Flame Retarding Chemicals - A Cause for Environmental Concern

In Canada, levels of PBDEs in human milk have increased by a factor of ten between 1992 and 2002 and by a factor of around 100 since the early 1980s, according to a recent Health Canada study.

Brominated flame retardants (BFRs) protect against the dangers of fire and are present in everyday items such as textiles, plastics, paints, televisions, computers and other electrical appliances.

Polybrominated diphenyl ethers (PBDEs) are the most widely used brominated flame retardant. They became a cause of international environmental concern in the late 1990s when a study in Sweden showed that in contrast to contaminants such as PCBs, levels of PBDEs in samples of human milk had increased exponentially since the early 1970s.

BDE (brominated diphenyl ether) molecules are similar in structure to polychlorinated biphenyls (PCBs), which are classified as probable carcinogens and are known to cause birth defects, neurological damage and thyroid imbalances.

NWRI and Flame Retarding Chemicals

NWRI scientists are leading international efforts to understand the sources, environmental behaviour and toxicity of brominated flame retardants. They work with experts from other countries to share research knowledge and help build a global picture of the extent of PBDEs in the environment.

BFRs from industrial activities in the south are transported north mainly by atmospheric processes and enter aquatic ecosystems when snow and ice melt in the spring. As part of the federal government's Northern Contaminants Program, NWRI conducted studies to determine the presence and extent of brominated diphenyl ethers in Arctic air.

NWRI has organized and hosted four, and played key roles in other, multi-sector international research workshops in the field of brominated flame retardants – indicative of the tremendous research and public policy interest in BFRs as a global environmental pollutant.

Building on a comprehensive report on contaminants in sediments across the entire width of the Great Lakes basin, NWRI is now working with partners to track trends of new and emerging chemicals including brominated flame retardants in the Great Lakes.

Collaborating with Fisheries and Oceans Canada, Health Canada, other members of Environment Canada, and the universities of Guelph and Trent, NWRI carried out a multi-year investigation of the impact of PBDEs in Canada. They examined samples of breast milk, foods, biota, avian eggs, sediment and air from different parts of the country. They also investigated the occurrence of the chemicals in Canada's wildlife. Their findings confirmed that PBDEs are a ubiquitous pollutant, on the rise in Canada.

Impacts of NWRI Research on Decision Making

NWRI was a co-leader of the Arctic Monitoring and Assessment Programme (AMAP) Report on Persistent Organic Pollutants. This assessment gives a comprehensive review of contamination of the Arctic environment and underlines the increasing concentrations of flame retardants and other new contaminants in marine and freshwater animals. The Arctic Monitoring and Assessment Programme's primary function is to advise the governments of the eight Arctic countries - Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden and the United States - on threats to the Arctic region from pollution, and help direct their efforts to take remedial and preventive actions.

The information gathered across Canada by NWRI researchers contributed to a risk assessment under the *Canadian Environmental Protection Act* (CEPA), which proposes that all PBDEs be considered persistent, bioaccumulative, and toxic as defined in the Act and that certain PBDEs be considered for inclusion on the Virtual Elimination List.

The research results have also been used in international risk assessment and management programs for brominated diphenyl ethers and other BFRs. For example, NWRI is contributing to the United Nations Economic Commission for Europe's (UN ECE) Task Force on Persistent Organic Pollutants (POPs), and the Working Group on Strategies and Review, which has a major policy role in revising existing protocols and preparing new ones.

Benefits to Canadians

Sound science benefits Canadians! Without it, assessments of the risk to the Canadian environment from industrial chemicals such as PBDEs could not be carried out.

Risk assessments help identify the sources of pollution that pose the greatest risk to the environment and human health, and are the prelude to actions to control them, actions that help reduce an increasing number of human health issues such as birth defects, neurological damage and thyroid imbalances.

In providing the science for the risk assessment that recommended PBDEs be recognized as toxic, NWRI played a vital role in the process that ultimately results in regulations, guidelines and other tools to manage the risks posed by these substances - the process that will prevent pollution and protect environmental and human health.

Photo credit: Basel Action Network

NATIONAL WATER RESEARCH INSTITUTE
INSTITUT NATIONAL DE RECHERCHE SUR LES EAUX