# CACAR II *factsheet*

## *Northern Contaminants Program*

The Northern Contaminants Program (NCP) was established in 1991 in response to concerns about human exposure to elevated levels of contaminants in the fish and wildlife species important for the traditional/country food diets of northern Aboriginal peoples. Early studies indicated that a wide spectrum of substances – persistent organic pollutants, heavy metals, and radionuclides – many of which had no Arctic or Canadian sources, were nevertheless reaching unexpectedly high levels in the Arctic ecosystem.

The first phase of the NCP (NCP–I) (1991-1996) focussed on gathering the data required to determine the levels, geographic extent, and sources of contaminants in the northern atmosphere, environment and its people, and the probable duration of the problem. Results from NCP-I were published in 1997 in the first *Canadian Arctic Contaminants Assessment Report* (CACAR).

During its second phase, which ran from 1998–2003, the NCP focussed on:

- impacts and risks to human health that may result from current levels of contaminants in key Arctic food species
- temporal trends of contaminants of concern in important indicator Arctic species and air
- improved education and communications activities involving northern communities
- efforts to control contaminant production, use and disposal at the international level

NCP–II addressed these issues under a number of subprograms: human health; monitoring the health of Arctic peoples and ecosystems and the effectiveness of international controls; education and communications; and international policy. The results of the research and related activities conducted during NCP–II are summarized in the *Canadian Arctic Contaminants Assessment Report II* (CACAR II) series of reports, which was released in March 2003. CACAR II is a comprehensive assessment of the last five years of research and related activities on northern contaminants funded under the NCP.

Five fact sheets have been developed, one for each of the CACAR II reports. These fact sheets provide a snapshot of many of the significant NCP research results described in each report.

## *Canadian Arctic Contaminants Assessment Report II*

# Highlights Report

The CACAR II Highlights report presents in plain language the main results of the four technical reports in the CACAR II series.

The North is particularly vulnerable to certain contaminants. Persistent organic pollutants – POPs – disappear more slowly and persist longer than in southern regions. Traditional/country foods are a major route for human contaminant exposure and Aboriginal northerners have fewer acceptable alternatives to these foods than do most other Canadians. Contaminants can therefore be of concern to northern Aboriginal people.

The traditional knowledge (TK) of the northern Aboriginal peoples, together with western science, have made valuable and complementary contributions to defining the problem of contaminants in northern Canada and in setting priorities under the NCP. This grassroots perspective involves connecting with people in communities, meeting concerns, and conducting research to provide answers about traditional/country foods.

## *Contaminants in the physical environment*

Contaminants enter the food web from the physical environment (e.g. air, snow, water, soils). Although levels of contaminants in the physical environment are not of direct concern to the health of people or animals, they can become a concern once they enter the food web and certain traditional/country food species.

Most human-made contaminants arrive in the North on air currents from sources such as Europe, Russia, North America and Asia. Oceans are also important for transporting e.g. the beta- and, increasingly, the alpha-hexachlorocyclohexanes (alpha- and beta-HCHs).

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada
Canada

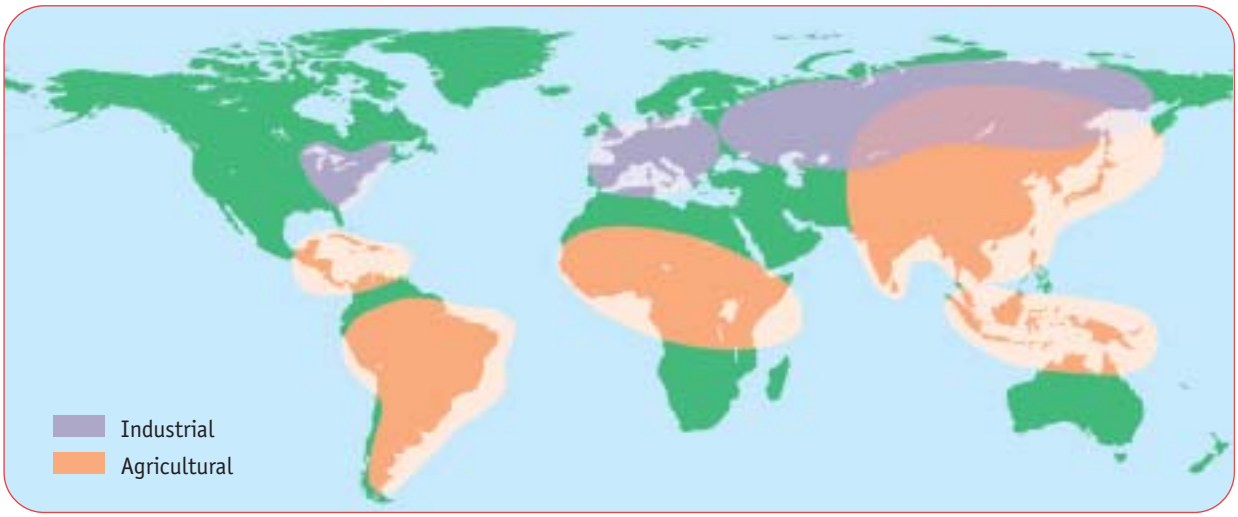


***Figure 1:*** *Sources of Agricultural and Industrial Contaminants*

Some contaminants come from countries that still actively use them, while leftover residues may be the main sources of other contaminants (Figure 1).

The levels of most contaminants in the air are declining slowly across the Arctic including northern Canada though it is not yet possible to tell whether mercury levels are increasing or decreasing. Several new human-made POPs have been detected at very low levels, including the brominated flame retardants (e.g. PBDEs), chlorinated paraffins (PCAs) and perfluorooctane sulfonate (PFOS).

A potentially important phenomenon involving mercury was discovered by Canadian scientists during NCP-II called a Mercury Depletion Event (MDE). Each year as the sun reappears after the long polar night, atmospheric mercury is transformed and deposited onto the snow surface. MDEs may be an important pathway for making atmospheric mercury available to plants and animals.

## *Contaminants in the biological environment*

Seals, whales, caribou and different species of fish are some of the most frequently consumed traditional/country foods among northern Aboriginal peoples, and contaminants were studied in these and other important species.

Many NCP projects rely on community involvement to collect fish and wildlife samples. Local harvesters have gained experience in scientific sampling of wildlife and are highly skilled in maintaining standards and procedures. Often local Hunters and Trappers Organizations and Committees liaise between scientists and harvesters and some researchers have employed local people to conduct and record interviews.

There is no evidence that levels of mercury or other heavy metals are increasing overall in fish or wildlife, though mercury is increasing in seabirds, and both mercury and cadmium are elevated in marine mammals near the mouths of large rivers.

### Ringed Seals

Levels of some contaminants (especially mercury and new POPs) are increasing in the organs of some ringed seal populations but there is much variation from seal to seal (Figure 2). While still very low, levels of PBDEs are now nine times higher than they were in 1981 in seal blubber from Holman (Uluqsaqtuuq). Levels of older POPs in ringed seal blubber tend to be similar across the North and are decreasing in some populations. There is no evidence that current levels of contaminants are a health hazard to the seals.

### Beluga Whales

Mercury levels have quadrupled in the livers of beluga whales from the Beaufort coast during the 1990s, and increased at least 10 times in belugas from western Hudson Bay. The mercury may have come from distant emissions, or from mercury released from local soils as the climate warms. The levels of some POPs in belugas are decreasing (e.g., PCBs, dieldrin), while others are staying the same (e.g., DDT, toxaphene), or even increasing (e.g., chlordane, endosulfan).


G-1995-001: 2608 GNWT/NWT Archives

ITK/Eric Loring

*Figure 2: Levels of mercury in the livers of ringed seals and belugas*

### Polar bears

Polar bears, located at the top of the food web, are able to biotransform many POPs into potentially more toxic forms. Scientists are more concerned about the effects of POPs on polar bears than any other wildlife species. PCBs are known to cause problems with both vitamin A and the thyroid hormone in polar bears.

### Caribou and other land animals

Research with caribou and a number of other land animals shows that POPs are found at only very low levels and are not of concern. The higher cadmium levels found in caribou are thought to have remained the same over thousands of years, and to come mostly from natural sources.

## *Human Health*

An important part of the NCP involves evaluating and communicating the benefits of traditional/country foods and the risks from contaminants, so that residents are able to make informed decisions about their food use.

### Nutritional and other benefits

Overall, traditional/country foods are healthy, nutritious and provide many benefits not available from other foods or practices. The health risks are currently outweighed by the benefits of continuing to harvest, prepare and consume traditional/country foods.

Breastfeeding should definitely continue since the benefits to both mother and child outweigh the currently known risks.

Comprehensive surveys were undertaken of Inuit eating habits, complementing previous studies of the dietary habits of Yukon First Nations, Dene and Métis. Traditional/country foods strengthen bones and teeth, and help keep the heart, lungs and blood healthy. They also help people fight illness, injury and disease better than the popular market foods. In contrast, switching to popular market foods may result in people consuming saturated fats and sugars above recommended levels, becoming overweight, and developing "western-style" health problems such as diabetes and heart disease.

Other benefits of traditional/country food are social, spiritual and cultural. Preparing and sharing food helps individuals to feel part of the group, and reinforces a sense of distinct culture. Young people are provided with skills necessary for living off the land and develop qualities such as responsibility, patience and respect.

There are also clear economic reasons which support continued and extensive use of traditional/country foods. Up to 78% of Inuit state that they would not be able to feed their families based only on store-bought food.

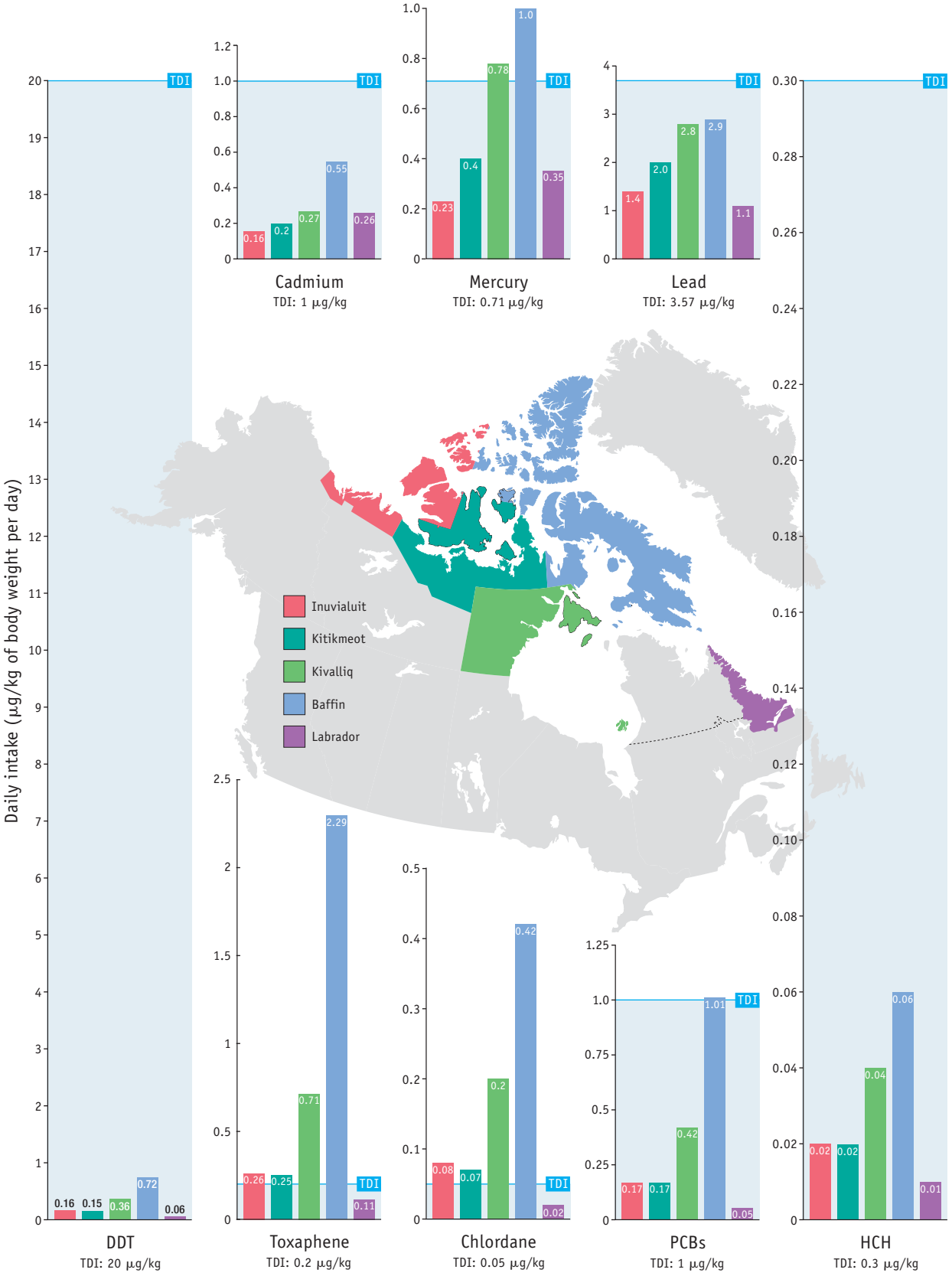


***Figure 3:*** *Intake levels of various contaminants in five Inuit regions*

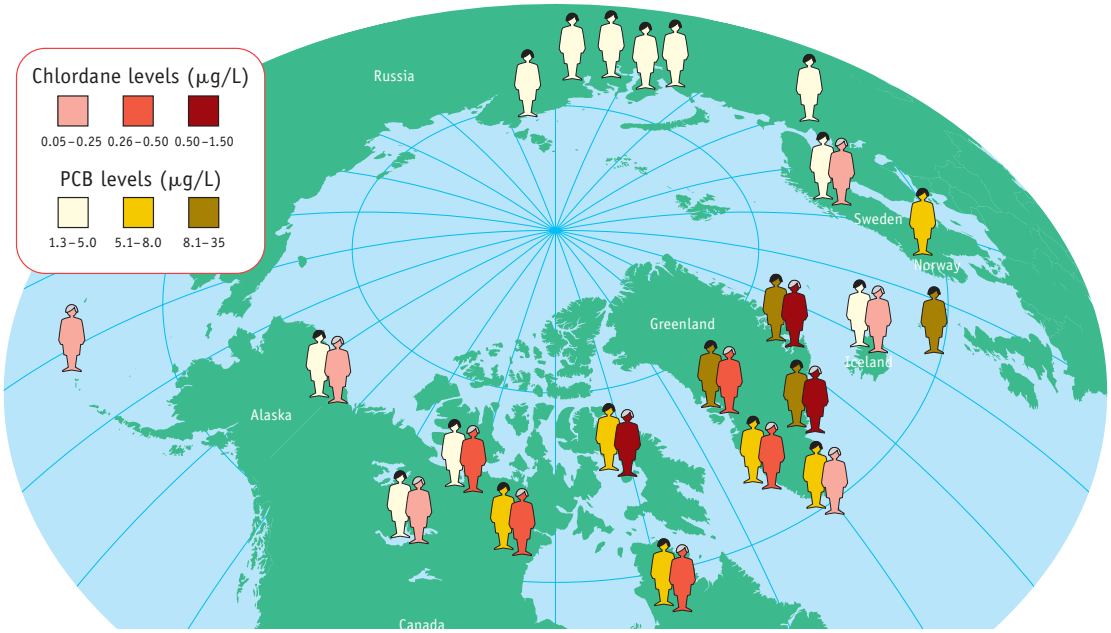


***Figure 4:*** *Average levels of chlordane and PCBs in maternal blood*

## Contaminant intakes

The tolerable daily intake, or TDI, is the amount of a contaminant that scientists estimate is a safe daily intake level for humans over their entire lifetime. An intake above the TDI does not necessarily mean that health problems will develop but only that the margin of safety is reduced.

Many people in Baffin and Kivalliq have mercury intakes that exceed the TDI, while average PCB intake levels in Baffin are also above the TDI (Figure 3). A significant number of people in four Inuit regions have chlordane and toxaphene intakes above the TDIs.

Marine mammals often contain much higher levels of mercury than caribou and consuming even small amounts of marine mammals may contribute a significant amount of mercury to the diet. Blubber from marine mammals contains higher levels of many POPs than other traditional/country foods. The higher intake levels of chlordane and toxaphene in e.g. Baffin and Kivalliq come largely from this source, even though only small amounts are consumed.

## Contaminants in maternal blood and tissues

Similar geographical patterns emerge for contaminant levels in maternal blood and tissues as with dietary intakes. A significant percentage of Baffin and Nunavik mothers have mercury blood levels that fall within Health Canada's "increasing risk" range of 20-100 µg/litre.

Inuit in Greenland, and people from the Faroe Islands have higher levels of mercury than Inuit from northern Canada. Nearly half of Nunavut, Nunavik and Inuvialuit mothers have blood levels of PCBs above the Health Canada "level of concern" of 5 µg/litre (Figure 4).

Recent, early research results from a study in Nunavik show that PCBs are having subtle effects on infants' birth weight, duration of pregnancy and visual memory. Fatty acid exposure partially reduced these negative effects. Mercury was associated with a subtle decrease in the infant's ability to remember things while being distracted. The study also demonstrated several important beneficial effects of traditional/country food consumption on infant development.[1]

## *Education, training, capacity building and communication*

The NCP recognizes that any information northerners receive about contaminants in traditional/country foods may have significant impacts on their diet, economy and way of life.

The NCP, therefore, invests considerable time and resources in education, training, capacity building and communication. The Aboriginal Partners play a central and key role in all aspects including educational materials for the school curriculum, Regional Contaminants Coordinators, frontline training courses, community tours, and Elder-scientist retreats (Figure 5).

[1] Results from this study only became available in early 2003 and were therefore not included in CACAR II.

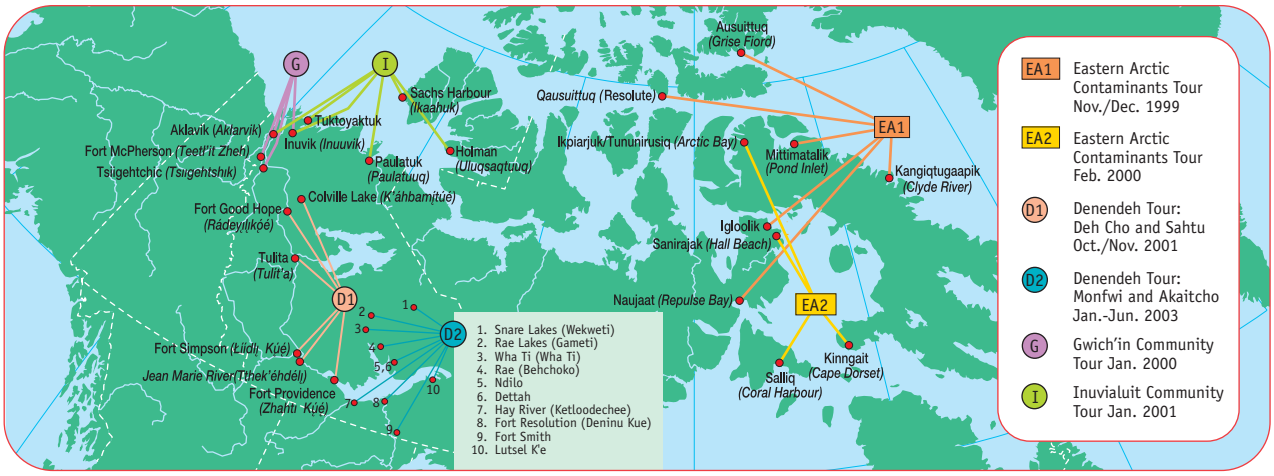


***Figure 5:*** *Locations of community tours that took place during NCP-II*

ICC/Terry Fenge

*Northern Canadian Aboriginal leaders together with Nelson Mandela at the United Nations POPs negotiations in Nairobi, Kenya.*

## National and international action

The NCP has provided the basis for policy decisions and action in Canada and on the international stage. Canadian northern Aboriginal organizations have played a particularly key role over the years, especially at the international level. It took less than 15 years (light speed for international diplomacy) to move from initial research that identified a POPs-related problem in the Canadian North to a global convention that addresses the issue. Not only did the NCP generate scientific data to convince skeptics of the nature of the problem, it educated and equipped Aboriginal peoples so they could effectively represent their interests on the international stage.

NCP research results contributed to the United Nations/ Economic Commission for Europe (UN/ECE) Long-range Transboundary Air Pollution (LRTAP) Convention protocols to control heavy metals and 16 POPs, all of which are of concern in the Canadian North. Both Protocols are expected to come into force later this year. NCP data also contributed significantly to the United Nations Environment Programme (UNEP) Global POPs agreement (the Stockholm Convention). Like the UN/ECE LRTAP POPs Protocol, the preamble of the Stockholm Convention specifically acknowledges the special situation and risks faced by the Arctic and Aboriginal peoples.

The NCP model is now well-known and is being copied in the circumpolar Arctic. Aboriginal peoples in northern Canada also view the NCP as a model for other research and monitoring programs which address issues of international importance in the Arctic.

**For more information** on the *Highlights Report* please consult the CACAR II series of reports, available from the Northern Contaminants Program Secretariat:

Northern Contaminants Program
Les Terrasses de la Chaudière
Room 660, 10 Wellington St.
Hull, Québec K1A 0H4
Tel: (819) 953-8109
http://www.ainc-inac.gc.ca/ncp/

Masthead photo credits: ITK/Eric Loring; ITK/Eric Loring; G-1995-001: 2608 GNWT/NWT Archives