

## Format for submitting pursuant to Article 8 of the Stockholm Convention the information specified in Annex E of the Convention

Introductory information	
<b>Name of the submitting Party/observer</b>	<b>Canada</b>
<b>Contact details (name, telephone, e-mail) of the submitting Party/observer</b>	<b>Cheryl Heathwood</b> Stockholm Convention on POPs Focal Point for Canada Chief, Hazardous Air Pollutants Transboundary Air Directorate Environment Canada 351 St. Joseph Blvd., 11th Floor Place Vincent Massey Gatineau, Quebec K1A 0H3 Canada Tel. (819) 953-7157 Email <a href="mailto:Cheryl.Heathwood@ec.gc.ca">Cheryl.Heathwood@ec.gc.ca</a>
<b>Chemical name (as used by the POPs Review Committee (POPRC))</b>	<b>Pentabromodiphenyl ether</b>
<b>Date of submission</b>	<b>January 27, 2006</b>

(a) Sources, including as appropriate (provide summary information and relevant references)	
<b>(i) Production data:</b>	
<b>Quantity</b>	
<b>Location</b>	
<b>Other</b>	
<b>(ii) Uses</b>	
<b>(iii) Releases:</b>	
<b>Discharges</b>	
<b>Losses</b>	
<b>Emissions</b>	
<b>Other</b>	

(b) Hazard assessment for endpoints of concern, including consideration of toxicological interactions involving multiple chemicals (provide summary information and relevant references)

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<b>(c) Environmental fate (provide summary information and relevant references)</b>	
<b>Chemical/physical properties</b>	
<b>Persistence</b>	
<b>How are chemical/physical properties and persistence linked to environmental transport, transfer within and between environmental compartments, degradation and transformation to other chemicals?</b>	
<b>Bio-concentration or bio-accumulation factor, based on measured values (unless monitoring data are judged to meet this need)</b>	***see monitoring data below***

<b>(d) Monitoring data (provide summary information and relevant references)</b>
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## PBDEs – recent results from Canada’s Northern Contaminants Program

PBDEs have been measured in numerous species of arctic biota including: freshwater and marine fish, seabirds, ringed seal, beluga, narwhal, walrus and polar bears. PBDEs have also been measured in the blood and breast milk of humans residing in the Canadian Arctic.

### Fish

Mackenzie river burbot liver, 2004, range of 0.3 ng/g ww for BDE 100 – 0.8 ng/g ww for BDE 47,  $\Sigma$ PBDE = 2.6 ng/g ww. 6-fold increase in  $\Sigma$ PBDE concentrations between 1988 and 2004. (Stern and Tomy, 2005)

Lake Laberge, Yukon, lake trout muscle, 2003, range of 1.3 ng/g ww for BDE 49 to 5.9 ng/g ww for BDE 99,  $\Sigma$ PBDE = 22 ng/g ww. No clear trend. Kusawa lake trout muscle, 2003,  $\Sigma$ PBDE = 7.5 ng/g ww. Quiet lake, 2003,  $\Sigma$ PBDE = 0.3 ng/g ww. (Stern et al., 2005)

Resolute lake, Nunavut, 2004,  $\Sigma$ PBDE were 1-5 ng/g ww. Concentrations of BDE 47 and 99 were most prominent and, to put these concentrations into perspective, they are in the same range as the 30 most prominent PCB congeners.  $\Sigma$ PBDE concentrations increased with a doubling time of 5 years between 1997 and 2004. Increase seems to have levelled off in recent years. (Muir et al., 2005a)

### Seabirds

Prince Leopold Island, Northern fulmar and thick-billed murre eggs, mean  $\Sigma$ PBDE – 18 ng/g ww and 15 ng/g ww respectively. Levels increased significantly between 1975 and 1998 for northern fulmars and 2003 for thick billed murre, but level off in recent years. (Braune and Muir, 2005)

### Ringed seal

Mean  $\Sigma$ PBDE concentrations in female ringed seal blubber from the Canadian Arctic ranged from 2.9 ng/g lw (Resolute) to 30 ng/g lw (Inukjuaq). (Muir, 2004)

### Beluga, narwhal and walrus

Mean  $\Sigma$ PBDE concentrations in Narwhal from Pangnirtung were 16 ng/g lw in 2004 which represented a 3-fold increase since 2000. Levels of  $\Sigma$ PBDE increased linearly in walrus from Igloodik between 1983 and 1996 to a mean of 3 ng/g lw. BDE 47 was the dominant congener in narwhal whereas BDE 99 was dominant in walrus (Tomy et al., 2005).  $\Sigma$ PBDEs were also measured in beluga from Hudson Strait and East Hudson Bay at mean levels ranging from 26 – 41 ng/g lw, while beluga from Baffin Island had a mean concentration of 5.7 ng/g lw. (Muir, 2004; Tomy and Letcher, 2004)

### Polar bears

BDE 47, 99, 100, and 153 were consistently measured in polar bear fat collected from the Canadian Arctic and East Greenland. Mean  $\Sigma$ PBDE concentrations increased from west to east, from 7.6 ng/g lw in the Bering-Chukchi samples to 70 ng/g lw in the East Greenland samples. This geographic trend is similar to that seen for PCBs and PFOS suggesting source regions, transport and bioaccumulation pathways. (Muir et al., 2005b)

### Humans

Mean concentrations of  $\Sigma$ PBDE measured in maternal blood and breast milk collected from Inuit mothers in Nunavik (between 1994 and 2000), both at 24 ug/kg lw, were similar to levels measured in southern Canadian populations (Ryan, NCP Results Workshop 2004). Dietary intake of PBDEs from country foods was quantified Chan et al. (Results Workshop, 2005). Inuit from the Baffin, Kivalliq and Kitikmeot regions had levels of intake in the neighbourhood of 3 – 6 ug/day. Consumption of marine mammals, particularly beluga, accounted for the majority of PBDE intake.

## References

- Braune B. and D. Muir. 2005. New Contaminants in Arctic Seabirds. In: *Synopsis of Research conducted Under the 2004 – 2005 Northern Contaminants Program*. Indian and Northern Affairs Canada, Ottawa. pp. 121-127.
- Chan L., K. Bull, M. Alae, E. Loring, and S. Bursian. 2005. Polybrominated Diphenyl Ethers (PBDEs): Dietary Exposure and Toxicity. Presentation to the 13<sup>th</sup> annual Northern Contaminants Program Results Workshop, Victoria B.C. Sept 27 – 29, 2005.
- Muir D. 2004. New Contaminants in Arctic Biota. In: *Synopsis of Research conducted Under the 2003 – 2004 Northern Contaminants Program*. Indian and Northern Affairs Canada, Ottawa. pp. 139-148.
- Muir D., G. Köck, X. Wang. 2005a. Temporal Trends of Persistent Organic Pollutants and Mercury in Inukjuaq and Chukchi, the High Arctic. In: *Synopsis of Research conducted Under the 2004 – 2005*

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Muir, D.C.G., S. Backus, A.E. Derocher, R. Dietz, T. Evans, G.W. Gabrielsen, J. Nagy, R.J. Norstrom, C. Sonne, I. Stirling, M.K. Taylor, and R.J. Letcher. 2005b. Brominated flame retardants in polar bears (*Ursus maritimus*) from Svalbard, Greenland, Alaska and the Canadian Arctic. *Environ. Sci. Technol.* In Press.

Ryan J., S. Tittlemier, and J. Van Oostdam. 2004. Emerging POPs in Maternal and Cord Blood Plasma of Several Northern Canadian Populations, 1994-1999. Presentation to the 12<sup>th</sup> annual Northern Contaminants Program Results Workshop, White Rock B.C. Sept 28 – 30, 2005.

Stern G. and G. Tomy. 2005. Temporal Trend Studies of Trace Metals and Halogenated Organic Contaminants (HOCs), Including New and Emerging Persistent Compounds, in mackenzie River Burbot, Fort Good Hope, NWT. In: *Synopsis of Research conducted Under the 2004 – 2005 Northern Contaminants Program*. Indian and Northern Affairs Canada, Ottawa. pp. 188-194.

Stern G., P. Roach, and G. Tomy. 2005. Trace Metals and Organohalogen Contaminants in Fish from Selected Yukon Lakes: A Temporal and Spatial Study. In: *Synopsis of Research conducted Under the 2004 – 2005 Northern Contaminants Program*. Indian and Northern Affairs Canada, Ottawa. pp. 212-218.

Tomy G. and R. Letcher. 2004. Persistent Metabolites of Polychlorinated Biphenyls (PCBs) and Polybrominated Diphenyl Ethers (PBDEs) in Marine Mammals from the Canadian Arctic. In: *Synopsis of Research conducted Under the 2003 – 2004 Northern Contaminants Program*. Indian and Northern Affairs Canada, Ottawa. pp. 165-167.

Tomy G., T. Halldorson, and G. Stern. 2005. Time-Trend Studies On New and Emerging Persistent Halogenated Compounds in Marine Mammals from the Canadian Arctic. In: *Synopsis of Research conducted Under the 2004 – 2005 Northern Contaminants Program*. Indian and Northern Affairs Canada, Ottawa. pp. 219-222.

<b>(e) Exposure in local areas (provide summary information and relevant references)</b>	
<b>- general</b>	
<b>- as a result of long-range environmental transport</b>	
<b>- information regarding bio-availability</b>	

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**(f) National and international risk evaluations, assessments or profiles and labelling information and hazard classifications, as available (provide summary information and relevant references)**

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**(g) Status of the chemical under international conventions**

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