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July 31, 2017

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***Transmission: Original submitted by email on July 31, 2017***  
***Resubmitted with supporting organizations: September 18, 2017***

**Re: Binational Strategies for PCBs and HBCD**

Dear Ms. Klevs and Mr. Marsden,

On behalf of the 47 undersigned organizations, we are providing these comments on the two draft binational strategies under Annex 3 – *Binational Strategy for PCB Risk Management* (February 2017, hereafter “PCB Strategy”), and *Binational Strategy for HBCD Risk Management* (March 2017, hereafter “HBCD Strategy”). We are offering several general observations and recommendations to the Parties for both chemical of mutual concern (CMC) strategies together. Then for each strategy document, we offer specific observations and/or recommendations for individual sections.

In general, the strategies offer a reasonable structure for addressing the two contaminants, including background on the chemicals/groups, review of existing policies and programs, identification of gaps, and identification of management and mitigation options going forward. Some of the review is particularly helpful – for example, it is useful in the PCB Strategy to highlight the differences in fish consumption advisory approaches pursued, between the regional approach and individual approaches at the state and provincial level. In addition, it is important to discuss the PCB byproduct issue, which may imply additional mitigation actions are needed.

At the same time, we feel there are several elements that are currently missing in the draft binational strategies that would significantly strengthen their scope and impact to the Great Lakes. It is also important to emphasize that these elements should also be included when strategies are developed for other CMCs.

### Goals Should be Provided

As drafted, the strategies do not outline specific goals for measures being undertaken on PCBs and HBCDs. The Executive Summary and Introduction of each of the draft strategies outline general goals to “reduce” the CMCs but do not include specific levels of reductions of each CMC in the Great Lakes basin that should be achieved and do not say how far the existing and planned activities and measures will take us towards those goals.

### Role of Virtual Elimination and Zero Discharge in Binational Strategies Is Essential to Address CMCs

The draft strategies outline the commitments under Annex 3 of the GLWQA specifically “to reduce the anthropogenic releases of chemicals of mutual concern...” The GLWQA also notes: “the need to manage chemicals of mutual concern including, as appropriate, by implementing measures to achieve virtual elimination and zero discharge of these chemicals.” The draft strategies have not made any reference to or discuss how proposed measures and strategies consider and apply the virtual elimination and zero discharge goals in the Great Lakes Water Quality Agreement. Given that PCBs and HBCDs have been designated as CMCs, the virtual elimination and zero discharge goals apply to these substances. Not to do so, is to ignore a basic commitment that Canada and the U.S. made when they signed the GLWQA and when they developed the CMC commitments in Annex 3 of the Agreement.

### Gaps Analysis Requires Legislative and Regulatory Gap Analysis

The draft binational strategies identified key gaps in addressing the threats presented by PCBs and HBCDs to the Great Lakes. However, these sections of the binational strategies do not provide a comprehensive gap analysis of the existing laws and regulations that apply to the CMCs. The inclusion of this analysis could reveal needs and opportunities to review or identify other laws or regulations required to adequately address the CMCs.

### Timelines Should be Provided

The strategy lacks specific timelines for implementation of action. The lack of specific reduction timelines creates uncertainty in the governments’ efforts, and makes it impossible to hold the governments accountable to their commitments.

### Require Commitment for Review of Binational Strategies

The Draft Strategies for PCBs and HBCDs do not include a timeline to conduct a public review of the binational strategies and their implementation. Each strategy should include a date at which the governments in consultation with the public will review the effectiveness of the binational strategies to reduce PCBs and HBCDs in the Great Lakes Basin and to determine whether changes are needed in each strategy in order to meet our goals. The governments should commit to carry out a review of each strategy and its implementation every five years. The public should be involved in this review.

### Further Work on Monitoring and Alternatives Is Needed

Data collection and monitoring of PCBs and HBCDs can be improved through improved annual reporting to existing pollution inventories. The use of pollution inventories is an important mechanism to track releases of CMCs. The strategy notes that HBCDs have recently been added to the U.S. Toxics Release Inventory. Canada has taken no similar action to list HBCD in the National Pollutant Release Inventory (NPRI). Also Canada does not include PCBs in its NPRI, whereas the U.S. does in its inventory. These changes to release reporting requirements would help focus industry attention, in addition to aiding in government and public tracking of progress on these chemical substances.

Furthermore, on the issue of alternatives for HBCDs, the HBCD Strategy should highlight more recent considerations around the broader context of flammability standards and the potential to achieve any needed fire protection through alternative approaches.

Specific recommendations on individual issues in each strategy are provided below for the two strategies separately.

### Specific Recommendations on PCB Strategy

Specific recommendations are provided by page and paragraph number, as follows:

<u>P., ¶</u>	<u>Comment</u>
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|---------------------|---|
| ii, 4 <sup>th</sup> | The Parties should provide examples of regulations (new or amended) that are needed concerning releases of PCBs in the region.  |
| ii, 4 <sup>th</sup> | While the invitation to stakeholders to identify, review and prioritize the risk mitigation and management options outlined in the report (fourth paragraph) is appreciated, the Parties should recognize that stakeholders will have varying capacities to carry out different options, and in many cases, might deem regulatory or other program action by the Parties (in which stakeholders can still engage) as priorities for action. |

- ii, 4<sup>th</sup> The reference to the amount of contaminated sediment removed (4 million cubic yards) is helpful, but it is not clear if this is the total removed for all Areas of Concern (AOCs), or those for which PCBs are one of the contaminants contributing to beneficial use impairments (BUIs). We know PCBs are in fact a common contributor to BUIs in AOCs, but it would still be good to clarify this statement.
- 1, 4<sup>th</sup> The paragraph mostly discusses binational goals and objectives for PCBs, but then has the sentence starting: “The purpose of Canadian PCB regulations is to protect the health of Canadians...” Given this is a binational report, it would be helpful to have a similar sentence describing (and citing) U.S. law or regulations addressing PCBs.
- 7, 2<sup>nd</sup> The last sentence in the paragraph references the national survey of fish contaminants, which found 17% of lakes sampled in the U.S. had PCB levels in fish exceeding a health-based consumption limit of 12 ppb (citing Stahl et al. 2009). While it is reasonable to cite this paper on national data, it is important to cite region-specific information, as is done in the subsequent paragraph. Another source of region-wide information is the State of the Great Lakes technical report. In fact, the 2011 report indicated *median* PCB values in lake trout or walleye ranged from 0.20 to 0.92 µg/g (parts per million) for late 2000s sampling, with all of the measurements for at least one dataset (EPA or Environment and Climate Change Canada (ECCC)) above the earlier Great Lakes Water Quality Agreement threshold of 0.1 µg/g (which itself is well above the health-based consumption limit noted above) (Environment Canada and the U.S. Environmental Protection Agency. 2014. *State of the Great Lakes 2011*. Cat No. En161-3/1-2011E-PDF. EPA 950-R-13-002. Available at <http://binational.net>). While these data are just for two species, the data do convey the magnitude and extent of the ongoing PCB contamination in the Great Lakes, and these data (whether through the SOGL report or some other region-wide synthesis) should be emphasized in the PCB Strategy report.
- 7, 3<sup>rd</sup> There is reference to “EPA’s wildlife protection level of 0.16 ppm” (in Figure 2-4 on p. 8), but it is not clear what value this is referencing (i.e., given that water quality values through the Great Lakes Initiative are typically implemented as water column concentrations), so a citation should be provided for this level.
- 8, 2<sup>nd</sup> There is reference to the Great Lakes Sport Fish Advisory Task Force general recommendation of keeping PCB intake below 3.5 µg per day, but it should be emphasized that the Task Force was assuming a 70 kg adult as the representative target consumer in this estimate. The proposed intake values may not be sufficiently protective given the potentially more significant impacts of consuming fish contaminated with PCBs for children, pregnant women and the fetus.
- 10, 3<sup>rd</sup> The first sentence in the PCB Regulations in Canada should be cited (there is already a citation in the reference list). In addition, the information on decline in PCB uses in

Canada is helpful (e.g. Figure 2-5). But it should be clarified if the decline in uses is accompanied by destruction/disposal, or simply transfer to storage. Also, it would be helpful to briefly state destruction method (presumably usually incineration). Furthermore, it would be helpful to know more about sources of PCBs in Ontario – i.e., the current Ontario population represents approximately 39 percent of the total Canadian population (according to Stats Canada), yet 85.5 percent of PCBs in use, according to the PCB Strategy. It would be helpful to confirm the 85.5 percent value for PCBs in use in the province, and whether there is any transfer of PCBs to Ontario (e.g., for disposal) that is somehow being captured as in use.

- 11, 1<sup>st</sup> This discussion on PCBs in use and storage in the U.S. is important, and should be expanded. We have several recommendations for improving this section: 1. For Table 2-3, it should be clarified if this is referencing all units (e.g. in use or in storage), or only units in use, for the given dates; 2. There is reference to disposal tracking in Minnesota, and it would be helpful to see data (whether described, or in tabular form), from efforts there; 3. Assuming available, it would be helpful to have a summary of data on PCB concentrations (ranges, median values, etc.) in the various legacy equipment (capacitors, transformers, lighting ballasts, etc.); 4. Presumably the Parties have considered this, but it is worth considering referencing in this section work done previously on the inventory issues in the region, including through the Great Lakes Binational Toxics Strategy (BTS) (even if it is somewhat dated).
- 12, 1<sup>st</sup> On this same issue, there are several citations to reports/dossiers, but several are incomplete in the reference section (e.g. USEPA (2012a-d), and it would be helpful to the reader to know if those are publicly available documents.
- 13 Table 2-4 could potentially be useful in providing a better sense of extent of PCB transformers in the Great Lakes region. However, we do have several questions/comments: 1. Do the data apply across each EPA region indicated, or just to the states (or portions of states) within the Great Lakes Basin? 2. The second column references number of transformer locations, so presumably this references locations where there may be multiple transformers. If data are available on number of individual transformers, that would be preferable; 3. The third and fourth columns include headings referencing “Average per transformer with PCBs”, but presumably these data are not showing average mass of PCBs (in ton) per transformer (the numbers would not be realistic) – this seems to be more a type of weighted-average, possibly considering only PCB-containing transformers. Furthermore, the overall total (for the average column) would presumably itself be an average for the three EPA regions, rather than summing for each region. In general, it would be preferable to reference simply number of transformers and approximate PCB mass in the transformers in the Basin, assuming those data are readily extractable from the transformer database.

- 13 The by-product issue is important, and it is helpful to have summary information in this section. For Table 2-5, however, it is not clear that all the sectors listed would necessarily be releasing by-product PCBs (vs. PCBs that wound up in their processes from upstream sources, etc.). There may need to be a separate section simply identifying PCB sources as reported through the various inventories/databases.
- 16, 1<sup>st</sup> The first full paragraph references recent research on PCB surficial sediment concentrations, and in the second sentence references “PCB loads”; the Parties should clarify whether this should indeed be referencing loads vs. surficial sediment concentrations.
- 16, 2<sup>nd</sup> On the issue of relative importance of air deposition to loading to the Great Lakes (third sentence), it is appropriate to cite Shanahan et al. (2015), but note that the paper estimated PCB emissions to the atmosphere over Chicago, not deposition to the Great Lakes, though the overall message is that urban sources can still be significant (and the implication is that atmospheric deposition of loadings still needs to be taken into account).
- 17, 2<sup>nd</sup> Concerning the ban on PCB uses under the Toxic Substances Control Act (TSCA), the text references there were exceptions under “limited circumstances”. Later discussion on regulations in Canada (p. 29) references specific exemptions from Canadian regulations. It would be helpful to identify use exemptions in this section for the U.S. and Canada. It would also be helpful to the binational strategy to review the existing exceptions or exemptions that exist for each Party and assess opportunities to advance their elimination within the Great Lakes Basin.
- 17, 2<sup>nd</sup> In contrast to later discussion (e.g. pp. 31-32) on PCB destruction in Canada, there is no mention of disposal/destruction in the U.S., so there is no sense of the quantities involved, destruction means, or locations (e.g. Great Lakes Basin or elsewhere). Assuming some such data are available, they should be provided somewhere in this section on U.S. programs.
- 18, 1<sup>st</sup> Reference is made to “PCB emissions”, but “PCB releases” would likely be more appropriate, given the reference is to air, water and land. In addition, for Table 3-1, the items include both laws and regulations, so the left column header should be modified accordingly.
- 18, 2<sup>nd</sup> In the discussion on the U.S. Clean Air Act (continuing on p. 19), the Web site referenced identifies PCBs as “one of 33 Hazardous Air Pollutants (HAPs) presenting the greatest threat to public health in urban areas.” But note that PCBs are among 187 HAPs formally identified (and regulated) under the CAA (<https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications>).

- 19, 1<sup>st</sup> The discussion on the Clean Water Act references EPA development of water quality criteria guidance for the Great Lakes states (under the Great Lakes Critical Programs Act), but does not formally reference or cite the Great Lakes Initiative. That should be done here (e.g. <https://www.epa.gov/gliclearinghouse>).
- 20, 1<sup>st</sup> Concerning discussion of CERCLA/Superfund, it would be helpful to identify the number of Superfund sites within the Great Lakes Basin (or at least within the Great Lakes states generally). And the Strategy could note that there is often overlap with Areas of Concern (i.e., some sites designated as both).
- 21 In Table 3-2, New York is the only state where there is no reference to some specific state regulatory program on PCB waste. It is useful to reference the state's broader Great Lakes strategy, but there should also be reference to a waste regulatory program, consistent with the other state descriptions.
- 22 Concerning the notice of proposed rulemaking on use authorizations, there is reference to natural gas pipelines. It would be helpful to have brief explanation of those uses – i.e., are they capacitors or transformers, or other PCB-containing equipment?
- 22, 3<sup>rd</sup> Concerning the U.S. National Action Plan for PCBs, it is not clear if that plan is still considered operational by EPA. It would be helpful to clarify the status of the plan, including any plans to revisit/update it.
- 22, 4<sup>th</sup> Concerning the Great Lakes Restoration Initiative (GLRI), while it has been a very valuable program addressing restoration needs in the Great Lakes, and continuing work on AOCs in particular is needed, it is notable that the current GLRI Action Plan does not explicitly address other pollution prevention approaches (e.g. related to improving inventory of PCB-containing products, education and outreach around such products, etc.) Recent research (including on by-products) emphasizes the need to consider new pollution prevention approaches that may be needed, including through the GLRI.
- 23, 1<sup>st</sup> Concerning risk management actions under the Pollution Prevention heading, there is reference to activities through the BTS; it would be helpful to cite 1-2 examples of such activities, including appropriate references (e.g., a BTS annual report, etc.)
- 23, 2<sup>nd</sup> Concerning surveillance and monitoring, there is no reference to existing or previous human biomonitoring. Somewhere in this section there should be some reference to such efforts, including historic (e.g. through ATSDR's Great Lakes Human Health Effects Research Program) and any ongoing biomonitoring on the U.S. side.
- 23, 3<sup>rd</sup> Concerning the U.S. Geological Survey Science in the Great Lakes (SiGL) Mapper, it makes sense to also cite the Web site directly (<https://sigl.wim.usgs.gov/sigl/>).

- 23 For Table 3-3, the Facility Type column is not clear in the context of the facilities listed – i.e., they all appear to be wastewater treatment plants, yet for two, the type is listed as “potable” implying effluent is used as drinking water supply – is that in fact the case?
- 26 For Table 3-4, the table lists water quality standards, first the EPA standard for wildlife (the seventh entry), and then individual state standards. But the individual state “standards” appear to be for protection of human health (as wildlife values then follow). In addition, in all cases, the values are really water quality criteria. The authors should clarify for individual entries (in the “Focus” column) whether the entries apply to human health or wildlife.
- 27, 1<sup>st</sup> Concerning import of PCBs in Canada, the second sentence implies most PCBs were imported into Canada in pure form, and then used in various products. This implies import of products (e.g., either capacitors or transformers containing PCBs, or electrical component fluids) was relatively minor – it would be important to verify this information.
- 31 Concerning the reporting on companies and sites with PCBs (Table 3-6), it would be helpful to know more about what the “sites” reference – i.e., presumably this is mostly companies that are using or storing PCB-containing equipment? Is there good information on the extent of collection/fluid replacement for presumably thousands of electrical components around the country?
- 33 Concerning monitoring, there is no reference to human biomonitoring for PCBs in this section. There should be some reference to ongoing initiatives (e.g., Haines, J., et al. 2017. An overview of human biomonitoring of environmental chemicals in the Canadian Health Measures Survey: 2007–2019, *International Journal of Hygiene and Environmental Health*, 220:13-28.)
- 33 For Table 3-7, we have several recommendations. 1. It would be helpful to separate (e.g., different rows) human health from wildlife criteria. 2. For the Ontario fish consumption guideline criterion, there should be indication of the consumption level associated with the particular criterion. 3. The tissue residue criterion for wildlife are in TEQ (toxic equivalents), which should be elaborated in a footnote; 4. For sediment, the table references “Predicted Effects Level”, whereas that should presumably reference “Probable Effect Level”.
- 34 Concerning binational actions and monitoring, there is no reference to the Cooperative Science and Monitoring Initiative, either here or elsewhere in the Strategy. There has been reporting on efforts through the initiative (e.g. Richardson, V., et al. 2012. Cooperative Science and Monitoring Initiative (CSMI) for the Great Lakes — Lake Ontario 2008, *Journal of Great Lakes Research*, 38(Suppl. 4):10-13). The Strategy should indicate what efforts are underway under that initiative, given its importance,



and the fact that such an effort is called for in the Great Lakes Water Quality Agreement.

- 36-37 Concerning the Stockholm Convention, the treaty entered into force in May 2004, when the fiftieth party submitted material indicating ratification. The treaty is still in force now (with Canada as a party), but given the U.S. has yet to ratify the treaty, the U.S. is not a party, but again, the treaty is still in force. Language on the top of page 37 should be clarified in this regard.
- 37, 4<sup>th</sup> Concerning gaps and potentially unreported PCB sources, there is reference to “Canadian Environmental Law Association and Great Lakes Centers”. – We are not clear which report is being referenced here – the Web site for the report referenced in the reference list (i.e., reference #5) is no longer active. It is possible this is referencing Canadian Environmental Law Association and University of Illinois-Chicago. 2001. Human health effects associated with PCB exposure. Report: Environmental Profile of PCBs in the Great Lakes.  
Online: [http://www.uic.edu/sph/glakes/pcb/health\\_effects.htm](http://www.uic.edu/sph/glakes/pcb/health_effects.htm)”, which is on the Great Lakes Mapping Web site. But again, this link is broken. So we recommend either finding a current link for the report, or otherwise confirm the report is still accessible.
- 37, 2<sup>nd</sup> Concerning gaps in sewerage systems, it would be helpful to have more specifics – i.e., is the reference to the complete sewer system (sewer lines, wastewater treatment plant, etc.), or just part? Also, it is not clear if the reference is to PCBs that wound up in wastewater streams, and are now deposited at various points in the system, or whether there was any particular use of PCB-containing products (in appreciable quantities) specific to the wastewater treatment sector. This should be clarified.
- 38, 4<sup>th</sup> The fourth paragraph discusses an important issue around data, but it is important to consider both of the broad aspects – i.e., methods for data acquisition, and storage and access of the data. In both cases, it would be helpful to briefly highlight current efforts that are aiming to implement or assess data collection, storage, and access programs – e.g. the Great Lakes Observing System, and a current project of the International Joint Commission’s Science Priority Committee on information coordination and flow.
- 39 In the second main bullet, the reference should be to “congener-11” (singular).
- 39 In the fourth main bullet, the reference to developing more uniform fish consumption advisories is reasonable, though it would be helpful to identify options for doing so – i.e., through an Annex 3 or Annex 10 process, or through another body (e.g., International Joint Commission). In addition, there is likely a need for further work on advisories, including additional work in assessing understanding and following of advisories by the public, as well as further education and outreach on advisories, in

particular to reach populations at greater risk of elevated PCB exposures and effects (as was previously noted above – see comment for page 8, second paragraph).

- 40, 1<sup>st</sup> There is a clear need to improve the inventory of PCBs in use and storage (in particular in the U.S.), but it is not clear if the notice of proposed rulemaking (NPRM) will include any inventory component. In any case, the Strategy should include a recommendation for development of both more comprehensive and regular updates of the PCB inventory in the U.S.
- 40, There is a clear need to review the “suite of risk management measures in place for PCBs” to “...ensure they reflect the most current scientific knowledge available.” Such a review is useful at the binational level where the U.S. and Canada approach may differ in scope and impact while the resulting environmental impacts are Basin-wide. This review could include reconsideration of regulatory thresholds - for example, the 50 mg/kg (or part per million) criterion for PCBs in equipment, which may allow for ongoing cycling of lower (but still problematic) amounts of PCBs.
- 40, 1<sup>st</sup> We support the call for increased attention to compliance and enforcement, activities which will also require additional funding (i.e., in base agency funding).
- 41 We support the call for continuing pollution prevention work. It would be helpful if the Strategy identifies recent or ongoing regional programs which can facilitate these efforts (e.g., Great Lakes Regional Pollution Prevention Roundtable).
- 43, 4<sup>th</sup> The call for a combined human health and environmental database is reasonable. But as noted above, there is also increased need for acquiring human biomonitoring data, and more formal work (in particular coordinated programs, potentially between CDC and Health Canada) could yield useful information, including on trends as additional programs are implemented.
- 44, 1<sup>st</sup> This section references domestic sources, but then (third sentence) references “effluents”. Presumably (based on next page) this is referencing wastewater effluents that can contaminate water supplies, which should be clarified.
- 45 For the highlights section here, there is reference to the total maximum daily load (TMDL) provision of the Clean Water Act. It is entirely appropriate to reference this; however, it is not mentioned in the Clean Water Act discussion up in the main text. A brief summary of the TMDL process and its applicability to contributing to addressing the PCB problems should be included in that earlier section (3.1.1.3). Furthermore it should be noted that through TMDL implementation, PCB levels in fish could also be reduced, as is noted in this highlight section (which is in the domestic water section, implying the focus would be on drinking water).
- 46 For this summary table, we believe the categories of action should be slightly modified. Given that domestic water quality in the large majority of cases is not likely

to be a major PCB exposure route for humans, we recommend the last category be fish consumption advisories, and include recommendations identified earlier in the Strategy – e.g., concerning further harmonization of protocols, assessments of effectiveness, outreach and education, etc. Also, presumably the Table should be identified as Table 6-1.

- 50 For the references, the numbering system may not be needed, given that number is not used for in-text citations.
- 52 For reference Kreis et al. (reference 32), the citation is not clear, as we could not find a book/report online with the title of the association (International Association for Great Lakes Research). Should double-check this citation.

### Specific Recommendations on HBCD Strategy

In comments on the HBCD Strategy, “HBCD” is used to reference the overall category of hexabromocyclododecane (HBCD) compounds. Specific recommendations are provided by page and paragraph number, as follows:

#### P., ¶ Comment

- ii It is noted that HBCD has been subject of regulations in Canada, which include prohibition on use, sale, offer for sale, or import (or same for certain products) as of January 1, 2017. However, although there is no similar general restriction in the U.S., there have been recent regulatory initiatives addressing some aspects of HBCD (e.g., addition to the Toxics Release Inventory), and these should be noted in the summary. In addition, the Executive Summary should briefly summarize potential regulatory actions the U.S. could take to reduce HBCD releases in the Great Lakes Basin (drawing on existing or new material in the main text), including identifying a timeline for a phase-out.
- ii As is the case for the PCB Strategy, there is the invitation to stakeholders in the HBCD Strategy to identify, review and prioritize the risk mitigation and management options outlined in the report (third paragraph). Again, the Parties should recognize that stakeholders will have varying capacities to carry out risk mitigation work, and might deem regulatory or other program activities by the Parties as priorities for action (but with stakeholder involvement).
- 3 The discussion on uses in this section would benefit by a table identifying major uses - i.e., North America, or U.S. and Canada, assuming such data are readily available (e.g., as compiled in the Identification Task Team report, or any other recent review).

- 4, 1<sup>st</sup> Though the emphasis in these strategies is appropriately on the Great Lakes, it should be recognized in this section (including p. 5) that there can be releases from products indoors as well as transboundary movement, leading to direct exposures to HBCD .
- 7, 3<sup>rd</sup> In the discussion on monitoring of Lake Ontario lake trout for HBCD, the Strategy notes a significant decline in values from 1979 to 2004. This is in contrast to the increase in global demand for HBCD (including in the 1990s and early 2000s) noted earlier (p. 3), and nothing earlier in the report indicates there would have been any decline in production and use in North America over that period. So it would be helpful to know more about the approach used in analyzing the archived samples – i.e., if it was just two sets of analysis, or multiple intervening years, or potentially some other methodological reasons that might help explain those results (assuming they cannot be explained exclusively based on food web or other changes).
- 8, 3<sup>rd</sup> In the discussion of human exposure, there is no mention of potential exposure via fish consumption. Presumably the reason is that it is assumed that the intake dose would be quite low, and thus below any thresholds. On the other hand, there are few human health guidelines for HBCD (i.e., nothing in the EPA Integrated Risk Information System database, nor among ATSDR’s Toxicological Profiles), so exposures would need to be compared to toxicity metrics (e.g. LOAEL) derived from individual studies, or some other guidelines. In any case, there should at least be mention in this section of the potential for human and wildlife exposure, but limited guidelines against which to compare.
- 8, 5<sup>th</sup> This sentence should reference “...in the United States is a rule under TSCA”. Also, it would be helpful in this section to clarify whether there are any other regulatory requirements applying to HBCD, beyond the two relatively recent rules/measures summarized.
- 9, 5<sup>th</sup> This section on alternatives references the recent EPA alternatives report (2014), but it would be helpful to have a broader discussion on other alternatives, including potentially alternative approaches to address flammability concerns (e.g., as has been discussed in the context of polybrominated diphenyl ethers in the region – e.g. Murray, M., Soehl, A., Abbasi, G., Diamond, M. 2014. Great Lakes PBDE reduction project, Summary paper no. 2, PBDE alternatives assessment; International Joint Commission, 2016. Polybrominated Diphenyl Ethers (PBDEs) in the Great Lakes Basin: Reducing Risks to Human Health and the Environment).
- 9, 6<sup>th</sup> In the discussion on the Great Lakes Restoration Initiative, it would be helpful to note that other risk management actions could potentially be pursued, including activities that, for example, lead to improved information on HBCD uses or sources in the Basin.

- 10, 2<sup>nd</sup> As noted above, concerning the U.S. Geological Survey Science in the Great Lakes (SiGL) Mapper, it makes sense to also cite the Web site directly (<https://sigl.wim.usgs.gov/sigl/>).
- 10, 6<sup>th</sup> As was done in the PCB Strategy, the HBCD Strategy should indicate whether there are any state guidelines developed.
- 11, 2<sup>nd</sup> This paragraph mentions the likelihood that releases of HBCD from products in homes would be relatively minor (in the context of total releases to the environment). However, from a human health perspective, given the earlier point on the importance of direct (inhalation) exposures to HBCD, and findings of measureable levels in human biomonitoring, the possibility of releases and exposures indoors should be stated here.
- 12, 3<sup>rd</sup> There is reference to a phase-out of HBCD in the automotive sector. It would be helpful to know if the automakers will be taking that action throughout North America, or just in Canada. It would be relevant to also understand fate of product stockpiles from this sector including approach to address end of product life (e.g. waste disposal or recycling of products containing HBCDs)
- 12, 6<sup>th</sup> In the reference to Federal Environmental Quality Guidelines, for the non-specialist, it would be helpful to briefly describe what they are protecting – i.e., the guideline is presumably not intended to protect humans (via drinking water exposure), but rather aquatic life. This should be clarified.
- 15, 1<sup>st</sup> Concerning the issue of release from products in use, we noted the point on direct human exposures noted above (p. 11, 2<sup>nd</sup> paragraph). In addition, it should be emphasized that there is still a need to better quantify releases from various products during each phase of the life cycle (production, use, storage, and disposal).
- 15, 3<sup>rd</sup> Concerning the discussion around exceedance of Federal Environmental Quality Guidelines, previously in the Strategy (e.g., p. 8), the text notes concerns for HBCD effects on invertebrates and other aquatic organisms. Yet concentrations measured and reported (e.g. in Table 4-1) are well below the guidelines. It would be helpful to note how often the guidelines are revised, and the possibility (given the other evidence provided on p. 8) that they are not capturing all potential ecological effects of concern.
- 16, 5<sup>th</sup> Concerning the issues of alternatives, this is an important issue – given the phase-out taking effect in Canada, presumably relevant product manufacturers have already identified alternative flame retardants. At the same time, as noted above, it is important that alternative flame retardants do not pose health or environmental risks. In addition, this section should also note the significant new use rule recently promulgated in the U.S.

- 16 The Strategy should identify additional potential regulatory actions the U.S. could take on risk mitigation/management, in support of a broader goal (which we support) of identifying a phase-out deadline. Concerning additional measures, in terms of standards and guidelines, the emphasis should be on water quality criteria (protective of human health, aquatic life, and wildlife); drinking water standards would presumably be a lower priority, given the likelihood of very low exposures apart from exceptional cases.
- 17, 3<sup>rd</sup> On the issue of alternatives, again we urge the Parties to consider the issue more broadly, including urging product manufacturers to closely examine flammability standards and consider if chemical flame retardants are in fact needed or if other approaches (e.g., product redesign) can be undertaken to meet all or some needs.
- 18, 1<sup>st</sup> Considering pollution prevention work on HBCD sources as well as tracking progress, that work should be promoted. Given the nature of the uses, there may be challenges in identifying pollution prevention opportunities (e.g., for existing stocks of HBCD-containing construction material), but the Parties should support research into potential avenues. In addition, tracking progress may require some initial pilot or other studies to identify potential approaches or best practices. For example, it is not clear if enough potential sources will be captured via Toxics Release Inventory reporting to track progress across relevant sectors.
- 18, 3<sup>rd</sup> The discussion on potential innovative monitoring approaches and validation should mention both EPA *and* Environment and Climate Change Canada.
- 20 For the Summary table, as was noted above for the PCB Strategy, we see development of water quality standards for human health (in particular via drinking water) as a lower priority. Though the potential for elevated HBCD exposures via fish consumption appears to be low, it may still be useful to carry out additional monitoring and research to verify. It seems possible (even likely) that fish consumption would be more significant than drinking water as an exposure route, for most cases.
- 22 The Conclusions section should also note the asymmetry on recent actions concerning risk management (between Canada and the U.S.), and the need for more proactive measures (including developing phase-out timelines, as stated on p. 16) especially in the U.S..
- 23 For the references, as noted for the PCB Strategy, the numbering system may not be needed, given that number is not used for in-text citations.

In summary, we appreciate the opportunity to provide these comments on the PCB and HBCD Strategies. As the first two strategy documents developed under the renegotiated Great Lakes Water Quality Agreement, it is important that they be as comprehensive and effective as possible, in identifying a roadmap for actions to address these two sets of challenging chemical

groups in the Great Lakes We believe addressing the comments above can result in strategies better able to address the ongoing concerns with ongoing presence and releases of these substances in the Great Lakes Basin.

Sincerely,



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