Environment Canada Environnement Canada

Canadian Environmental Protection Act, 1999

Combined Annual Reports

for April 2006 to March 2007 and April 2007 to March 2008

Canada

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Foreword

This combined Annual Report provides an overview of the results achieved under the *Canadian Environmental Protection Act, 1999* (CEPA 1999) for the periods of April 1, 2006, to March 31, 2007, and April 1, 2007, to March 31, 2008.

The publication of this report responds to the statutory requirement to provide annual reports to Parliament on the administration and enforcement of the Act.

Chapter 1, Introduction, lists the four special activities under the Act during the two years and provides details on two of these activities. More detailed information on the other two activities can be found in the main body of the report.

Chapters 2 through 4 focus on fulfilling the mandatory annual reporting requirements under the Act:

- Chapter 2 summarizes the administration of the Act, including the major tools and instruments developed under the Act during the reporting periods;
- Chapter 3 provides an overview of research in support of the Act; and
- Chapter 4 provides information on compliance with and enforcement of the Act.

Publication in the *Canada Gazette*

In the table headings, “draft publication” and “final publication” refer to publication in the *Canada Gazette*, Part I, Notices and Proposed Regulations, or (in a few instances) Part II, Official Regulations. Similarly, in the text, “publication of notices” refers to publication in the *Canada Gazette*, Part I. To learn about the purpose of publication in the *Canada Gazette,* consult the *Canada Gazette* URL provided in Appendix A or contact C*anada Gazette* general inquiries listed in the same appendix.

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1 INTRODUCTION

During the reporting years—April 1, 2006, to March 31, 2007, and April 1, 2007, to March 31, 2008—the four activities of special interest under the *Canadian Environmental Protection Act, 1999* (CEPA 1999) were as follows:

1. the review by Parliament, between May 2006 and March 2008, of the Act and the Government's response to the report of the Committee of the House of Commons;
2. the completion in September 2006 of the categorization of 23 000 substances in commercial use in the mid 1980s, in terms of potential risk to human health or to the environment;
3. the establishment in December 2006 of the Chemicals Management Plan to deal with 4300 substances of concern; and
4. the announcement in April 2007 of "Turning the Corner," an action plan to reduce greenhouse gases and air pollution.

Information about the Parliamentary review of the Act and Turning the Corner is included in this introduction. The categorization process and the Chemicals Management Plan are addressed in chapter 2, section 2.5, which deals with Part 5 of the Act, Controlling Toxic Substances.

1.1 Parliamentary Review of the Act

http://ec.gc.ca/CEPARegistry/review/default.cfm

The Act requires that a committee of the House of Commons, the Senate or both review the provisions and operation of the Act every five years and report to Parliament on any recommendations for changes to the Act or its administration.

In May 2006, the House of Commons Standing Committee on Environment and Sustainable Development and the Senate Standing Committee on Energy, the Environment and Natural Resources began their review of CEPA 1999. Both committees began public hearings in May 2006.

In September 2006, Environment Canada and Health Canada released an issues paper to support the deliberations of both committees.

The Standing Committee on Environment and Sustainable Development released its report, *The Canadian Environmental Protection Act, 1999 — Five-year Review: Closing the Gaps*, in April 2007. Generally, the Committee reaffirmed that CEPA 1999 is a strong, fundamentally sound piece of legislation. The Committee also called on the Government to act faster under the Act to protect the environment and the health of Canadians, and to make appropriate use of the full range of authorities in the Act. The Committee's report made specific recommendations under the broad categories of knowledge, consumer products, implementation, and compliance and enforcement.

In responding to the Committee's recommendations, the Government of Canada released a report, *Canadian Environmental Protection Act, 1999 Review: The Interim Government Response*, in October 2007.

The Senate Committee presented its report, *The Canadian Environmental Protection Act (1999, c.33) Rx: Strengthen and Apply Diligently*, in March 2008. The Senate Committee highlighted the need for better implementation and enforcement of the Act.

1.2 Turning the Corner

www.ec.gc.ca/cleanair-airpur/Turning_the_Corner-WSF3084CB7-1_En.htm

On October 21, 2006, the Government of Canada published a Notice of Intent to develop and implement regulations and other measures to reduce air emissions, including measures under CEPA 1999. Measures were planned for transportation, industrial sectors, consumer and commercial products, and indoor air.

To provide a framework for these initiatives, on April 26, 2007 the Government announced "Turning the Corner," an action plan to reduce greenhouse gases and air pollution. This plan was the cornerstone of the Government's broader efforts to address the challenges of climate change and air pollution. The actions under this plan were to be implemented under CEPA 1999.

Announced as part of the action plan in April 2007, the *Regulatory Framework for Air Emissions* required reductions in greenhouse gases and air pollutants by the major emitting sectors—thermal electricity, oil and gas, and certain mining and manufacturing sectors. The targeted sectors accounted for about half of Canada's total emissions of both greenhouse gases and air pollutants.

In December 2007, the Government published a notice requiring industry to submit air emissions data to the Government of Canada. The targeted industrial sectors were electricity; oil and gas; pulp and paper; base metal and aluminum smelting; iron and steel; cement, lime and chemicals manufacturing; and some mining sectors. These industries were required to provide information by May 31, 2008, about their emissions of air pollutants and greenhouse gases for the year 2006.

On March 10, 2008, the Government announced additional details about how it planned to reduce greenhouse gas emissions. Accompanying documents included the *Regulatory Framework for Industrial Greenhouse Gas Emissions*, *Canada's Offset System for Greenhouse Gases*, *Canada's Credit for Early Action Program*, and *Detailed Emissions and Economic Modelling*. These four documents specified how emission reduction targets applied to each industry sector, how the offsets and trading systems worked, and how credits were to be provided to companies that took early actions to reduce their emissions. Companies were to be able to choose the most cost-effective way to meet their emission reduction targets from a range of options, including in-house reductions, contributions to a capped time-limited technology fund, domestic emissions trading and offsets, and access to the United Nations' Clean Development Mechanism.

Bill C-33**:** An Act to amend the Canadian Environmental Protection Act, 1999 made changes to provide for effective regulations requiring renewable fuel content. Bill C-33 went through first reading in the House of Commons on December 3, 2007.

2 ADMINISTRATION OF THE ACT

This chapter summarizes the results achieved under CEPA 1999 during the reporting periods, and it includes the following mandatory administration-related information.

- Section 2.1.1 highlights the activities of the National Advisory Committee. There were no other committees established as provided for under paragraph 7(1)*(a)* of CEPA 1999 during the reporting periods.
- Section 2.1.2 highlights the activities under the Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem.
- Section 2.1.3 describes the activities under the Canada–Saskatchewan Administrative Agreement during the reporting periods.
- Section 2.1.4 describes the activities under the Canada–Alberta Equivalency Agreement during the reporting periods.
- Section 2.1.5 describes the activities under the Canada–Quebec Administrative Agreement during the reporting periods.
- There were no activities under the international air pollution provisions (Division 6 of Part 7) of CEPA 1999 during the reporting periods.
- There were no activities under the international water pollution provisions (Division 7 of Part 7) of CEPA 1999 during the reporting periods.

2.1 Administration (Part 1)

Part 1 of CEPA 1999 requires the Ministers to establish the National Advisory Committee, composed of one representative for each of the federal Ministers of Environment and Health, representatives from each province and territory, and not more than six representatives of Aboriginal governments from across Canada.

Part 1 allows the Minister of the Environment to negotiate an agreement with a provincial or territorial government, or an Aboriginal people with respect to the administration of the Act. Part 1 also allows for equivalency agreements, which suspend federal regulations in a province or territory that has equivalent regulatory standards.

2.1.1 National Advisory Committee

A study to assess the effectiveness of the National Advisory Committee was conducted in 2006. The assessment included opinions of the committee's members, former members (provincial, territorial and federal) and observers. The draft study, which was validated by the committee members at a workshop held in November 2006, suggested ways to strengthen and enhance the committee that, by most accounts, has worked reasonably well over its initial years of operation.

The majority of the National Advisory Committee agendas for teleconferences and meetings held during the reporting periods focused on the Clean Air Agenda (and its related initiatives), the Chemicals Management Plan, the National Advisory Committee Assessment and the CEPA Parliamentary Review.

2.1.2 Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem

www.on.ec.gc.ca/greatlakes/default.asp?lang=En&n=D11109CB-1

Since 1971, Canada and Ontario have worked together through the Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem. This agreement, renewed in 2002 and again in June 2007, guided the efforts of Canada and Ontario to improve the environmental quality of the Great Lakes Basin and contributed to meeting Canada's obligations under the Canada–U.S. Great Lakes Water Quality Agreement. The 2007 agreement concludes in 2010. It comprises 13 goals, 37 results and 183 specific commitments in four priority areas:

- designated Areas of Concern in the Great Lakes Basin;
- harmful pollutants;
- lake and basin sustainability; and
- coordination of monitoring, research and information.

The Harmful Pollutants Annex (Annex 2) of the Agreement addresses both past and ongoing sources of pollution in the Great Lakes Basin. Annex 2 takes a substance and/or sector approach to reducing and preventing releases throughout the basin, and seeks to virtually eliminate persistent bioaccumulative toxic substances. Environment Canada's efforts under Annex 2 also support the delivery of Canada's Chemicals Management Plan.

Actions taken on harmful pollutants in 2006–2007 and 2007–2008 included federal and provincial regulatory and non-regulatory initiatives to reduce the use, production and release of harmful pollutants. These actions contributed to overall reductions in the past 20 years of:

- over 98% in sources, uses and releases of alkyl-lead;
- 90% in releases of mercury;
- 89% in releases of dioxins and furans;
- 73% in releases of hexachlorobenzene; and
- 52% in releases of benzo(a)pyrene.

In addition, by March 2008, 90% of high-level polychlorinated biphenyls (PCBs) in storage had been destroyed, compared to 1993 levels, and high-level PCBs in service had been reduced by nearly 70% since 1989.

Workshops were held in 2006 and 2008 on harmful pollutants found within the Great Lakes Basin. The workshops, which were each attended by more than 100 participants, provided managers and technical and scientific personnel working on the Ontario side of the Great Lakes with opportunities to:

- share knowledge on existing research and programs, such as the federal Chemicals Management Plan;
- identify priority areas for enhanced collaboration, such as the sound management of chemicals, criteria air contaminants and municipal wastewater effluents;
- explore opportunities and develop actionable work plans for federal–provincial collaboration to implement the deliverables in the Canada–Ontario Agreement; and
- identify opportunities for the development of future agreements.

Air and precipitation monitoring activities continued in order to identify the status and trends of pollutants in the Great Lakes Basin. This work was carried out through the Integrated Atmospheric Deposition Network. Data on persistent toxic substances, such as PCBs,

benzo(a)pyrene, hexachlorobenzene and DDT, are available to support policy and decision making by the federal government.

2.1.3 Canada–Saskatchewan Administrative Agreement

www.mb.ec.gc.ca/pollution/e00s63.en.html

The Canada–Saskatchewan Administrative Agreement for the Canadian Environmental Protection Act has been in force since September 1994. It is a work-sharing arrangement covering certain provincial legislation and seven CEPA 1999 regulations, including two regulations related to the pulp and paper sector, two regulations on ozone-depleting substances and three regulations on PCBs.

No prosecutions under these regulations were undertaken in 2006–2007 or 2007–2008.

Activities under the agreement from April 1, 2006, to March 31, 2008, include the following:

- Provincial authorities relayed to Environment Canada reports of 19 releases (9 in 2006–2007 and 10 in 2007–2008) of electrical fluids that could have contained PCBs. It was concluded that corrective actions were taken, including the immediate cleanup of the spills and proper disposal of PCBs and contaminated soils. Of the 19 releases reported, one contained PCBs at levels over the federal prescribed limit (50 parts per million), and three contained PCBs at levels over the provincial prescribed limit (5 parts per million).
- The Saskatchewan Ministry of Environment continued to promote the use of the TIP line for environmental offences. Throughout 2006–2007 and 2007–2008, the Ministry received a total of 174 TIP calls related to environmental matters, including 12 (5 in 2006–2007 and 7 in 2007–2008) involving CEPA 1999.
- The only mill subject to the *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations* had been closed and no longer had a continual effluent discharge. Due to rain and runoff, the mill conducted periodic discharges in both 2006–2007 and 2007–2008, which were found to be in compliance.
- Environment Canada conducted eight (seven in 2006–2007 and one in 2007–2008) field inspections under the *Ozone-depleting Substances Regulations, 1998*. Two investigations were opened for unlawful importation and seven written warnings were issued as a result.
- Environment Canada conducted 12 (8 in 2006–2007 and 4 in 2007–2008) field inspections under the *Storage of PCB Material Regulations*, and no violations were detected.
- Environment Canada conducted four field inspections in 2006–2007 and none in 2007–2008 under the *PCB Regulations*. No violations were detected.
- The Saskatchewan Ministry of Environment conducted five inspections under the provincial *PCB Waste Storage Regulations*.

2.1.4 Canada–Alberta Equivalency Agreement

www.mb.ec.gc.ca/pollution/e00s61.en.html

In December 1994, the Agreement on the Equivalency of Federal and Alberta Regulations for the Control of Toxic Substances in Alberta came into effect. As a result of the Agreement, the following CEPA 1999 regulations, or parts thereof, are no longer applicable in Alberta:

- *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations* (all sections);
- *Pulp and Paper Mill Defoamer and Wood Chip Regulations* (sections 4(1), 6(2), 6(3)(b), 7, and 9);
- *Secondary Lead Smelter Release Regulations* (all sections); and
- *Vinyl Chloride Release Regulations, 1992* (all sections).

There are no longer any operating vinyl chloride plants or lead smelters in Alberta and therefore no compliance issues to report under the *Vinyl Chloride Release Regulations* or the *Secondary Lead Smelter Release Regulations.*

Alberta Environment indicated that there were no reported violations by the four pulp and paper mills regulated under the pulp and paper regulations between April1 2006 and March 31 2008.

2.1.5 Canada–Quebec Administrative Agreement

The governments of Quebec and Canada have been working under an administrative agreement for the pulp and paper sector since 1994. The fourth agreement expired on March 31, 2007. In 2007–2008, while the governments were negotiating a new agreement (which was not yet signed as of March 31, 2008), they continued to work together within the spirit of the agreement.

Under the agreement, the province acts as a "single window," collecting data from pulp and paper mills under the provincial regulations and under federal regulations under the *Fisheries Act* and CEPA 1999, and sending this data to Environment Canada. The CEPA 1999 regulations are the *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations* and the *Pulp and Paper Mill Defoamer and Wood Chip Regulations*. Both levels of government maintain full responsibility for conducting inspections and investigations, and for taking appropriate law enforcement measures to ensure that industry complies with their respective requirements.

2.2 Public Participation (Part 2)

Part 2 of CEPA 1999 outlines public participation requirements under the Act, including the establishment of an environmental registry, whistleblower protection, and the right of an individual to request an investigation and pursue court action.

2.2.1 CEPA Environmental Registry
www.ec.gc.ca/CEPARegistry

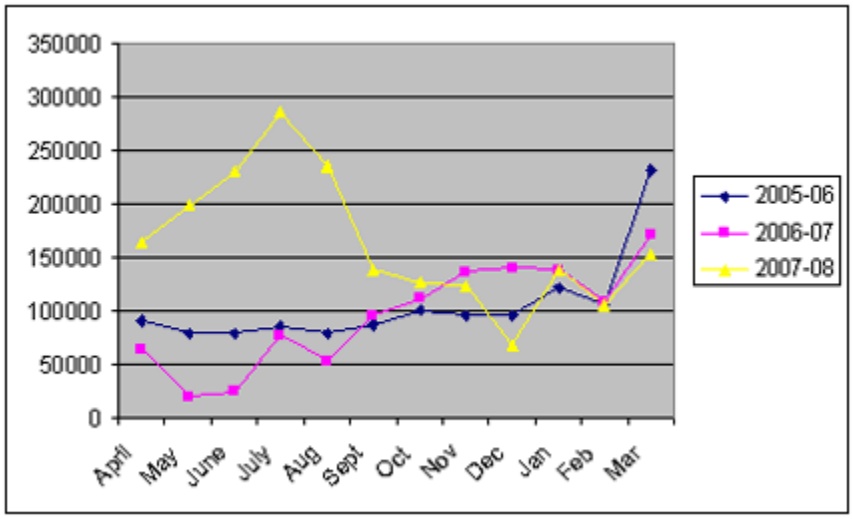
The CEPA Environmental Registry was launched on Environment Canada's website with the coming into force of sections of the Act on March 31, 2000. Since that time, ongoing efforts have been made to increase the Registry's reliability and user-friendliness. The structure of the Registry continued to evolve during the reporting period, as new documents were added and as improvements were suggested by users. During the 2006–2008 period, the content of the Registry continued to expand in order to serve Canadians better and to encompass thousands of CEPA-related documents and references. It was a primary source of environmental information for public and private sectors, both nationally and internationally, and for university and college curricula.

Figure 1 shows the number of visitors to the CEPA Environmental Registry every month during the reporting periods compared to the period April 1, 2005, to March 31, 2006.

In 2006–2007, the Registry (ceparegistry@ec.gc.ca) received more than 260 requests for CEPA-related information regarding importing and exporting chemicals, transporting dangerous goods, lab testing, proposed regulations, and the Domestic Substances List. There were three notices of objection (see section 332(2) of the Act) filed in 2006–2007.

In 2007–2008, the Registry received more than 220 requests for CEPA-related information. Many of these requests were for information on Batch 3 and 4 substances identified under the Chemicals Management Plan Challenge. Other requests involved pollution prevention plans, proposed regulations, guidelines, importing chemicals, biotechnology, permits and the Domestic Substances List. There were five notices of objection filed in 2007–2008.

Figure 1. Visitors to the CEPA Environmental Registry, by month, 2005–2006 to 2007–2008



2.2.2 Public Participation
www.ec.gc.ca/CEPARegistry/participation/

In 2006–2007, there were 28 opportunities posted on the CEPA Environmental Registry for stakeholders and the public to consult, including (but not limited to) regulations, risk management strategies, guidelines, environmental performance agreements and additions to the List of Toxic Substances.

In 2007–2008, there were 55 opportunities posted on the CEPA Environmental Registry for stakeholders and the public to consult. This is double the number usually posted within a given year, which may account for the spike in Figure 1.

2.3 Information Gathering, Objectives, Guidelines and Codes of Practice (Part 3)

Part 3 of CEPA 1999 requires the Minister of the Environment to issue environmental quality objectives and guidelines, and release guidelines and codes of practice. Under this Part, the Minister of Health is also required to issue objectives, guidelines and codes of practice with

respect to the elements of the environment that may affect the life and health of the people of Canada. Part 3 also provides for research, information gathering and the creation of inventories. See Chapter 3 of this report for results of research made under Part 3 of the Act.

Three guidelines and one code of practice were issued under the Act during the reporting periods (Table 1).

Table 1. Guidelines and codes of practice from April 2006 to March 2008

Guideline/Code	Draft Publication	Final Publication
Guidelines		
Indoor air quality guideline for radon		9-Jun-07
Residential indoor air quality guideline for formaldehyde		15-Apr-06
Residential indoor air quality guideline for moulds	23-Dec-06	31-Mar-07
Codes of Practice		
Environmental Code of Practice for Base Metals Smelters and Refineries		29-Apr-06

2.3.1 National Pollutant Release Inventory

www.ec.gc.ca/inrp-npri/

The National Pollutant Release Inventory (NPRI) is Canada's legislated, publicly accessible inventory of pollutant releases (to air, water and land), disposals and transfers for recycling. The National Pollutant Release Inventory includes information reported by industrial facilities and comprehensive emission summaries and trends for key air pollutants in Canada. The inventory is an important source of information for identifying, assessing and managing risks to the environment and human health. Public access to the National Pollutant Release Inventory motivates industry to prevent and reduce pollutant releases and improves public understanding about pollution and environmental performance in Canada.

Over 8500 facilities reported to this inventory on their releases and transfers for the 2006 and 2007 calendar years. Reporting was required for more than 350 pollutants, including toxic substances, such as mercury, lead, dioxins and furans; and air pollutants that contribute to smog and acid rain, such as sulphur dioxide, particulate matter and nitrogen oxides. The reported facility-level emissions for 2005 were published in 2006–2007 and those for 2006 in 2007–2008.

2005 National Pollutant Release Inventory data were published in October 2006, and 2006 data were published in November 2007. The data (including facility reports) are publicly available online on Environment Canada’s website in various formats, including a searchable query site and downloadable datasets.

2.3.2 Reporting on Greenhouse Gas Emissions

This reporting program lays the foundation for the development of a single domestic mandatory greenhouse gas (GHG) reporting system to meet the greenhouse gas reporting needs for all jurisdictions and to minimize the reporting burden for both industry and government. The program's three main objectives are to provide Canadians with timely information on these emissions, to enhance the level of detail in the National Greenhouse Gas Inventory, and to meet provincial and territorial requirements for information on these emissions. The data are collected

under three acts: by Environment Canada under the authority of the *Canadian Environmental Protection Act, 1999* (CEPA 1999), by Statistics Canada under the authority of the *Statistics Act,* and by Alberta Environment under the *Climate Change and Emissions Management Act.*

Reports were issued in 2006–2007 and 2007–2008.

Canada's Greenhouse Gas Emissions Reporting Program Overview of the Reported 2005 Facility Level GHG Emissions was published in December 2006 and is available online at *www.ec.gc.ca/pdb/ghg/onlineData/webarc/report2005_e.cfm in HTML and PDF*.

A total of 336 facilities reported greenhouse gas emissions for the 2005 calendar year, collectively emitting a total of 280 megatonnes carbon dioxide equivalent (Mt CO_2 eq) of these gases. Facilities can voluntarily report their greenhouse gas emissions if they are below the reporting threshold; 26 facilities did so for 2005. Total facility greenhouse gas emissions in 2005 represent just over one third (37%) of Canada's total of these emissions in 2004, as published in the *National Inventory Report, 1990–2004: Greenhouse Gas Sources and Sinks in Canada*. The data used in this report are current as of November 23, 2006.

Facility Greenhouse Gas Emissions Reporting Program Overview of the Reported 2006 Greenhouse Gas Emissions was published in October 2007 and is available online at *www.ec.gc.ca/pdb/ghg/onlineData/webarc/report2006_e.cfm in HTML and PDF*.

A total of 343 facilities reported greenhouse gas emissions for the 2006 calendar year, collectively emitting a total of 273 Mt CO_2 eq of these gases. Facilities can voluntarily report their greenhouse gas emissions if they are below the reporting threshold; 44 facilities did so for 2006. Total facility greenhouse gas emissions in 2006 represent just over one third (37%) of Canada's total of these emissions in 2005, as published in the *National Inventory Report, 1990–2005: Greenhouse Gas Sources and Sinks in Canada*. The data used in this overview report are current as of August 1, 2007.

2.4 Pollution Prevention (Part 4)

Part 4 of the Act provides the authority for the Minister of the Environment to require the preparation and implementation of pollution prevention plans.

Two Pollution Prevention Planning notices were published under the Act during 2006–2007 and 2007–2008 (Table 2).

Table 2. Pollution Prevention Planning notices from April 2006 to March 2008

Pollution Prevention Planning Notice	Draft Publication	Final Publication
Notice requiring the preparation and implementation of pollution prevention plans in respect of mercury releases from mercury switches in end-of-life vehicles processed by steel mills	9-Dec-06	29-Dec-07
Notice requiring the preparation and implementation of pollution prevention plans in respect of specified toxic substances released from base metals smelters and refineries and zinc plants		29-Apr-06

2.5 Controlling Toxic Substances (Part 5)

Part 5 of the Act includes specific requirements for the assessment and management of substances currently existing in commerce (substances on the Domestic Substances List) or being released to the environment in Canada and substances that are new to Canada.

2.5.1 Existing Substances

Through the Existing Substances Program, Environment Canada and Health Canada jointly identify, prioritize and assess the risks resulting from exposure to existing substances.

In 2006–2007, through the New Substances Program, Environment Canada and Health Canada jointly launched the development of a screening assessment process for the micro-organisms listed on the Domestic Substances List (DSL). Four draft guidelines were developed to support a proposed framework for the screening assessment process: a risk assessment framework guideline, a prioritization guideline for Domestic Substances List living organisms, a guideline for the external review of the draft screening assessment reports and guidance on the mechanisms for sharing information.

The program established a Technical Expert Group (TEG) composed of independent scientific experts from academia, industry, public advocacy groups and other federal government departments to advise on both the process and the scientific basis of screening assessments.

In 2007–2008, a risk assessment process was established and the four guidelines drafted in 2006–2007 were finalized following three meetings with the TEG panel. An annual report highlighting the TEG recommendations and program response was also produced.

2.5.1.1 Categorization Process

www.chemicalsubstanceschimiques.gc.ca/categor/index_e.html

CEPA 1999 introduced a requirement for the Government to sort through, or "categorize," the substances on the Domestic Substances List. The Domestic Substances List contains about 23 000 "existing substances," i.e., substances that were in commercial use in the mid 1980s in Canada but had not been assessed for the risks they might pose to the environment or human health.

The categorization process identified substances that:

- were suspected to be inherently toxic to humans or to the environment, and are persistent (take a very long time to break down) and/or bioaccumulative (collect in living organisms and end up in the food chain); or
- present the greatest potential for exposure to Canadians.

Using information from industry and academic research from Canada and other countries, Environment Canada and Health Canada scientists worked with partners in applying a rigorous, systematic approach to the 23 000 chemical substances on the Domestic Substances List.

The Government completed the categorization of the 23 000 substances in September 2006, as required by the Act. A comprehensive collection of information on the categorization of the DSL (including general information, categorization guidance and approach documents, progress

reports and spreadsheets of ecological categorization decisions, robust study summaries, and other related documents) is available to the public on CD-ROM. The CEPA Environmental Registry also contains a search engine that can be used to obtain categorization results for a particular substance.

As a result of the categorization process, the Government identified approximately 19 000 substances that need no further action at this time and 4000 chemical substances that need further attention, such as screening assessments, research, or measures to control the use or release of a chemical substance. These 4000 substances are being managed under the Government's Chemicals Management Plan (CMP).

2.5.1.2 Chemicals Management Plan

www.chemicalsubstanceschimiques.gc.ca/plan/index_e.html

In December 2006, the Government of Canada announced its Chemicals Management Plan—the Government's response to dealing with the 4000 substances of potential concern identified during the categorization process. The 4000 substances include 200 high-priority substances, 2600 medium-priority substances and 1200 substances of low concern. CEPA 1999 is a key instrument for delivering the goals of the CMP. The plan has the ambitious goal of assessing all of these substances by 2020—a 10-fold increase in the previous rate of assessments. Substances that pose a risk to the environment or human health will be subject to risk management measures.

The Chemicals Management Plan also places an increased focus on potentially toxic substances found in products.

Canada's Chemicals Management Plan includes:

- regulations and enforcement;
- the Challenge to industry and other stakeholders;
- restrictions on reintroduction and new uses of chemicals;
- rapid screening of lower-risk chemical substances;
- accelerated re-evaluation of older pesticides;
- mandatory ingredient labelling of cosmetics;
- regulations to address environmental risks posed by pharmaceuticals and personal care products;
- enhanced management of environmental contaminants in food;
- ecological and health monitoring, surveillance and research; and
- good stewardship of chemical substances.

Through its Challenge under the CMP, the Government will address the 200 highest-priority substances by 2010. These 200 substances have been divided up into a number of smaller groups or "batches" that are being addressed sequentially. Each batch of substances in the Challenge progresses through various information-gathering, screening assessment, management and regulatory stages. Every three months, a batch of 15 to 30 substances is launched, by publishing the names of these substances in the *Canada Gazette*, Part 1, for a six-month comment and information-gathering period. The substances in each of the first five batches are listed in Appendix C.

Table 3 shows the launch dates of these batches. Table 4 lists the Challenge workshops held during the reporting periods. Table 5 lists the results of draft screening assessments for Batch 1 substances.

Table 3. Batches of substances launched under the Chemicals Management Plan Challenge in 2006–2007 and 2007–2008

Batch No.	Number of Substances in Batch	Launch Date	Draft Screening Assessment Publication Date
1	15	February 3, 2007	19-Jan-2008
2	17	May 12, 2007	
3	19	August 18, 2007	
4	18	November 17, 2007	
5	19	February 16, 2008	

Table 4. Challenge information workshops from April 2006 to March 2008

Workshop Topic	Date	Location
Batch 1	12-Feb-07	Ottawa, Ontario
	27-Feb-07	Ottawa, Ontario
Batch 2	7-Jun-07	Toronto, Ontario
	12-Jun-07	Calgary, Alberta
Batch 3	No workshops held, due to insufficient stakeholder interest	
Batch 4	15-Jan-08	Toronto, Ontario
	17-Jan-08	Montréal, Quebec

Table 5. Draft screening assessment results for Batch 1 substances, published on January 19, 2008

Proposed Measure	Substance
Add to Schedule 1 of CEPA 1999 and implement virtual elimination	- Peroxide, (1,1,4,4-tetramethyl-1,4-butanediyl)bis[(1,1-dimethylethyl)] (DMHBP) - Peroxide, (1,1,4,4-tetramethyl-2-butyne-1,4-diyl)bis[(1,1-dimethylethyl)] (DMBP) - Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl) (DBTMC) - Propanedinitrile, [[4-[[2-(4-cyclohexylphenoxy)ethyl]ethylamino]-2-methylphenyl]methylene]- (CHPD)
Add to Schedule 1	- Oxirane, methyl- (Methyloxirane) - Oxirane, ethyl- (Ethyloxirane) - Benzene, 1,3-diisocyanatomethyl- (TDI mixed isomers) - Benzene, 1,3-diisocyanato-2-methyl (2,6-TDI) - Benzene, 2,4-diisocyanato-1-methyl (2,4-TDI) - Naphthalene - 1,4-Benzenediol (1,4-benzenediol) - 1,2-Benzenediol (1,2-benzenediol)
Take no further action	- 2-Naphthalenecarboxamide, N-[4-acetylamino)phenyl]-4-[[5-(aminocarbonyl)-2-chlorophenyl]azo]-3-hydroxy- (Pigment Orange 38) - Benzenesulfonic acid, 4-[[3-[[2-hydroxy-3-[[(4-methoxyphenyl)amino]carbonyl]-1-naphthalenyl]azo]-4- methylbenzoyl]amino]-, calcium salt (2:1) (Pigment Red 247:1) - 2-Naphthalenecarboxamide, 4-[[5-[[[4-(aminocarbonyl)phenyl] amino]carbonyl]-2-methoxyphenyl]azo]-N-(5-chloro-2,4-dimethoxyphenyl)-3-hydroxy- (Pigment Red 187)

A Challenge Advisory Panel of experts and a Stakeholder Advisory Council of industry and non-governmental organization representatives were established. The Panel's mandate is to provide third-party advice on the application of the precautionary principle and weight of evidence during the risk assessment of the Challenge substances. The Council serves as a forum for members to provide advice and other input to the Government on various issues related to the implementation of the CMP.

An integrated approach to collecting and managing information for decision making by linking risk assessment and risk management with research and monitoring activities was developed and implemented. The CMP Monitoring and Surveillance Program was developed to bring together nationally the monitoring of chemicals in multiple environmental media: air, water, sediment, non-human biota (fish and wildlife); as well as the development of source monitoring (wastewater treatment plant effluents and sludge; landfill leachate and biogas). This program complements the human health monitoring conducted by Health Canada. Together these programs generate science-based information essential to identifying risks and informing risk assessment and risk management, and to supporting informed decision making.

The CMP Monitoring and Surveillance Program is driven by priorities emerging from the risk assessment and risk management (RA/RM) process under the CMP. In order to optimize alignment of the CMP monitoring program with emerging priorities, a formal CMP Monitoring and Surveillance Working Group has been established. This Working Group includes representation from RA/RM and research and monitoring experts from both departments. This forum allows RA/RM to work with departmental experts in order to communicate evolving needs and to further refine priorities for monitoring. The Monitoring and Surveillance Working Group oversees the development and refinement of the national, multi-media CMP Monitoring and Surveillance Program by selecting abiotic and biotic indicators, prioritizing emerging CMP chemicals for monitoring, coordinating activities nationally, identifying required resources, and reporting on results.

Research funds under the CMP are available for generating and disseminating the science-based information necessary to identify risks and support risk assessment and risk management processes. These funds are managed collectively through a joint Health Canada/Environment Canada process in a fair, transparent and equitable manner based on priorities. The pool of CMP research funds is to be used by both departments and resides at Health Canada. An interim process was developed for allocating funds in the first year of the CMP (2007–2008). For the remaining years (2008–2009, 2009–2010, 2010–2011), a more formal proposal process has been developed and implemented.

2.5.1.3 Risk Assessment

The risk assessment decisions made under the Act that were published in the reporting periods appear in Table 6.

Table 6. Publication of existing substance assessment decisions from April 2006 to March 2008, with the exception of Batch 1 substances (PSL1 = First Priority Substances List; PSL2 = Second Priority Substances List)

Substance	Type of Assessment	Meets s.64 Criteria	Proposed Measure	Draft Publication	Final Publication
2006–2007					
148 substances on the Domestic Substances List but no longer in commerce	Rapid screening	No	Significant New Activity notice and no further action	9-Dec-06	
Perfluorooctane sulfonate and its salts	Screening	Yes	Add to Schedule 1 and virtual elimination		1-Jul-06
Polybrominated diphenyl ethers that have the molecular formula $C_{12}H_{(10-n)}Br_nO$, in which $4 \leq n \leq 10$	Screening	Yes	Add to Schedule 1		1-Jul-06
Releases of radionuclides from nuclear facilities	PSL2	Yes	No further action*		2-Sep-06
2007–2008					
2,2′-Methylenebis[6-(1,1-dimethylethyl)-4-methylphenol) ion	Screening – pilot project	No	No further action	23-Jun-07	
4,6-Dinitro-o-cresol	Screening – pilot project	No	No further action	23-Jun-07	
754 substances on the Domestic Substances List	Rapid screening	No	No further action	23-Jun-07	
Ethylene glycol	PSL2	Yes	Add to Schedule 1	1-Dec-07	
Non-pesticidal uses of six substances (trifluralin, atrazine, chlorothalonil, chlorophacinone, methoxychlor and pentachlorophenol)	Screening – pilot project	No	Significant New Activity notice and no further action	23-Jun-07	
Organotins (monomethyltins, monobutyltins, monooctyltins, dimethyltins, dibutyltins and dioctyltins)	PSL1 follow-up	No	No further action	21-Apr-07	
Organotins (tributyltins and tetrabutyltins)	PSL1 follow-up	Yes	Add to Schedule 1	21-Apr-07	
Organotins (fluorotriphenylstannane and tetraphenylstannane)	PSL1 follow-up	No	Significant New Activity notice and no further action	21-Apr-07	
Used crankcase oils	PSL1 follow-up	Yes	No further action**		4-Aug-07

* Managed under the *Nuclear Safety and Control Act.*
** Managed by provinces and territories.

2.5.1.4 Risk Management

Tables 7, 8 and 9 show substances added to Schedule 1 of CEPA 1999, Significant New Activity notices and proposed and final regulations made under the Act during 2006–2007 and 2007–2008.

Table 7. Existing substances added to Schedule 1 of CEPA 1999 from April 2006 to March 2008

Substance	Final Publication
- Polybrominated diphenyl ethers that have the molecular formula $C_{12}H_{(10-n)}Br_nO$ in which $4 \leq n \leq 10$ - Perfluorooctane sulfonate and its salts - Compounds that contain one of the following groups: $C_8F_{17}SO_2$, $C_8F_{17}SO_3$ or $C_8F_{17}SO_2N$	27-Dec-06

Table 8. Significant New Activity notices for existing substances from April 2006 to March 2008

Substance	Draft Publication
2006–2007	
148 substances on the Domestic Substances List but no longer in commerce	9-Dec-06
2007–2008	
Fluorotriphenylstannane and tetraphenylstannane	21-Apr-07
Non-pesticidal uses of six substances (trifluralin, atrazine, chlorothalonil, chlorophacinone, methoxychlor and pentachlorophenol)	23-Jun-07

Table 9. Proposed and final regulations made under Part 5 from April 2006 to March 2008

Regulation	Draft Publication	Final Publication
2-Butoxyethanol Regulations		27-Dec-06
Ozone-depleting Substances Regulations, 1998, Regulations Amending the	2-Dec-06	27-Jun-07
PCB Regulations	4-Nov-06	
Perfluorooctane Sulfonate and its Salts and Certain Other Compounds Regulations	16-Dec-06	
Polybrominated Diphenyl Ethers Regulations	16-Dec-06	
Prohibition of Certain Toxic Substances Regulations, 2005 (2-Methoxyethanol, Pentachlorobenzene and Tetrachlorobenzenes), Regulations Amending the		29-Nov-06
Prohibition of Certain Toxic Substances Regulations, 2005, (Four New Flurotelomer-based Substances), Regulations Amending the	17-Jun-06	
Virtual Elimination List – Addition of hexachlorobutadiene		13-Dec-06

2.5.2 New Substances

Substances that are not on the Domestic Substances List are considered to be new to Canada. New substances may not be manufactured in, or imported into, Canada, unless the Minister has been notified with certain prescribed information, and the potential risk to the environment and human health has been assessed, or the period for assessing the information has expired.

2.5.2.1 Risk Assessment of New Substances

In 2006–2007, 436 New Substance Notifications were received pursuant to the *New Substances Notification Regulations (Chemicals and Polymers)*. In 2007–2008, 437 notifications were received.

Between April 2007 and March 2008, one new nanomaterial notification was received.

New Substance Notifications received for substances that could be used as a nanomaterial for any potential future uses or activities may be subject to a Significant New Activity notice. To date, 14 such Significant New Activity notices have been published.

2.5.2.2 Risk Management of New Substances

Of the total 437 notifications received in the 2007–2008 fiscal year, Environment Canada issued 8 Ministerial Conditions, no prohibitions, and 22 Significant New Activity notices.
The notification for a new nanomaterial was subject to a Significant New Activity notice.

Tables 10, 11 and 12 list new substances proposed for addition to Schedule 1 of CEPA 1999, Significant New Activity notices and the Ministerial Conditions made under the Act during 2006–2007 and 2007–2008.

Table 10. Proposed orders adding new substances to Schedule 1 of CEPA 1999 from April 2006 to March 2008

Substance	Draft Publication
Four new fluorotelomer-based substances: - Hexane, 1,6-diisocyanato-, homopolymer, reaction products with alpha-fluoro-omega-2-hydroxyethyl-poly(difluoromethylene), C16-20-branched alcohols and 1-octadecanol - 2-Propenoic acid, 2-methyl-, hexadecyl ester, polymers with 2-hydroxyethyl methacrylate, gamma-omega-perfluoro-C10-16- alkyl acrylate and stearyl methacrylate - 2-Propenoic acid, 2-methyl-, 2-methylpropyl ester, polymer with butyl 2-propenoate and 2,5-furandione, gamma-omegaperfluoro-C8-14-alkyl esters, tert-Bu benzenecarboperoxoateinitiated - 2-Propen-1-ol, reaction products with pentafluoroiodoethane tetrafluoroethylene telomer, dehydroiodinated, reaction products with epichlorohydrin and triethylenetetramine	17-Jun-06

Table 11. Significant New Activity notices for new substances from April 2006 to March 2008

Substance	Final Publication
2006–2007	
1-Butanesulfonyl fluoride, 1,1,2,2,3,3,4,4,4-nonafluoro	7-Oct-06
2-Propenoic acid, 2-methyl-, 2-[(3,5-dimethyl-1*H*-pyrazol-1-yl) carbonyl]aminoethyl ester, polymer with chloroethene, octadecyl 2-propenoate and perfluoroalkyl ethyl 2-methyl-2-propenoate;	24-Jun-06
2-Pyrrolidinone, 1-(2-hydroxyethyl)	4-Nov-06
6-(Phthalimido)peroxyhexanoic acid	27-May-06
Alkanamide, (3,3'-dichloro[1,1'-biphenyl]-4,4'-diyl)bis(azo)bis[phenylfattyalkyl polyazaalkylidine]	8-Apr-06
Benzoic acid, nonyl ester, branched and linear	6-Jan-07
Perfluoroalkylhydroxyaminoazetidinium polymer	22-Jul-06
Phosphonium, tetrabutyl-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-1-butanesulfonic acid (1:1)	31-Mar-07
2007–2008	
1-Hexadecanesulfonic acid, (dimethylphenyl)	5-May-07
1-Tetradecanesulfonic acid, (dimethylphenyl)	5-May-07
2-Propenoic acid, 2-methyl-, oxiranylmethyl ester, polymer with ethenylbenzene, substituted alkyl 2-propenoate, 2-methylalkyl 2-propenoate, and rel-(1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]hept-2-yl 2-propenoate, *tert*-Bu ethaneperoxoate-initiated	21-Apr-07
Benzenesulfonic acid, 4-[[4-[(4-hydroxy-2methylphenyl)azo]phenyl]amino]-3- nitro-, monosodium salt	12-Jan-08
Hexane, 1,6-diisocyanato-, homopolymer, polyhalosubstituted-1-alkanolblocked	3-Nov-07
Oxirane, (chloromethyl)-, polymer with α-hydro-ω-hydroxypoly[oxy(methyl-1,2-ethanediyl)] ether with polyol, 4,4'-(1-methylethylidene) bisphenol, 2,2'-[(methylethylidene)bis(4,1-phenyleneoxymethylene)] bisoxirane and methyloxirane polymer with oxirane, 2-aminopropyl methyl ether	26-Jan-08
Oxirane, [[(2-ethylhexyl)oxy]methyl]-, reaction products with polyethylene glycol ether with 2,4,7,9-tetramethyl-5-decyne-4,7-diol (2:1)	9-Feb-08
Phosphoric acid, C12-15-alkyl esters	9-Jun-07
Silane, trimethoxypropyl-, hydrolysis products with silica, Chemical Abstracts Service Registry No. 849036-06-2	29-Dec-07
Siloxanes and Silicones, 3-[(2-aminoethyl)amino]propyl Me, di-Me, hydroxy and methoxy-terminated, polymers with polyethylenepolypropylene glycol bis(2-methyl-2-propen-1-yl) ether	12-Jan-08
Siloxanes and Silicones, 3-[(2-aminoethyl)amino]propyl Me, hydroxy-terminated, polymers with hydrogen terminated di-Me siloxanes and polyethylene glycol bis(2-methyl-2-propen-1-yl) ether	12-Jan-08
Siloxanes and Silicones, dimethyl, methyl-3,3,4,4,5,5,6,6,6-nonafluorohexyl	26-May-07
Siloxanes and Silicones, substituted alkyl Me, di-Me, Me substituted alkyl, polymers with stearyl acrylate, polyfluoro methacrylate and vinyl chloride	1-Dec-07
Starch, 2-hydroxyalkyl 2-hydroxy-3-(trimethylammonio)alkyl ether, chloride	30-Jun-07

Table 12. Notices of Ministerial Conditions for new substances from April 2006 to March 2008

Substance	Final Publication
2006–2007	
Butane derivatives, butyl-(2,3-dihydroxypropyl)-2-propenyl-3-C12-14-alkyl ethers, chlorides	24-Jun-06
Mixed α-hydro- ω-hydroxypoly(oxyalkylenediyl), mono aryl ethers and α-hydroxy-ω-alkyl, phosphates	15-Apr-06
Tetrahalidearomaticdione, reaction product with 2-ethyl-1-hexanol	6-May-06
2007–2008	
Acetic acid, reaction products with 1-[[2-[(2-aminoethyl)amino] ethyl]amino]-3-phenoxy-2-propanol, bisphenol A diglycidyl ether-Bu glycidyl ether-2,2'-[1,4- butanediylbis (oxymethylene)]bis[oxirane]-polyethylenepolyamine polymer, formaldehyde, and polyethylenepolyamine	14-Jul-07
Acetic acid, reaction products with 1-[[2-[(2-aminoethyl)amino]ethyl] amino]-3-phenoxy-2-propanol, bisphenol A diglycidyl ether-Buglycidyl ether-2,2′-[1,4-butanediylbis(oxymethylene)]bis[oxirane]-polyethylenepolyamine polymer, formaldehyde, and polyethylenepolyamine	21-Apr-07
Benzene, 1,1'-(1,2-ethanediyl)bis(2,3,4,5,6-pentabromo)	3-Nov-07
Formaldehyde, polymer with N1-(2-aminoethyl)-N2-[2-[(2-aminoethyl)amino] ethyl]-1,2-ethanediamine, alkane bis oxymethyleneoxirane, 4,4'-(1- methylethylidene) bis[phenol] and 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bis[oxirane], reaction products with Buglycidyl ether and 1-[[2-[(2-aminoethyl)amino]ethyl]amino]-3-phenoxy-2-propanol, acetates (salts)	5-Jan-08
Poly(oxy-1,2-ethanediyl), α-[3-[1,3,3,3-tetramethyl-1-[(trimethylsilyl)oxy] disiloxanyl]propyl]-ω-hydroxy	23-Jun-07

2.6 Animate Products of Biotechnology (Part 6)

The Act establishes an assessment process for living organisms that are new animate products of biotechnology, which mirrors provisions in Part 5 of CEPA 1999 respecting new substances that are chemicals or polymers.

2.6.1 Risk Assessment and Management

In 2006–2007, 14 notifications were received pursuant to the *New Substances Notification Regulations (Organisms)* for new animate products of biotechnology. Of the 14 notifications received, the Minister of the Environment issued one Significant New Activity notice on yeast on March 17, 2007.

In 2007–2008, 10 notifications were received pursuant to the *New Substances Notification Regulations (Organisms)* for new animate products of biotechnology. No ministerial actions were taken with respect to these notifications.

2.6.2 Proposed Regulatory Amendments

In June 2007, as part of the New Substances Program's ongoing commitment to regulatory review and amendment of the *New Substances Notification Regulations (Organisms)*, a consultative process was initiated with establishment of a first multi-stakeholder workshop on proposed regulatory amendments to provisions dealing with organisms other than micro-organisms (i.e. "higher" organisms covered by Schedule 5 of the Regulations). Over 60 representatives from academia, industry, other federal and provincial government departments, non-government agencies and public advocacy groups participated in the workshop.

In December 2007, a second multi-stakeholder workshop to further enhance stakeholder input and to better inform the on-going regulatory review and amendment initiative was held. Over 50 participants attended this second workshop.

2.7 Controlling Pollution and Managing Waste (Part 7)

Part 7 of CEPA 1999 provides the Minister with authorities to deal with substances that have the potential to harm the environment or human health.

2.7.1 Regulations

Two regulations were proposed, amendments to four existing regulations were proposed, and two existing regulations were amended under Part 7 during the reporting periods (Table 13).

Table 13. Regulations under Part 7 from April 2006 to March 2008

Regulation	Division under CEPA 1999	Draft Publication	Final Publication
Disposal at Sea Regulations – Amendments	Division 3	24-Nov-07	
Gasoline Regulations – Amendments	Division 4	22-Dec-07	
Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations	Division 8	2-Sep-06	
Marine Spark-Ignition Engine and Off-Road Recreational Vehicle Emission Regulations	Division 5	30-Dec-06	
On-Road Vehicle and Engine Emission Regulations, Regulations Amending the	Division 5	5-Nov-05	15-Nov-06
Regulations Respecting Applications for Permits for Disposal at Sea (Miscellaneous Program), Regulations Amending the	Division 3	10-Nov-07	
Sulphur in Diesel Fuel Regulations, Regulations Amending the	Division 4	1-Apr-06	12-Jul-06
Sulphur in Gasoline Regulations (Miscellaneous Program), Regulations Amending the	Division 4	11-Aug-07	

Table 14 lists two notices of intent published during the reporting period, which indicate the action the Government intends to take to further reduce air pollution.

Table 14. Other results under CEPA 1999 related to air emissions from April 2006 to March 2008

Measure	Draft/Notice Publication
Notice of intent to develop a federal regulation requiring renewable fuels	30-Dec-06
Notice of intent to establish a program under section 322 of the *Canadian Environmental Protection Act , 1999* to allocate credits for early action taken to reduce greenhouse gas emissions	15-Mar-08

2.7.2 Disposal at Sea

The disposal of waste at sea within Canadian jurisdiction and by Canadian ships in international waters requires a permit issued by the Minister. A permit for disposal at sea will be approved only if it is the environmentally preferable option. Incineration at sea is banned except under emergency situations. CEPA 1999 provides additional controls on disposal at sea, including:

- a prohibition on the export of a substance for disposal in an area of the sea under the jurisdiction of a foreign state or in its internal waters;
- a list of six substances that can be disposed of at sea (Schedule 5 to the Act);
- an assessment framework for reviewing permit applications based on the precautionary principle, which must be followed (Schedule 6 to the Act); and
- a statutory obligation for the Minister of the Environment to monitor selected sites.

2.7.2.1 Disposal at Sea Permits

There were 187 disposal at sea permits issued and almost 8.1 million tonnes of material permitted to be disposed of during the reporting periods (Table 15), in four regions (Table 16). The number of permits issued has remained relatively stable since 1995. The quantities permitted were lower in 2006–2007 than in 2007–2008, mostly due to a lower need for dredging by several large regulatees. Permits for the disposal of geological matter, mostly excavated till, have increased in these two years due to an increase in construction work in the lower mainland of British Columbia.

Table 15. Disposal at sea quantities permitted (in tonnes) and permits issued in Canada from April 2006 to March 2008

Material	Quantity permitted	Permits issued
2006–2007		
Dredged material*	1 667 120	37
Geological matter*	1 627 600	9
Fisheries waste	66 330	42
Vessels	190	1
Organic	-	-
Total	**3 361 240**	**89**
2007–2008		
Dredged material*	3 329 560	42
Geological matter*	1 345 500	9
Fisheries waste	60 380	45
Vessels	1118	1
Organic	200	1
Total	**4 736 758**	**98**

* Dredged material and geological matter were converted to tonnes using an assumed density of 1.3 tonnes per cubic metre.

Table 16. Disposal at sea quantities permitted (in tonnes) and permits issued by region from April 2006 to March 2008

Material	Atlantic		Quebec		Pacific and Yukon		Prairie and Northern	
	Quantity permitted	Permits issued	Quantity permitted	Permits issued	Quantity permitted	Permits issued	Quantity permitted	Permits issued
2006–2007								
Dredged material*	985 400	9	80 600	10	601 120	18	-	-
Geological matter*	-	-	-	-	1 627 600	9	-	-
Fish waste	64 930	39	1400	3	-	-	-	-
Vessels	190	1	-	-	-	-	-	-
Organic	-	-	-	-	-	-	-	-
Total	**1 050,520**	**49**	**82 000**	**13**	**2 228 720**	**27**	**0**	**0**
2007–2008								
Dredged material*	1 235,910	11	145 600	12	1 948 050	19	-	-
Geological matter*	-	-	-	-	1 345 500	9	-	-
Fish waste	59 330	42	1050	3	-	-	-	-
Vessels	-	-	-	-	1118	1	-	-
Organic	-	-	-	-	-	-	200	1
Total	**1 295 240**	**53**	**146 650**	**15**	**3 294 668**	**29**	**200**	**1**

* Dredged material and geological matter were converted to tonnes using an assumed density of 1.3 tonnes per cubic metre.

2.7.2.2 Monitoring Program

In 2006–2007 and 2007–2008, field monitoring was conducted at a total of 30 ocean disposal sites. Of note:

- An intensive study was conducted on the stability of the Sand Heads disposal site at the mouth of the Fraser River in Vancouver. This site receives a large amount of sand annually from dredging activities in the Fraser River. Conclusions of the study are that the site can remain open, but the timing and rate of disposal activities must be carefully managed to avoid slope failure at the site.
- Bathymetric surveys were conducted at the Charlottetown Harbour disposal site as part of an investigation of site stability and the possible effects of disposal activities on nearby fish habitat and other uses of the sea. Preliminary analysis indicated that the site is stable, suggesting that long-term off-site effects may be minimal.
- Ongoing work continued in sediment transport and contaminant levels at disposal sites in the Magdalen Islands, Quebec.
- A study was undertaken at a disposal site off Banks Island in the Northwest Territories that receives muskox waste from a muskox processing operation.

2.7.3 Control of Movement of Hazardous Waste and Hazardous Recyclable Material and of Prescribed Non-hazardous Waste for Final Disposal

www.ec.gc.ca/drgd-wrmd/

CEPA 1999 provides the authority to enact regulations governing the export and import of hazardous waste, including hazardous recyclable materials. The Act also enables authorities to make regulations on the export and import of prescribed non-hazardous waste for final disposal. The Act requires exporters of hazardous wastes destined for final disposal to submit export reduction plans; and sets out criteria that the Minister may consider in refusing to issue an export, import, or transit permit if the waste or recyclable material will not be managed in a manner that will protect the environment and human health. The Act also directs the Minister to publish notification requiring information on exports, imports and transits of hazardous waste and hazardous recyclable material are also included in CEPA 1999.

The *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* came into force in November 2005. These Regulations set out new notification requirements which are intended to assist in reducing the paper burden for Canadian companies that are subject to regulatory control for the export out of, import into, transit through Canada and Canada-to-Canada transit movements of hazardous waste and hazardous recyclable material. Under the new notification requirements, a single permit application notice may now cover multiple hazardous waste or hazardous recyclable material lines beyond the former limit of three lines per notice. However, in the case of an export or import, the notice must not include both hazardous waste and hazardous recyclable material. For the 2006 calendar year,[1] the number of notices submitted and processed fell from 6793 notices in 2005 to 4719 notices. Overall, the number of hazardous waste and hazardous recyclable material lines notified increased in 2006 to 20 511 individual lines compared to the 2005 value of 18 489 notice line items.

For the calendar year running from January 2006 to December 2006, the quantity of hazardous waste and hazardous recyclable material imported into Canada was 408 839 tonnes. This represented a decrease of approximately 14% over the total quantity of 2005 imports, which were 476 416 tonnes. Most of the reduction in the quantities imported into Canada was due to the decline in the import of hazardous wastes destined for disposal operations. During this period, just over 45 800 actual individual shipments of hazardous waste and hazardous recyclable material were reported through the movement documents received.

In the case of exports of hazardous waste and hazardous recyclable material out of Canada, the overall quantities increased in 2006 compared to 2005 figures. In 2005 the total quantities of hazardous waste and hazardous recyclable material exports combined amounted to 327 746 tonnes, which increased to 474 538 tonnes in 2006. Most of this amount is due to a marked increase in the quantity of exported hazardous recyclable materials, which increased from 226 380 tonnes in 2005 to 374 024 tonnes for 2006.

[1] Export and import quantities set out in Section 2.7.3 of this report represent actual movement values that took place during the 2006 calendar year (from January 1 to December 31, 2006) and the 2007 calendar year (from January 1 to December 31, 2007). These values are consistent with Canada's international reports, which are all based on the calendar year.

During the 2007 calendar year,[2] nearly 4300 notices were processed for proposed imports, exports and transits of hazardous wastes and hazardous recyclable materials, representing more than 17 900 individual waste streams. The waste streams exhibited a range of hazards, including compressed gases, flammability, acute toxicity, corrosivity, dangerous reactivity and environmental hazards. Sources of the hazardous waste included leftovers from various industrial activities such as oil refining, chemicals manufacture and metal processing. During the same period, more than 45 300 individual shipments of hazardous waste and hazardous recyclable material were tracked through manifests and movement documents.

In 2007, the total imported quantity of hazardous wastes and hazardous recyclable materials was 470 136 tonnes, an increase of 61 297 tonnes—or 15%—from 2006. The quantity of materials destined for final disposal increased minimally compared to 2006. The quantity of hazardous recyclable materials destined for recovery operations was 220 377 tonnes in 2007, an increase of about 34% from 2006.

Based on the annual statistics for international transboundary movements in 2007, nearly 99% of Canadian imports came from the United States, with the remainder coming from Europe as hazardous recyclable materials destined for metal recovery operations. Shipments destined for recycling, which reduce reliance on primary resources and benefit Canadian industry, represented nearly 47% of all imports. Used or spent batteries, metal-bearing waste and manufacturing residues made up the majority of imports of hazardous recyclable material into Canada. Other hazardous waste imports included used or spent liquors from metallurgical processes, and residues from oil refining destined for disposal operations.

Imports of hazardous recyclable materials destined for recycling operations were shipped to five provinces, with Quebec and Ontario continuing to receive the vast majority of all imports and British Columbia receiving smaller quantities. The situation is similar for imports of hazardous waste for final disposal, with most destined for Quebec and Ontario and relatively small quantities imported into British Columbia and Alberta.

Canadian exports were 452 396 tonnes in 2007, a decrease of almost 5% from 2006. The quantity of exports shipped for both recycling and final disposal decreased in 2007, with the percentage of exports for recycling dropping slightly—from 79% in 2006 to 78% in 2007. The decrease in exports in 2007 was due to significant decreases in metallurgical processes and mechanical and electrical engineering processes.

In 2007, exports of hazardous recyclable materials originated from eight provinces, with Ontario and Quebec accounting for 77% of all shipments out of Canada. The bulk of these shipments were managed by facilities in the northeastern and central United States. Hazardous wastes or hazardous recyclable materials were not exported in 2007 from Newfoundland and Labrador, Prince Edward Island or the territories.

Figure 2 shows the trends of imports and exports, and Tables 17 and 18 list the quantities imported and exported from 2001 to 2007.

[2] Export and import quantities set out in Section 2.7.3 of this report represent actual movement values that took place during the 2006 calendar year (from January 1 to December 31, 2006) and the 2007 calendar year (from January 1 to December 31, 2007). These values are consistent with Canada's international reports, which are all based on the calendar year.

Figure 2. Imports and exports of hazardous waste and hazardous recyclable material, 2001–2007 (tonnes)

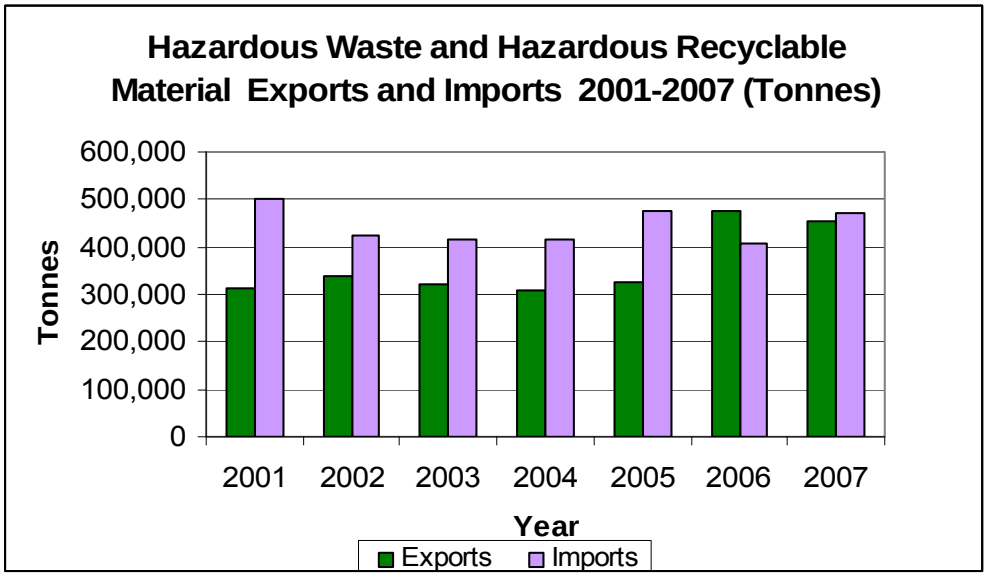


Table 17. Hazardous waste and hazardous recyclable material, imports, 2001–2007 (tonnes)

	2001	2002	2003	2004	2005	2006	2007
Recyclables	237 069	193 318	189 110	200 097	174 983	164 903	220 377
Total imports	499 758	423 067	417 368	416 136	476 416	408 839	470 136

Table 18. Hazardous waste and hazardous recyclable material, exports, 2001–2007 (tonnes)

	2001	2002	2003	2004	2005	2006	2007
Recyclables	237,872	238,597	205,356	187,986	226,380	374,024	352,933
Total exports	313,361	340,261	321,294	308,357	327,746	474,538	452,396

2.7.4 International Air Pollution

No actions were taken under the international air pollution provisions in 2006–2007 and 2007–2008.

2.7.5 International Water Pollution

No actions were taken under the international water pollution provisions in 2006–2007 and 2007–2008.

2.8 Environmental Emergencies (Part 8)

Part 8 of CEPA 1999 allows for the emergency prevention, preparedness, response and recovery of uncontrolled, unplanned or accidental releases of a substance that poses potential harm to the environment or to human health. Part 8 provides the authority for environmental emergency plans, regulations, guidelines and codes of practice.

Proposed amendments to the *Environmental Emergency Regulations* were published on June 9, 2007.

The purpose of the proposed amendments was to add to Schedule 1 of the Regulations 33 hazardous substances whose release would pose an unacceptable level of risk, and which consequently require environmental emergency planning. The proposed amendments were also intended to clarify certain provisions of the Regulations.

2.9 Government Operations and Federal and Aboriginal Land (Part 9)

Part 9 of the Act provides the authority to issue regulations, guidelines and codes of practice that apply to departments, boards and agencies of the Government of Canada; federal works and undertakings; federal land; Aboriginal land; persons on that land and other persons insofar as their activities involve that land; and Crown corporations.

Proposed regulations, *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations*, were published on April 7, 2007.

The purpose of the proposed Regulations was to reduce the risk of contaminating soil and groundwater due to spills and leaks of petroleum products and allied petroleum products from storage tank systems, and to help reduce a number of CEPA toxic substances from entering the environment.

3 RESEARCH (PART 3)

Part 3 of CEPA 1999 allows the Minister to conduct research. Environment Canada and Health Canada scientists published numerous reports, papers, book chapters, articles and manuscripts on subjects related to the Act. CEPA 1999 directs the Minister to report on research in the annual report. Although it is not possible to describe all of these activities in this report, this chapter summarizes the types of research initiatives underway during the reporting periods, along with the key contributions of this research.

3.1 Air

Air-related research under CEPA 1999 in 2006–2007and 2007–2008 included the following studies:

- Hexachlorobenzene in the Great Lakes — Hexachlorobenzene, a persistent toxic substance, continues to have an impact on air quality in the Great Lakes environment years after it was banned for agricultural use in Canada (in the 1970s). Researchers therefore inventoried releases from major North American sources and used an atmospheric transport model to investigate how this fungicide finds its way into the Great Lakes Basin. The findings of the two-year study were summarized in an 85-page report entitled *Emission Inventory and Multiple Pathways Modeling of HCB to the Great Lakes from North American Sources*, submitted to Environment Canada and the U.S. Environmental Protection Agency in May 2008.

- Exchange and fate of persistent organic pollutants (POPs) and currently used pesticides in water, soil and air — Researchers studied residues from currently used and banned pesticides in and above Hudson Bay waters, in Ontario precipitation and streams, and in the Great Lakes. In July 2007, Arctic researchers identified currently used pesticides (chlorpyirfos, dacthal, chlorothalonil and endosulfan), as well as legacy pesticides such as chlordane in Hudson Bay waters and in air samples collected at three different heights above the sea surface. In Ontario, the focus was on estimating the air/water exchange and fate of herbicides (mecoprop, dichlorprop and metolachlor). The lab work at the Canada Centre for Inland Waters was able to determine the rate at which pesticides, such as hexachlorocyclohexane, DDT, chlordane and dieldrin, and brominated flame retardants are released from soil to air as residues age over time.

- Monitoring pesticides on Prince Edward Island — In the second year of a three-year study, 106 air and soil samples were collected on Prince Edward Island at sites near a field where pesticides had been applied to a potato crop, and at residential and background sites. The overall preponderance of pesticides sprayed onto island potatoes includes carbofuran, chlorothalonil and methamidophos. Other currently used pesticides, such as endosulfan, trifluralin, chlorpyrifos, dacthan, and metribuzin, were also detected, although they were not applied to the investigated field, indicating spray drift and or long-range transport and deposition from other local/regional pesticide activities.

- Sampling and analytical techniques for measuring levels of perfluorinated chemicals, polybrominated ethers and other emerging chemicals — A new type of sampling disc was successfully developed for volatile and ionic compounds. A hazardous air pollutants laboratory at Environment Canada was involved in the first international

study investigating different sampling techniques for measuring perfluorinated chemicals. Air samples were collected collaboratively from a variety of international and Canadian outdoor sites, and these and archived indoor air and dust samples from Ottawa were analyzed. Scientists are assessing links between maternal thyroid hormone levels during pregnancy and exposure to these chemicals and analyzed target compounds in indoor and outdoor air samples, dryer lint and house dust.

- Activities of the Integrated Atmospheric Deposition Network — The Canada–United States Integrated Atmospheric Deposition Network fulfills the requirement for surveillance and monitoring mandated by Annex 15 of the 1987 revision to the Canada–U.S. Great Lakes Water Quality Agreement. In addition to conducting routine sampling and analytical and administrative activities, the network developed a technical summary of its progress from 2002 to 2008.

- Global Atmospheric Passive Sampling network — Results under the network help to fulfill Canada's obligations under the Stockholm Convention on Persistent Organic Pollutants. During the 2007 calendar year, the third year of activity under the network, Canadian research scientists contributed to, presented papers on and published results of air sampling at 55 worldwide sites, four of which were in Canada. In October 2007, Environment Canada launched a new website (*www.msc-smc.ec.gc.ca/gaps/*) about the network.

- In support of the development of air quality objectives and guidelines, new mapping techniques were developed to interpolate air quality monitoring data across most of Canada. This information was combined with population data to determine population exposures at various levels of particulate matter (PM) and ozone.

- Critical load maps for acid deposition, which are used to assess progress toward mitigating acid rain in Canada (i.e. long-term environmental target for Canada), were updated with new information from western Canada and updated information for parts of eastern Canada.

- The Canadian Air and Precipitation Monitoring Network (CAPMoN), Canada's rural and background air and precipitation monitoring network, added new sites and analytical capacity in order to better define the air quality, human health and environmental impacts of domestic and international emissions.

- The Environment Canada-led federal-provincial National Air Pollution Surveillance (NAPS) network, added new sites and analytical capacity to better define the air quality and human health impacts of domestic emissions.

- A PM2.5 inter-comparison network was formed to assess the performance and methods comparability of instruments for continuous monitoring of fine particulate matter ($PM_{2.5}$).

- A field survey was completed in northern Saskatchewan to estimate the chemical and biological sensitivity of lakes potentially affected by oil sands development.

- Chemical and biological data were collected to enhance assessments of the acidification and recovery of sensitive lakes in eastern Canada.

- Evaluations were made of the influence of nitrogen deposition, base cation depletion, release of stored sulphur and other alkalinity-generating mechanisms on the acidification status and recovery of selected eastern and western lake ecosystems.

- Improvements were made to Environment Canada's regional and global air quality models to improve their capacity to predict future levels of air pollution in Canada.

- In support of the Canada-U.S. PM Annex discussions, modelling and monitoring work were assessed in order to quantify the impact of Canadian and U.S. emissions on the air quality of the other country.

- In support of the United Nations Economic Commission for Europe (UNECE) Gothenburg Protocol, scientific contributions were made to the Task Force on Hemispheric Transport of Air Pollution in order to better understand the scope and scale of regional and continental influences on air quality.

- Studies were undertaken with other government departments and industrial partners to investigate the impacts of renewable fuels (i.e. ethanol and biodiesel), engine hardware and aftertreatment devices (i.e. diesel particulate traps and selective catalytic control systems), and advanced combustion technologies on fuel efficiency and emissions. Within this research, additional studies were undertaken to investigate the human health impacts of transportation-related emissions, particularly the toxicity and mutagenicity of advanced fuels and related emissions.

- To support decision making, research was conducted to investigate and develop suitable emissions and fuel economy measurement methods and models for evaluating plug-in hybrid electric vehicles. The study provides some of the first available results of cold temperature laboratory testing of emissions, fuel economy and electrical energy consumption of a plug-in hybrid electric vehicle system as well as the performance and emissions of hybrids relevant to conventional utility trucks in a Canadian context.

- Emission research studies were completed under real-world test environments to quantify the emissions produced from various non-road vehicles and engines ranging from lawn, garden and construction equipment to ocean-going vessels and locomotives. The objective of this research was to gain a better understanding of the air emissions contributed from this sector under real-world conditions as well as the potential for mitigating these emissions through the introduction of clean fuels and/or emission control systems.

- Studying the significance of transportation-related sources to particulate matter levels in Canada — Three projects (funded by the Program of Energy Research and Development) were undertaken to characterize ambient particulate matter (PM) and its precursors associated with transportation sources in Canada across a range of representative emissions, locations, and meteorological and topographic conditions. The research themes included the significance of on-road and non-road transportation-related emissions sources to PM levels in Canada; how PM was emitted and/or produced, transported, transformed and removed from the atmosphere; and the health and environmental (air quality) impacts of transportation-

related PM in Canada. New science and technology capacities developed through this research include the ability to identify, within the particulate matter, organic matter and its sources, water-soluble organic compounds, and transportation-related organic acids.

- Development of analytical methodologies — Two projects were initiated to support new regulations under CEPA 1999. The goal of the first project was to develop and implement an analytical method related to the *2-Butoxyethanol Regulations* published in the *Canada Gazette*, Part II, on December 27, 2006 (Vol. 140, no.26, 2006). The Regulations govern the concentration of 2-Butoxyethanol in products designed for indoor use (e.g. household cleaners, paints, paint stripers and solvents). The final report provides detailed information on sample preparation, the instrumental techniques for detection and quantification, and the quality assurance required to achieve reliable results.

  The second project was initiated to develop and implement a reference method to analyze chlorinated paraffins (CPs). CPs are subdivided into short-chain CPs (SCCPs, $C_{10\text{-}13}$), medium-chain CPs (MCCPs, $C_{14\text{-}17}$) and long-chain CPs (LCCPs, $C_{>17}$). Over 200 CP formulations are used in industrial applications, such as *flame retardants* and *plasticisers*, and as additives in metal-working fluids, in sealants, paints and coatings. CPs in the environment result primarily from human activity. This project started in 2005 with the goal of developing a method to analyze CPs in various matrixes including soil, sediments and water effluents, and will be concluded in 2009.

3.2 Water

Water-related research under CEPA 1999 in 2006–2007 included the following 14 studies:

3.2.1 Pharmaceuticals and Personal Care Products

- Occurrence and fate of the three most-prescribed fluoroquinoline antibiotics (ciprofloxacin, ofloxacin and norfloxacin) in the Canadian environment — Researchers developed a method to measure the amount of these relatively new antibiotics in wastewater. Wastewater was collected from eight sewage treatment plants in southern Ontario. All three compounds were detected in all samples of sewage effluents, both treated and untreated. Development of analysis methods is ongoing. The research will make it possible to monitor the amounts of the three antibiotics being removed during treatment and improve treatment technologies.

- Effects of pharmaceuticals on aquatic microbial community structure, diversity and function — Assessment of the effects on microbial communities of relevant concentrations of combinations of mixtures of anti-inflammatory drugs (e.g. diclofenac and acetaminophen) and other sewage effluent constituents (e.g. caffeine) indicated a variety of effects on protozoan and micrometazoan populations. In general, the results indicate that, of the three compounds tested, only diclofenac caused significant changes to community structure and function, although these effects can be influenced by nutrient availability and the presence of readily degraded co-contaminants.

- Effects of pharmaceuticals on attached (to sediments) and pelagic (free-living) microbial communities in a small stream — A summer survey of pelagic microbial communities confirmed that primary production was depressed for at least 10 km downstream of Regina's sewage treatment plant in streams. Pharmaceuticals and personal care products were detected below the pharmaceutical plant, but were absent upstream. Two sets of experiments were conducted to test the effects of three antibiotics (clindamycin, erythromycin and trimethoprim) and nutrients on attached microbial communities. Preliminary results indicated differences in the biomass, primary production and metabolism of communities treated with the antibiotics compared to controls. Microcosm experiments showed negative effects only for erythromycin.

- Isomerisation and biological effects of chlortetracycline in wetlands — Chlortetracycline is a broad-spectrum antimicrobial routinely added to feed in many intensive swine, poultry and cattle operations. Present in manure that is sometimes applied to pasture or cropland as a nutrient, chlortetracycline residues subsequently occur in various forms in aquatic ecosystems. Contamination of natural waters could accelerate the development of antimicrobial-resistant bacteria. Laboratory testing using water from a prairie wetland showed that chlortetracycline and its isomers generally break down quickly and have no harmful environmental effects. However, further testing of the effect of this antimicrobial on algal biomass at concentrations of more than 1000 µ/L is needed to assess impacts in streams near cultivated plots.

- Occurrence and fate of beta blockers in sewage treatment plants — These drugs are used to treat high blood pressure, congestive heart failure and abnormal heart rhythms; relieve angina; and prevent heart attacks. Using a new liquid chromatography/mass spectrometry method, eight of the most commonly prescribed drugs (acebutolol, atenolol, bisopolol, metoprolol, nadolol, propranolol, labtalol and sotalol) were detected in 14 samples of primary and final effluents collected from seven sewage treatment plants located in southern Ontario. Rates of removal by primary and tertiary treatments ranged from 7% to 40%. Prior to this study, there were only a few reports of the occurrence of a handful of beta blockers in the Canadian environment. Their stability (failure to break down into substances that occur naturally) means that future work is required to assess their ultimate impacts on Canadian ecosystems.

- Field sampling protocol and solid-phase microextraction method for three antibiotics — A field sampling protocol (optimum materials to use for sample collection, handling and storage) for three classes of antibiotics (fluoroquinolones, sulphonamides and tetracyclines) was developed that allowed the extracted samples to remain stable until their analysis. Using water samples collected from Woodland Beach, Ontario, according to the protocol, a solid-phase microextraction method was also developed for the three classes of antibiotics.

- Effects of environmentally relevant concentrations of certain antidepressants and antiepileptics (fluoxetine and carbamazepine) — During this third year of research, scientists assessed the effects of these drugs on fish growth, health and reproduction of adult fathead minnow (*Pimephales promelas*) breeding groups exposed to environmentally relevant concentrations. The minnows exposed to fluoxetine had lowered egg production, but this could not be distinguished from the effects of the solvent (methanol) alone for the highest concentration. Fish exposed to lower concentrations of fluoxetine had decreased reproduction compared to control

fish. Fish exposed to carbamazapine showed no effects on reproduction, but bacterial disease in fish in the temporary wetlab facilities caused several fish deaths that prevented definitive analyses of the data. Therefore, this part of the study will have to be repeated.

- Use and occurrence of perchlorate in Canadian natural waters — The highest perchlorate occurrence in Canadian natural ground and surface waters was observed in samples taken in the vicinity of military sites, mining areas, sodium chlorate production facilities and fireworks displays. Concentrations in samples from these areas commonly exceeded interim drinking water guidelines. Elevated concentrations in Canada were also associated with fertilizer application, livestock farming, potash storage facilities, and pulp and paper operations. Perchlorate was detected in the majority of samples, but generally at fairly low concentrations. Concentrations greater than 0.3 µg/L were not found in any public water supplies. Perchlorate is used mainly in military applications, and more than half the 3174 samples were obtained by the Department of National Defence from five military sites across the country. Contamination from natural sources of perchlorate appears to be low in Canada.

3.2.2 Municipal Wastewater Treatment

- Effects of municipal wastewater effluents on resident fish populations — Fathead minnows (*Pimephales promelas*) and brook stickleback (*Cultaea inconstans*) were collected on Wascana Creek upstream and downstream of the discharge from the Regina wastewater treatment facilities. The downstream male fatheads were significantly shorter and lighter than male fatheads collected upstream, but they did not differ in fish condition or gonadal development relative to body weight, despite having significantly reduced secondary sexual characteristics. Downstream female fatheads did not differ in any of the above characteristics compared to upstream females. Fatheads of both sexes had larger livers compared to controls collected upstream of the treatment plant. In March 2008, the stickleback had not yet been analyzed. In addition, greenside darters (*Etheostoma blennioides*) were collected on the Speed River upstream and downstream of the discharge from the Guelph wastewater treatment facility. Downstream male darters were shorter and lighter and had reduced gonadal development relative to length than upstream male darters, but did not differ in overall condition nor was there any significant difference in gonadal development relative to body weight. Darters of both sexes that were exposed to the effluents had smaller livers. There was 100% survival of darters caged for 21 days directly downstream of the discharge, which shows that the effluent is not acutely toxic to greenside darters.

- Exposure of goldfish to estradiol — During this third year of the study, male goldfish (*Carassius auratus*) were exposed to estradiol and sampled after one and six days. Lab tests involving injections of estradiol showed that vitellogenin, a protein essential in the formation of egg yolk and expressed only in female fish (normally dormant in males), is an effective biomarker for the presence of exposure to estrogen. Vitellogenin was present at similar low levels in both control and treated fish after one day. The levels rose significantly in exposed fish after six days.

3.2.3 Pulp and Paper Mill Effluents

- Through the Environmental Effects Monitoring Program, a joint research initiative was established to investigate the cause of widespread effects on fish reproduction (small gonads) found near pulp and paper mills across Canada and associated with endocrine-disrupting substances. — Monitoring the recovery of white suckers (*Catostomus commersonii*) after the February 2006 closure of a pulp mill at Terrace Bay in Ontario showed, in males collected in spring, improved gonad size and circulating steroid levels, but unimproved secondary sexual characteristics. Female white suckers failed to show recovery. In July 2006, tests began on effects of effluent from a new mill in La Tuque, Quebec. Testing proved the need to ship, receive and process samples of condensate of the mill's effluent as quickly as possible to reduce loss of compounds associated with steroid depressions. Smaller fish with enlarged livers were found both in fathead minnows (*Pimephales promelas*) used in the bioassays and wild fish captured downstream of the effluent outfall. Seven publications, four submitted or in-press articles, four peer-reviewed conference proceedings and eight conference presentations ensued from this project during 2006–2007.

3.2.4 Persistent Organic Pollutants

- New contaminants in the Arctic and Subarctic atmospheric and aquatic environments — This study completed the analysis of samples for contaminants, including ice-cap and lake water, sediment cores, snowmelt, upper ocean waters, plankton and tissues from Arctic cod (Boreogadus saida). One article was published and two were in press at year-end. Four presentations were made at an annual meeting and a workshop. One major finding of ice-cap sampling was that perfluorooctane sulphonate (PFOS) was declining in concentrations consistent with the removal of certain types of PFOS-based industrial and consumer products, such as soil, oil, grease and water repellents used on textiles and packaging, from the market in 2001.

3.2.5 Ecosystem Effects of Genetically Modified Organisms

- In January 2007, under the Canadian Regulatory System for Biotechnology initiative, the New Substances Program led the organization and coordination of a two-day, government-wide conference held in Gatineau, Quebec. The conference provided a forum for researchers, policy analysts, program managers and policy makers to present results achieved during previous funding cycles, and to discuss existing and future challenges and directions. In addition to facilitating priority setting for research projects in support of the regulations, the New Substances Program used the success of the conference to establish an evidence-based decision-making process to call for and fund research project proposals that meet regulatory research needs consistent with priorities.

- Fate and effects of transgene DNA in aquatic environments — Using the South Saskatchewan River as a model system, researchers developed baseline information on the composition and seasonal dynamics of microbial communities and the natural occurrence of the phosphotransferase gene in these river communities. This established a basis for monitoring certain effects of genetically modified micro-

organisms in aquatic environments. Also, analysis of genes of bacteria found in rhizosphere soils (soil layer around roots) from multi-year field trials of three commercial corn lines suggested that different corn lines do influence microbial communities in the rhizosphere. Tests involving one commercially released genetically modified corn line concluded that evidence for potential transfer of the phosphotransferase gene to indigenous bacteria is lacking.

- Fate and effects of transgene DNA in aquatic environments — Using the Richelieu River as a sink for transgenic DNA resulting from intense crop cultivation, the presence, fate and potential effects of transgenic corn and canola were examined in microbial flora and in wild and caged *Elliptio complanata* mussels. Recent studies at this site revealed that transgenic DNA from corn is found in local bacterial communities and accumulates in both wild and caged mussels. However, data on the bioactivity of these DNA fragments in bacterial and mussel tissues are lacking.

- Microbial biotechnology products subject to notification under the *New Substances Notification Regulations (Organisms)* were analyzed by DNA microarray and DNA fingerprinting techniques. These techniques were more effective than existing culture-based techniques at characterizing the composition of the microbial communities in these products, and determining their stability between batches.

3.2.6 Pathogens in Aquatic Environments

- Occurrence of pathogenic and antibiotic-resistant *Escherichia coli* (*E. coli*) in aquatic ecosystems — Researchers tested new techniques that will equip public health authorities to do more than detect and count the fecal-indicator bacterium *E. coli* in water. The more sophisticated techniques will allow researchers to identify disease-causing and antibiotic-resistant genes in the bacterium. Initial trials in Hamilton Harbour recreational waters identified the genes at proportions consistent with a potential concern for human health. The researchers then analysed the DNA fingerprints of *E. coli* isolates taken from different aquatic ecosystems in the Detroit and St. Clair river areas. Researchers then presented their results at a symposium and a workshop and published two articles in the journal *Applied and Environmental Microbiology*.

- Over 4500 water samples from four intensive agricultural watersheds across Canada were analyzed from July 2005 to December 2007. These analyses were conducted as part of research to develop a benchmark for ambient water quality impairment from waterborne pathogens under the National Agri-Environmental Standard Initiative (NAESI). Two provisional pathogen standards were derived based on annual mean concentrations of *E. coli* for sites on low- and high-order streams in agricultural watersheds. The standards were derived by accounting for the natural background occurrence of waterborne pathogens from sources such as wildlife at reference sites away from agricultural impacts in each watershed.

Progress to March 31, 2008

Water-related research under CEPA 1999 in 2007–2008 included the following 12 studies:

3.2.7 Exposure to Substances of Interest

- Presence, fate and discharge of brominated flame retardants in municipal wastewaters and biosolids — Debromination of eight polybrominated diphenyl ether congeners during sewage sludge digestion was monitored for 238 days under various conditions. The initial concentrations of five congeners in the sludge decreased by 18–50%. Breakdown is enhanced by higher temperatures. Debromination was not observed for the other three congeners.

- Emerging halogenated and siloxane contaminants in the Canadian aquatic environment — Sampling studies were conducted and methods developed to assess the presence and concentration of halogenated and siloxane contaminants in water. Results indicated their presence and, in some environments, increased quantities over time.

- Methodology for detecting pharmaceuticals and personal care products in municipal wastewater and sludge samples — Two methods were developed and validated for the detection of triclocarban in wastewater and sludge samples. Triclocarban is a preservative in many liquid and bar soaps, deodorants and cosmetics. Prior to this study, not much information was available about its toxicity or occurrence in the Canadian environment. It was detected in all water and effluent samples collected in southern Ontario. A third method was developed for the determination of the beta blockers commonly used in Canada. Atenolol, acebutolol, sotalol and metoprolol were found at the highest concentrations in sewage samples.

- Occurrence and fate of ciprofloxacin, ofloxacin, and norfloxacin in the Canadian environment — A preliminary analytical method for measuring the concentrations of these fluoroquinolones (antibiotics prescribed to humans and other animals) was developed. The primary pathway into the environment is via human secretion in sewage.

- Recovery of antibiotics from groundwater and manure — Sulfamethazine, chlortetracycline and tylosin are among the antibiotics administered routinely to cattle and swine to prevent disease and promote growth. A method was successfully developed to recover 70–90% of residues of these three veterinary antibiotics from groundwater under controlled conditions. The method was adapted to recover the same three compounds from control samples of raw and composted cattle manure, but the recovery rate was slightly lower, at 50–70%.

3.2.8 Effects of Substances of Interest

- Long-term effects of antidepressants in fathead minnows — To correct a complete lack of data on the long-term effects of antidepressants or mixtures of anti-depressants in fish, fathead minnows (*Pimephales promelas*) were exposed for a life cycle to concentrations of venlafaxine (a selective serotonin uptake inhibitor) in municipal wastewater effluents. They were also exposed to a mixture of the top five

selective serotonin uptake inhibitors at levels found in Ontario municipal wastewaters and at 10 times the actual levels. Larval fish growth was good and no significant effects on survival were seen. There were significant differences in egg production. Preliminary trials suggest an increase in aggression.

- Effects of pharmaceuticals and municipal wastewater effluents on aquatic microbial community structure, diversity and function — In the final year of a survey that began in 2005–2006, 14 pharmaceutical products were found to always be present in Wascana Creek, Saskatchewan, independent of season or flow conditions. Research focused on the effects of selected anti-inflammatory drugs (ibuprofen, gemfibrozil, acetaminophen, salycylic acid, naproxen and diclofenac, and mixtures of these) typically found in municipal wastewater effluents, on aquatic microbial community structure, diversity and function. A wide range of results was obtained. Results from the microbial community from the eutrophic (excessive nutrients) Wascana Creek system differed from those from the oligotrophic (very low levels of nutrients) South Saskatchewan River. Results also varied according to the drug or drug mixture, and the organism or class of organisms tested. Primary bacterial production on Wascana Creek just below the effluent outlet of the Regina sewage treatment plant was three times less than that at an upstream site, and its ratio to upstream bacterial production was <1 to 1.26. Other detailed analyses are being conducted to identify cumulative effects and interactions.

- Effects of municipal wastewater effluents on resident fish populations —Several fish from a variety of locations were collected during the third year of this study: fathead minnows (*Pimephales promelas*) and brook stickleback (*Cultaea inconstans*) from Wascana Creek, Saskatchewan, both upstream and downstream of the Regina sewage treatment plant; and feral greenside (*Etheostoma blennioides*) and rainbow (*Etheostoma caeruleum*) darters in the Grand River, Ontario, both upstream and downstream of the Kitchener and Waterloo wastewater plants. Both sexes of minnows were smaller downstream of the outlet and in poorer condition generally; the secondary sexual characteristics of exposed males were underdeveloped (this is the first time this has been demonstrated in wild fish populations in Canada); and exposed females had increased gonad size, higher testosterone levels and decreased estradiol steroid production capacity. Results for stickleback were inconclusive. In contrast, the downstream darters were longer and heavier, and in better condition than those collected upstream of the wastewater outlets. Assessments of the downstream fish communities showed improved abundance and diversity. These improvements are thought to be a response to nutrients in the wastewater plant effluent.

- Fate and effects of transgene DNA in microbial communities in aquatic environments and in soil, and its persistence in soil — Scientists continued to compile baseline data on molecular biodiversity and function in aquatic ecosystems for use in monitoring the effects of genetically modified organisms on microbial biodiversity in these ecosystems. A related but separate investigation of the persistence of transgene DNA in rhizosphere soil samples suggested that transgene DNA degraded after the growing season. Investigations of the long-term effects of genetically modified crops showed that there is no significant difference in the abundance of AmoA genes between genetically modified and non genetically modified maize: AmoA genes are indicators of functioning nitrogen cycling.

- Persistence of Domestic Substances List (DSL) microbial strains in water microcosms — The release of microbial strains listed on Environment Canada's DSL to environments raises concerns over ecological and public health impacts. Molecular techniques were developed and applied to investigate survival and persistence of DSL microbial strains in water microcosms. Scientists developed protocols using propidium monoazide to distinguish DNA carried by live and dead cells of microbial strains in real-time polymerase chain reaction. With the setup of water microcosms, preliminary results showed that introduced strains (e.g. *Bacillus* cells) could persist in water microcosms for periods ranging from a few weeks to over 100 days.

3.2.9 Ecosystem Health

- Endocrine-disrupting substances in pulp and paper mill effluents — Recovery of hormonally active compounds and sampling of suckers from a pulp mill's effluent receiver and from spawning wild fish took place in Terrace Bay, Ontario. Scientists did a detailed reproductive assessment and found that white sucker (*Catostomus commersonii*) males and females living in the effluent receiving water were significantly smaller and had smaller gonadal somatic indices.

- Microbial source tracking research was conducted to investigate the source of fecal pollution contaminating aquatic ecosystems and causing beach closures in the cities of Toronto, Hamilton and Ottawa. DNA fingerprinting and antibiotic resistance profiling techniques demonstrated the importance of *E. coli* contamination from gulls and geese at some beaches, while human gut DNA marker techniques demonstrated the importance of municipal sewage contamination at other beaches. These results are being used to target clean-up efforts and beach management actions in these cities.

- Occurrence of pathogenic and antibiotic-resistant *E. coli* in aquatic ecosystems — Scientists who analyzed 1856 *E. coli* isolates from 20 sites in three intensively farmed agricultural watersheds found the highest frequency of antibiotic resistance in the pathogen in the Bras d'Henri watershed (swine farming) and lowest in the South Nation River watershed (dairy farming). Results in the Old Man River watershed in Alberta (beef cattle) were intermediate. The antibiotics were ampicillin, chloamphenicol and cephalothin.

- Nanotechnology products in aquatic ecosystems — Researchers developed a method to track nanotechnology products in municipal effluents and in biota. Lab tests revealed a wide range of sensitivity resulting from tests of the toxicity of nine metallic nano-powders and two organic nano-powders on several taxonomic groups, including decomposers, primary producers, and primary and secondary consumers. The researchers also tested the toxicity of four of the metallic nano-powders using natural St. Lawrence River sediments, with results indicating that adverse effects on biota will in part depend on the physical characteristics of the sediments, such as grain size. The third set of tests examined the toxic effects of a specific type of nano-particle on the freshwater mussel. Testing showed that the response of the organism varied based on the concentration of the contaminant, which allows researchers to establish biomarkers to distinguish the form (colloidal or molecular) in which the cadmium is present in the mussels.

3.3 Wildlife

Wildlife-related research under CEPA 1999 in 2006–2007 and 2007–2008 comprised the following studies:

- Continued monitoring of the long-term temporal and spatial trends of priority chemicals (e.g. halogenated substances on the Domestic Substances List, such as perfluoroalkyl compounds and brominated flame retardants) and regulated legacy compounds (e.g. DDT and PCBs) in eggs of fish-eating bird bioindicator species (e.g. gulls, puffins and cormorants) and in other selected wildlife (e.g. polar bears *Ursus maritimus*, mink and otter) in the Arctic, Pacific (particularly in the Strait of Georgia) and Atlantic marine environments, and in the St. Lawrence River – Great Lakes ecosystem, was conducted in order to obtain information on the presence, sources, environmental pathways and effects of these compounds on birds and other species and their food webs.

- An ongoing assessment of the impact of methylmercury, lake acidity and related stressors on the breeding success of the Common Loon (*Gavia immer*) and other wildlife in Eastern Canada continued through focused studies in Nova Scotia and in various parts of Quebec.

- The role of mercury and other organic chemical contaminants in the decline of the Ivory Gull (*Pagophila eburnea*) population in the Canadian Arctic was investigated. Some of the highest levels of mercury recorded in Arctic seabirds and steadily increasing concentrations (since 1976) of some brominated flame retardants have been found.

- Retrospective studies, using specimens that were archived at the National Wildlife Research Centre, of Northern Fulmars (*Fulmarus glacialis*) that were collected in 1975 and 1993 revealed the highest concentrations of some polychlorinated dibenzo-dioxins and -furans reported in tissues of Canadian Arctic biota.

- After remediation of a contaminated site in the Canadian Arctic, the toxicological impact of PCBs was studied in Black Guillemot (*Cepphus grylle*) chicks. It was discovered that PCB pollution near a military radar site at Saglek, Labrador, impaired the health of locally breeding seabirds and posed risks to the local marine ecosystem. PCBs disrupted the endocrine system, altered organ development and changed liver enzyme activity in exposed seabird chicks. In 2007, researchers visited the site to study the impacts of lower PCB exposures on seabird chicks and the effectiveness of PCB remediation at the site. A decline in PCB levels in guillemot chicks from 1999 to 2007 was associated with a decrease in the extent of adverse effects observed. However, some endocrine and neurochemical impacts still remain at current PCB concentrations.

- New methods based on analyses of gene expression, combined with cultures of neuronal and other tissue types from wild and domestic birds, were developed and applied to assess toxicity of commercial industrial contaminant mixtures and various individual congeners of polybrominated diphenyl and other priority substances.

- Tree Swallow (*Tachycineta bicolor*) colonies were established at reference and test sites, and test methods were selected and refined for wildlife sampling and standard

toxicity testing. The methods established will be used for undertaking long-term studies, using selected wildlife indicators, to identify and assess the occurrence and ecological effects of chemicals found in sewage treatment plant effluents. In 2007 and 2008, differences between the effluents and reference sites were found in the reproductive success, growth and thyroid hormone concentrations of tree swallows.

- A laboratory was established for conducting analyses of fatty acids in birds and other wildlife. Ecological tracers, such as fatty acids, can be used in combination with other approaches, such as stable isotopes, in order to assess how contaminants, nutrients and pathogens are transferred to wildlife through food webs. This approach will lead to new insights into contaminant sources, and improve the ability to predict and assess the bioaccumulation potential of toxic substances and their associated risks.

- Investigations of the relationships between contaminant levels and parasite load in fish-eating birds (e.g. Double-crested Cormorants, *Phalacrocorax auritus*, from the Great Lakes) were conducted to improve understanding of how contaminants and parasites may be interacting to affect the health of wildlife.

- Studies of toxicity and effects at the molecular level of perfluoroalkyl compounds and other priority compounds in avian embryos and cells using egg injection and tissues of wild and domestic birds to establish quantitative structure-activity relationships for prediction of the toxic potential of these contaminants in birds were ongoing.

- A collaborative study with scientists from Denmark on the fate and effects of legacy and emerging organohalogen contaminants (e.g. PCBs and brominated flame retardants) in captive sled dogs was conducted. The dogs were a surrogate in a cause-effect study to assess how pollution affects the Arctic top mammalian predator, the polar bear. Results showed that, relative to control dogs fed a diet essentially free of organic pollutants, exposed dogs experienced deleterious effects on their immune system, as well as increased frequencies of kidney and liver lesions.

- Studies on East Greenland polar bears suggested that long-term exposure to legacy and emerging organohalogen contaminants (e.g. PCBs and brominated flame retardants) may be a factor in kidney lesion occurrence, although other factors, such as exposure to heavy metals and recurrent infections from micro-organisms, cannot be ruled out. This new information is important to the assessment of the health status of polar bear populations and humans relying on food resources that are contaminated with these substances.

- The composition of PCBs and organochlorine contaminants were shown to be similar in different major fat tissue deposits of polar bears from the Canadian Arctic. This study demonstrated that the part of the polar bear body where a fat sample is taken is not a serious confounding factor in the assessment of the trends of these legacy contaminants.

- In collaboration with Norwegian researchers, a study was completed that examined priority organic pollutants (e.g. PCBs, organochlorine pesticides and brominated flame retardants) in Glaucous Gull (*Larus hyperboreus*) eggs and plasma samples of the laying females collected from the Norwegian Arctic. The study specifically examined the variability in the concentrations and composition of organohalogen pollutants associated with the laying sequence in this bird species. Organohalogen contamination in breeding Glaucous Gulls was also found to affect basal metabolism

and circulating thyroid hormone levels. These results are important for health risk assessments in free-ranging Arctic seabird populations, including those in Canada.

- Exposure and effects of persistent halogenated compounds in nestling Bald Eagles (*Haliaeetus leucocephalus*) on the south coast of British Columbia were studied and compared with the results of a study of birds from California, in collaboration with U.S. colleagues. As a top predator, the eagle is a valuable ecosystem indicator. Eagles continue to be exposed to substantial concentrations of PCBs, organochlorine pesticides and brominated flame retardants, as well as halogenated metabolites of PCBs and brominated flame retardants.

- Non-intrusive methods using feces were developed to study river otter populations and contaminants in the Strait of Georgia region of the Pacific coast. Otters using the major harbours of Vancouver, Victoria and Esquimalt were most exposed to persistent contaminants, and otters from Victoria harbour had fecal concentrations exceeding reported reproductive effects criteria. Results have been communicated to federal contaminated sites managers, and follow-up studies are underway.

- Collaborative studies with U.S. and Mexican biologists were undertaken using satellite telemetry and measurements of contaminants in prey items to compare exposures of migrating Ospreys (*Pandion haliaetus*) to DDT and other contaminants at breeding versus wintering grounds. Greater exposure occurred at breeding sites, particularly on the lower Columbia River, compared to wintering grounds in Mexico.

- Research was initiated to investigate the effects of exposure during critical early development of birds, using the Zebra Finch (*Taeniopygia guttata*) and the starling as laboratory and field models. Their long-term fitness was also examined. A related field study showed that there were permanent neuro-anatomical effects on the song and courtship centres of the brain of adult American Robins (*Turdus migratorius*) that had been exposed to DDT-related compounds at the embryo and early nestling stages.

- A study of the Surf Scoter (*Melanitta perspicillata*), a sea duck species whose populations have been steadily declining across North America, was completed. The study examined the exposure to, and effects of, contaminants in populations wintering in the Strait of Georgia. Sea ducks were exposed to a wide range of persistent halogenated compounds and heavy metals. A number of biochemical, physiological and morphological characteristics were correlated with exposure, particularly to tributyltin, an anti-fouling compound.

3.4 Human Health

Progress to March 31, 2007

3.4.1 Endocrine-disrupting Substances (2006–2007)

- Health impacts of endocrine-disrupting substances — A variety of both *in vitro* and *in vivo* animal and other studies investigated the health impacts of CEPA 1999 and Chemicals Management Plan priority substances with endocrine-disrupting properties. In particular, a significant effort was directed at understanding the long-

term reproductive, neurodevelopmental and endocrine consequences of fetal and/or neonatal exposures to complex mixtures of common environmental contaminants present in human blood. A short report was published summarizing the effects of *in utero* and postnatal exposure to a mixture of methylmercury, organochlorine pesticides and polychlorinated biphenyl on the metabolism of estrogens and DNA methylation. Health Canada scientists continued to investigate the impacts of chemical exposure on endocrine physiology that is critical for normal development, and participated in activities sponsored by the Organisation for Economic Co-operation and Development to develop standardized regulatory testing protocols. Results from all of these studies have been or will be published.

3.4.2 Canada–United States Border Air Quality Strategy

- The Border Air Quality Strategy (2003–2007) was undertaken to evaluate the impacts of transboundary air pollution on human health in the border regions between Canada and the United States. As part of the Strategy, Canada and the United States conducted three joint air quality pilot projects, two of which involved Health Canada. Preliminary results indicated that these studies will provide valuable health-based evidence to support the development of strategies for improving air quality. The health evidence could also support future work on an international agreement on particulate matter.

- Data collected under the Strategy was provided to the Ontario Ministry of Transportation for inclusion in environmental impact assessments of any new border crossings. In addition, as part of the Windsor/Detroit research, Health Canada collaborated with the United States Environmental Protection Agency in the design and implementation of an extensive air pollution exposure study. Health Canada included approximately 100 Windsor residents in a personal, indoor and outdoor air pollution study to investigate the exposure of adults and asthmatic children to a variety of air pollutants, including fine particulate matter, coarse particulate matter, nitrogen dioxide, ozone and volatile organic compounds.

- As part of the Canada–U.S. Border Air Quality Strategy, the Georgia Basin/Puget Sound International Airshed Strategy investigated measures to reduce air emissions and address transboundary pollution in southwestern British Columbia and northwestern Washington State. In collaboration with the British Columbia Centre for Disease Control and academic partners, Health Canada conducted health and air quality studies in support of the objectives under the airshed pilot project.

3.4.3 Air Quality Health Index

- Health Canada conducted studies of the observed relationship between air pollutants and mortality and estimated the overall risk presented by the air pollution mixture in order to provide a health-based approach to presenting air quality information to the public. The resultant Air Quality Health Index, which will help Canadians understand how to protect their health from the negative effects of air pollution on a daily basis, was developed and introduced as a pilot program in areas of British Columbia and the city of Toronto in 2006 and 2007, respectively.

3.4.4 Air Quality Benefits Assessment Tool (2006–2007)

- In 2006–2007, Health Canada finalized the development and testing of the Air Quality Benefits Assessment Tool (AQBAT), a computer simulation tool designed to estimate the human health and welfare benefits or damages associated with changes in Canada's ambient air quality. This flexible tool can combine and link pollutants, health endpoints, geographic areas and scenario years. It contains historical and projected population counts and health endpoint occurrence rates, and allows for the input of pollutant concentration changes. A review version of the application was released for stakeholder access and was peer reviewed.

Progress to March 31, 2008

3.4.5 Priority Substances

- Health Canada research on priority substances under the Chemicals Management Plan emphasized the health impacts of mixtures, endocrine-disrupting substances and metals. The Department increased its capacity to investigate hazards posed by thyroid hormone or androgen-disrupting substances.

- Health Canada scientists carried out research on the identification and measurement of certain chemicals in indoor environments. The flame retardant dechlorane plus was measured in indoor dust. Another previously unreported flame retardant, hexachlorocyclopentadienyl-dibromocyclooctane, was detected in both indoor air and indoor dust. These results were published in peer-reviewed science journals.

- Research on airborne aldehyde species (formaldehyde, acetaldehydes, medium-chain aldehydes, alpha-beta unsaturated aldehydes) was performed and is ongoing. A paper describing the structure-activity relationship of alpha-beta unsaturated aldehydes was accepted for publication.

3.4.6 Endocrine-disrupting Substances (2007–2008)

- An investigation in rodents to identify the critical period of development sensitive to endocrine disruption was undertaken and is ongoing. Effects of low-dose exposure during the *in utero* and/or the postnatal periods to mixtures of contaminants, such as PCBs, polychlorinated dibenzofurans, polychlorinated dibenzo-*p*-dioxin, pesticides and methylmercury, were investigated (and are ongoing) by measuring numerous endpoints (systemic, neuro-endocrine, epigenetic) indicative of a susceptibility to develop cancers, learning disabilities, and psychological and metabolic problems. Preliminary endocrine results have suggested that individuals can tolerate exposure to mixtures with no consequences unless they are subjected to early postnatal stress.

3.4.7 New Substances

- Work on di(2-ethylhexyl) phthalate (DEHP), perflurooctane sulphonate (PFOS) and perfluorooctanoic acid (PFOA) with peroxisome proliferator properties was undertaken and is ongoing. Comparative studies of human and animal responses

were initiated and are nearing completion. Results were presented at two international conferences. A final report will be prepared to support the new substances assessment and control activities.

3.4.8 Biomarkers

- To identify new biomarkers of exposure and health effects and explain the molecular mechanisms of toxicity, Health Canada research scientists used genomics and proteomics methodologies to support regulatory activity. This research work has led to discoveries of relevant biomarkers of exposure, susceptibility and health outcomes of exposure to a toxicant or toxicants, including endocrine disruptors. There are five prominent research themes:

    - Critical examination of assumptions used in regulatory toxicology and risk assessment — Gene expression profiles from laboratory experiments were investigated to examine cross-species assumptions in toxicology.
    - Functional genomics and biological validation of novel health effects — The research involved the verification of the identified “prospective” biomarkers of thyroid hormone deficiency. This resulted in the definition of a more limited set of genes as candidate biomarkers that do not exhibit a species-specific response. This research has also examined carcinogens that disrupt cellular signal transduction networks for growth and other hormones.
    - Methodology development and assessment — Technical validation exercises were undertaken that included inter-laboratory validation of DNA microarray data, which is crucial for international harmonization. These research activities have generated innovative approaches to the optimization of microarray design, experimental use and data normalization.
    - Discovery of biomarkers — Characterization of oxidative stress biomarkers was developed to screen model particles and metal compounds with different physical and chemical properties for relative potencies in *in vitro* cell culture experiments based on peptide/protein changes. Diverse instrumental analysis methods are employed to discover biomarkers and the pathways of biological responses to toxic environmental contaminants.
    - Assessment of micro-organisms and their by-products — This has resulted in the updating of information critical for definitive micro-organism identification through the use of advanced methodologies and the investigation of the toxicity and immunologic effects of certain selective genera, such as *Bacillus, Enterobacter, Escherichia* and *Pseudomas,* which are considered sources of new or existing biotechnology applications and include opportunistic and pathogenic relatives.

3.4.9 Drinking Water

- Health Canada research scientists conducted a small-scale study of Canadian drinking water treatment plants in which residual aluminum was reported at levels higher than those recommended in the Guidelines for Canadian Drinking Water Quality (greater than 100 µg/L). While the seasonal monitoring of the other main parameters (turbidity and dissolved organic carbon) had not shown problems, this monitoring of aluminum at various treatment stages provided evidence that residual

aluminum levels peak in winter and summer. The variations occur because it is difficult to adapt water treatment to the large seasonal temperature range in Canada.

3.4.10 Air Quality Benefits Assessment Tool (2007–2008)

- In 2007–2008, the Air Quality Benefits Assessment Tool was used to run various scenarios to assess the impact of changes in levels of greenhouse gases, emissions from ethanol-blended gasoline and specific Clean Air Regulatory Agenda scenarios.

3.5 Soil

Progress to March 31, 2008

- Data were gathered on the persistence of 6 out of 10 high-priority Domestic Substances List (DSL) micro-organisms in soil microcosms. Genetic fingerprints were developed for the micro-organisms, and then the micro-organisms were inoculated into soil microcosms and incubated for up to 180 days. Genetic material from the microcosms was then retrieved and the persistence of each strain determined. One DSL strain persisted for the entire incubation period, while three strains persisted for 126 days and the remaining two for 62 and 5 days, respectively. Data from this study will be used to support possible new regulatory data requirements under amendments to the *New Substances Notification Regulations (Organisms)*.

- Data were gathered to assess the pathogenicity and/or toxicity to plants and soil invertebrates of the high-priority Domestic Substances List micro-organisms. Test methodology consisted of procedures recommended in Environment Canada's *Guidance Document for Testing the Pathogenicity and Toxicity of New Microbial Substances to Aquatic and Terrestrial Organisms* (EPS 1/RM/44, 2004). Tests evaluated the effect of single and continuous inoculation events, with confirmation of the presence of the micro-organisms via the retrieval of genetic material from soil samples throughout the test. Data from this study will be used to support possible new regulatory data requirements under amendments to the *New Substances Notification Regulations (Organisms)*.

4 COMPLIANCE AND ENFORCEMENT (PART 10)

CEPA 1999 provides enforcement officers with a wide range of powers to enforce the Act, including the powers of a peace officer. Enforcement officers can carry out inspections to verify compliance with the Act; conduct investigations of suspected violations; enter premises, open containers, examine contents, take samples; conduct tests and measurements; obtain access to information (including data stored on computers); stop and detain conveyances; enter, search, seize, and detain items related to the enforcement of the Act; secure inspection warrants to enter and inspect premises that are locked and/or abandoned or where entry has been refused; seek search warrants; and arrest offenders. CEPA analysts can enter premises when accompanied by an enforcement officer and can exercise certain inspection powers.

Enforcement officers can select from a wide range of responses to alleged violations, including directions, tickets, prohibition orders, recall orders, detention orders for ships, Environmental Protection Compliance Orders (EPCOs), injunctions to stop or prevent a violation, prosecution, and Environmental Protection Alternative Measures (EPAMs). Enforcement activities include measures to compel compliance without resorting to formal court action and measures to compel compliance through court action. The former are directions, tickets, prohibition orders, recall orders, detention orders for ships, and EPCOs. The latter include injunctions, prosecutions and EPAMs.

This chapter summarizes the results achieved during the reporting periods under enforcement-related sections of CEPA 1999 and regulations made under the Act.

4.1 Designations and Training

The total number of designated CEPA enforcement officers was 138 in 2006–2007 and 151 in 2007–2008.

From 2006 to 2008, Environment Canada completed two consecutive years of a three-year project to redesign the Basic Enforcement Training Program in collaboration with a contracted law enforcement training facility at Algonquin College. The program resulted in 34 newly designated officers with full enforcement officer powers in 2006–2007 and 14 new officers in 2007–2008.

Other training accomplishments in 2006–2007 include:

- online course developed and launched for the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations;*
- Advanced Investigative Techniques Program designed;
- Birds Oiled at Sea learning symposium developed and launched; and
- Limited Powers/CEPA Analyst course redesigned and delivered.

Other training accomplishments in 2007–2008 include:

- Professional Development and Apprenticeship Program finalized;
- Pilot Coaching Program co-developed with the Canada School of Public Service;
- Regulatory Orientation program launched; and
- three consecutive nine-week Basic Enforcement Training courses delivered.

4.2 Compliance Promotion

Compliance promotion relates to the planned activities that are undertaken to increase the awareness and the understanding of the law and its subordinate instruments. Through these activities, information is provided on what is required to comply with the law, the benefits of compliance, and the consequences of non-compliance.

Numerous compliance promotion activities were delivered for new and existing control instruments under the *Canadian Environmental Protection Act, 1999*. Multiple approaches were used to reach the regulated communities, varying from mail-outs to information sessions in collaboration with other federal departments, provinces or non-governmental organizations when appropriate.

The following describes the priority activities for 2006–2007 which were delivered nationally.

New Substances Notification Regulations (Chemicals and Polymers) **and** ***New Substances Notification Regulations (Organisms)***. A national mail-out was sent to approximately 10 000 companies. It included fact sheets, customized to their sector of activities, on the following topics:

- Reporters to the National Pollutant Release Inventory (NPRI);
- Environmental emergencies;
- Ozone-depleting substances; and
- Mining (other than metal mining).

Ongoing Multi-Instrument Compliance Promotion. Environment Canada organized or participated in several multi-instrument workshops each year in order to meet with regulatees who are required to conform to several regulations. For example, Environment Canada organized a booth at the annual Canadian Environmental Conference and Tradeshow (CANECT) held at the Metro Toronto Convention Centre May 1–2, 2006. The Department's booth showcased the following:

- *New Substances Notification Regulations (Chemicals and Polymers)*;
- *New Substances Notification Regulations (Organisms);*
- *Ozone-depleting Substance Regulations, 1998;*
- *Environmental Emergency Regulations;*
- National Pollutant Release Inventory; and
- *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*.

The following describes the priority activities for 2007–2008.

Environmental Emergency Regulations The proposed *Regulations Amending the Environmental Emergency Regulations* of the *Canadian Environmental Protection Act, 1999* (CEPA 1999) were published in the *Canada Gazette*, Part I in June 2007. Information sessions on proposed regulatory amendments were delivered across Canada.

Fuels Regulations A Fuels Regulations Compliance Promotion Package is sent out annually to manufacturers, importers and/or blenders of fuel in Canada to inform and remind them of their regulatory obligations under the *Canadian Environmental Protection Act, 1999*. The compliance promotion package contains summaries and reporting requirements for the following seven CEPA 1999 fuels regulations:

- *Fuels Information Regulations, No. 1*;

- *Benzene in Gasoline Regulations*;
- *Gasoline Regulations*;
- *Sulphur in Diesel Fuel Regulations*;
- *Sulphur in Gasoline Regulations*;
- *Gasoline and Gasoline Blend Dispensing Flow Rate Regulations*; and
- *Contaminated Fuel Regulations*.

Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations. The Department distributed its annual information kit on the regulations to more than 550 dry cleaners, sellers, importers and recyclers in Quebec. Also, 2000 stickers showing the requirements under the regulation were produced, and they were distributed in all provinces. Lastly, regulatees were sent a reminder of the deadline for submitting the reports required under the regulations.

4.3 Inspection Priorities

Each year, a National Inspection Plan is developed that describes the inspection activities to be carried out that fiscal year under CEPA 1999. To maximize the effectiveness of these activities, priority is given to specific regulations. The selection of these priorities is consistent with the Compliance and Enforcement Policy for the *Canadian Environmental Protection Act, 1999.*

In 2006–2007, the National Inspection Plan identified the following as CEPA-related national priorities:

- *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations;*
- *Federal Halocarbon Regulations, 2003;*
- *Fuels Information Regulations, No.1;*
- *Gasoline Regulations*;
- *Sulphur in Diesel Fuel Regulations;*
- *Sulphur in Gasoline Regulations;*
- *Benzene in Gasoline Regulations;* and
- *Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations*.

In 2007–2008, the National Inspection Plan identified the following as national priorities:

- *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*;
- *Fuels Information Regulations, No.1*;
- *Gasoline Regulations*;
- *Sulphur in Diesel Fuel Regulations*;
- *Sulphur in Gasoline Regulations*; and
- *Benzene in Gasoline Regulations*.

In addition, a number of regulations were identified as regional inspection priorities. The priority placed on regulations in each region was influenced by a number of factors, including geography, demographic factors, and provincial and territorial environmental sensitivities.

4.4 Summary of Inspections, Investigations and Enforcement Measures

Tables 19 and 20 summarize the inspections, investigations and enforcement measures for 2006–2007 and 2007–2008 respectively.

Table 19. Summary of inspections, investigations and enforcement measures in 2006–2007

CEPA Tool	Inspections			Investigations	Enforcement Measures									
	Off-site	On-Site	Total		Tickets	Written Directives	Written Warnings	Injunctions	Ministerial Orders	EPCOs	EPAMs	Prosecutions	Charges	Convictions
Regulations														
2-Butoxyethanol	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Asbestos Mines and Mills Release	-	4	**4**	-	-	-	2	-	-	-		-	-	
Benzene in Gasoline	172	66	**238**	-	-	-	14	-	-	-		-	-	-
Chlor-Alkali Mercury Release	3	1	**4**	-	-	-	-	-	-	-		-	-	-
Chlorobiphenyls	28	79	**107**	3	-	1	-	-	-	-		-	-	-
Contaminated Fuel	-	-	**-**	-	-	-	-	-	-	-		-	-	-
Disposal at Sea	21	20	**41**	2	-	-	-	-	-	-		-	-	-
Environmental Emergency	198	96	**294**	2	-	-	421	-	-	-		-	-	-
Export and Import of Hazardous Waste and Hazardous Recyclable Material	143	674	**817**	32	-	-	45	-	-	-		-	-	-
Export Control List Notification	1	-	**1**	-	-	-	12	-	-	-		-	-	-
Export of Substances under the Rotterdam Convention	1	-	**1**	-	-	-	8	-	-	-		-	-	-
Federal Halocarbon, 2003	252	193	**445**	4	-	3	258	-	-	4		-	-	-
Federal Mobile PCB Treatment and Destruction	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Federal Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands or Aboriginal Lands	-	4	**4**	-	-	-	38	-	-	-		-	-	-
Fuels Information, No. 1	167	19	**186**	-	-	-	19	-	-	-		-	-	-
Gasoline	16	3	**19**	-	-	-	2	-	-	-		-	-	-
Gasoline and Gasoline Blend Dispensing Flow Rate	-	-	**-**	-	-	-	-	-	-	-		-	-	-
Interprovincial Movement of Hazardous Waste	12	41	**53**	2	-	-	-	-	-	-		-	-	-
New Substances Notification (Chemicals and Polymers)	14	82	**96**	2	-	-	4	-	-	-		-	-	-
New Substances Notification (Organisms)	6	28	**34**	2	-	-	2	-	-	-		-	-	-
Off-Road Compression-Ignition Engine Emission	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Off-Road Small Spark-Ignition Engine Emission	1	1	**2**	-	-	-	-	-	-	-		-	-	-
On-Road Vehicle and Engine Emission	3	-	**3**	1	-	-	-	-	-	-		-	-	-
Ozone-depleting Substances, 1998	40	63	**103**	3	9	-	4	-	4		5	2	2	3
PCB Waste Export, 1996	-	-	**-**	6	-	-	-	-	-	-		-	-	-
Phosphorus Concentration	-	1	**1**	-	-	-	-	-	-	-		-	-	-
Prohibition of Certain Toxic Substances, 2005	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Pulp and Paper Mill Defoamer and Wood Chip	41	13	**54**	-	-	-	-	-	-	-		-	-	-
Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans	88	16	**104**	-	-	-	-	-	-	-		-	-	-
Secondary Lead Smelter Release	-	4	**4**	-	-	-	-	-	-	-		-	-	-
Solvent Degreasing	27	30	**57**	1	-	-	52	-	-	2		-	-	-
Storage of PCB Material	136	127	**263**	2	2	92	86	-	-	69		-	-	-
Sulphur in Diesel Fuel	168	106	**274**	2	-	-	8	-	-	-		1	2	-

CEPA Tool	Inspections			Investigations	Enforcement Measures									
	Off-site	On-Site	Total		Tickets	Written Directives	Written Warnings	Injunctions	Ministerial Orders	EPCOs	EPAMs	Prosecutions	Charges	Convictions
Sulphur in Gasoline	45	72	**117**	-	-	-	18	-	-	-		-	-	-
Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements)	381	432	**813**	4	-	-	620	-	-	151		1	4	-
Vinyl Chloride Release, 1992	12	2	**14**	-	-	-	-	-	-	-		-	-	-
Other Tools														
CEPA 1999 - Section(s)*	227	485	**712**	39	-	-	79	-	-	2		2	4	-
Glycol Guidelines	1	3	**4**	-	-	-	-	-	-	-	-	-	-	-
National Pollutant Release Inventory	217	30	**247**	-	-	-	84	-	-	1		-	-	-
Section 56 Notices - P2 Plans	10	1	**11**	-	-	-	1	-	-	-		-	-	-
Section 46 Notices - Greenhouse Gases	2	2	**4**	-	-	-	8	-	-	-		-	-	-
Section 71 Notices - Substances	1	-	**1**	-	-	-	-	-	-	-		-	-	-
Total	**2,434**	**2,698**	**5,132**	**64**	**11**	**96**	**1,785**	**-**	**4**	**229**	**5**	**6**	**12**	**3**

EPCO = Environmental Protection Compliance Order.
EPAM = Environmental Protection Alternative Measure.
* These numbers include activities related to enforceable provisions of the Act.

Explanatory Notes:

Number of inspections — The number of regulatees who were inspected for compliance where inspections were completed during the fiscal year.

Number of investigations — The number of investigations started in the fiscal year. The total number of investigations is the number of investigation *files* started in the fiscal year. An investigation file may include activities relating to another law or to more than one regulation. Therefore, the total number of investigations shown does not add up to the total number of investigation by regulation.

All enforcement measures (except for prosecutions and EPAMs) are tabulated at the section level of a regulation. For example, if the outcome of an inspection is the issuance of a written warning that relates to alleged violations of three sections of a given regulation, the number of written warnings is three.

Number of prosecutions — The number of regulatees who were prosecuted, regardless of the number of regulations involved.

Number of EPAMs — The number of regulatees who signed EPAMs, regardless of the number of regulations involved.

Additional Statistics:

There were 183 referrals to other federal departments, or to a provincial or municipal government.

Of the 64 investigation files started in 2006–2007, 21 ended in 2006–2007 and 43 are ongoing. Of the 58 investigation files initiated before 2006–2007 (not included in the table), 23 were completed in 2006–2007 and 35 are ongoing.

Table 20. Summary of inspections, investigations and enforcement measures in 2007–2008

CEPA Tool	Inspections			Investigations	Enforcement Measures									
	Off-site	On-Site	Total		Tickets	Written Directives	Written Warnings	Injunctions	Min Orders	EPCOs	EPAMs	Prosecutions	Charges	Convictions
Regulations														
2-Butoxyethanol	-	-	**-**	-	-	-	-	-	-	-	-	-	-	**-**
Asbestos Mines and Mills Release	-	-	**-**	-	-	-	-	-	-	-	-	-	-	**-**
Benzene in Gasoline	95	61	**156**	-	-	-	5	-	-	-	-	-	-	-
Chlor-Alkali Mercury Release	1	1	**2**	-	-	-	-	-	-	-	-	-	-	-
Chlorobiphenyls	20	40	**60**	1	-	-	-	-	-	-	-	-	-	-
Contaminated Fuel	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Disposal at Sea	21	42	**63**	1	-	-	3	-	-	-	-	-	-	-
Environmental Emergency	27	73	**100**	1	-	-	140	-	-	-	-	-	-	-
Export and Import of Hazardous Waste and Hazardous Recyclable Material	134	582	**716**	14	-	-	151	-	-	7	-	2	16	-
Export Control List Notification	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Export of Substances under the Rotterdam Convention	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Federal Halocarbon, 2003	416	299	**715**	4	-	2	550	-	-	-	-	-	-	-
Federal Mobile PCB Treatment and Destruction	-	-	**-**	-	-	-	-	-	-	-	-	-	-	**-**
Federal Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands or Aboriginal Lands	-	19	**19**	-	-	-	-	-	-	-	-	-	-	-
Fuels Information, No. 1	130	18	**148**	-	-	-	5	-	-	-	-	-	-	-
Gasoline	14	15	**29**	-	-	-	2	-	-	-	-	-	-	-
Gasoline and Gasoline Blend Dispensing Flow Rate	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Interprovincial Movement of Hazardous Waste	18	56	**74**	-	-	2	4	-	-	-	-	-	-	-
New Substances Notification (Chemicals and Polymers)	4	46	**50**	1	-	-	-	-	-	-	-	-	-	-
New Substances Notification (Organisms)	1	21	**22**	1	-	-	-	-	-	-	-	-	-	-
Off-Road Compression-Ignition Engine Emission	-	-	**-**	-	-	-	-	-	-	-	-	-	-	**-**
Off-Road Small Spark-Ignition Engine Emission	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
On-Road Vehicle and Engine Emission	2	-	**2**	-	-	-	-	-	-	-	-	-	-	-
Ozone-depleting Substances, 1998	45	32	**77**	2	-	-	2	-	-	-	-	-	-	-
PCB Waste Export, 1996	1	1	**2**	-	-	-	-	-	-	-	-	-	-	-
Phosphorus Concentration	-	-	**-**	-	-	-	-	-	-	-	-	-	-	-
Prohibition of Certain Toxic Substances, 2005	-	-	**-**	-	-	-	-	-	-	-	-	-	-	**-**
Pulp and Paper Mill Defoamer and Wood Chip	33	14	**47**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	**-**	**-**	**-**
Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans	97	15	**112**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	**-**	**-**	**-**
Secondary Lead Smelter Release	-	5	**5**	-	-	-	2	-	-	-	-	**-**	**-**	**-**

CEPA Tool	Inspections			Investigations	Enforcement Measures									
	Off-site	On-Site	Total		Tickets	Written Directives	Written Warnings	Injunctions	Min Orders	EPCOs	EPAMs	Prosecutions	Charges	Convictions
Solvent Degreasing	21	11	**32**	-	-	-	3	-	-	-	-	**-**	**-**	**-**
Storage of PCB Material	178	90	**268**	-	-	-	42	-	-	-	-	**-**	**-**	**-**
Sulphur in Diesel Fuel	174	108	**282**	-	-	-	20	-	-	-	-	**-**	**-**	**-**
Sulphur in Gasoline	34	61	**95**	-	-	-	2	-	-	-	-	**-**	**-**	**-**
Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements)	719	511	**1,230**	12	-	-	485	-	-	162	-	**-**	**-**	**-**
Vinyl Chloride Release, 1992	8	**-**	**8**	-	-	-	-	-	-	-	-	**1**	**1**	**-**
Other Tools														
CEPA 1999 - Section(s)*	271	360	**631**	19	-	-	44	-	-	5	-	2	5	1
Glycol Guidelines	3	1	4											
Section 46 Notices - Greenhouse Gases	35	-	35	-	-	-	-	-	-	-	-	-	-	-
Section 56 Notices - P2 Plans	10	14	**24**	-	-	-	4	-	-	-	-	-	-	-
National Pollutant Release Inventory	162	26	**188**	1	-	-	96	-	-	-	-	-	-	-
TOTAL	**2,674**	**2,522**	**5,196**	**43**	**-**	**4**	**1,560**	**-**	**-**	**174**	**-**	**5**	**22**	**1**

* These numbers include activities related to enforceable provisions of the Act.

EPCO = Environmental Protection Compliance Order.
EPAM = Environmental Protection Alternative Measure.

Explanatory Notes:

Number of inspections — The number of regulatees who were inspected for compliance where inspections were completed during the fiscal year.

Number of investigations — The number of investigations started in the fiscal year. The total number of investigations is the number of investigation *files* started in the fiscal year. An investigation file may include activities relating to another law or to more than one regulation. Therefore, the total number of investigations shown does not add up to the total number of investigation by regulation.

All enforcement measures (except for prosecutions and EPAMs) are tabulated at the section level of a regulation. For example, if the outcome of an inspection is the issuance of a written warning that relates to alleged violations of three sections of a given regulation, the number of written warnings is three.

Number of prosecutions — The number of regulatees who were prosecuted, regardless of the number of regulations involved.

Number of EPAMs — The number of regulatees who signed EPAMs, regardless of the number of regulations involved.

Additional Statistics:

There were 66 referrals to another federal government department, or to a provincial or municipal government.

Of the 43 investigation files started in 2007–2008, 8 ended in 2007–2008 and 35 are ongoing. Of the 80 investigation files initiated before 2007–2008 (not included in the table), 37 were completed in 2007–2008 and 43 are ongoing.

4.5 Enforcement Measures

4.5.1 Environmental Protection Compliance Orders

Environmental Protection Compliance Orders (EPCOs) secure an alleged violator's return to compliance, without use of the court system. An enforcement officer is empowered to issue an EPCO to:

- prevent a violation from occurring; or
- stop or correct a violation that is occurring or continuing over a period of time.

In 2006–2007, 229 EPCOs were issued:

- 151 to dry cleaners for violating the *Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations*;
- 69 under the *Storage of PCB Material Regulations*; and
- 9 for violating various other regulations.

In 2007–2008, 174 EPCOs were issued:

- 162 to dry cleaners for violating the *Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations*; and
- 12 for violating various other regulations.

4.5.2 Environmental Protection Alternative Measures

An Environmental Protection Alternative Measures agreement (EPAM) is an enforcement instrument that allows for a negotiated return to compliance without a court trial. If an EPAM agreement is successfully negotiated, it is filed with the court and is a public document. The agreement must also be published on the CEPA Environmental Registry.

In 2007–2008, an EPAM agreement was negotiated between Environment Canada and an Ontario company. The company had been charged with contraventions of the *Ozone-depleting Substances Regulations, 1998* for the import, sale and offering for sale of products containing hydrochlorofluorocarbons. As part of the agreement, the company was required to deliver a training program to its clientele on environmental issues associated with the import and sale of ozone-depleting substances, provide a report to Environment Canada following each of the training sessions and pay $5,000 to the Environmental Damages Fund.

4.5.3 Prosecutions and Court Cases

On January 18, 2007, after a Provincial Court appearance, a guilty plea was entered for two alleged violations of the *Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations*. This case was related to an inspection by an Environment Canada enforcement officer in February 2006. The enforcement officer observed that the company failed to adequately store tetrachloroethylene residue. Additionally, the firm’s wastewater treatment was alleged not to meet regulatory standards, thereby potentially allowing untreated tetrachloroethylene wastewater to be released into the drain. The court imposed a penalty consisting of a $1,000 fine payable to the Courts, and a $3,000 fine payable to the

Environmental Damages Fund. In addition to the fines, the company is required to develop and implement a set of written procedures to ensure that it does not repeat the offence.

In 2007–2008, one prosecution dealt with the export of PCB material under the *PCB Waste Export Regulations, 1996*. On April 23, 2007, the accused pleaded guilty on the first day of the trial. The company was convicted and fined $10,000.

A second prosecution concerned an operator of a drycleaning firm. The accused pleaded guilty on August 27, 2007, to five charges under the *Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations.* The court sentenced the company to pay a total of $3,904.88. This amount included a fine of $1,400, a reimbursement of $404.88 to the Department for costs incurred in the proper disposal of waste, and a payment of $2,100 to the Environmental Damages Fund.

The last prosecution dealt with offences under CEPA 1999 and the *Criminal Code.* An Ontario company and one of its employees allegedly used an authorization letter of unknown authorship for the importation of two substances prior to a full risk assessment being completed. On July 5, 2007, the accused individual pleaded guilty to one count of providing false and misleading information under the Act and was fined $5,000. All charges under the *Criminal Code* were withdrawn.

4.6 Domestic and International Cooperation

Enforcement-related activities are carried out under various international and domestic agreements and organizations. In April 2008, the International Network for Environmental Compliance and Enforcement, a network of more than 100 countries, held its 8th annual conference in Cape Town, South Africa. Environment Canada participated in the panels and workshops.

APPENDIX A – CONTACTS
Further information on CEPA 1999 and related activities can be found online at:

- CEPA Environmental Registry website (*www.ec.gc.ca/ CEPARegistry*);
- Environment Canada's website (*www.ec.gc.ca*); and
- Health Canada's website (*www.hc-sc.gc.ca*).

Departmental publications are available from the departmental library or the nearest regional library. Many departmental publications are also available online at *www.ec.gc.ca/publications* or through Environment Canada's Inquiry Centre:

Inquiry Centre
Environment Canada
Gatineau, Quebec
K1A 0H3
Telephone: 819-997-2800 or 1-800-668-6767
Fax: 819-994-1412
TTY: 819-994-0736 (Teletype for the hearing impaired)
E-mail: enviroinfo@ec.gc.ca

The following communications contacts are also available to provide additional information:

Environment Canada
Media Relations
Toll-free within Canada: 1-888-908-8008
Outside Canada: 1-819-934-8008
E-mail: mediarelations2@ec.gc.ca

Health Canada
Media Relations
Telephone: 613-957-2983
Fax: 613-952-7747
E-mail: Info@hc-sc.gc.ca
Address Locator 0900C2
Ottawa, Ontario K1A 0K9

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APPENDIX B – SUMMARY OF PROPOSED AND FINAL REGULATIONS MADE UNDER CEPA 1999 FROM APRIL 2006 TO MARCH 2008

Regulation	Draft Publication	Final Publication
2-Butoxyethanol Regulations		December 27, 2006
Disposal at Sea Regulations, Regulations Amending the	November 24, 2007	
Environmental Emergency Regulations, Regulations Amending the	June 9, 2007	
Gasoline Regulations, Regulations Amending the	December 22, 2007	
Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations	September 2, 2006	
Marine Spark-Ignition Engine and Off-Road Recreational Vehicle Emission Regulations	December 30, 2006	
On-Road Vehicle and Engine Emission Regulations, Regulations Amending the	November 5, 2005	November 15, 2006
Ozone-Depleting Substances Regulations, 1998, Regulations Amending the	December 2, 2006	June 27, 2007
PCB Regulations	November 4, 2006	
Perfluorooctane Sulfonate and its Salts and Certain Other Compounds Regulations	December 16, 2006	
Polybrominated Diphenyl Ethers Regulations	December 16, 2006	
Prohibition of Certain Toxic Substances Regulations, 2005 (2-Methoxyethanol, Pentachlorobenzene and Tetrachlorobenzenes), Regulations Amending the		November 29, 2006
Prohibition of Certain Toxic Substances Regulations, 2005 (Four New Flurotelomer-based Substances), Regulations Amending the	June 17, 2006	
Regulations Respecting Applications for Permits for Disposal at Sea (Miscellaneous Program,) Regulations Amending the	November 10, 2007	
Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations	April 7, 2007	
Sulphur in Diesel Fuel Regulations, Regulations Amending the	April 1, 2006	July 12, 2006
Sulphur in Gasoline Regulations Regulations Amending the	August 11, 2007	
Virtual Elimination List		December 13, 2006

APPENDIX C – SUBSTANCES IN THE FIRST FIVE BATCHES LAUNCHED UNDER THE CHEMICALS MANAGEMENT PLAN CHALLENGE FROM APRIL 2006 TO MARCH 2008

CAS RN	Substance name
Batch 1	
78-63-7	Peroxide, (1,1,4,4-tetramethyl-1,4-butanediyl)bis[(1,1-dimethylethyl)
1068-27-5	Peroxide, (1,1,4,4-tetramethyl-2-butyne-1,4-diyl)bis[(1,1-dimethylethyl)
6731-36-8	Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl)
12236-64-5	2-Naphthalenecarboxamide, *N*-[4-(acetylamino)phenyl]-4-[[5-(aminocarbonyl)-2-chlorophenyl]azo]-3-hydroxy-
43035-18-3	Benzenesulfonic acid, 4-[[3-[[2-hydroxy-3-[[(4-methoxyphenyl)amino]carbonyl]-1-naphthalenyl]azo]-4-methylbenzoyl]amino]-, calcium salt (2:1)
54079-53-7	Propanedinitrile, [[4-[[2-(4-cyclohexylphenoxy)ethyl]ethylamino]-2-methylphenyl]methylene]-
59487-23-9	2-Naphthalenecarboxamide, 4-[[5-[[[4-(aminocarbonyl)phenyl]amino]carbonyl]-2-methoxyphenyl]azo]-*N*-(5-chloro-2,4-dimethoxyphenyl)-3-hydroxy-
75-56-9	Oxirane, methyl-
91-08-7	Benzene, 1,3-diisocyanato-2-methyl
91-20-3	Naphthalene
106-88-7	Oxirane, ethyl-
120-80-9	1,2-Benzenediol
123-31-9	1,4-Benzenediol
584-84-9	Benzene, 2,4-diisocyanato-1-methyl
26471-62-5	Benzene, 1,3-diisocyanatomethyl-
Batch 2	
540-97-6	Cyclohexasiloxane, dodecamethyl-
541-02-6	Cyclopentasiloxane, decamethyl-
556-67-2	Cyclotetrasiloxane, octamethyl-
732-26-3	Phenol, 2,4,6-tris(1,1-dimethylethyl)-
2778-42-9	Benzene, 1,3-bis(1-isocyanato-1-methylethyl)-
4474-24-2	Benzenesulfonic acid, 3,3'-[(9,10-dihydro-9,10-dioxo-1,4-anthracenediyl)diimino]bis[2,4,6-trimethyl-, disodium salt
15086-94-9	Spiro[isobenzofuran-1(3*H*),9'-[9*H*]xanthen]-3-one, 2',4',5',7'-tetrabromo-3',6'-dihydroxy-
70161-19-2	Benzenesulfonic acid, [(9,10-dihydro-9,10-dioxo-1,4-anthracenediyl)bis(imino-4,1-phenyleneoxy)]bis-, disodium salt
83006-67-1	Benzenesulfonic acid, 2,2 -[(9,10-dihydro-5,8-dihydroxy-9,10-dioxo-1,4-anthracenediyl)diimino]bis[5-(1,1-dimethylethyl)-, disodium salt
125351-99-7	9,10-Anthracenedione, 1,4-bis[(4-methylphenyl)amino]-, sulfonated, potassium salts
62-56-6	Thiourea
78-79-5	1,3-Butadiene, 2-methyl-
80-05-7	Phenol, 4,4 -(1-methylethylidene)bis-
106-89-8	Oxirane, (chloromethyl)-
108-05-4	Acetic acid ethenyl ester
1344-37-2	C.I. Pigment Yellow 34
12656-85-8	C.I. Pigment Red 104

Batch 3	
81-68-5	Benzenesulfonamide, *N*-(4-amino-9,10-dihydro-3-methoxy-9,10-dioxo-1-anthracenyl)-4-methyl-
1594-08-7	9,10-Anthracenedione, 1-hydroxy-4-[[4-[(methylsulfonyl)oxy]phenyl]amino]-
2425-85-6	2-Naphthalenol, 1-[(4-methyl-2-nitrophenyl)azo]-
2814-77-9	2-Naphthalenol, 1-[(2-chloro-4-nitrophenyl)azo]-
3468-63-1	2-Naphthalenol, 1-[(2,4-dinitrophenyl)azo]-
4395-65-7	9,10-Anthracenedione, 1-amino-4-(phenylamino)-
6410-09-9	2-Naphthalenol, 1-[(2-nitrophenyl)azo]-
6410-13-5	2-Naphthalenol, 1-[(4-chloro-2-nitrophenyl)azo]-
6410-41-9	2-Naphthalenecarboxamide, *N*-(5-chloro-2,4-dimethoxyphenyl)-4-[[5-[(diethylamino)sulfonyl]-2-methoxyphenyl]azo]-3-hydroxy-
6471-01-8	2-Anthracenesulfonic acid, 4,4'-[(1-methylethylidene)bis(4,1-phenyleneimino)]bis[1-amino-9,10-dihydro-9,10-dioxo-, disodium salt
20241-76-3	9,10-Anthracenedione, 1,8-dihydroxy-4-nitro-5-(phenylamino)-
25155-25-3	Peroxide, [1,3(or 1,4)-phenylenebis(1-methylethylidene)]bis[(1,1-dimethylethyl)
60352-98-9	1-Propanaminium, 3-[[4-[(2,4-dimethylphenyl)amino]-9,10-dihydro-9,10-dioxo-1-anthracenyl]amino]-*N,N,N*-trimethyl-, methylsulfate
72243-90-4	Benzenesulfonic acid, 3-[[4-amino-9,10-dihydro-9,10-dioxo-3-[sulfo-4-(1,1,3,3-tetramethylbutyl)phenoxy]-1-anthracenyl]amino]-2,4,6-trimethyl-, disodium salt
74336-60-0	9,10-Anthracenedione, 1-[(5,7-dichloro-1,9-dihydro-2-methyl-9-oxopyrazolo[5,1-b]quinazolin-3-yl)azo]-
110-49-6	Ethanol, 2-methoxy-, acetate
111-15-9	Ethanol, 2-ethoxy-, acetate
111-77-3	Ethanol, 2-(2-methoxyethoxy)-
1589-47-5	1-Propanol, 2-methoxy-
Batch 4	
115-39-9	Phenol, 4,4 -(3*H*-2,1-benzoxathiol-3-ylidene)bis[2,6-dibromo-, S,S-dioxide
115-40-2	Phenol, 4,4 -(3*H*-2,1-benzoxathiol-3-ylidene)bis[2-bromo-6-methyl-, S,S-dioxide
125-31-5	Phenol, 4,4 -(3*H*-2,1-benzoxathiol-3-ylidene)bis[2,5-dimethyl-, S,S-dioxide
1154-59-2	Benzamide, 3,5-dichloro-*N*-(3,4-dichlorophenyl)-2-hydroxy-
1176-74-5	Benzoic acid, 2-[(3,5-dibromo-4-hydroxyphenyl)(3,5-dibromo-4-oxo-2,5-cyclohexadien-1-ylidene)methyl]-, ethyl ester
17321-77-6	5H-Dibenz[b,f]azepine-5-propanamine, 3-chloro-10,11-dihydro-*N,N*-dimethyl-, monohydrochloride
62625-32-5	Phenol, 4,4 -(3*H*-1,2-benzoxathiol-3-ylidene)bis[2,6-dibromo-3-methyl-, S,S-dioxide, monosodium salt
64325-78-6	Adenosine, *N*-benzoyl-5 -*O*-[bis(4-methoxyphenyl)phenylmethyl]-2 -deoxy-
68308-48-5	Amines, tallow alkyl, ethoxylated, phosphates
68443-10-7	Amines, C18-22-tert-alkyl, ethoxylated
68921-45-9	Benzenamine, *N*-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene
70776-86-2	2-Butanone, 4-[[[1,2,3,4,4a,9,10,10a-octahydro-1,4a-dimethyl-7-(1-methylethyl)-1-phenanthrenyl]methyl](3-oxo-3-phenylpropyl)amino]-, [1R-(1a,4aß,10aa)]-
79357-73-6	Amines, C18-22-tert-alkyl, (chloromethyl)phosphonates (2:1)
64-67-5	Sulfuric acid, diethyl ester
75-28-5	Propane, 2-methyl-
77-78-1	Sulfuric acid, dimethyl ester
106-97-8	Butane
110-54-3	Hexane

CAS RN	Substance name
Batch 5	
5261-31-4	Propanenitrile, 3-[[2-(acetyloxy)ethyl][4-[(2,6-dichloro-4-nitrophenyl)azo]phenyl]amino]-
6232-56-0	Ethanol, 2-[[4-[(2,6-dichloro-4-nitrophenyl)azo]phenyl]methylamino]-
12239-34-8	Acetamide, *N*-[5-[bis[2-(acetyloxy)ethyl]amino]-2-[(2-bromo-4,6-dinitrophenyl)azo]-4-ethoxyphenyl]-
16421-40-2	Acetamide, *N*-[5-[[2-(acetyloxy)ethyl](phenylmethyl)amino]-2-[(2-chloro-4,6-dinitrophenyl)azo]-4-methoxyphenyl]-
16421-41-3	Acetamide, *N*-[5-[[2-(acetyloxy)ethyl](phenylmethyl)amino]-2-[(2,4-dinitrophenyl)azo]-4-methoxyphenyl]-
17464-91-4	Ethanol, 2,2'-[[4-[(2-bromo-6-chloro-4-nitrophenyl)azo]-3-chlorophenyl]imino]bis-
23355-64-8	Ethanol, 2,2'-[[3-chloro-4-[(2,6-dichloro-4-nitrophenyl)azo]phenyl]imino]bis-
26850-12-4	Propanamide, *N*-[5-[bis[2-(acetyloxy)ethyl]amino]-2-[(2-chloro-4-nitrophenyl)azo]phenyl]-
29765-00-2	Benzamide, *N*-[5-[bis[2-(acetyloxy)ethyl]amino]-2-[(4-nitrophenyl)azo]phenyl]-
52697-38-8	Acetamide, *N*-[2-[(2-bromo-4,6-dinitrophenyl)azo]-5-(diethylamino)phenyl]-
55281-26-0	Propanenitrile, 3-[[4-[(2,6-dibromo-4-nitrophenyl)azo]phenyl]ethylamino]-
55619-18-6	Ethanol, 2,2'-[[4-[(2,6-dibromo-4-nitrophenyl)azo]phenyl]imino]bis-, diacetate (ester)
72927-94-7	Benzenamine, 4-[(2,6-dichloro-4-nitrophenyl)azo]-N-(4-nitrophenyl)-
75-12-7	Formamide
79-06-1	2-Propenamide
79-07-2	Acetamide, 2-chloro-
115-96-8	Ethanol, 2-chloro-, phosphate (3:1)
126-73-8	Phosphoric acid tributyl ester
127-19-5	Acetamide, *N,N*-dimethyl-

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