

toxic nation : at Queen's Park

A Report on Pollution in Three Ontario Politicians



Ontario Premier
Dalton McGuinty



Ontario NDP Leader
Howard Hampton



Ontario PC Leader
John Tory

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Overview

In Environmental Defence's most recent Toxic Nation body burden study, three Ontario politicians volunteered to be tested for 70 different chemicals. The participating politicians included Premier Dalton McGuinty, NDP Leader Howard Hampton, and Progressive Conservative Leader John Tory.

Each politician was tested for 70 chemicals that fall under the following groups:

- Phthalates;
- PCBs (polychlorinated biphenyls);
- PFCs (perfluorinated chemicals);
- OCPs (organochlorine pesticides);
- OPIMs (organophosphate insecticide metabolites);
- PAHs (polycyclic aromatic hydrocarbons), and,
- BPA (bisphenol A).

All four Environmental Defence Toxic Nation 'body burden' studies to date have provided strong Canadian evidence of what numerous investigations have found elsewhere in the world – people can be polluted with these, and other toxic chemicals no matter where they live and where they work. As our second report (*Polluted Children, Toxic Nation: A Report on Pollution in Canadian Families*) has illustrated, it does not even matter how old you are; both adults and children tested were found to have a long list of chemicals in their body.

Summary of Results and Key Findings

Of the 70 chemicals tested for a total of 46 were detected (66 per cent) in the three volunteers, including 8 phthalates, 13 PCBs, 4 PFCs, 10 OCPs, 4 OPIMs, 6 PAHs and BPA. The number of chemicals detected in each volunteer ranged from 41 to 44 (Table 1).

Many of the chemicals detected in the politicians are associated with adverse health effects. In total, 33 carcinogens, 24 hormone disruptors, 9 respiratory toxins, 39 reproductive/developmental toxins, and 12 neurotoxins were detected in the study volunteers (Table 2). Two chemicals for which there is no data on health effects were detected in the volunteers (Table 2); both of these chemicals are PFCs.

Table 1. Comparison of politician's test results: number of chemicals detected

Chemical Group	Number of Compounds Tested	Number of Compounds Detected			
		In All 3 People	Dalton McGuinty	Howard Hampton	John Tory
Phthalates	11	7	7	8	7
PCBs	16	11	11	12	13
PFCs	13	4	4	4	4
OCP	13	9	9	9	10
OPIM	6	2	4	3	3
PAHs	10	5	5	5	6
BPA	1	1	1	1	1
Total	70	39	41	42	44

Table 2. Number of chemicals detected in the politicians that are linked to a listed known or suspected health effect

Chemical's Effect on Health	Total Detected	Number of Chemicals Detected that are Linked to a Listed Health Effect		
		Dalton McGuinty	Howard Hampton	John Tory
Carcinogen	33	29	29	32
Hormone Disruptor	24	21	23	23
Respiratory Toxin	9	7	7	9
Reproductive/Developmental Toxin	39	34	35	37
Neurotoxin	12	11	10	11
No Data on Health Effects	2	2	2	2

*See Appendix 3 for information on how chemicals were categorized according to known or suspected health effects.

All three politicians tested were more polluted than the volunteers who participated in Environmental Defence's earlier study, *Polluted Children, Toxic Nation: A Report on Pollution in Canadian Families*, released in June 2006. A similar set of chemicals were tested in these Ontario politicians as were investigated in two other Toxic Nation studies: *Polluted Children, Toxic Nation*; and *Toxic Nation: On Parliament Hill A Report on Pollution in Four Canadian Politicians*. All three studies analyzed PFCs, PCBs, PAHs, OPIMs, and OCPs. The difference is that this study of Ontario politicians did not analyze PBDEs or heavy metals; instead, it analyzed phthalates and BPA. For the chemical groups the studies have in common, the same lab and methodology was used. A comparison of the Ontario politicians'

results to those of the volunteers in the first Toxic Nation study (*Toxic Nation: A Report on Pollution in Canadians*) was not conducted, due to differences in the chemicals that were tested.

All the politicians in this study had higher total concentrations than the median for the volunteers in the *Polluted Children, Toxic Nation* study in every comparable chemical group. The range of total concentrations was lower in this study than that found in *Toxic Nation: On Parliament Hill* for PFCs, PCBs, and OCPs. The range of total concentrations was higher in this study than that found in *Toxic Nation: On Parliament Hill* for PAHs. For OPIMs, the upper end of the range of total concentration for this study was below that of *Toxic Nation: On Parliament Hill*, while the lower end of the range was higher.

Of the three Ontario politicians, Dalton McGuinty had the highest concentration for OPIMs; Howard Hampton had the highest concentration of PAHs and phthalates, and John Tory had the highest total concentrations for PCBs, PFCs and OCPs. Dalton McGuinty and Howard Hampton had the highest concentration of BPA (Table 3).

Table 3. Comparison of politician’s test results: total concentrations per group of chemicals

Chemical Group	Total Concentration		
	Dalton McGuinty	Howard Hampton	John Tory
Phthalates (ug/L in urine)	224.6	272.01	267.1
PCBs (µg/L in plasma)	1.815	3.566	5.339
PFCs (ng/mL in serum)	29.77	25.151	31.8
OCP (µg/L in plasma)	1	1.671	2.832
OPIM (µg/L in urine)	49.2	27.2	28.8
BPA (ppb in urine)	0.65	0.650	0.30
PAHs (ug/L in urine)	0.563	1.68	0.812

Results by Chemical Group

Phthalates

8 of 11 phthalates tested for were detected (Table 1). Of the eight phthalates detected, all were found in each of the volunteers, except monocyclohexyl, which was only detected in Howard Hampton. This was the first Toxic Nation study to test for phthalates. The range of total phthalate concentration found among the politicians was 224.6 – 272.01 ug/L (Table 3, Figure 1). The highest total concentration for phthalates was detected in Howard Hampton (272.01 ug/L). The phthalates not detected in any of the volunteers were mono-iso-nonyl, monomethyl, and mono-n-octyl.

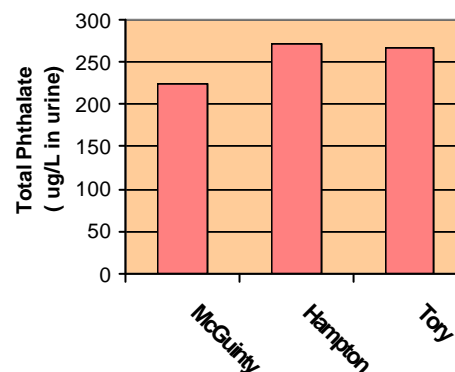


Figure 1. Comparison of total Phthalate concentrations in three politicians

PCBs (Polychlorinated Biphenyls)

13 of 16 PCBs tested for were detected (Table 1). All 13 of these were detected in every person tested, except for PCB 101 (detected in one person) and PCB 105 (detected in two people). The three PCBs that were not detected are PCB 28, 52, and 128. The total PCB concentrations ranged from 1.815 – 5.339 µg/L in plasma (Table 3, Figure 2), which is higher than the total median PCB concentration detected in *Polluted Children, Toxic Nation* (1.041 µg/L in plasma). The highest total PCB concentration was detected in John Tory (Table 3, Figure 2).

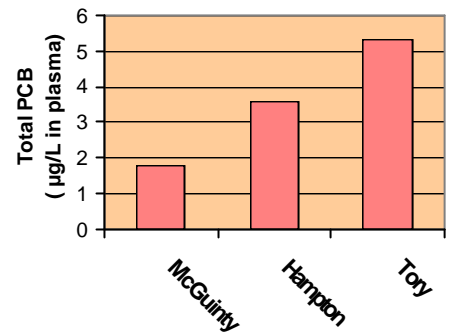


Figure 2. Comparison of total PCB concentrations in three politicians

PFCs (Perfluorinated Chemicals)

4 of 13 PFCs tested for were detected (Table 1), including PFOA, PFNA, PFHxS and PFOS. All four of these PFCs were detected in every person. The total PFC concentrations ranged from 25.151 – 31.8 ng/mL in serum (Table 3, Figure 3), which is higher than the total median PFC concentration detected in *Polluted Children, Toxic Nation* (17.345 ng/mL), but lower than the results found in *Toxic Nation: On Parliament Hill*. For each chemical detected, the range for this study was higher than the median in *Polluted Children, Toxic Nation*. For example, the range for PFOA in this study was 4.35 – 5.66 ng/mL, while the median in *Polluted Children, Toxic Nation* was 2.38 ng/mL. For PFOS, the range found in this study was 16.8 – 22.3 ng/mL, while the median in *Polluted Children, Toxic Nation* was 13.8 ng/mL. The highest total PFC concentration detected among the Ontario politicians was in John Tory (Table 3, Figure 3).

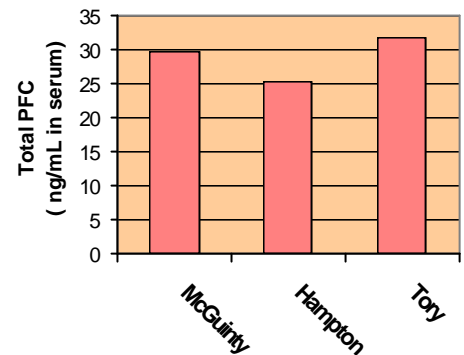


Figure 3. Comparison of total PFC concentrations in three politicians

OCPs (Organochlorine pesticides)

10 of 13 OCPs tested for were detected (Table 1); all 10 of these OCPs were detected in every person, except for p,p'-DDT, which was only detected in one person. The three OCPs that were not detected are aldrin, α-chlordane and γ-chlordane. The total OCP concentrations ranged from 1 – 2.832 µg/L in plasma (Table 3, Figure 4), which is higher than the total median OCP concentration detected in the *Polluted Children, Toxic Nation* study (0.602 µg/L), but a lower range than *Toxic Nation: On Parliament Hill* (1.862 – 4.077). The highest total OCP concentration detected among the politicians was in John Tory (Table 3, Figure 4).

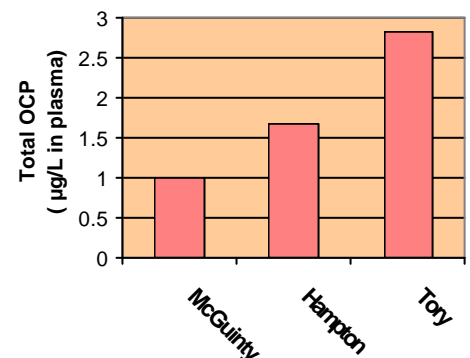


Figure 4. Comparison of total OCP concentrations in three politicians

OPIM (Organophosphate Insecticide Metabolites)

4 of 6 OPIMs tested for were detected (Table 1), including DEP (diethylphosphate), DMDTP (dimethyldithiophosphate) and DMP (dimethylphosphate) and DMTP (dimethylthiophosphate). Of the four detected, only DMP and DMTP were detected in all three people tested. For all four OPIMs detected, the median for this study was higher than the median found in *Polluted Children, Toxic Nation*. The total OPIM concentrations among the politicians ranged from 27.2 – 49.2 ug/L (Table 3, Figure 5). The highest total OPIM concentration detected among the politicians was in Dalton McGuinty (Table 3, Figure 5).

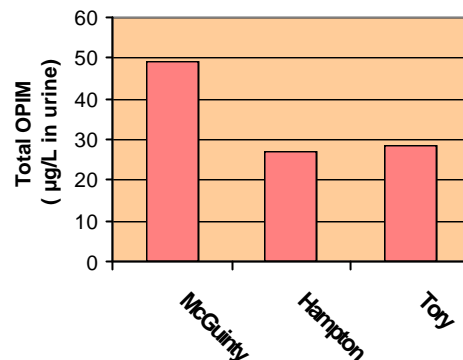


Figure 5. Comparison of total OPIM concentrations in three politicians

PAHs (Polycyclic Aromatic Hydrocarbons)

6 of 10 PAHs tested for were detected (Table 1). The four PAHs that were not detected are 1-OH-benz(a)-anthracene, 3-OH-benz(a)-anthracene, 3-OH-chrysene and 6-OH-chrysene. All of the PAHs detected were found in all of the volunteers, with the exception of 3-hydroxyfluoranthene, which was only found in John Tory. The PAH levels vary significantly among people, most likely because they are quickly metabolized and do not stay in the body for very long, which complicates the use of a sample as a representation of general exposure; as a result it is difficult to make comparative observations. Regardless, the results clearly show that the highest total PAH concentration detected among the politicians was in Howard Hampton (Table 3, Figure 6).

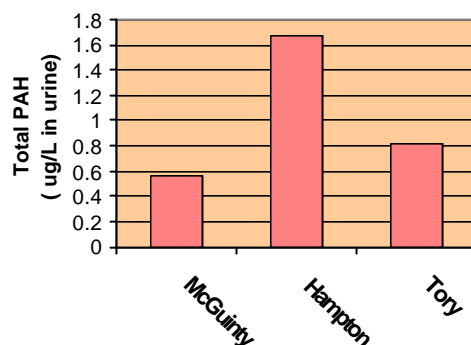


Figure 6. Comparison of total PAH concentrations in three politicians

BPA (Bisphenol A)

Bisphenol A was detected (Table 1), in every person tested. This was the first study in Canada to test for bisphenol A.

The bisphenol A levels detected in the politicians ranged from 0.30 – 0.65 ppb in urine (Table 3, Figure 7). All of the concentrations detected fall in the range of concentrations found in some studies to potentially cause health effects.

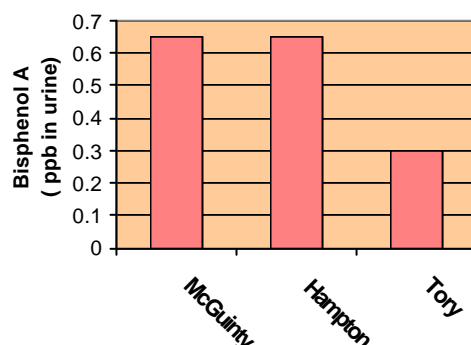


Figure 7. Comparison of bisphenol A concentrations in three politicians

Conclusion and Recommendations

The exposure to pollution that Canadians experience today is unacceptable. Often this exposure, and subsequent contamination, occurs without a person knowing how they came into contact with toxic chemicals. The three Ontario politicians tested are no exception. Two critical ways for Canadians, and Ontarians specifically, to help curb chemical exposures is to revamp Canada's national pollution law – the *Canadian Environmental Protection Act* (CEPA) – and to institute an *Ontario Pollution and Cancer Prevention Act*.

In December 2006, the federal government announced a new Chemicals Management Plan aimed at taking action on a list of harmful substances, including several chemicals in this report. The most harmful chemicals, identified by Health Canada and Environment Canada, should be phased out of use, except in rare instances (i.e. essential products for which less harmful substitutes are not available).

The *Canadian Environmental Protection Act* (CEPA), is currently being reviewed by Parliament. The federal government should amend CEPA in the following ways:

- The most harmful chemicals, which have already been identified by Health Canada and Environment Canada, should be phased out of use, except in rare instances (i.e. essential products for which less harmful substitutes are not available).
- Mandatory and tight timelines should be in place at each stage of the chemicals management process, from assessment to regulation.
- A special section of CEPA should deal with vulnerable ecosystems such as the Great Lakes-St. Lawrence basin, where 45 per cent of Canada's toxic air pollution is generated.
- CEPA should place the onus on industry to demonstrate that products in the marketplace are safe, as Europe is currently implementing with their new toxics law.
- CEPA should explicitly provide protections against harmful substances in consumer products, which are the source of an increasing number and volume of toxic chemicals.
- The system of industry reporting of toxic emissions, known as the National Pollutant Release Inventory, should be expanded to include more sectors and facilities and to require reporting on more substance.

Ontarians will be voting in October 2007 to elect a new government. Priorities for Ontario's Future, a coalition comprised of 13 of Ontario's leading environmental organizations, has outlined how an *Ontario Pollution and Cancer Prevention Act* could help protect human and environmental health.

The Act would include any substance listed in the federal National Pollutant Release Inventory, and require companies currently releasing those chemicals to find safer solutions. The Act would also include increasing public awareness of toxins, in part by ensuring that products containing carcinogens, mutagens (materials that disrupt genetic codes) and reproductive toxins would be labelled. Lastly, the Act would stipulate that funding be provided to support companies, workers, and citizens to reduce, and hopefully eliminate, the use and production of toxins.

The momentum for an *Ontario Pollution and Cancer Reduction Act* is growing. On August 20, 2007, the Canadian Cancer Society (CCS), Cancer Care Ontario (CCO) and their allies released a comprehensive cancer prevention strategy for Ontario. The strategy is called Cancer 2020, and its first recommendation stipulates that a "comprehensive, integrated, provincial regulatory strategy be developed for environmental toxics use reduction. This strategy will involve government and key stakeholders, and focus on goals and caps for carcinogen use reduction."

For background information on toxic chemicals and body burden testing, please refer to previous Toxic Nation Reports:

- Toxic Nation: A Report on Pollution in Canadians (November, 2005)
- Polluted Children, Toxic Nation: A Report on Pollution in Canadian Families (June 2006)
- Toxic Nation: On Parliament Hill (January, 2007)

All Toxic Nation Reports are available online at www.toxicnation.ca

Acknowledgements

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APPENDIX 1. OVERVIEW OF CHEMICAL GROUPS INCLUDED IN THE TESTING

BPA (bisphenol A)

Bisphenol A (BPA) is a hormone disruptor that is prevalent in our consumer products, and studies have detected it in surface and ground waters worldwide. BPA is found in such products as hard, clear plastic containers (including certain brands of baby bottles), the linings of some tin cans, and some types of dental sealants. All of the exposure pathways to people have not been identified, and it is possible, given the existence of BPA in some surface waters, that people could also become exposed to this chemical through their tap water and other interactions with the environment.

BPA is classified as a reproductive toxin by the European Commission. Based on this classification, BPA has been included in the Canadian federal Chemicals Management Plan. In this plan, BPA is considered to be a chemical of greatest concern given its high exposure and potential hazard to human health. The period of time within which Canadian manufacturers and importers must report on their BPA usage will be over at the end of September 2007. The government has until May 2008 to decide what action will be taken on this chemical.

Environmental Defence is calling on Canadian governments to respond to the mounting evidence against BPA with both an immediate and long-term action plan. Environmental Defence is currently gathering names for a petition to Ban BPA in food and beverage containers. This is the immediate action that governments need to take to protect the health of Canadians.

A longer term action plan must also be formulated by Canadian governments to address the broader concern of BPA prevalence in our everyday life. In many cases, the most effective form of pollution control is to substitute safer alternatives. Given the many pathways through which BPA enters our bodies, governments should conduct: a survey of which products in the Canadian market contain BPA; an assessment of safer substitutes; and an action plan for achieving substitution where safer alternatives exist for these products. Exemptions may be granted for products that are essential and for which the cost of substitution would be prohibitive.

Organochlorine pesticides

Organochlorine pesticides are mainly used on agricultural crops—the fruits and vegetables we all eat. Canada still allows the use of many organochlorine pesticides, even though research has shown that these chemicals are persistent and bioaccumulative. As a group of chemicals, organochlorine pesticides are recognized carcinogens and reproductive/developmental toxins; they are also suspected hormone disruptors and respiratory toxins. The most notorious organochlorine pesticide, DDT, is banned in Canada, but continues to be used in other countries.

Organophosphate insecticide metabolites (a.k.a. dialkyl phosphate metabolites)

Dialkyl phosphate metabolites are breakdown products of organophosphate insecticides such as parathion, diazinon, malathion, and chlorpyrifos, which have a variety of applications for lawns, agricultural crops, and mosquito and pest control. These chemicals are suspected of causing cancer and reproductive, developmental and neurological disorders.

In Canada, a variety of restrictions apply to the use of these chemicals, especially in residential settings. Many of these chemicals, however, are used extensively in agriculture in Canada and in other countries from which we import fresh produce.

PAHs (polycyclic aromatic hydrocarbons)

PAHs come from both natural and human-made sources, and are formed during the incomplete burning of coal, oil, gas, garbage, or other organic substances; some PAHs are manufactured.

Forest fires are the largest natural source of PAHs in Canada. The greatest human-made sources of PAHs in air, water and soil are aluminium smelters, coking plants, creosote-treated products, spills of petroleum products, and transportation.

PAHs have been identified as 'probably carcinogenic to humans', and are suspected reproductive and respiratory toxins. In Canada, some PAHs have been assessed under the Priority Substances List of CEPA, and 17 of them are subject to reporting under the NPRI, Canada's national pollution reporting program.

PCBs (polychlorinated biphenyls)

PCBs have been banned in Canada since 1977, yet they continue to be released into the environment from sources in other countries and from PCB-containing industrial equipment that is still in use here in Canada.

PCBs are highly toxic and persistent chemicals that build up in wildlife and people through the process of bioaccumulation. PCBs cause many types of cancer, as well as reproductive and developmental disorders. These chemicals damage the nervous, immune and cardiovascular systems, leading to birth defects, brain damage and decreased immune function. PCBs are also suspected of being hormone disruptors.

Under the Stockholm Convention on Persistent Organic Pollutants, Canada is required to phase out the remaining uses of PCBs (in electrical transformers and other equipment) by 2025 and to dispose of these PCBs in an environmentally sound manner by 2028.

PFCs (perfluorinated chemicals)

PFCs and their precursors are a group of chemicals widely used in a range of consumer products for their resistance to environmental breakdown. PFCs are used to make non-stick coatings on items such as cooking pans, and stain repellent coatings on everything from carpets and furniture to microwave popcorn bags and fast-food packaging. Two of the most well-known PFCs are PFOS and PFOA. PFOA belongs to the subgroup of PFCs known as perfluorinated carboxylic acids (PFCAs), and PFOS to the subgroup known as perfluorinated alkyl sulfonates.

Existing studies show that perfluorinated chemicals are extremely persistent and bioaccumulative, as well as probably cancer-causing, hormone disrupting and toxic to reproduction and development. Recent research indicates that a major source of PFCs in the environment is the migration of PFC precursors from consumer products. In the first-ever cross-Canada measurement of PFOS levels, Environmental Defence detected PFOS in all volunteers tested for *Toxic Nation: A Report on Pollution in Canadians*.¹ Similar findings have been reported from numerous other countries.²

Many concerned people and organizations around the world have called for the phase-out of specific compounds within the group of PFCs. Sweden has proposed that PFOS be banned globally under the Stockholm Convention on Persistent Organic Pollutants, and along with Britain, has applied to the European Commission for a national ban on the substance. As of 2005, the EC had initiated a Directive requiring EU-wide restrictions on PFOS. In the US, the 3M company (the major manufacturer of PFOS) voluntarily agreed to stop using the chemical by 2003 after receiving pressure from the US Environmental Protection Agency (EPA). In February 2006, concerns about the possible health threats of PFOA led US regulators to reach a voluntary agreement with eight companies to phase-out the use of this controversial substance. Under the agreement, companies will reduce emissions of PFOA from

¹ Environmental Defence. (2005, November).

² Kannan, K. et al. (2004). Perfluorooctanesulfonate and related fluorochemicals in human blood from several countries. Environmental Science and Technology. v 38, n.17, pp. 4489-4495.

their facilities and consumer products by 95 per cent by 2010, and work toward eliminating sources of PFOA by no later than 2015.

In June, 2006, Canada announced an Action Plan for PFCAs, and proposed a permanent ban on four fluorotelomer-based substances (precursors to PFCAs). The Action Plan aims to prevent the introduction of new PFCAs and their precursors to the market, and to work with industry to address PFCAs and precursors that are already on the Canadian market.

In July, 2006, the federal government also announced that PFOS, its salts and its precursors, will be added to the List of Toxic Substances (Schedule 1) of the Canadian Environmental Protection Act (CEPA). The government proposed regulations prohibiting the use, sale or import of PFOS and PFOS-containing products in Canada in December 2006. The proposed regulations do exempt certain uses, such as for semiconductors, film processing and metal plating, and they have yet to be finalized.

Unfortunately, the proposed regulations for the four fluorotelomer-based substances will not apply to consumer products that are imported from other markets. This is a major loophole that could leave Canadians exposed to these chemicals. In addition, the federal government has not yet completed its risk assessment of PFOA, and has excluded this compound from the PFCA Action Plan.

Phthalates

Phthalates are a group of man-made chemicals that are widely used as plasticizing additives in a broad range of consumer products, including cosmetic and personal care products, polyvinyl chloride (PVC) consumer products and construction materials. These chemicals are also used in synthetic fragrances to extend the scents' staying power. Phthalates are relatively persistent in the environment and have been found in drinking water, soil, household dust, wildlife, fatty foods (meat and dairy products) and in the blood and breast milk of people. Scientific research has shown that phthalates disrupt hormones, and are reproductive and developmental toxins.

APPENDIX 2. LIST OF CHEMICALS TESTED

Phthalates (11)

monomethyl phthalate
monoethyl phthalate
mono-n-butyl phthalate
monobenzyl phthalate
monocyclohexyl phthalate
mono-n-octyl phthalate
mono-3-carboxypropyl phthalate
mono-iso-nonyl phthalate
mono-2-ethylhexyl phthalate
mono-(2-ethyl-5-hydroxyhexyl) phthalate
mono-(2-ethyl-5-oxohexyl) phthalate

PCBs (Polychlorinated Biphenyls) (16)

PCB Aroclor 1260
PCB-101
PCB-105
PCB-118
PCB-128
PCB-138
PCB-153
PCB-156
PCB-163
PCB 170
PCB-180
PCB-183
PCB-187
PCB-28
PCB-52
PCB-99

OCPs (Organochlorine Pesticides) (13)

aldrin
α-chlordane
cis-nonachlor
γ-chlordane
hexachlorobenzene
mirex
oxychlordane
toxaphene parlar 26
toxaphene parlar 50
p,p'-DDE
p,p'-DDT
β-HCH
trans-nonachlor

PFCs (Perfluorinated Chemicals) (13)

PFBA
PFPeA
PFHxA
PFHpA
PFOA
PFNA
PFDA
PFUnA
PFDoA
PFBS
PFHxS
PFOS
PFOSA

OPIM

(Organophosphate Insecticide Metabolites) (6)

DEDTP (diethyl dithiophosphate)
DEP (diethyl phosphate)
DETP (diethyl thiophosphate)
DMDTP (dimethyl dithiophosphate)
DMP (dimethyl phosphate)
DMTP (dimethyl thiophosphate)

PAHs (Polycyclic Aromatic Hydrocarbons) (10)

1-OH-benz(a)-anthracene
1-OH-phenanthrene
1-OH-pyrene
2-OH-phenanthrene
3-OH-benz(a)-anthracene
3-OH-chrysene
3-OH-fluoranthene
3-OH-phenanthrene
4-OH-phenanthrene
6-OH-chrysene

BPA (Bisphenol A) (1)

APPENDIX 3. CATEGORIZING CHEMICALS ACCORDING TO EFFECTS ON HEALTH

All chemicals included in the study were categorized according to five groups of health effects: carcinogens, hormone disruptors, respiratory toxins, neurotoxins and reproductive/developmental toxins. The chemicals were categorized according to information obtained from Scorecard Chemical Profiles in April 2006,¹ with the exception of phthalates and bisphenol A, which were obtained in August 2007. Scorecard differentiates between chemicals that are recognized and suspected of causing adverse health effects; in our study we included both in our total count of health effects. Our result, for example, of 54 carcinogens detected includes both recognized and suspected carcinogenic chemicals.

For many of the chemicals in the study, information was available on the health effects of individual compounds; however, this was not the case for phthalates, perfluorinated chemicals, organophosphate insecticide metabolites, or polycyclic aromatic hydrocarbons. Scorecard does provide a group assessment for phthalates, organophosphate insecticide metabolites, and polycyclic aromatic hydrocarbons, so all the compounds within each of these groups are coded for the same health effects. For perfluorinated chemicals, data on health effects is only available for two compounds, PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate), the rest of the perfluorinated chemicals are coded as having 'no data on health effects'. The health effect data for PFOA and PFOS is based on the work of the Environmental Working Group which for these two compounds has more up-to-date data than Scorecard.

APPENDIX 4. SAMPLING AND ANALYTICAL METHODOLOGY

Laboratories:

- Centre de Toxicologie, Institut National de Santé Publique du Québec (INSPQ) in Ste-Foy, Quebec, conducted the analysis for:
 - polychlorinated biphenyls (PCBs), organochlorine pesticides, organophosphate insecticide metabolites, polycyclic aromatic hydrocarbons (PAHs), and phthalates
- AXYS Analytical Services in Sidney, British Columbia, conducted the analysis for:
 - perfluorinated chemicals (PFCs)
- XenoAnalytical LLC in Columbia, MO, USA, conducted the analysis for:
 - bisphenol A

Polychlorinated Biphenyls (PCBs) and Organochlorine Pesticides

Compounds	PCBs: PCB Aroclor 1260, PCB-28, PCB-52, PCB-99, PCB 101, PCB-105, PCB-118, PCB 128, PCB 138, PCB-153, PCB-156, PCB 163, PCB-170, PCB-180, PCB 183, PCB 187 Organochlorine pesticides: aldrin, α -chlordane, γ -chlordane, β -HCH, cis-nonachlore, p,p'-DDT, p,p'-DDE, hexachlorobenzene, oxychlordane, mirex, trans-nonachlore, toxaphene 26, toxaphene 50
Specimen	Plasma
Specimen collection container	10 mL lavender plastic Vacutainer BD #366643
Specimen collection	Immediately invert tube 8 to 10 times. Centrifuge for 10 minutes at 3000 rpm to isolate the plasma. Transfer plasma using a plastic transfer pipette into shipping container.
Shipping container	Pre-cleaned 7 mL screw-cap glass vial with teflon disc
Storage	4°C (samples to reach laboratory within 3 days)
Shipping	Shock-resistant cooler. Include ice pack.
Methodology	Gas Chromatography Mass Spectrometry (GC-MS)
Detection limit	0.0050 – 0.30 ug/L

Phthalates

Compounds	monomethyl phthalate, monoethyl phthalate, mono-n-butyl phthalate, monobenzyl phthalate, mono cyclohexyl phthalate, mono-n-octylphthalate, mono-is-nonyl phthalate, mono-2-ethylhexyl phthalate, mono-(2-ethyl-5-hydroxyhexyl) phthalate, mono-(2-ethyl-5-oxohexyl) phthalate
Specimen	Urine
Specimen container	125 mL Nalgene bottle
Specimen collection	Collect a spot sample preferably the first morning sample.
Storage temperature	Maintain frozen at -20°C
Shipping	Shock-resistant cooler. Include ice pack.
Methodology	High Performance Liquid Chromatography Mass Spectrometry (HPLC-MS-MS)
Detection limits	0.2 – 7.0 μ g/L

Polycyclic Aromatic Hydrocarbons (PAHs)

Compounds	3-OH-benz(a)-anthracene, 3-OH-chrysene, 6-OH-chrysene, 3-OH-fluoranthene, 1-OH-phenanthrene, 2-OH-phenanthrene, 3-OH-phenanthrene, 4-OH-phenanthrene, 1-OH-pyrene, 1-OH-benz(a)anthracene
Specimen	Urine
Specimen container	125 mL Nalgene bottle (#2104-0004)
Specimen collection	Collect a spot sample preferably the first morning sample.
Storage temperature	Maintain frozen at -20°C
Shipping	Shock-resistant cooler. Include ice pack.
Methodology	Gas Chromatography Mass Spectrometry (GC-MS)
Detection limit	0.005 – 0.01 ug/L

Organophosphate Insecticide Metabolites

Compounds	diethyl phosphate, dimethyl phosphate, diethyl thiophosphate, dimethyl thiophosphate, diethyl dithiophosphate, dimethyl dithiophosphate
Specimen	Urine
Specimen container	125 mL Nalgene bottle (#2104-0004)
Specimen collection	Collect a spot sample preferably the first morning sample.
Storage temperature	Maintain frozen at -20°C
Shipping	Shock-resistant cooler. Include ice pack.
Methodology	Gas Chromatography Mass Spectrometry (GC-MS)
Detection limit	0.30 – 1.0 ug/L

Perfluorinated Chemicals (PFCs)

Compounds	PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnA, PFDoA, PFBS, PFHxS, PFOS, PFOSA
Specimen	Serum
Specimen collection container	10 mL Red top (EDTA) Becton Dickinson Vacutainers (plastic)
Specimen collection	Avoid all contact of samples with Teflon, glass surfaces, sticky labels and adhesive tape. For each lot of number of vacutainers retain a single vacutainer unused and sealed to send to laboratory as a blank. Clot at room temperature for 60 minutes. Centrifuge vacutainer as soon as possible (same day). Decant/pour the serum into lavender top plastic vial. If using glass pipettes do not pipette the serum out.
Storage temperature	Refrigerate if sending within 24-48 hours, otherwise freeze.
Shipping	Place cool or frozen samples upright in shock-resistant cooler with ice packs.
Methodology	Liquid chromatography Mass spectrometry (LC-MS/MS)
Detection limit	0.452 – 1.12 nm/mL

Bisphenol A

Compound	Bisphenol A
Specimen	Urine
Specimen collection container	125 mL Nalgene bottle (#2104-0004)
Specimen collection	Collect a spot sample preferably the first morning sample.
Storage temperature	Maintain frozen at -20°C
Shipping	Shock-resistant cooler. Include ice pack.
Methodology	High Resolution Gas Chromatography Mass Spectrometry
Detection limit	0.08 nanograms in 2 mL of urine

¹Green Media Toolshed. (2005). Scorecard: Chemical Profiles. Retrieved online April 16, 2006 from <http://www.scorecard.org/chemical-profiles/>