

*Environ. Sci. Technol.*, **40** (2), 449 -455, 2006. 10.1021/es051707u S0013-936X(05)01707-4

**Web Release Date:** December 10, 2005

**Copyright © 2005 American Chemical Society**

**Brominated Flame Retardants in Polar Bears (*Ursus maritimus*) from Alaska, the Canadian Arctic, East Greenland, and Svalbard**

**Derek C. G. Muir,\* Sean Backus, Andrew E. Derocher, Rune Dietz, Thomas J. Evans, Geir W. Gabrielsen, John Nagy,# Ross J. Norstrom, Christian Sonne, Ian Stirling, Mitch K. Taylor, and Robert J. Letcher**

*National Water Research Institute, Environment Canada, Burlington, Ontario L7R 4A6, Canada, Norwegian Polar Institute, Troms, NO-9296, Norway, Department of Biological Sciences, University of Alberta, Edmonton, Alberta, T6G 2E9 Canada, Department of Arctic Environment, National Environmental Research Institute, Roskilde, DK-4000, Denmark, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska, 99503, Department of Environment and Natural Resources, Government of Nunavut, Iqaluit, Nunavut, Canada, Carleton University, Ottawa, Ontario K1S 5B6 Canada, Canadian Wildlife Service, Environment Canada, Edmonton, Alberta T6B 2X3, Canada, Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, Inuvik, Northwest Territories, Canada, and National Wildlife Research Centre, Environment Canada, Ottawa K1A 0H3 ON Canada*

*Received for review August 27, 2005*

*Revised manuscript received October 13, 2005*

*Accepted November 1, 2005*

**Abstract:**

Polybrominated diphenyl ethers (PBDEs) were determined in adipose tissue of adult and subadult female polar bears sampled between 1999 and 2002 from sub-populations in Arctic Canada, eastern Greenland, and Svalbard, and in males and females collected from 1994 to 2002 in northwestern Alaska. Only 4 congeners (BDE47, 99, 100, and 153) were consistently identified in all samples. BDE47 was the major PBDE congener representing from 65% to 82% of the sum (Σ) PBDEs. Age was not a significant covariate for individual PBDEs or ΣPBDE. Higher proportions of BDE 99, 100, and 153 were generally found in samples from the Canadian Arctic than from Svalbard or the Bering-Chukchi Sea area of Alaska. Geometric mean PBDE concentrations were highest for female polar bear fat samples collected from Svalbard (50 ng/g lipid weight (lw)) and East Greenland (70 ng/g lw). Significantly lower PBDE concentrations were found in fat of bears from Canada and Alaska (means ranging from 7.6 to 22 ng/glw). For the entire dataset, PBDE concentrations were correlated with PCBs. Higher total hexabromocyclododecane (HBCD) concentrations were found in fat of bears from Greenland and Svalbard than in those from Alaska. The geographical trends for PBDEs and HBCD parallel those for PCBs implying similar source regions for long range transport to the Arctic and bioaccumulation pathways in the arctic marine food web. All four major PBDE congeners were found to biomagnify from ringed seals to polar bears. BDE153 showed the greatest (71×) biomagnification factors (BMFs) and, on average, had a BMF that was 5.5-fold higher than for PCB congener 153 (13×) but similar to PCB congener 194 (73×), indicating that it is a highly bioaccumulative compound.