Polychlorinated biphenyls (PCBs)

Canada, Mexico, and the United States have developed a framework for the environmentally sound management of polychlorinated biphenyls (PCBs) in North America.

The North American Regional Action Plan (NARAP) on PCBs, adopted by the three countries through the Commission for Environmental Cooperation (CEC) of North America in 1996, has three main objectives. They are:

- the virtual elimination of PCBs
- environmentally sound management and control of existing PCBs throughout their life-cycles; and
- the safe phase-out and destruction of PCBs

What are PCBs?

PCBs are synthetic industrial chemicals that are persistent organic pollutants (POPs). They do not occur naturally. PCBs are oily liquids that are extremely resistant to decomposition and have excellent electrical insulating and thermal properties. They are highly stable, non-corrosive and relatively non-flammable, which have made them desirable industrial chemicals.

Commercial manufacturing of PCBs began in North America in 1929 and continued for close to 50 years. Monsanto, the sole North American producer of PCBs, manufactured 634,900 metric tonnes (700,000 US tons or 1.4 billion pounds) before production was discontinued in the 1970s because of evidence of harmful environmental and human health effects.

The PCB NARAP

Through the implementation of the NARAP, Canada, Mexico and the United States are seeking to achieve no measurable releases of PCBs to the environment and the phase-out of PCB uses for which release cannot be contained. The NARAP addresses six primary strategies:

- Establishing a PCB information base. This serves as the basis for target setting, transfer of technology and ongoing tracking.
- Managing the use of PCBs. This strategy includes addressing dispersive and non-dispersive uses of PCBs; PCBs at sensitive sites such as hospitals, schools and food processing facilities; repair and re-use of PCB-containing equipment; and labeling PCB-containing equipment.
- Managing the storage of PCB wastes. This strategy includes the regulation of storage facilities, and the transfer of PCB wastes from storage to treatment/disposal. Domestic regulations to accomplish this have been developed in each of the three countries.
- Promoting PCB waste reduction and recycling. Through this strategy, the countries will explore and enhance the use of environmentally sound reduction and recycling methods, which are preferred alternatives to treatment and subsequent disposal of wastes.
- Properly treating and/or disposing of PCB wastes. This will ensure PCB wastes are treated and disposed only at authorized facilities that meet regulatory environmental standards.
- Managing international shipments of PCB wastes. This includes allowing for transit shipments and the return of stranded shipments.

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Aside from electrical uses, PCBs were also used as plasticizers, heat transfer and hydraulic fluids, fluids in vacuum pumps and compressors, lubricants, special adhesives, and as surface coatings for carbonless copy paper. Although they are no longer manufactured in North America, and their use is highly restricted in Canada, Mexico and the United States, large quantities of PCBs are still in use in electrical equipment.

Significant quantities of PCBs have been taken out of use, and have been landfilled, disposed of through high temperature incineration, or are currently in storage awaiting disposal. All three countries have stringent regulations governing the use and handling of PCBs.

PCBs are found throughout the world in air, water, soils, and sediment, and in the fatty tissues of animals, fish and humans. Many of the chemical and physical properties that made them such desirable industrial chemicals have also made them one of the most widespread contaminants in the environment.

PCBs are among the "dirty dozen" POPs that were included in the Stockholm Convention, a legally binding international agreement that was signed by more than 100 countries in May 2001. The NARAP on PCBs provides a basis for coordinated regional action to organize and encourage individual and joint actions by the three countries that will promote sound life cycle management of PCB in North America.

More information is available at: http://www.cec.org/programs_projects/pollutants_health/smoc/

Effects of PCBs

Like other chlorinated substances, PCBs tend to accumulate in living organisms, and enter the food chain. Concentrations of PCBs increase as they are transferred up the food chain. All humans and animals are exposed to PCBs, principally through food, but also through air and water. Everyone has a detectable level of PCBs in their body fat and blood, although scientists generally agree these low levels are unlikely to cause any adverse health effects.

Exposure to high levels of PCBs can result in a painful and disfiguring skin condition known as chloracne, which is similar to adolescent acne. It can also cause liver damage and may affect the nervous system, causing numbness, weakness, and tingling in arms and legs. Chronic exposure can lead to reproductive system problems. PCBs are also suspected endocrine disrupting substances and can sometimes affect the immune system.

PCBs can be passed to a child through breast milk and have been associated with neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals and the International Agency for Research on Cancer has identified them as probable human carcinogens.

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