ASSEMBLY OF FIRST NATIONS

First Nations Biomonitoring Initiative
Background Paper

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# Table of Contents

Table of Contents................................................................................................................... 3  
About the First Nations Biomonitoring Initiative ................................................................. 3  
  Purpose and importance of initiative ................................................................................ 3  
  Benefits of initiative ......................................................................................................... 4  
  How study results will be used ......................................................................................... 4  
Background on biomonitoring .............................................................................................. 4  
  What is biomonitoring? .................................................................................................... 4  
  Why is biomonitoring important? ................................................................................... 4  
  What does biomonitoring entail? .................................................................................... 5  
Background on chemical exposure ....................................................................................... 5  
  We live in a chemical world ............................................................................................ 5  
  Sources of exposure ........................................................................................................ 6  
  Routes of exposure .......................................................................................................... 6  
  Health implications ......................................................................................................... 6  
  Who is most vulnerable? ................................................................................................. 7  
    Risks to First Nations communities .......................................................................... 7  
    Risks to the fetus, infants and children .................................................................. 7  
  Risk assessment and total load ...................................................................................... 8  
Additional Resources .......................................................................................................... 9  
  Examples of other programs and studies .................................................................... 9  
  What you can do to reduce your exposure to toxins ................................................... 11  
  Safe alternatives ............................................................................................................. 13  
APPENDIX 1 .......................................................................................................................... 15  
  Chemicals Usually Tested For ..................................................................................... 15  
APPENDIX 2 .......................................................................................................................... 17  
  Chemical descriptions, sources, health impacts ......................................................... 17  
APPENDIX 3 .......................................................................................................................... 19  
  Links to groups that have carried out body burden testing ......................................... 19
About the First Nations Biomonitoring Initiative

Purpose and importance of initiative

The First Nations Biomonitoring Initiative seeks to assess the health of First Nations communities throughout Canada, by identifying chemicals that accumulate in community members, and determining the concentration of these chemical loads. The data collected could potentially be used in future studies to examine the sources and routes of exposure within communities. Community testing will take place over a two year period, starting in 2010. The goal of the initiative is to create baseline data for contaminants in First Nations communities.

The First Nations Biomonitoring Initiative will assess First Nations interest in a Canada-wide biomonitoring study. Recruitment for biomonitoring testing will only begin once this preliminary step takes place and it is found that such an initiative is supported by multiple communities, Chiefs and councils.

First Nations communities are especially vulnerable to chemical exposure. Cultural influence on diet can lead to an increase in exposure to harmful pollutants. The consumption of fish, marine mammals and wild game has cultural, spiritual and nutritional significance, but unfortunately, these food sources tend to have much higher concentrations of mercury and other persistent organic pollutants, such as PCBs, pesticides and PBDEs. Toxins build up in the fatty tissues of fish, marine mammals and other food sources through the process of bioaccumulation; in addition, many transboundary pollutants accumulate in North communities due to air and water currents.
and climate conditions. Communities are often situated close to industry and other sources of pollution, and community members can have occupations in industrial settings, both of which contribute to exposure levels.

**Benefits of initiative**

This study will help First Nations communities gain a better understanding of their exposures to a range of substances, determine whether a person or a group has an unusually high level of a contaminant in their body, identify potentially vulnerable groups that may experience higher levels of exposure, and track, over time, trends in levels of exposure in First Nations populations. One of the key benefits of the initiative is that it allows for the comparison of First Nations data at the national level to the Canadian Health Measure Survey and the Inuit Health Survey.

The results of this biomonitoring assessment will allow future research efforts to focus on the link between exposure and health, and provide information to guide action by individuals, communities and government(s).

**How study results will be used**

The study will not only help create baseline data on toxic exposure in First Nations communities across Canada, but will also determine what chemicals are contaminating community members. Through this important study, information will be collected which will be used to influence future policies.

**Background on biomonitoring**

**What is biomonitoring?**

Biomonitoring is a scientific technique for measuring the presence of chemicals in a person, by sampling and analyzing their tissues and fluids. Biomonitoring techniques are used to assess a person's body burden, which is the amount of toxic chemicals stored in the body at a given time.

**Why is biomonitoring important?**

Biomonitoring is a powerful tool for informing communities about potential negative health impacts of chemicals so First Nations can protect themselves. It provides strong evidence that people can harbour toxic chemicals no matter where they live, work or play.
Both adults and children tested using biomonitoring techniques have been found to have a long list of chemicals in their body.

Many of the chemicals detected in biomonitoring are associated with adverse health effects which have become more prevalent in recent years, such as carcinogens, hormone disruptors, respiratory toxins, neurotoxins and reproductive/developmental toxins.

**What does biomonitoring entail?**

Before any involvement in biomonitoring, potential volunteers are provided with a detailed information package and are required to sign consent forms to confirm their free and informed participation.

Once participants have been selected for the study, they must answer a brief lifestyle questionnaire, and are set up for an appointment at a local laboratory or clinic for testing. The participants provide samples which are sent from the laboratory where they are collected to independent Canadian laboratories that conduct the toxicological analysis.

The results of the tests are available six to eight weeks after the samples are taken and indicate: the chemical concentrations detected in blood and urine specimens, comparisons between individual test results and those of others who have been tested; and, other supplemental information to help participants and the larger community understand their results.

**Background on chemical exposure**

**We live in a chemical world**

We come into contact with chemicals in almost every aspect of our lives, and low levels of many toxic chemicals are detectable in individuals no matter what their age. Most of us are unaware that we are surrounded by harmful chemicals every day and that we carry the legacy of long-term chemical exposure in our bodies.

In the last 50 years, the global production and use of chemicals has escalated; more than 80,000 new chemicals have been created worldwide. In Canada, over 23,000 chemicals
are registered for use in the market, many of which are particularly harmful to children's health, and each year approximately 300 new substances are added to this list.

**Sources of exposure**

The contamination of Canadians is the result of industrial, commercial and individual pollution of our air, land and water with vast quantities of toxic chemicals, as well as the failure of people, sectors and government to adequately address the release of toxic chemicals during the use or disposal of a consumer product.

Toxic chemicals are found at low levels in a number of applications, in everything from personal care products, and cooking pots and pans, to electronics, furniture, clothing, food wrap and building materials.

**Routes of exposure**

Chemicals make their way into our bodies through our food, air, water, soil and dust. Chemicals are transferred to, or absorbed by, your body through your lungs, digestive system, and skin. Chemical uptake occurs through inhalation, ingestion and dermal (skin) contact. For instance, the main route of exposure for chemicals carried in food is your stomach, where chemicals are absorbed through digestion. Chemicals carried in air can enter your body through inhalation and skin contact. Contaminants in water and soil are absorbed through all three main routes of exposure.

**Health implications**

A large body of scientific research links exposure to toxic chemicals to many ailments that plague Canadians, including several forms of cancer, reproductive problems and birth defects, respiratory illnesses such as asthma, and neurodevelopmental disorders such as Attention Deficit Hyperactivity Disorder (ADHD). Chemicals can also be toxic to the
immune system, the kidneys, the gastrointestinal system and liver, skin and sense organs, the musculoskeletal system, and the cardiovascular system.

*Who is most vulnerable?*

**Risks to First Nations communities**

First Nations communities are especially vulnerable to chemical exposure for a number of reasons. Cultural influence on diet can lead to an increase in exposure to harmful pollutants. For example, the consumption of fish, marine mammals and wild game has cultural, spiritual and nutritional significance, but these food sources also tend to have much higher concentrations of mercury and other persistent organic pollutants, such as PCBs, pesticides and PBDEs. Toxins build up in the fatty tissues of fish, marine mammals and other food sources through the process of bioaccumulation. In First Nation communities higher risk groups for contamination are: infants, pregnant and breastfeeding women, and Elders.

In addition, many transboundary pollutants accumulate in Northern communities due to air and water currents and climate conditions.

Communities are often situated close to industry and other sources of pollution. Due to proximity to these industrial areas many community members may work in these industrial settings increasing their level of exposure to toxic contamination.

**Risks to the fetus, infants and children**

Children are more vulnerable than adults to negative health effects from environmental exposures due to their physiology and behaviour. Because children's bodies and physiological systems undergo substantial growth and development from conception through adolescence, they are particularly sensitive to chemical interference. They are particularly sensitive to chemical interference because their bodies rapidly grow and change from before birth through adolescence. By far the most vulnerable time in a child's development is while in the womb and during childhood. During this time, major organs,
body structures, and the nervous and reproductive systems are formed and environmental exposures may lead to anatomical abnormalities and physiological defects. Children's exposure and vulnerability to harmful chemicals are also affected by other genetic, social, economic, nutritional, and cultural factors.

**Risk assessment and total load**

The presence of chemicals everywhere means that people are exposed to multiple chemicals everyday of their life. Some are so hazardous that they can have effects at very low doses. However, governments often determine if such a chemical is “safe” on the basis of how much is in our environment. Whether or not a chemical is “safe” is usually partly based on computer-modeled data and not entirely based on real-world data. Also, very few studies or government risk assessments examine the health effects of our exposure to low levels of lots of different toxic chemicals at the same time, which is the way we often encounter them in every day life.

Most biomonitoring studies carried out by government and researchers in the past have focused on specific chemicals rather than capturing data on the cumulative body burden of people. The prevalence of chemical use and the ubiquitous nature of many pollutants mean that people are exposed to low doses of multiple chemicals everyday of their life. Very few studies or government risk assessments have examined the health effects of multiple low level exposures to toxic chemicals. As a result, chemicals on the market have been identified as 'safe' based on lack of proof of harm, rather than on the basis of rigorous scientific proof of safety.

In addition, the small number of biomonitoring studies and risk assessments that have been conducted have mainly focused on measuring contaminant levels in adults. Recent studies focus on low dose exposures and chemical loads during critical periods of fetal development or infancy-effects, which often do not surface until later in life.

Biomonitoring does have some short-comings in that it can be very expensive to conduct testing. Often biomonitoring studies are not fully encompassing simply because funding for the types of testing that the project would like to do are too expensive. Often researchers have to choose which chemicals are more of a risk to individuals and choose based on that knowledge.

The First Nations Biomonitoring Initiative will create baseline data on the exposure levels of First Nations’ people. This will enable researchers to compare First Nations’ data to that of Canada’s (Canadian Health Measure Survey) and Inuit (Inuit Health Survey) population baseline data. The baseline data will also provide information for future studies, allowing researchers to observe trends and connections between exposure to toxins and health. The Biomonitoring Initiative will test individuals for a large comprehensive suite of
chemicals, vitamins and nutrients that will provide researchers with an extensive perspective on that individual’s body burden.

**Additional Resources**

*Examples of other programs and studies*

Biomonitoring has been conducted around the world to analyze chemicals in various populations. Studies have been both small and large-scale in focus.

The Canadian Health Measures Survey (CHMS) is an ongoing project that was launched in 2007 by Health Canada in collaboration with Statistics Canada. Biomonitoring is an integral part of the CHMS. The CHMS collects key information that will create national baseline data on the extent of such major health concerns as obesity, hypertension, cardiovascular disease, exposure to infectious diseases, and exposure to environmental contaminants. The biomonitoring portion of the CHMS will help to meet the need for nationally representative data on human levels of environmental chemicals. Blood and urine specimens are collected and analyzed for a number of contaminants including metals, PCBs, flame retardants, pesticides, insecticides, herbicides, and bisphenol-A among others. In December 2008 Statistics Canada released a report titled, “Lead, mercury and cadmium levels in Canadians” by Suzy L. Wong and Ellen J.D. Lye. The report presented preliminary data on blood levels of lead, total mercury, and cadmium in Canadians.

The US Center for Disease Control and Prevention (CDC) has also conducted biomonitoring studies where they have tested people aged one year and older for over 100 chemicals (including metals, PCBs, dioxins and furans, and various pesticides, insecticides, and herbicides). The CDC's reports show that many chemicals known to harm human health were detected in the US population.

Environmental Defence, under their Toxic Nation program, used biomonitoring to identify the types and levels of pollutants in the bodies of Canadian adults, families, and children. In the first Toxic Nation report, the only First Nation’s person tested showed the highest levels of mercury and Persistent Organic Pollutants (POPs), such as PCBs and organochlorine pesticides. These findings are consistent with numerous previous scientific
studies which have documented elevated levels of POPs in the North and particularly among First Nations populations. In the second report, another First Nations’ person who was tested had the highest total concentrations for PCBs and organochlorine pesticides. That persons’ son had the highest total number of chemicals detected in a volunteer (36 of 68), as well as the highest total concentrations for PBDEs and PFCs. He also had the highest level of PFOS and the highest concentration of cadmium.
Take Action!

What you can do to reduce your exposure to toxins

Clean Your Indoor Air Quality
Poor indoor air quality can expose you to a number of pollutants such as VOCs and mould.
Solution: Don’t smoke indoors; control humidity; allow air-flow; dust and vacuum regularly; don’t store paints, solvents, or varnishes in the home; and keep fuel-burning appliances maintained.

Eat Organic
Many commercially grown fruits and vegetables are grown with organochlorine pesticides. These are highly toxic and environmentally persistent. They have also been shown to cause cancer, and immune system and reproductive damage. Unfortunately while eating organic is preferable, due to the lack of regulations around organic producers, make sure to buy from a trusted source. Farmers markets are great places to start or grow your own food. Always make sure to wash your fruits and vegetables before eating them.
Solution: Eat Organic. When it’s not possible to eat organic, try to have a variety of foods in your diet. This helps to keep you from being exposed to the same pesticide repeatedly.

Choose Personal Care Products Carefully
Many products expose you to a wide range of chemicals with various potential health effects: hormone disruption, cancer, damage to reproduction and development.
Solution: Avoid products that contain sodium lauryl sulphate, cocamide dea (diethanolamine), formaldehyde, benzyl violet, nonyphenols, parabens, phthalates, EDTA, polyethylene glycol, triclosan, synthetic dyes, and fragrances. These chemicals should be listed under the ingredients section on the back of most personal care products.

Avoid Plastics with Bisphenol A
In June 2009, the Government of Canada decided to prohibit the advertisement, sale and importation of polycarbonate baby bottles. Polycarbonate plastics often contain bisphenol A (a.k.a. BPA), a chemical that
mimics estrogen and may be linked to breast and prostate cancer. Prohibiting bisphenol A in baby bottles will reduce newborn and infant exposure to the chemical. It is important to note that this new regulation does not ban bisphenol A completely. Bisphenol A can also be found in the lining of some food cans. It can leach into food and beverages.

**Solution:** Avoid plastic containers, mainly those with the plastic code ‘7’. Switch to using non-plastic containers such as glass, stainless steel, or ceramic. Do not heat up your food in a plastic container in the microwave, if you can transfer food to a non-plastic container such as a bowl or plate. Be conscious that the liners of some canned foods may contain bisphenol A and act accordingly.


**Choose Chemical-free Lawn Care**
Organophosphate insecticides are known neurotoxins, and chronic exposure causes reproductive system damage resulting in reduced fertility.

**Solution:** Use chemical-free gardening methods such as mulching, composting and planting flowers that attract beneficial insects to feed on pests.

**Get Green School Supplies**
School supplies can expose you to a wide range of toxic chemicals such as PVC plastics, formaldehyde, and toxic solvents.

**Solution:**
- For back packs: choose organic cotton, hemp or recycled rubber
- For paper: choose chlorine-free, post-consumer recycled
- For markers/pens: use water-based, non-toxic writing utensils
- For lunch containers: avoid #3 and #7 plastics; use re-usable utensils
- For desks: avoid wood treated with formaldehyde (particleboard, fibreboard, plywood); choose solid wood with a non-toxic finish, or buy furniture from stores that are committed to formaldehyde-free wood.

**Say NO to Stain Repellents and Non-stick cookware**
Perfluorooctane sulfonate (PFOS) is found in stain repellent clothing and carpets. Studies suggest that PFOS may cause cancer and disrupt hormones, and resist environmental breakdown. PFOS is also used in some but not all non-stick cookware. These chemicals that make some cookware non-stick are also suspected of causing cancer, disrupting hormones and harming reproduction and development. PFOA, the chemical in Teflon, will be phased out by 2015

**Solution:** Research your options, and find alternatives that are PFOS free.

**Get Rid of the DEET Insect Repellent**
Many bug sprays contain DEET, which is a suspected neurotoxin, reproductive toxin, and respiratory toxin. Health Canada warns: Don’t use personal insect repellents containing DEET on infants.
Solution: Use soybean oil-based repellents. Also remove all standing water around your property, wear light-coloured clothing that covers the skin (pants and long-sleeved shirts), avoid scented personal care products, and limit outdoor activities at dawn and dusk when bugs generally bite.

No Need for Toxic Cleaning Products
Benzene, toluene, ethylebenzene, xylene, methanol, bleach/sodium hypochlorite, fragrances, formaldehyde, naphthalene and phosphoric acid are associated with a variety of health concerns, including cancer, hormone disruption and immune and organ damage. Solution: Make your own cleaners with vinegar, baking soda, vegetable oil, and lemon juice.

Avoid Toxic Flame Retardants (PBDEs)
PBDEx are suspected of disrupting hormones, causing cancer and developmental disorders. Solutions: Research and find companies the have phased out the use of PBDE flame retardants. Buy furniture from companies who are committed to products free from hazardous substances.

Safe alternatives

Living Room
1. Avoid: Carpets, curtains, upholstery and furniture that contain stain repellants and brominated flame retardants
   Use: Organic or natural fibre carpets, such as wool, cotton, rattan or jute, and furniture and curtains with no toxic chemicals.
2. Avoid: PVC-containing mini-blinds from Mexico or Asia (they may contain lead)
   Use: Blinds made in Canada
3. Avoid: Chemical air fresheners
   Use: Pot pourri, baking soda, or open the windows. You can also try homemade air freshening recipes. House plants clean air by absorbing chemicals and converting them into food and energy. Top air-cleaners include philodendron, Boston fern, peace lily and English ivy.

Kitchen
1. Avoid: Vinyl floors
   Use: Wooden, ceramic, marble, cork or bamboo flooring
2. Avoid: Canned food (the cans are lined with an epoxy resin that may leach bisphenol A)
   Use: Fresh, frozen or dried food
3. Avoid: Plastic food wrap (may contain bisphenol A)
   Use: Aluminum foil, wax paper, food-grade reusable containers.
4. **Avoid**: PVC and polycarbonate plastic items (bottles, containers, etc). These plastics are labeled # 3 and 7. (The number is usually found on the bottom of the item inside a recycle symbol)
   **Use**: Glass containers, or plastics # 1, 2, 4 and 5

5. **Avoid**: Microwaving food in plastic wrap, or plastic containers that are not marked microwave safe
   **Use**: Glass, ceramic and plastic containers that are labeled microwave safe.

6. **Avoid**: Produce treated with pesticides
   **Use**: Organic food. However find a producer who you trust truly does produce organic food.

7. **Avoid**: Non-stick cookware and ceramic glazed cookware (may contain cadmium and lead)
   **Use**: Cast iron, stainless steel, or glass cookware, or terra cotta without lead glaze

8. **Avoid**: Crystal tableware (may contain lead)
   **Use**: Glass tableware.

9. **Avoid**: Cleaning products with harsh chemical ingredients and synthetic fragrances (often strengthened with phthalates)
   **Use**: Fragrance-free and biodegradable products, and homemade all-purpose cleaners.

10. **Avoid**: Antibacterial soaps, dishwashing liquids and other cleaners that contain triclosan
    **Use**: Look for soaps and cleansers that do not contain triclosan. There are many alternative ‘green’ products on the market now.

**Bedroom**

1. **Avoid**: Sheets that are wrinkle-resistant (they contain formaldehyde), or made with pesticide-treated cotton.
   **Use**: Sheets that are 100% cotton, hemp, linen or wool.

2. **Avoid**: Moth-proof wool blankets (they contain pesticides)
   **Use**: Wool blankets without a moth-proofing treatment

3. **Avoid**: Clothing with stain repellants, wrinkle-resistant treatments (they contain formaldehyde), brominated flame retardants, pesticide-treated cotton, or plastic labels.
   **Use**: Organic clothing made of cotton, hemp, linen or wool.

For more information visit the Environmental Stewardship Unit’s website at [http://www.afn.ca](http://www.afn.ca)

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APPENDIX 1

Chemicals Usually Tested For

Chemicals that have been tested for in other biomonitoring studies fall under the following groups below. These chemicals are considered some of the most harmful chemicals to human health, and include carcinogens, hormone disruptors, reproductive/developmental toxins and respiratory toxins.

- **Phthalates**: monomethyl phthalate, monoethyl phthalate, mono-n-butyl phthalate, monobenzyl phthalate, monocyclohexyl phthalate, mono-n-octyl phthalate, mono-3-carboxypropyl phthalate, mono-isooctyl phthalate, mono-2-ethylhexyl phthalate, mono-(2-ethyl-5-hydroxylhexyl) phthalate, mono-(2-ethyl-5-oxoohexyl) phthalate;


- **PFCs (perfluorinated chemicals)**: PFBA, PFPeA, PFOA, PFHxA, PFHpA, PFNA, PFDA, PFUnA, PFDoA, PFBS, PFHxS, PFOS, PFOSA;

- **OCPs (organochlorine pesticides)**: Aldrin, α-chlordane, Cis-nonachlor, γ-chlordane, Hexachlorobenzene, Mirex, Oxychlorodane, toxaphene parlar 26, toxaphene parlar 50, p,p’-DDE, p,p’-DDT, β-HCH, Trans-nonachlor;

- **OPIMs (organophosphate insecticide metabolites)**: Diethyl dithiophosphate (DEDTP), Diethyl phosphate (DEP), Diethyl thiophosphate (DETP), Dimethyl dithiophosphate (DMDTP), Dimethyl phosphate (DMP), Dimethyl thiophosphate (DMTP);

- **PAHs (polycyclic aromatic hydrocarbons)**: 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);**

- **PBDEs (polybrominated diphenyl ethers)**: PBB 153, PBDE 100, PBDE 153, PBDE 47, PBDE 99;

- **Heavy metals**: cadmium, lead, manganese, arsenic, mercury; and,
• **VOCs (volatile and semivolatile organic compounds):** Benzene, Toluene, Ethylbenzene, M.P. Xylenes, O-Xylene, Styrene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, Chloroform, Dichloromethane, 1,1,1-Trichloroethane, Trichloroethene, Tetrachloroethene, 1,2-Dichlorobenzene, 1,3- Dichlorobenzene, 1,4- Dichlorobenzene, Bromodichloromethane, Carbon Tetrachloride, 1,1-Dichloroethene, Trans-1,2-Dichloroethene, MTBE, Cis-1,2-Dichloroethene, 1,2-Dichloroethane, 1,2-Dichloropropane, 1,1,2-Trichloroethane, Dibromochloromethane, Chlorobenzene, Tetrachloroethylene.
APPENDIX 2

Chemical descriptions, sources, health impacts

The following chemicals can be characterized in one or all three of the following type of toxin: carcinogen, mutagen, and teratogen. These three toxins that have adverse health effects. Carcinogens may cause cancer; some examples include asbestos and benzene. Mutagens can cause mutations or changes in a person or animal’s body that may lead to disease or abnormalities in future generations. Mutagens may cause abnormalities in reproductive cells (eggs and sperm) and/or cells not part of the reproductive system (skin or lung cells). Examples of mutagens include chloroform, benzene, and lead. Finally, a teratogen toxin may cause birth defects, abnormalities, developmental delays, or death in children in the absence of significant harmful effect on the mother.1

- **Phthalates**: used in a range of consumer products, including cosmetic and personal care products, synthetic fragrances, PVC (“vinyl”) consumer products, and construction materials. Disrupt hormones and can cause birth defects of male reproductive organs.

- **PCBs (polychlorinated biphenyls)**: banned in Canada since 1977, but continue to be released into the environment from PCB-containing industrial equipment still in use, and from sources in other countries. Cause cancer; damage the nervous, immune and cardiovascular systems; and lead to birth defects, brain damage, and decreased immune function.

- **PFCs (perfluorinated compounds)**: used in a range of consumer products, such as stain repellents on clothing and other fabrics, food packaging, and Teflon® products (e.g., non-stick cookware). Can cause cancer and disrupt hormones. Common PFCs include perfluorohexansulfonate (PFHS), perfluoroctane sulfonate (PFOS), and perfluorooctane acid (PFOA).

- **OCPs (organochlorine pesticides)**: many of their uses have been restricted because they persist in the environment (e.g., DDT). Can enter environment from direct application and runoff, emissions from waste incinerators, releases from manufacturing plants, and disposal of contaminated waste in landfill. Recognized carcinogens and reproductive/developmental toxins, suspected hormone disruptors and respiratory toxins.

- **BPA (bisphenol A)**: used to make polycarbonate plastic (recycling # 7) food and beverage containers and linings of metal cans for foods. Known hormone disruptor

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that can cause reproductive damage and birth defects, which may lead to prostate and breast cancer in adulthood.

- **PBDEs (polybrominated diphenyl ethers):** used as flame retardants in upholstered furniture, mattresses, curtains, carpets, clothing, and electronics. Suspected hormone disruptors and can cause cancer, reproductive and developmental disorders. Has damaging effects on the thyroid, and may cause neurodevelopmental disorders such as learning disabilities and behaviour problems.

- **Heavy metals:** most common source of exposure is food. Some are known to cause cancer, reproductive and developmental disorders, and may be respiratory toxins.
  - **Cadmium:** exposures come from dyes and bakeware, electronic equipment, car parts, batteries, phosphate fertilizer, sludge applications in agriculture, cigarettes and contaminated food. Known to cause lung and prostate cancer, and is toxic to the gastrointestinal tract, kidneys, respiratory, cardiovascular, and hormonal systems.
  - **Lead:** exposures come from lead paint as well as emissions from industrial facilities like metal smelters. Lead shot, spent bullets and fishing sinkers used in hunting and fishing are common sources of lead. Found in crystal tableware, porcelain enamel and contaminated food. Suspected carcinogen, a known hormone disruptor, and can damage almost every organ and system in the human body, particularly the nervous system. Cause of decreased mental ability, developmental delays, behavioural disorders, and reproductive defects.
  - **Mercury:** sources include coal-fired power plant emissions and emissions from mining and manufacturing processes, and mercury-containing products, such as thermometers, batteries, and fluorescent light tubes. Eating contaminated fish and seafood is the most common pathway of mercury contamination. Recognized developmental toxin, and is a suspected hormone disruptor, neurotoxin, reproductive toxin and respiratory toxin.

- **VOCs (volatile and semivolatile organic compounds):** include xylene, benzene, and toluene. Found in many household products, including paints, varnishes, paint stripping products, and adhesives. Contribute to poor air quality and are one of the building blocks of smog. Can cause cancer and is toxic to the nervous system, and damage reproductive, neurological and respiratory systems. May also contribute to birth defects and impaired kidney and liver function.
APPENDIX 3

Links to groups that have carried out body burden testing


Inuit Health Survey - http://www.inuithealthsurvey.ca/

Environmental Defence - www.environmentaldefence.ca

Environmental Working Group -
Body Burden- The pollution in people -- EWG has conducted two studies on the pollution inside people. For the first study, blood and urine from nine people were tested for 210 chemicals that occur in consumer products and industrial pollution. The second study was a benchmark investigation of industrial chemicals, pollutants and pesticides in the umbilical cord blood of ten newborns.

Contaminated Britain -- As part of their Chemicals and Health Campaign, WWF UK has conducted five major surveys to explore which hazardous man-made chemicals are contaminating our bodies and to what extent.

Northwest Environment Watch -
http://www.northwestwatch.org/scorecard/pollution.asp
Cascadia Scorecard: Pollution Indicator -- NEW researchers conducted a study of breastmilk to determine the extent to which persistent chemicals are contaminating northwesterners. The breast milk of forty mothers from British Columbia, Montana, Oregon, and Washington were analyzed for PBDEs and PCBs.

Commonweal - http://www.commonweal.org/programs/brc/
Visit Commonweal's Biomonitoring Resource Centre and read their report Taking It All In — Documenting Chemical Pollution in Californians Through Biomonitoring, the first study of its kind that measures the chemical pollution in a cross-section of Californians.

Center for Disease Control and Prevention (US) - http://www.cdc.gov/exposurereport/
The Third National Report on Human Exposure to Environmental Chemicals provides an ongoing assessment of the exposure of the U.S. population to chemicals in the environment.
Environmental Health News - http://www.environmentalhealthnews.org
This site provides quick access to breaking environment and health stories from around the world.

Canadian Partnership for Children’s Health and the Environment (CPCHE) -
http://www.healthyenvironmentforkids.ca/english/
CPCHE is an affiliation of organizations working together to protect children's health from environmental contaminants.

Environmental Health Association of Nova Scotia -
http://www.lesstoxicguide.ca/index.asp
This Canadian Guide to Less Toxic Products provides information about potential health risks of commonly used products, and helps visitors identify less toxic alternatives for personal care, household cleaning, baby care, and household pest control.

Greenpeace UK -
Read the report: Consuming chemicals in house dust as an indicator of chemical exposure in the home.

Read the report: Causes for Concern: chemicals and wildlife.

Our Stolen Future - www.ourstolenfuture.com
A comprehensive source of scientific information on endocrine (a.k.a. hormone) disruption by common contaminants

Reports

Lead, mercury and cadmium levels in Canadians – Canadian Health Measure Survey

Toxic Nation: A Report on Pollution in Canadians – Toxic Nation
Polluted Children, Toxic Nation: A Report on Pollution in Canadian Families – Toxic Nation

Body Burden - The Pollution in Newborns – Environmental Working Group
Body Burden - The Pollution in the People – Environmental Working Group

Taking It All In: Documenting Chemical Pollution in Californians Through Biomonitoring – Commonweal

National Report on Human Exposure to Environmental Chemicals - Center for Disease Control and Prevention (US)