have moved away from mercury amalgam altogether and all private clinics offer composite resin as an alternative. Mercury products for the most part are properly and securely stored using the mercontainers in which they were shipped. Traps and filters are the only equipment used to deal with mercury wastes in most clinics, although at least three clinics now have separators which conform to the ISO 11143 standards.

The 2004 survey revealed several disposal methods for waste mercury amalgam in the Yukon, including disposal with regular garbage, inclusion in the Special Waste Collection conducted annually through the Yukon Department of Environment, and incineration with biomedical waste. Since that time, incineration of mercury amalgam wastes has been discontinued. As well, the Yukon Government is continuing efforts to educate dental clinic operators of the annual Special Waste Collection and of the benefits of using the Collection. Regular participation in the Collection by the Yukon Government School Dental Program and some private clinics has been recorded since 2004, although the total amount of mercury amalgam waste collected has decreased annually, perhaps due in part to the gradual reduction in the use of mercury amalgam.

The Government of Yukon will continue to work with the dental profession to improve the performance of Yukon Dental Association (YDA) members with regards to the handling of waste mercury products in their clinics. Toward this end, in the fall of 2004 the YDA held an educational meeting at which the importance of proper handling and disposal techniques and equipment for waste amalgam was discussed. This meeting promoted a positive working relationship between the Government of Yukon and Yukon dentists in achieving the goals set out in the CWS.

CANADA-WIDE STANDARDS FOR MERCURY EMISSIONS

There are no hazardous waste, sewage sludge, or municipal waste incineration facilities and no base metal smelters in the Yukon.

Medical Waste Incineration

Only one biomedical waste incinerator, located at Whitehorse General Hospital, is currently in operation in the Yukon. It holds an Air Emissions permit under the Yukon *Air Emissions Regulations*. In response to the CWS, the hospital assessed the operation of their incinerator in 2000 and consequently retrofitted the pollution control equipment for maximum efficiency. The pollution control equipment was not designed for treating mercury wastes and steps were taken to ensure that waste amalgam from community dental clinics is no longer incinerated.

In accordance with their Air Emissions permit the hospital is working on a Pollution Prevention Plan to address the reduction of dioxins/furans and mercury emissions from the incinerator. Once accepted by the Department of Environment, the hospital must implement the Plan within three months. Possible follow-up actions that may be undertaken after implementation include the option of a one-time stack test to assess the level of particulate matter, mercury and dioxins/furans, an audit of the waste diversion program, pollution control upgrading, or other measures as determined by the Department.

CANADA-WIDE STANDARD FOR MERCURY-CONTAINING LAMPS

It is the policy of the Yukon Government to purchase low-mercury T-8 lamps. Government buildings are retrofitted for T-8 bulbs as old bulbs are changed out, budget permitting.

The Yukon Government is continuing to work with various partners to foster the recycling of fluorescent lamps where feasible. The joint venture between the government's Property Management Agency and the Department of Environment to collect used fluorescent lamps from government-operated buildings and schools continues to operate throughout the territory. All bulbs removed from government buildings are collected by Property Management staff and crushed in a bulb crusher; the proper disposal of the crushed bulbs at an approved facility is then arranged and funded by the Department of Environment as part of the government's annual Special Waste Collection program.

The City of Whitehorse and other communities in the Yukon hold Household Hazardous Waste (HHW) Collection days for the public to dispose of special wastes, including mercury bulbs. The bulbs are collected and crushed by Property Management in the bulb crusher, and disposed by the Department of Environment at an appropriate facility.

To date, 9 barrels of mercury bulbs from government buildings and the special waste collection have been diverted from the landfill.

The Yukon Government continues to explore partnership opportunities with other parties so that more bulbs may be dealt with responsibly. The main stumbling block to the expansion of the bulb recycling program appears to be concerns about the cost of insurance necessary for private businesses to accept this type of waste for treatment and recycling.

The Yukon Government has not prepared a public accounting for progress on recycling, though should other parties become involved in the program they may choose to do so individually. While promotion of lamp recycling and encouragement of the purchase of efficient, low mercury lamps will be pursued, the Yukon has not set any milestones or deliverables for these activities.