

LEVELS AND TRENDS OF PERSISTENT ORGANIC POLLUTANTS IN THE ARCTIC ENVIRONMENT

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Introduction

Arctic biota were demonstrated to contain a range of persistent organic pollutants (POPs), particularly organochlorines (OCs) pesticides and PCBs in the 1970s, however, until the mid-1990s there was limited knowledge on the sources, pathways, levels, spatial and temporal trends and biological effects of these substances in Arctic species^{1,2}. A report by the Arctic Monitoring and Assessment Program (AMAP) reviewed the data on POPs in Arctic air, seawater, sediments, and terrestrial, freshwater and marine biota, that was available as of 1996³. That assessment has recently been updated with new data that has emerged in the last 5 years to fill important knowledge gaps⁴. There has been an expansion of the information available on levels of contaminants in air, seawater, fish, in top predators and in marine food web organisms in the past 5 years. The major findings on levels and trends of POPs, in that assessment, will be presented here.

Sources and spatial trends

Information on global sources of POPs has also improved greatly with the publication of global gridded inventories for hexachlorocyclohexane (HCH)⁵, and PCBs⁶. Additional information on local sources within the Arctic has emerged. Harbours in Norway, Svalbard, Canada, and Russia, as well as areas around former military bases in Alaska, Canada and Norway (Jan Mayen; Svalbard) have been shown to have elevated levels of some PCBs in sediments and/or biota. Many of the former military sites in Canada, Alaska, Greenland and Norway have undergone cleanups in the past 5 years, which include removal of contaminated equipment and soils. The situation in the Russian Arctic regarding PCB use at military sites is unclear.

Less is known about sources of dioxin-like PCBs and polychlorinated dibenzo-p-dioxins and -dibenzofurans (PCDD/Fs) in the Arctic. A recent inventory, based on US and Canada per-capita dioxin emissions estimated for 1996, shows most of the Arctic region of North America having emissions of <0.1 ug TEQ/km²/yr and more populated areas (e.g. southern Alaska, southern Yukon, Labrador) with estimated emissions of 0.1-25 ug TEQ/km²/yr⁷. This is consistent with the very low population density given the total population of the North American Arctic of about 650,000 and land area of approximately 7.5x10⁶ km². By comparison the densely populated regions of North America have emissions of 100-5000 ug TEQ/km²/yr and higher values for point sources such as municipal waste incinerators. There is also local open, low temperature, burning of municipal garbage in the Canadian Arctic, Alaska and Russia, which is probably contributing to loadings of PCDD/Fs to the Arctic atmosphere. Like the PCB emissions from former military sites these emissions may be locally important sources, i.e. within a short radius of each community.

