

Information submitted by the Government of Canada to support the further work of the intergovernmental negotiating committee in its preparation for early implementation of the Minamata Convention as well as its first meeting of the Conference of Parties

Article 3 – Mercury supply sources and trade

Regarding whether there are any additional elements within the guidance referred to in Article 3(12) not covered by either the guidance on the forms or that for stocks. And if so, the nature of that guidance.

Canada considers that the forms negotiated at INC-6, and the guidance that will be developed for identifying stocks, are the required elements called for under Article 3(12). Therefore, Canada is of the view that there is no need for additional guidance on Article 3. Notwithstanding, Canada supports the development of material to assist Parties in completing the forms.

Canada recommends that time and resources be focused on items of higher priority that need to be decided or adopted by COP-1, such as guidance on best available techniques and best environmental practices to control and reduce atmospheric emissions, and the timing and format of national reporting.

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Article 11 – Mercury wastes

Regarding information on the use of mercury waste thresholds and the levels established.

In Canada, mercury wastes are defined as hazardous waste consistent with the definitions under the Basel Convention. Under the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (EIHWHRMR)*, materials consisting of, containing or contaminated with mercury or mercury compounds are hazardous waste or hazardous recyclable material if they are going to disposal or recycling operations as listed in Schedules 1 and 2 of the Regulations (which captures the operations listed in the Basel Convention Annex IV), and meet any of the hazard criteria (i.e. possess hazard characteristics, which are consistent with Annex III of the Basel Convention; are listed in one of the waste schedules of the Regulations; or are considered hazardous in the receiving country or country through which they are being transported). Generally, the provincial and territorial jurisdictions define mercury wastes as hazardous waste consistent with the federal EIHWHRMR (and Transportation of Dangerous Goods Regulations).

In Canada, mercury waste is not determined by a content threshold. Rather, mercury wastes are determined to be hazardous waste if they contain mercury or mercury compounds to the extent that they exhibit hazardous characteristics. There are well established methodologies used to determine the hazardous characteristics of wastes.

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Table 1. Human Biomonitoring

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
1	Canadian Health Measures Survey	Direct measures health survey	National (16 sites per 2 year cycle)	Human biomonitoring	2-year cycles, starting in 2007 (planned through to 2019, contingent upon funding)	N=5,600 per cycle; both sexes, ages 3-79 years; blood and urine analysis (total, inorganic, and methylmercury measured)	Direct health measures (height, weight, blood pressure, blood sampling for other biomarkers, etc.); food frequency questionnaire; fish & shellfish consumption; health status; physical fitness; socio-economic status
2	Nunavik Child Development Study (Northern Contaminants Program)	Ongoing cohort study	Nunavik, Quebec	Human biomonitoring	Multiple year follow-up	N=250; Both sexes, follow-up late adolescents (followed since birth), blood analysis	Psychological and neural development outcomes
3	Nunavik Inuit Health Survey (“Qanuippitaa?”) (Northern Contaminants Program)	Population health & biomonitoring survey	Nunavik, Quebec	Human biomonitoring	Multiple year follow-up (2004, 2016)	N=700; Both sexes, adults (18-74 years), pregnant women, blood analysis	Health data, dietary survey
4	Inuit Health Survey (Northern Contaminants Program)	Population health & biomonitoring survey	Northwest Territories, Nunavut, Nunatsiavut (Labrador)	Human biomonitoring	Multiple year follow-up (2007/2008, 2017/2018)	N=2000; Both sexes, adults (18-90 years), blood analysis	Health data, dietary survey
5	Nunavik Biomonitoring Regional Studies (Northern Contaminants Program)	Population health & biomonitoring studies	Nunavik, Quebec	Human biomonitoring	Multiple year follow-up	N=50-200; Pregnant women, ages 16-49 years, blood analysis, breast milk analysis	Status to be confirmed

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
6	Arctic Monitoring and Assessment Programme	Population health & biomonitoring studies	Across Arctic (international)	Human biomonitoring	Multiple year assessment report publication (1998, 2003, 2009, 2015)	N=various; Both sexes, pregnant women, children; All ages; Blood analysis, breast milk analysis, hair analysis, urine analysis;	Health effects, dietary survey, health data
7	Maternal Infant Research on Environmental Contaminants	Population health & biomonitoring survey	National (10 sites)	Human biomonitoring	Recruitment and initial sample collection from 2008-2011; follow-up with cohort between ages 2.5 & 5 years for additional sampling	N=2000; pregnant women, children at birth and follow-up between ages 2.5 & 5 years; maternal blood, urine, hair and breast milk, as well as cord blood and infant meconium; blood and urine sampling from children in follow-up study	Questionnaire collecting information on demographics, smoking and alcohol use, medical history, medication use, and potential sources of exposure; food frequency questionnaire. Follow-up study included questionnaire about determinants of child neurodevelopment
8	Metals Study in Recent Canadians	Population health & biomonitoring survey	British Columbia, Ontario	Human biomonitoring	2015-2016	N=400-500; Women of reproductive age, ages 18-45 years, blood analysis, South or East Asian resident in Canada for 1 to 5 years	Health data
9	First Nations Food, Nutrition and Environment Study (FNFNES) http://www.fnfnes.ca/	The FNFNES includes a non-invasive biomonitoring component, relying on sampling human hair for mercury analysis. The hair results are used	21 FN communities in British Columbia (2008/2009) 9 FN communities in Manitoba (2010) 18 FN communities in Ontario (2011/2012)	Human biomonitoring (hair)	Repeat sampling is intended to be on a ten year cycle.	The FNFNES plans to sample up to 100 First Nation communities across Canada, with 100 FNs participants selected per community. Participants are all FNs living on reserve and > 18 years of age. N=487 hair samples in British Columbia	Mercury is monitored in traditional food samples (fish, game, birds and plants).

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
		to validate the results of the dietary assessments and to develop a new estimate of the First Nation (FN) exposure to mercury across Canada.	10 FN communities in Alberta (2013) 11 FN communities in Atlantic Canada (2014) 13 FN communities in Saskatchewan (2015) 9 FN communities in Quebec (2016)			N=236 hair samples in Manitoba N= 744 hair samples in Ontario Data from other provinces have not yet been released. Cold Vapour Atomic Fluorescence Spectrophotometry (CVAFS)	

Table 2. Biotic Monitoring

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
1	Northern Contaminants Program	Ringed seal monitoring	Arviat, Resolute, Sachs Harbour, Nain	Biotic – ringed seal (muscle, liver, fat)	Arviat: '86, '92, '98, '03 - '12, 14 Resolute: '72, '84, '93, '00, '04-'14, Sachs Harbour: '72, '88, '01, '05-'07, '10-'14 Nain: '97, '98, '05, '06, '09-'10, '12-'14 Annual collections planned post 2014.	N ≥ 10. Collection by local hunter of individual seals from each location. Hunter's measure and note: length, girth, blubber thickness at the sternum, sex and weight. Mercury is measured by direct mercury analyzer (muscle) and/or cold vapour atomic absorption spectrometry (liver). Tooth samples are used to determine age.	Tissues are also analyzed for Inorganic elements by ICP-MS (liver), stable isotopes of Nitrogen and Carbon, and an extensive list of organic contaminants (POPs and chemicals of emerging concern)
2	Northern Contaminants Program	Polar Bear monitoring	West and South Hudson Bay sub-populations	Biotic – polar bear (muscle, liver, fat)	'82, '84, '02, '07 – '14, Annual collections planned post 2014.	N ≥ 10. Collection by local hunters of individual bears from each sub-population in cooperation with territorial biologists. Hunter observations include sex. Mercury is measured by cold vapour atomic absorption spectrometry (liver). Tooth samples are used to determine age.	Tissues are also analyzed for Inorganic elements by ICP-MS (liver), stable isotopes of nitrogen and carbon (muscle), fatty acids (fat), and an extensive list of organic contaminants (POPs and chemicals of emerging concern, various tissues)
3	Northern Contaminants Program	Beluga whale monitoring	Hendrickson Island – Beaufort Sea, Sanikiluaq – Hudson	Biotic – beluga whale (muscle, liver, fat and	Hendrickson Island – '81, '89, '93-'96, '01-'14	N ≥ 10. Collection by local hunters of individual whales. Hunter observations include	Tissues are also analyzed for inorganic elements by ICP-MS (liver and muscle), stable

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
			Bay	skin)	Sanikiluaq – '94, '95, '98, '02-'14 Annual collections planned post 2014.	sex, length. Mercury is measured combustion atomic adsorption spectrometry (muscle and liver). Tooth samples are used to determine age.	isotopes of nitrogen and carbon, and an extensive list of organic contaminants (POPs and chemicals of emerging concern)
4	Northern Contaminants Program	Seabird egg monitoring	Prince Leopold Island (PLI) – Lancaster Sound, Coats Island – North Hudson Bay	Biotic – eggs of thick-billed murre and northern fulmar (PLI only)	PLI murre: '75-'77, '87, '88, '93, '98, 03, '05 and annually thereafter PLI fulmars: : '75-'77, '87, '93, '98, 03, '05 and annually thereafter Coats murre: '93, '98, '03, '05-'11, '13, '14 and annual collections planned thereafter	N = 15 eggs of each species. Collected by trained technicians. Samples are analyzed for mercury by advanced/direct mercury analyzer.	Tissues are also analyzed for stable isotopes of nitrogen and carbon, and an extensive list of organic contaminants (POPs and chemicals of emerging concern)
5	Northern Contaminants Program	Anadromous arctic char monitoring	Cambridge Bay, Nunavut Nain, Nunatsiavut	Biotic – arctic char	Annual sampling/analysis at Cambridge Bay since 2004, with 4 additional samplings back to 1977 (2 in late 1970s and 2 in early 1990s)	N ≥ 20. Collection by local fishers of individual fish from the local subsistence fishery. Samples are processed in a lab and assessed for length, weight and sex. Mercury is measured by direct mercury analyzer (filet with skin). Otoliths are used to	Tissues are also analyzed for Inorganic elements by ICP-MS (muscle), stable isotopes of Nitrogen and Carbon.

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
					Nain samples/data from '97, '98, '99, '07- '10, 2013, and annual thereafter	determine age.	
6	Northern Contaminants Program	Land-locked arctic char monitoring	Lakes Amituk, Char, Resolute, North and Small (near Resolute Bay), and Lake Hazen (Elsmere Island)	Biotic – arctic char	Amituk: '89, '92, '01-'03, '05-'09, '11-'14 Char: '93, '99-'01, '03, '05, '07, '09-'12 (series ends) Resolute: '93, '97, '99-'14 Hazen : '90, '92, '01, '03-2008, '10-'14 North: '00, '05-'08, '10-'14 Small: '92, '05-'14 Annual collections planned post 2014	N ≥ 10. Collection by local fisher of individual fish from each lake. Samples are processed in a lab and assessed for length, weight and sex. Mercury is measured by cold vapour atomic absorption spectrometry (filet with skin). Otoliths are used to determine age.	Tissues are also analyzed for Inorganic elements by ICP-MS (muscle), stable isotopes of Nitrogen and Carbon, and an extensive list of organic contaminants (POPs and chemicals of emerging concern)
7	Northern Contaminants Program	Lake trout monitoring	Great Slave Lake, North West Territories (east arm and west basin) Lake Laberge and Kusawa Lake, Yukon	Biotic – Lake trout	East Arm GSL: '93, '95, '99-'02, '04-'14 West Basin GSL: '93, '99, '00-'02, '04-'14 Lake Laberge: '93,	N ≥ 10. Collection by local fisher of individual fish from each location. Samples are processed in a lab and assessed for length, weight and sex. Mercury is measured by cold vapour atomic absorption	Tissues are also analyzed for Inorganic elements by ICP-MS (muscle), stable isotopes of Nitrogen and Carbon, and an extensive list of organic contaminants (POPs and chemicals of emerging

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
					'96, '98, '00 – '14 Kusawa Lake: '93, '99, '01 – '14 Annual collections planned post 2014	spectrometry or direct mercury analyzer (filet with skin). Otoliths are used to determine age.	concern)
8	Northern Contaminants Program	Burbot monitoring	Great Slave Lake, North West Territories (West basin and East arm) Mackenzie River at Fort Good Hope, North West Territories	Biotic – Burbot	GSL West Basin: '93, '95, '96, '99- '02, '04-'14 GSL East Arm: '93, '99-'02, '04, '08- '14 Mackenzie River: '85, '88, '93, '95, '99 – '14 Annual collections planned post 2014	N ≥ 10. Collection by local fisher of individual fish from each location. Samples are processed in a lab and assessed for length, weight and sex. Mercury is measured by cold vapour atomic absorption spectrometry or direct mercury analyzer (filet with skin). Otoliths are used to determine age.	Tissues are also analyzed for Inorganic elements by ICP-MS (muscle), stable isotopes of Nitrogen and Carbon, and an extensive list of organic contaminants (POPs and chemicals of emerging concern)
9	Northern Contaminants Program	Caribou monitoring	Barren-ground caribou: Porcupine herd (Yukon), Qamanirjuak herd (Nunavut)	Biotic – caribou (liver, kidney, muscle)	Porcupine herd: 1997-2014 (annual) Qamanirjuak herd: 2006 – 2014 (annual) Annual collections planned post 2014	N ≥ 20. Collection by local hunters of individual animals from each herd. Hunters report sex of animals. Mercury is measured by cold vapour atomic absorption spectrometry or direct mercury analyzer (kidneys). Teeth are used to determine age.	Tissues are also analyzed for Inorganic elements by ICP-MS (kidney).

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
10	Canadian Food Inspection Agency – Seafood	Testing of imported and domestic fish and seafood products	Across Canada	Biotic – consumable tissues of fish and seafood	Throughout the year, annually	N = 500 – 700 samples per year. Consumable tissues of fish and seafood.	
11	Great Lakes Herring Gull Egg Monitoring Program	Herring gull eggs are sampled from the Canadian Great Lakes to monitor contaminants including mercury	Fifteen colonies in Canadian Great Lakes (Lakes Ontario, Erie, Huron, Superior)	Seabird eggs	Annually	Fifteen pools of 13 eggs each from 15 colonies analyzed for total mercury using Direct Mercury Analyzer	Stable carbon and nitrogen isotopes
12	Atlantic Seabird Egg Monitoring Program	Eggs of 4 species of seabirds are sampled from colonies on Canada’s Atlantic coast to monitor contaminants including mercury	Twelve colonies on Canadian Atlantic coast	Seabird eggs	Every 4 years	Fifteen eggs per species analyzed individually for total mercury using Direct Mercury Analyzer	Stable carbon and nitrogen isotopes
13	Pacific Seabird Egg Monitoring Program	Eggs of 3 species of seabirds are sampled from colonies on Canada’s Pacific coast to monitor contaminants including mercury	Seven colonies on Canadian Pacific coast	Seabird eggs	Every 4 years	Fifteen eggs per species per colony analyzed individually for total mercury using Direct Mercury Analyzer	Stable carbon and nitrogen isotopes
14	Salish Sea Contaminants Monitoring Program	Eggs of 2 species sampled from the Salish Sea region of Canada’s west coast	2 colonies within the Salish Sea region	Bird eggs	Every 4 years	5 to 10 eggs per species per colony analyzed individually for total mercury using Direct Mercury Analyzer	Stable carbon and nitrogen isotopes

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
15	Fraser River Monitoring	Eggs of ospreys are sampled at 3 sites along the Thompson and Fraser Rivers	3 sites on the Fraser and Thompson Rivers	Bird eggs	Every 5 years	5 eggs per species per site analyzed individually for total mercury using Direct Mercury Analyzer	Stable carbon and nitrogen isotopes
16	State of the St. Lawrence Monitoring Program - Great Blue Heron and Northern Gannet	As part of the St. Lawrence Action Plan, eggs of great blue herons and northern gannets are sampled from colonies along the St. Lawrence River for contaminants monitoring including mercury	Four great blue heron colonies in the St. Lawrence River; One northern gannet colony in the Gulf of St. Lawrence	Bird eggs	1 collection every five years for both species	Herons: 15 eggs per colony analyzed as 5 pools of 3 eggs per colony; Gannets: 15 eggs analyzed as 3 pools of 5 eggs; total mercury analysed using Direct Mercury Analyzer	Stable carbon and nitrogen isotopes
17	Canadian Fish Mercury Database – Research project Queens University	An assembly of available fresh water fish mercury levels in all provinces and territories in Canada	All provinces and territories in Canada	Biotic - Fish	See paper	See: Depew, D. C. <i>et al.</i> An overview of mercury concentrations in freshwater fish species: a national fish mercury dataset for Canada, Canadian Fish and Aquatic Science, 70, 436-451, dx.doi.org/10.1139/cjfas-2012-0338 , 2013.	A summary was put together of fish mercury concentrations that have been measured over the last 30–40 years in all regions of Canada as part of various monitoring and research programs. This paper identifies in the supplemental information a full list of the networks that collected the fish mercury data, species and locations.

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
18	Gulfwatch Contaminants Monitoring Program – US and Canadian Atlantic regions http://www.gulfofmaine.org/gulfwatch/	Gulfwatch is a chemical-contaminants monitoring program organized and administered by the Gulf of Maine Council on the Marine Environment.	Nova Scotia and New Brunswick (Maine, USA)	Biotic - Blue mussels	Annual	See website	

Table 3. Atmospheric Monitoring

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
1	Northern Contaminants Program	Atmospheric mercury monitoring	Alert, Nunavut	Abiotic - air	Continuous total gaseous mercury (TGM) measurements Jan 1995- present Hourly averaged data available Continuous Gaseous Elemental Mercury (GEM), Reactive Gaseous Mercury (RGM) and Total Particulate	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. See Cole <i>et al.</i> , 2014; Temme <i>et al.</i> , 2007 and Kellerhals <i>et al.</i> , 2003	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 . The meta data for this site is housed on the Canadian Polar Data Catalogue Snow is collected at Alert annually in spring for assessment of mercury deposition (total mercury).

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
					Mercury (TPM): 2001- present Bi-Hourly averaged data available		
2	Northern Contaminants Program)	Atmospheric mercury monitoring	Little Fox Lake, Yukon	Abiotic - air	Continuous TGM measurements Jun 2007 – present Hourly averaged data available	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 . The meta data for this site is housed on the Canadian Polar Data Catalogue
3	The Canadian Air and Precipitation Monitoring Network (CAPMoN)	Total gaseous mercury monitoring Mercury in precipitation monitoring	Saturna Island, British Columbia	Abiotic – air Abiotic-precipitation	Continuous Total Gaseous Mercury (TGM) measurements Mar 2009 – present Hourly averaged concentrations available Weekly Hg in precipitation: Sep 2009 – present	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537B instrument and 0.2 µm filter inlet. Integrated wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the US Mercury Deposition Network laboratory.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 . Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
4	The Canadian Air and Precipitation Monitoring Network (CAPMoN)	Total gaseous mercury monitoring	Bratt's Lake, Saskatchewan	Abiotic – air Abiotic-	Continuous TGM measurements May 2001- Dec	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
		[Note: Mercury measurements at this site are temporarily on hold.] Mercury in precipitation monitoring		precipitation	2012 Hourly averaged concentrations available Weekly Hg in precipitation: Jun 2001 - April 2013	and 0.2 µm filter inlet. Integrated wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	478768-1. Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
5	The Canadian Air and Precipitation Monitoring Network (CAPMoN)	Mercury in precipitation monitoring [Note: Mercury is no longer being monitored at this site.]	Experimental Lakes Area, Ontario	Abiotic-precipitation	Weekly Hg in precipitation: Nov. 2009 - Jan. 2011	Integrated wet deposition samples were collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network lab	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
6	The Canadian Air and Precipitation Monitoring Network (CAPMoN)	Total gaseous mercury monitoring Mercury in precipitation monitoring	Egbert, Ontario	Abiotic – air Abiotic-precipitation	Continuous TGM measurements Dec 1996- present Hourly averaged concentrations available Weekly Hg in precipitation: Mar 2000- present	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A/B instrument and 0.2 µm filter inlet. Integrated wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1. Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
7	The Canadian Air and Precipitation Monitoring Network (CAPMoN)	Mercury in precipitation monitoring	Chapais, Quebec	Abiotic-precipitation	Weekly Hg in precipitation: Nov 2001-Mar 2003 - present	Integrated wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
						and analyzed in the US Mercury Deposition Network laboratory.	
8	The Canadian Air and Precipitation Monitoring Network (CAPMoN)	Total gaseous mercury monitoring Mercury wet deposition monitoring	Kejimikujik, Nova Scotia	Abiotic – air Abiotic-precipitation	Continuous TGM measurements Jan 1996-present Hourly averaged concentrations available Weekly Hg in precipitation: Jul 1996- present	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537B instrument and 0.2 µm filter inlet. Integrated wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 . Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
9	The Canadian Air and Precipitation Monitoring Network (CAPMoN)	Mercury in precipitation monitoring	Stephenville, Newfoundland	Abiotic-precipitation	Weekly Hg in precipitation: Feb 2010- present	Integrated wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
10	The Canadian Air and Precipitation Monitoring Network (CAPMoN) [Note: CAPMoN is no longer monitoring mercury at this site.]	Wet deposition monitoring	Cormack Newfoundland	Abiotic-precipitation	Weekly Hg in precipitation: May 2000-Jul 2010	Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
11	Environment Canada	Atmospheric mercury monitoring	Ucluelet, British Columbia	Abiotic - air	Continuous TGM measurements June 2010 – present	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	Marine boundary layer site Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
					Hourly averaged data available	See Cole <i>et al.</i> , 2014; Temme <i>et al.</i> , 2007 and Kellerhals <i>et al.</i> , 2003	478768-1.
12	Environment Canada	Atmospheric mercury monitoring	Whistler, British Columbia	Abiotic - air	Continuous TGM measurements Aug 2008 – present Hourly averaged data available	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	High elevation site Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1. Some of these measurements were conducted under the former Intercontinental Atmospheric Transport of Anthropogenic Pollutants to the Arctic (INCATPA) program.
13	Environment Canada	Atmospheric mercury monitoring Wet deposition monitoring	Genesee, Alberta	Abiotic – air Abiotic-precipitation	Continuous TGM measurements May 2004- Dec 2010 Hourly averaged data available Continuous GEM RGM and TPM: Jan-Sep 2009 Weekly Hg in precipitation: Jul 2006 – Jan	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	Site close to a coal-fired power plant Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
					2011		
14	Environment Canada	Atmospheric mercury monitoring Wet deposition monitoring	Flin Flon, Manitoba	Abiotic – air Abiotic-precipitation	Continuous TGM measurements Jul 2008- present Hourly averaged data available Continuous GEM RGM and TPM: Jul 2010-May 2011 Weekly Hg in precipitation: Sep 2009-Dec 2010	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
15	Environment Canada	Atmospheric mercury monitoring	Saint-Anicet, Quebec	Abiotic – air	Continuous TGM measurements Aug 1994- present Weekly Hg in precipitation: Apr 1998-Aug 2007 Continuous GEM, RGM and TPM: 2002 to present Bi-Hourly	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and sent to the lab. Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.coupled with an external Tekran 1130	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/ Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
						oxydized Hg speciation unit and Tekran 1135 particulate Hg module See Poissant et al., 2005	
16	Environment Canada	Atmospheric mercury monitoring	Halifax, Nova Scotia Kejimikujik, Nova Scotia	Abiotic – air	Continuous GEM RGM and TPM: Oct 2009- present (Halifax) Continuous GEM RGM and TPM: Jan 2009- present (Kejimikujik)		Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 .
17	Joint Oil Sands Monitoring (JOSM) Program	Atmospheric mercury monitoring	Patricia McInnes Alberta	Abiotic - air	Continuous TGM measurements Oct 2010- present Hourly averaged data available	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	Air data is housed on the JOSM portal http://jointoilsandsmonitoring.ca/default.asp?n=5F73C7C9-1&lang=en <u>Refer to publication:</u> Parsons et al., Total Gaseous Mercury Concentration Measurements at Fort McMurray, Alberta Canada (2013). Atmosphere, 4, 472-493.
18	University of Alberta	Atmospheric mercury monitoring	Experimental Lakes Area, Ontario	Abiotic – air	Continuous GEM RGM and TPM: May 2005-2013		

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
19	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring Wet deposition monitoring	Reifel Island, British Columbia	Abiotic – air Abiotic-precipitation	Continuous TGM measurements: Mar 1999 – Feb 2004 Hourly averaged data available Weekly Hg in precipitation: Apr 2000 – Feb 2004	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 . Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
20	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring	Fort Chipewyan, Alberta	Abiotic – air	Continuous TGM measurements Jun 2000- Jul 2001 Hourly averaged data available	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 .
21	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring Wet deposition monitoring	Esther, Alberta	Abiotic – air Abiotic-precipitation	Continuous TGM measurements Jun 1998- Apr 2001 Hourly averaged data available Weekly Hg in precipitation: Apr 2000-May 2001	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and analyzed in the U.S. Mercury Deposition Network laboratory.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 . Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
22	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring Wet deposition monitoring	Burnt Island, Ontario	Abiotic – air Abiotic-precipitation	Continuous TGM measurements May 1998- Dec 2007 Hourly averaged data available Weekly Hg in precipitation: Nov 2001-Jan 2011	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and sent to the lab.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 . Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
23	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring Wet deposition monitoring	Point Petre, Ontario	Abiotic – air Abiotic-precipitation	Continuous TGM measurements Nov 1996- Dec 2007 Hourly averaged data available Weekly Hg in precipitation: Nov 2001-Mar 2003	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and sent to the lab.	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
24	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring	Kuujuarapik, Quebec	Abiotic - air	Continuous TGM measurements Aug 1999- Sep 2009 Hourly averaged data available	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 .
25	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring	Mingan, Quebec	Abiotic – air Abiotic-precipitation	Continuous TGM measurements Jan 1997 to present	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 .

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
		Wet deposition monitoring			Hourly averaged data available Weekly Hg in precipitation: Apr 1998-Aug 2007	Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and sent to the lab.	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
26	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring Wet deposition monitoring	Saint Andrews, New Brunswick	Abiotic – air Abiotic-precipitation	Continuous TGM measurements Jan 1996-Dec 2010 Hourly averaged data available Weekly Hg in precipitation: Jul 1996-Dec 2003	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet. Wet deposition samples are collected weekly in collection bottles charged with a hydrochloric-acid preservative and sent to the lab.	Wet deposition data is housed on http://nadp.sws.uiuc.edu/data/MDN/
27	Canadian Atmospheric Mercury Measurement Network (CAMNet) <i>[Note: This network was in operations from 1994 to 2007.]</i>	Atmospheric mercury monitoring	Southampton, Prince Edward Island	Abiotic - air	Continuous TGM measurements Jan 2005-Dec 2006 Hourly averaged data available	Cold Vapour Atomic Fluorescence Spectrometry with the Tekran 2537A instrument and 0.2 µm filter inlet.	Air Data is housed on http://www.ec.gc.ca/natchem/default.asp?lang=En&n=CD478768-1 .

Table 4. Modelling

#	Program or monitoring network	Description	Location	Media	Temporal details	Methodology	Other / Ancillary data
1	Environment Canada	Global/ Regional Atmospheric Heavy Metals Model (GRAHM) is used for the analysis and prediction of the distribution and deposition of mercury in the atmosphere	All across Canada (and global)	Air (includes gases, particles, snow)	Variable	Environment Canada’s GRAHM simulates the dynamics of 3 mercury species (GEM, RGM, and TPM) and all meteorological variables in the atmosphere in the framework of the Environment Canada’s Global Environmental Multiscale-Global Deterministic Prediction System	This model produces data and graphics on ambient levels of mercury in the atmosphere as well as wet, dry, and total deposition of mercury across Canada (and the world). This is a process-based model and, thus, can produce dynamic representations of the transport and fate of mercury from point of emission (including anthropogenic, biogenic and re-emissions) to deposition.
2	Environment Canada	An integrated a whole-ecosystem mercury model was developed to predict responses in fish to changes in anthropogenic mercury emissions	Applied to 4 lakes in Canada: Lake Wabamun, Alberta Phantom Lake, Saskatchewan Lake 240, Ontario Big Dam West, Nova Scotia	Abiotic – air, water, soils, sediment, foliage Biotic - fish	Simulations from 1990 to 2006	The 4 models integrated: 1) GRAHM 2) Integrated terrestrial Catchments Model for Mercury (INCA-Hg) [Trent University] 3) Dynamic Mercury Cycling Model (D-MCM) [aquatic mercury cycling and bioaccumulation] 4) Mercury Environmental Ratios Multimedia Ecosystem Sources (HERMES) [steady-state aquatic Hg cycling model]	Environment Canada developed an ecosystem mercury modelling framework that includes atmospheric, terrestrial, aquatic, and bioaccumulation models for simulating the impact of changes in mercury emissions on levels of mercury in terrestrial and aquatic ecosystems including fish. .

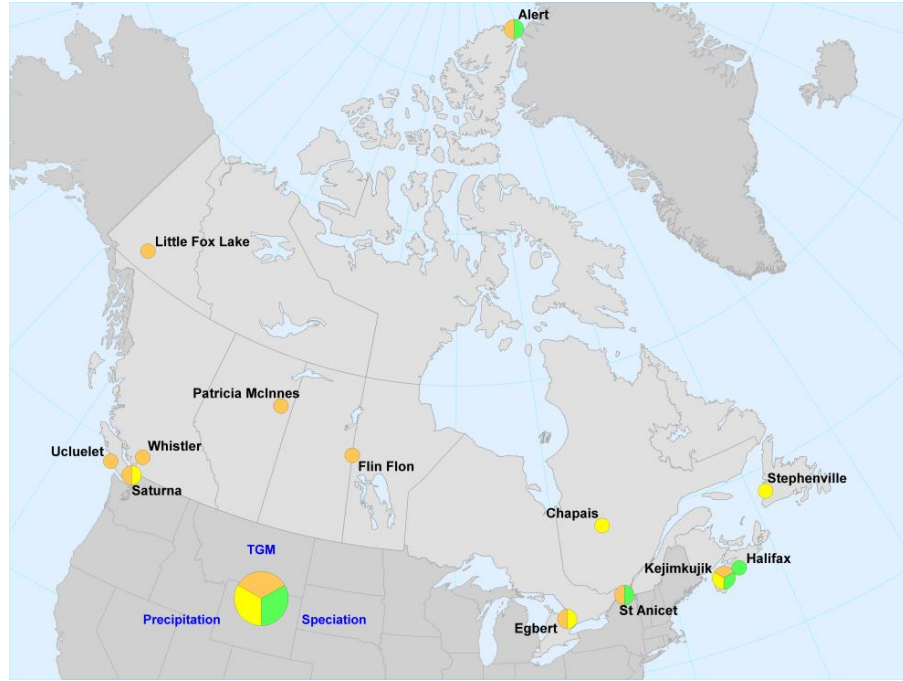


Figure 1: Map of the 2014 active atmospheric mercury monitoring and wet deposition (precipitation) sites in Canada.

ADDITIONAL INFORMATION

The Northern Contaminants Program

The Canadian Northern Contaminants Program has been conducting monitoring and research on mercury and other pollutants in the Canadian Arctic since 1991. Monitoring activities are designed to assess mercury concentration trends in the atmosphere, terrestrial, freshwater and marine ecosystems, and human populations. Since 2004 this has involved annual monitoring of various fish and wildlife species. In order to better assess trend data, and interpret the environmental factors that influence trends, the Northern Contaminants Program funds research projects that examine how mercury cycles in the environment and how climate change might influence environmental processes. Research is also carried out on ecosystem and human health effects of mercury and other contaminants, which includes the Nunavik Child Development Study, one of few longitudinal epidemiological studies designed to assess the impacts of pre- and post-natal exposure to environmental contaminants. In 2012, the Northern Contaminants Program published its most recent assessment on Mercury in the Canada's North (<http://pubs.aina.ucalgary.ca/ncp/78702-English.pdf>). This was followed up by a special issue in Science of the Total Environment, Volumes 509–510, Pages 1-262 (15 March 2015) Special Issue: Mercury in Canada's North (<http://www.sciencedirect.com/science/journal/00489697/509/supp/C>)

Further information about the Northern Contaminants Program, including other recent publications, is available on the program's website: <http://www.science.gc.ca/ncp>