



BIOACCUMULATION OF CONTAMINANTS

Fact Sheet

With all this talk about contaminants, there are a lot of unfamiliar terms. Also, scientific language can sometimes be overly complicated. So, in this fact sheet, the words *bioaccumulation*, *bioconcentration*, *biomagnification* and *contaminant* will be explained and hopefully this will help you with other information about contaminants that you might come across.

WHAT IS A CONTAMINANT?

- ❖ Particular types of non-living substances that can be harmful to plants, animals and people, or to the physical environment.
- ❖ Found in a place where it should not be or in a concentration greater than what is normally found in that area.
- ❖ Some contaminants are natural, others are human-made.

Example: Mercury occurs naturally in the environment but because of human activities it can reach much higher levels and cause pollution, making it a contaminant.

WHERE DO CONTAMINANTS COME FROM?

1. Pollution from other parts of the world can travel long distances on wind currents (long range transport)
2. Pollution from industries within close proximity (local point source)

Plants and animals anywhere in the world are most affected from very large amounts of direct contamination. For example, the Mohawk on the Akwesasne reserve on the St. Lawrence River in southern Ontario cannot hunt or fish on their lands anymore because the wildlife is too contaminated by industrial pollution upstream. On the flip side, most of the contaminants in the Arctic come from long range transport and the amounts are still too small to cause too many problems in plants and animals.

HOW DO CONTAMINANTS GET INTO THE WILDLIFE?

ATMOSPHERE

Contaminants usually come from pollution that gets into the atmosphere and it can stay there a long time.

SNOW AND RAIN

When it snows or and/or rains, the contaminants get into the water and soil.

WATER WAYS AND LAND

The oceans, rivers and the land get contaminated.

Because the plants grow in soil and the fish and other animals feed from the land and water ways, contaminants build up in these living things.

HUMANS

When humans eat contaminated plants, fish and other animals, contaminants then build up in us.

Overall, the three main transporters of contaminants are: Wind currents; Flows of Rivers; and Ocean currents.

WHAT IS BIOACCUMULATION?

- ❖ The accumulation of substances, such as contaminants, in an organism (plant, fish, other animals, humans)
- ❖ Substances enter the organism through respiration, food intake, and skin contact.
- ❖ Over time, the organism ends up with a higher level of those substances than its surrounding environment.



WHAT AFFECTS BIOACCUMULATION?

- ❖ Rate of uptake of the substance
- ❖ How the substance is taken in
- ❖ How quickly the substance is eliminated
- ❖ How the substance is transformed in the organism
- ❖ Whether the substance can dissolve completely in water (if it can, it won't add up in the organism as much)
- ❖ Reproduction and migration to contaminated areas
- ❖ Fat content of the organism (contaminants stick to fatty tissues and accumulate)
- ❖ Age of the organism (the older it is, the more time it has to accumulate contaminants)
- ❖ Other environmental, biological and physical factors

Over time, contaminants build up in plants, fish and other animals. Contaminants are also passed up the food chain as they are not always excreted but stored in different organs. This is called biomagnification.

FOR EXAMPLE

- ❖ PCBs are stored in fat.
- ❖ Cadmium is stored in kidneys.
- ❖ Mercury is stored in liver.
- ❖ Radiocesium is stored in bone.

WHAT IS THE DIFFERENCE BETWEEN BIOCONCENTRATION, BIOACCUMULATION AND BIOMAGNIFICATION?

BIO- CONCENTRATION	BIO- ACCUMULATION	BIO- MAGNIFICATION
The uptake of substances in an organism from water alone.	The more general term because it includes all means of uptake into the organism.	The increase in concentration of a substance, such as the pesticides, that occurs in a food chain.
Occurs within an organism		Occurs across food chain levels

VULNERABLE PEOPLE

Contaminants affect certain groups of people more than others for different reasons.

PREGNANT WOMEN AND FETUSES

- ❖ The mother can be at risk if contamination occurs during the pregnancy.
- ❖ Some contaminants can cross the placenta and cause developmental problems to a fetus.
- ❖ Human breast milk may contain contaminants but for most people, the benefits of breast milk far outweigh the risks.

CHILDREN

- ❖ Children are growing and have immature organs, physiology and behaviour.
- ❖ Lack knowledge on what is safe and unsafe.
- ❖ Spend more time in direct contact with surfaces by crawling, playing outside, and mouthing many different surfaces which can cause them to ingest harmful substances.
- ❖ Higher intake of air, water and food than adults in relation to their body weight.

ELDERS

- ❖ Aging is often accompanied by a weakened immune system which leads to a variety of health problems. Being older also means that contaminants may have accumulated in the body over time and that health-related conditions are more likely.

ABORIGINAL PEOPLES

- ❖ Rely on traditional foods.
- ❖ More likely to live in inadequate housing and have contaminated water supplies.
- ❖ It is important to note that traditional foods are an important part of the First Nations Peoples' diet and that the benefits of these foods often outweigh the risks. They are good sources of protein, rich in vitamins, minerals and essential fatty acids, and are of high cultural importance.

The information given has been adapted from the following sites and documents:

Health Canada documents:
[It's Your Health-PCBs Vulnerable Populations](#)

Inuit Tapirit Kanatami:
[Information About Northern Environmental Contaminants](#)

FOR MORE INFORMATION

Call us Toll-Free at 1-866-960-5223 for more environmental health resources.

You can contact your local public health unit or contact Health Canada at:

Health Canada's
Management of Toxic
Substances Division
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