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Great Lakes-St. Lawrence River Basin Roadmap on Toxic Chemicals:

Advancing Prevention by Promoting Safer Alternatives



Prepared for the Canadian Environmental Law Association by:

Burgandy Dunn

Sarah Miller

Fe de Leon

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*Cover Photo Source: Photograph of Lakes Ontario, Erie and Huron plus the Finger Lakes of upstate New York, June 14, 2012, taken aboard the International Space Station.
https://upload.wikimedia.org/wikipedia/commons/b/bb/Overview_of_the_Great_Lakes_from_orbit.jpg*

Introduction

Scope and Purpose of the Roadmap

The impacts of toxic chemicals detected in the Great Lakes-St. Lawrence River Basin (“Basin”) have been well documented over the past four decades. While progress has been made to reduce levels of legacy toxic chemicals such as mercury, polychlorinated biphenyl (PCBs), DDT, hexachlorobenzene (HCB), dioxins and furans, continued efforts are needed to achieve further reductions on these chemicals.

Furthermore, in recent years a growing body of evidence has indicated the presence, and increasing levels of, new “chemicals of concern” in the Basin (See Side Box 1). Chemicals, such as flame retardants, triclosan, bisphenol A and musk, have made their way into the ecosystem from consumer products, personal care products, and pharmaceuticals. These chemicals are being detected in the air, water, and sediment of the Basin, and at unexpected levels in tissues of various wildlife species.

In Canada, the federal and provincial governments share the responsibility for the protection and restoration of the Basin from toxic pollution, and is responsible for implementing provisions of the Great Lakes Water Quality Agreement (GLWQA) Annex 3 which addresses “chemicals of mutual concern.” While it is recognized that the protection of the Basin requires a

BOX 1: Chemicals of Concern

Please note that throughout what follows the authors adopted the term “chemicals of concern” rather than the more limiting concept of “chemicals of mutual concern”, the latter of which is used to circumscribe Annex 3 of the new GLWQA. The rationale for this choice in terminology is to more accurately capture the breadth of chemicals not captured under traditional chemicals management. Chemicals may not be designated a binational concern despite the fact that the impact of the chemical is localized in one region and management measures are needed. As such, the process of negotiating binational agreement on chemicals that are of “mutual concern” can delay or impede action to limit a chemical’s continued impacts.

Similarly, “chemicals of emerging concern” was too narrow for the purposes of the current report, as many “so called” chemicals have been present in the Great Lakes system for years, if not decades. While these chemicals may be lacking adequate scientific analysis, most are certainly not emerging in the sense that they are new to the Canadian market.

For the purposes of the present Roadmap, we use the term “chemicals of concern” to include:

- 1) Chemicals identified in the report, “The Challenge of Substances of Emerging Concern in the Great Lakes Basin” (also referred to as the Great Lakes Review Report);
- 2) Chemicals which are persistent or bioaccumulative or toxic according to criteria outlined in the GLWQA;
- 3) Chemicals that may or may not have been detected in the Basin, but which are included in the categories of chemicals of concern, such as veterinary drugs; and
- 4) Those chemicals that have been shown to occur widely in the environment and have also been identified as being a potential environmental or public health risk.

This choice of terminology more accurately reflects the full range of substances impacting the Basin’s ecosystem.

comprehensive binational effort, and coordinated action at all levels of government, the focus of this report is on opportunities for the federal government of Canada to advance the elimination of toxic chemicals in the Basin through the promotion of safer alternatives. Several key Great Lakes initiatives, such as the implementation of the Canada-United States (“U.S.”) GLWQA¹ Annex 3 and the Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health, 2014 (“COA”), provide opportunities to achieve elimination of toxic chemicals and promote the use of safer alternatives.

This Great Lakes-St. Lawrence River Basin Roadmap on Toxic Chemicals (“Roadmap”) provides recommendations for binational federal action on chemicals management in the Basin, and serves as a tool for environmental non-governmental organizations (ENGOS) to use in support of an approach to eliminate the release of toxic chemicals and promote safer alternatives in the Basin. This Roadmap builds on the research completed in 2009 by the Canadian Environmental Law Association (CELA) and Lowell Center for Sustainable Production, University of Massachusetts Lowell in a report to the International Joint Commission Multi-Board Work Group on Chemicals of Emerging Concern (June 2009) titled “The Challenge of Substances of Emerging Concern in the Great Lakes Basin: A Review of chemicals policies and programs in Canada and the United States” (“The Great Lakes Review Report”).² While the Roadmap emphasizes the role of the federal government in achieving the objectives of the GLWQA, it is also recognized that provincial and municipal programs are expected to make critical contributions toward achieving the goals of the GLWQA, including the identification of chemicals used and released in Ontario through the *Toxics Reduction Act* (TRA),³ proposed *Great Lakes Protection Act*, *Environmental Protection Act*, *Clean Water Act*, *Nutrient Management Act* and the reporting of pollutant releases through pollution inventories. As such, a section summarizing opportunities for agents other than the federal government, including provincial and municipal governments as well as members of the public, has been included in the Backgrounder.⁴ The Backgrounder provides an overview of the legislative framework in Canada relevant to chemicals management in the Basin, and offers a brief description of the relevant laws, regulations and programs, and identifies gaps and challenges in the current policy and legislative framework.

1. Chemicals of Concern in the Great Lakes-St. Lawrence River Basin

Keeping Pace with the Sources of Chemicals of Concern: New Chemicals Detected in the Great Lakes Basin

While the exact pathway of many chemicals of concern into the environment are not always well understood (be it from long range atmospheric transport, precipitation such as rain and snow, wastewater, waste disposal or house dust), the original source is often a particular product *type* – a pharmaceutical, a pesticide, a cosmetic, a consumer item. What is known is that the chemicals found in these and other products are a source of contamination that may pose a threat to human

health and the environment within the Basin.⁵ Many chemicals which are rapidly metabolized and excreted from the body are now considered nonetheless persistent because of chronic, continuous exposure, and this, along with other characteristics (such as toxicological persistence, bioaccumulation, low-dose toxicity, and potential for cumulative or interactive effects through multiple exposures) pose a pressing concern.⁶ For example, endocrine disrupting chemicals (EDCs) pose a special challenge in chemical management in that they do not fit into traditional dose-response models. However, conventional toxicity testing methods for chemicals should not impede action into detecting and preventing harm caused by EDCs. All chemical types listed in Table 1 (below) are detected in the air, water, and sediment of many of the Great Lakes, and at unexpected levels in tissues of various wildlife species.⁷

The current approach to chemicals management law and policy in the Basin has focused on individual media and product types, involving regulatory and non-regulatory actions to control direct emissions such as industrial, municipal, and agricultural pollution. However, the sources of pollutants in the Basin are both direct and indirect, and current control measures are not sufficient to prevent the latter.⁸ Many chemicals detected in the Basin as “chemicals of concern” are product-based, and result from non-point emissions. Such emissions include flame retardants, triclosan, bisphenol A and musk. It is this class of chemicals, referred to as “chemicals of concern,” which is the subject of this Roadmap.⁹ The Roadmap also outlines an approach that would significantly advance efforts for prevention of industrial emissions to the Basin.

Table 1: Chemical types identified by the International Joint Commission (IJC), and in research by Hornbuckle and Persoon, as “emerging” chemicals of concern present in the Great Lakes Basin.¹⁰

Chemicals identified as Emerging Chemicals
Synthetic Musks
Fluorinated Surfactants
Brominated Flame Retardants (PBDEs)
Chlorinated Flame Retardants
Alkylphenol-Ethoxylates
Short Chain Chlorinated Paraffins
Phthalates
Hydroxylated PCBs
Pharmaceuticals and Personal Care Products
Pesticides

Source: The Great Lakes Review Report

Traditional pollution control measures designed for industrial processes applied in current regulatory approaches have proven largely ineffectual in addressing the continued introduction of these chemicals of concern into the Basin, as well as hazards that occur over the full lifecycle of products. Existing policies, which are based on managing risk and exposure, are ill-suited to the challenges of chemicals whose exposure patterns and environmental fate and transport do not

fit into traditionally accepted epidemiological constructs of dose-response and risk assessment. This has been demonstrated by a growing body of scientific literature over the past three decades which documents increasing levels of these chemicals in the Basin, even as there appears to be a levelling-off of banned legacy contaminants such as PCBs and DDE.^{11,12} It is important to note that after many years of a downward trend in the levels of these legacy contaminants, current data indicate that further reductions are not being observed.¹³ While the Canadian federal government has issued some media-specific regulatory measures¹⁴ to regulate emissions of some chemicals from products, these laws were not designed to address hazards that may occur over the full lifecycle of products (from “cradle to cradle design”¹⁵), and have therefore proven inadequate to fully protect human health and the Basin ecosystem from exposures in a comprehensive manner. A substantial shift in approach from traditional pollution control measures (which focus on reducing and preventing releases to the environment) to one which gives consideration to prevention at the *sources* of these chemicals is required if the Great Lakes Basin is to be protected from the use or disposal of products containing harmful chemicals. This approach has been envisioned for the Great Lakes by the International Joint Commission since it released its Sixth Biennial Report on Water Quality in 1992. These goals have not been realized under the current binational approach.

The Great Lakes Water Quality Agreement and the Canada-Ontario Agreement

The Canadian and U.S. federal governments are Parties to the Great Lakes Water Quality Agreement (GLWQA), and under this Agreement they assume joint responsibility for protecting the Great Lakes Basin from toxic chemicals within their own jurisdictions. They, in turn, designate responsibilities for chemical management to the provinces and states, respectively.

The GLWQA, first signed in 1972 and later updated in 1987, was amended in 2012 and entered into force on February 12, 2013. The 2012 amendments to the GLWQA have introduced an expanded governance structure which includes First Nations, Tribes and Municipalities on the new Great Lakes Executive Committee (GLEC). It also includes additional attention to aquatic ecology, including provisions to address the nearshore environment, aquatic invasive species, habitat degradation, and climate change impacts. The new Agreement has also returned some of the International Joint Commission’s powers to oversee Agreement progress in Great Lakes protection.

Despite various additions, the 2012 amendments to the GLWQA have created significant challenges for chemical management in the Great Lakes. In particular, the 2012 Agreement excludes the lists for Specific Objectives to address Persistent and Non-Persistent Toxic Substances (found in Annex 10 of the previous 1978 [Revised]) Agreement). In its place, the Great Lakes Executive Committee presented an initial list of priority chemicals to be considered under GLWQA Annex 3 for binational action by late 2014 with no guidance to determine priorities for chemicals beyond 2014.

Further prioritization of chemicals will continue to be necessary for subsequent rounds, however, and although the Terms of Reference (TOR) for Annex 3 (entitled “Chemicals of Mutual Concern”) set out the objectives and mandate of the committee, these efforts are left to proceed, with only broad and general criteria, and without lists of specific chemicals to provide a starting point and indicate those chemicals of greatest concern.^{16,17}

In Canada, the COA,¹⁸ a federal-provincial agreement that supports the restoration and protection of the Great Lakes Basin, is the principal mechanism for implementing the GLWQA. The COA outlines how the federal and Ontario governments will coordinate efforts to restore, protect and conserve the Basin ecosystem.¹⁹ A new COA was released in late 2014. The new COA includes substantial changes from the previous COA (which expired in 2012) to address multiple threats to the Great Lakes-St. Lawrence River Basin including toxic chemicals, climate change, invasive species, reduced water levels, and development. One significant change in the new COA under Annex 2 on Harmful Pollutants is the elimination of the COA Tier I and II substances. In previous COAs, the identification of harmful pollutants in Tier I and II guided the efforts of the federal-provincial governments on substances requiring actions. The governments have not fully implemented the commitments made under the previous COA on harmful pollutants. The new COA seeks to assess the presence of harmful pollutants listed in previous COAs, while also making a commitment to establish a process to nominate chemicals of concern in the Great Lakes. This shift has significant implications for the work to be undertaken under Annex 2. The new COA does not provide clear timeframe to identify and develop measures to address chemicals of concern in the Great Lakes. Furthermore, there is uncertainty in the application of key principles, including virtual elimination and pollution prevention, to address harmful pollutants under this Annex.

The Roadmap: Achieving Prevention and Promoting Safer Alternatives

The Roadmap is based primarily on recommendations previously described in the report, “The Challenge of Substances of Emerging Concern in the Great Lakes Basin,”²⁰ and also incorporates actions supported by Great Lakes environmental and health advocates that participated in the renegotiations of the GLWQA and its implementation. These recommendations have culminated in the present Roadmap, which outlines next steps to achieving the prevention of toxic chemicals and promoting the use of safer alternatives as integral components for improving the management of chemicals of concern in the Basin.

The approach adopted by the below Roadmap is prevention-oriented. It also stresses effective and timely management of chemicals of concern in the Basin, and the use of safer alternatives to toxic chemicals in the implementation of the GLWQA. It draws on the European Union’s Registration, Evaluation and Authorization of Chemicals (REACH) framework, which promotes broader application of pollution prevention and precaution.

The Roadmap outlines key elements critical to establishing a coordinated approach by the Canadian and provincial governments, which includes processes for meaningful public engagement, to enable the identification and elimination of chemicals of concern in the Basin, as well as establishing programs based on priority hazards. If adopted, the Roadmap's suggestions have the potential to result in prevention or significant reductions of toxic chemicals levels in the Basin.

Roadmap for Advancing Prevention and Promoting Safer Alternatives

Step I: Establish a Binational Task Force on Chemicals of Concern

A binational task force on chemicals of concern may be established under the authority of the subcommittee for Annex 3 by the Great Lakes Executive Committee (GLEC). One option would be to establish a Task Force under the International Joint Commission (IJC), where its work could be informed by the Water Quality Board and Science Advisory Board of the IJC. This Task Force would be charged with developing a binational strategy for chemicals that spans jurisdictional boundaries. Its focus would be on rapid identification, screening, control, and prevention actions for such chemicals. The taskforce would consist of scientists, social scientists, labour representatives, health and environmental NGOs. The mandate for the Task Force would be established by the Annex 3 Subcommittee under the GLWQA and focus on development of processes that will implement the actions described below.

Step II: Establish a Great Lakes rapid identification and screening process for chemicals of concern under GLWQA Annex 3

Many chemicals that are used, produced, imported, and released in the Basin have yet to be assessed for their toxicity or subjected to monitoring programs. Given the thousands of chemicals that remain unassessed or unmonitored, there is a need to undertake rapid assessment processes to identify chemicals of concern. The proposed Task Force should establish a Great Lakes screening process for chemicals of concern. The screening process will build on existing national programs within Canada and the U.S., as well as the List of Specific Objectives to address Persistent and Non-Persistent Toxic Substances (Article 10 of 1987 GLWQA); discussions and efforts through the Binational Toxics Strategy process; and data from other jurisdictions for identification and screening substances of concern.

This process would call upon the GLWQA Annex 3 Subcommittee to establish criteria, as its first priority, for persistence, bioaccumulation and/or toxicity,²¹ which could include carcinogenicity, reproductive and developmental toxicity, neurodevelopmental toxicity, genotoxicity, respiratory toxicity, and endocrine disruption to capture substances of concern in the Basin. Given the unique vulnerability of the Basin's ecosystems, determination of chemicals of concern should be based on the most conservative criteria adopted internationally. This identification, screening, and prioritization process should be applied to consumer products (e.g.,

personal care products, chemicals used in drugs, other pharmaceutical products, electronics, and nanomaterials) in order to effectively characterize their uses, possible exposures, and fate in the environment.

Step III: Publish a Great Lakes List of Chemicals of Concern under Annex 3

Building on the screening process above, the Parties, through the GLEC, should proceed to identify and rank substances as to their potential to become a chemical of high, medium, or low concern in the Basin by 2015.²²

This categorization would be based on hazard screening, as well as information on chemical uses and exposure potential, that would need to be collected for the Basin to identify uses and exposures of highest concern. Substances that have been detected through existing bio-monitoring, identified through exposure potential, and have inadequate hazard data should be listed as high concern. The results of this process should be widely publicized as a Great Lakes List of Chemicals, Processes, and Uses of Concern. This list would be a tool to inform regulatory-making processes, markets, research and innovation, and educational activities that support implementation of safer alternatives.

The Canadian and U.S. governments have an inventory of priority chemicals and workplans for chemicals to be assessed as well as previous lists of chemicals that have been identified as chemicals relevant to the Great Lakes Basin that should be considered to support this step.

Step IV: Develop Action Plans

The Parties should develop and implement mandatory action plans for all chemicals identified under the Great Lakes List of Chemicals of Concern to achieve the goals outlined under the GLWQA by 2020 and outline deadlines for elimination within 3 years. The first set of action plans should be released by the end of 2015. The action plans should promote proactive activities, including alternatives assessment, substitution, and prohibition (depending on particular use categories) of chemicals of high concern listed on the Great Lakes List of Chemicals of Concern. Action plans should include mandatory processes and programs, as well as voluntary initiatives that achieve pollution prevention. Such voluntary initiatives should include alternatives assessment; substitution with safer, technologically feasible, alternatives; product redesign; the adoption of green engineering best practices; and proactive management options implemented in specific targets. Action plans should also consider end of life take-back considerations for products containing chemicals of concern. A model to explore may be the *Environmental Protection Act's* 'Persistent Bioaccumulative and Toxic (U.S. EPA PBT) Action Plans'.²³ In addition, the EPA's Design for the Environment Program²⁴ should be applied as a model to promote informed substitution.

The action plans should strengthen accountability mechanisms for those industries producing, using, selling, importing, or disposing of chemicals, pharmaceuticals, pesticides, and nanomaterials, which are introduced into the Basin market. This should include the requirement that monitoring regimes ensure the efficacy of action plans developed on chemicals identified under the Great Lakes List of Chemicals of Concern as well as end of life take back programs.

Step V: Establish a Binational Safer Alternatives Program

To support these action plans, the Parties should establish a binational safer alternatives initiative to be coordinated by a binational Great Lakes agency, such as the IJC. This initiative would aim to provide tools; technical support; and incentives for research, development and application of alternatives based on the principles of green chemistry and engineering, and would establish a process to assess the safety of alternatives to ensure benefits to the Basin's environment, health, and economy. It should also include the development of a database on alternatives.

Step VI: Establish a Public Database and Clearinghouse

The Parties should establish a publicly accessible database that records the uses of high and medium concern substances in the Basin. This database could be modeled after the Interstate Mercury Education and Reduction Clearinghouse.²⁵ This database would be housed at a relevant Great Lakes Agency, such as the IJC. Such a database could provide government agencies and the public with a vital source of information to track flows of chemicals of concern in the Basin. It could also include information on the environmental fate of chemicals; their impacts; their uses and benefits; and safer alternatives for different use types. This database would supplement existing pollutant inventories in Canada and in the U.S., which tend to focus on chemicals in medium to large scale manufacturing.

Step VII: Foster and Enhance the work of Green Chemistry organizations toward the goals of pollution prevention

A commitment should be made to seek all opportunities to work with green chemistry research organizations to promote prevention of toxic chemicals through innovation, and identification of alternatives and substitutions of chemicals and processes on the Great Lakes List of Chemicals of Concern.

Step VIII: Review of Chemicals Management Programs and Action Plans

Within three years, a binational review should be undertaken to evaluate the scope and effectiveness of the action plans for Great Lakes chemicals of concern under Annex 3 and the progress made towards safer alternatives on these toxic chemicals. For Canada, this evaluation should include, but not be limited to, an evaluation of management efforts on CEPA toxic chemicals detected in the Basin.²⁶ Based on the results of this evaluation, action plans should be updated to refocus efforts to support replacement with safer alternatives to achieve elimination of CEPA toxic substances and involve effective public stakeholder engagement.

Step IX: Create Chemical Tracking and Right-to-Know Programs

The Parties should commit appropriate resources to ensure a comprehensive monitoring and surveillance program for the Basin ecosystem that should include biomonitoring for chemicals of concern and new chemicals. A dedicated report providing chemical levels and trends for the Basin ecosystem is valuable for establishing priorities within the Basin. Similarly, the health status of the Basin's population should also be tracked and reported to the public. Results from monitoring programs should be released to the public every two years.



Source: Wikimedia.org

2. Existing Support for the Roadmap's 9 Steps

The table below provides a summary of existing federal obligations which support the Roadmap's recommendations (See Table 2). The table is not a comprehensive analysis, but an overview of some of the most relevant provisions within the Great Lakes Water Quality Agreement (GLWQA)²⁷ and the Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health, 2014 (COA 2014).²⁸ The renewed COA does not include a list of harmful pollutants (previous COA included Tier I and II pollutants). However, it is critical that a Great Lakes List of Chemicals of Concern be established to set priorities for achieving elimination of the most hazardous chemicals.

Table 2: Key Obligations under GLWQA 2012 and COA 2014 in support of Roadmap 9 Steps

Roadmap Step	GLWQA 2012	COA 2014
Step I: Establish a Binational Task Force on Chemicals of Concern	GLWQA Preamble GLWQA Article 3 (6) – Review GLWQA Article 7, (1) (c), (d), (e) The International Joint Commission	COA Article II: Purpose (1, 2, 4, 5) COA Article V: Administration of the Agreement (4 (g), 5, 6,7) Annex 2
Step II: Establish a Great Lakes rapid identification and screening process for chemicals of concern under GLWQA Annex 3	GLWQA Purpose GLWQA Article 3, s. 1 (b) (i) – General Objectives GLWQA Article 3, s. 1 (b) (ii) - Specific Objectives ²⁹ GLWQA Article 7, ss. 1 (a), (b) GLWQA Article 8, (3) (b) GLWQA Annex 3 (A) (2), (6) - Purpose GLWQA Annex 3 (B) – Programs and Other Measures GLWQA Annex 3 (C) (1), (2), (3) – Science	COA Annex 2 Goal 2, Results 2.1, 2.2
Step III: Publish a Great Lakes List of Chemicals of Concern under Annex 3	GLWQA Annex 3 (B) – Programs and Other Measures	COA Annex 2, Goal 2 Result 2.1, 2.2
Step IV: Develop action plans for chemicals identified under the Great Lakes List of Chemicals of Concern to achieve the goals outlined under the GLWQA	GLWQA Article 2, s. 1 (a)-(c), 3 – Purpose GLWQA Annex 3 (B) – Programs and Other Measures	COA Principles (j, k, l, o, p) COA Annex 2 Goals 2 Result 2.3, 2.4 Goal 3
Step V: Establish a Binational Safer Alternatives Program	GLWQA Article 4, ss. 1, 2 (e) GLWQA Article 4, s. 3 (c) GLWQA Article 7, (1) (d), (e) – The International Joint Commission GLWQA Annex 3, (A) (4) – Purpose GLWQA Annex 3 (B) Programs and Other Measures	COA Article III: Principles (j, k) Annex 2 Goal 3

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Roadmap Step	GLWQA 2012	COA 204
Step VI: Establish a Public Database and Clearinghouse	GLWQA Article 7, ss. (1) (a), (b) GLWQA Annex 3 (B) – Programs and Other Measures	COA Annex 2 Goal 3 Result 3.1
Step VII: Foster and Enhance the work the Great Lakes Green Chemistry organizations towards the goals of pollution prevention	GLWQA Article 2, s (4) (e) – Principles GLWQA Article 7, s. (1) (j) – The International Joint Commission GLWQA Annex 3 (A) (6) - Purpose GLWQA Annex 3 (C) (5) – Science	COA Annex 2 Goal 3 Goal 4
Step VIII: Review of Chemicals Management Programs and Action Plans	GLWQA Article 3, s. 3 – Monitoring GLWQA Article 3, s. 2 – Implementation GLWQA Article 3, s. 5 – Review GLWQA Annex 3 (B) – Programs and Other Measures	COA Annex 2 Goal 3 Result 3.2
Step IX: Create Chemical Tracking and Right-to-Know Programs	GLWQA Article 4, ss. 1, 2 (e) GLWQA Article 2, s. (4) (k) – Principles and Approaches GLWQA Article 5, s (1) (a) GLWQA Article 7, ss. (1) (n), (o) GLWQA Article 4, ss. (3) (a) - (c) GLWQA Annex 3 (A) (6) - Purposes	COA Principles (m) Annex 2 Goal 3 Result 3.1

3. Opportunities to Advance Prevention at the Provincial and Local Levels

This report recognizes that there are many diverse sources of pollution, the regulation of which is a shared responsibility between the U.S. and Canadian governments, as well as each federal government and their respective provinces/states. While the Canadian government, as party to the GLWQA, is responsible for meeting the requirements of the agreement, the provincial governments play an important role in regulating key toxic chemical pollutants, including through provincial laws, policies, and programs. In addition to opportunities for public participation throughout provincial processes, there are also opportunities for engagement in municipal decision-making and through consumer campaigns (See Side Box 2). For a summary

of key pieces of federal and provincial legislation and programs, and their relevance to chemicals management in the Basin, please refer to Parts 5-7 of the Backgrounder.³⁰

BOX 2: Meaningful opportunities for public engagement include:

1. **Promote Right to Know Campaigns at the local level** - Access to information on local emissions or by-laws for reporting pollution
2. **Promote pollution prevention strategies** –Seek full implementation of Ontario’s *Toxic Reduction Act* (including expanding the list of chemicals for pollution prevention plans, and reporting and monitoring implementation of pollution prevention plans of local industry required under the Act);
3. **Support negotiations for strong agreements** to protect the Basin from toxic chemicals; and
4. **Engage and support citizen’s campaigns** (i) to promote Right to Know (such as ChemTrac in Toronto), (ii) to phase out chemicals in consumer products and apply alternatives assessments, and (iii) to promote a Great Lakes -St. Lawrence River Basin health study that includes a biomonitoring program (similar to the federal program “Canadian Health Measures Survey”).

Consumer products and market campaigns aimed at the phasing-out of specific toxic chemicals in products have been successful in several U.S. states, including, for example, campaigns on BPA in food containers, triclosan in personal care products, and brominated flame retardants in furniture.³¹

Investments have also been made for the development of tools for identifying chemicals of concern and informing substitution. For example, The GreenScreen for Safer Chemicals (GreenScreen™),³² developed by Clean Production Action,³³ is an example of a tool that has been developed to make it possible for product manufacturers as well as assessors to evaluate the health and environmental toxicity associated with chemicals. This tool considers the toxicity of potential chemical alternatives to avoid regrettable substitutions and inform possible reformulation requirements.

Opportunities for innovations that achieve pollution prevention in the Great Lakes Basin may be facilitated by promoting Green Chemistry practice, outreach and education in the binational Great Lakes Basin.³⁴ This work is predicated on the 12 Principles for Green Chemistry (See Side Box 3). Similarly, the Environmental Working Group, based in the U.S., has done extensive product testing and developed a tool, the Skin Deep Cosmetics Database, for consumers to access information on the toxicity of cosmetic products. The database includes online safety profiles for cosmetics and personal care products and easy-to-navigate safety ratings for a wide range of products and ingredients on the U.S. market allowing for consumers to make informed decisions on purchases for personal care products.³⁵



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Source: www.shutterstock.com

BOX 3: The 12 Principles for Green Chemistry

- 1. Pollution Prevention** - It is better to prevent waste than to treat and clean up waste after it is formed.
- 2. Atom Economy** - Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
- 3. Less Hazardous Synthesis** - Whenever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and the environment.
- 4. Design Safer Chemicals** - Chemical products should be designed to preserve efficacy of the function while reducing toxicity.
- 5. Safer Solvents and Auxiliaries** - The use of auxiliary substances (solvents, separations agents, etc.) should be made unnecessary whenever possible and, when used, innocuous.
- 6. Design for Energy Efficiency** - Energy requirements should be recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted to ambient temperature and pressure.
- 7. Use of Renewable Feedstocks** - A raw material or feedstock should be renewable rather than depleting whenever technically and economically practical.
- 8. Reduce Derivatives** - Unnecessary derivatization (blocking group, protection/deprotection, temporary modification of physical/chemical processes) should be avoided whenever possible.
- 9. Catalysis** - Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
- 10. Design for Degradation** - Chemical products should be designed so that at the end of their function they do not persist in the environment and instead breakdown into innocuous degradation products.
- 11. Real-Time Analysis for Pollution Prevention** - Analytical methodologies need to be further developed to allow for real-time in-process monitoring and control prior to the formation of hazardous substances.
- 12. Inherently Safer Chemistry for Accident Prevention** - Substance and the form of a substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents, including releases, explosions and fires.

Source: Warner Babcock Institute.

4. Conclusion

Data on the Great Lakes-St. Lawrence River Basin ecosystem suggests progress has been made to reduce levels of legacy toxic chemicals, such as mercury, polychlorinated biphenyl (PCBs), DDT, hexachlorobenzene (HCB), dioxins and furans. Yet while efforts and progress are being directed at point-source, primarily industrial emissions, new chemicals of concern in the Basin are being detected. These chemicals of concern pose an unaddressed challenge for chemical management in the Basin, due to the fact that the sources of many of these chemicals of concern are product-based and result from non-point emissions. To date, pollution control measures have proven largely ineffective in addressing the introduction of product-based sources of contamination to the Basin. Federal media-specific laws and policies which regulate chemical emissions were not designed to address hazards that may occur through a product's lifecycle, and have proven inadequate to fully protect human health and the Basin's ecosystem from such emissions.

Consideration of the *sources* of these chemicals and initiating prevention strategies is necessary in efforts to ensure that the quality of the Basin's ecosystem is protected. This requires the expansion of chemicals management to include a dedicated and elevated focus on preventing emissions of toxic chemicals from industrial processes *as well as* exposures from the use and disposal of products.

The Steps outlined in the Roadmap respond to the need to redirect the chemicals management approach in the Basin to emphasize prevention rather than pollution control. Building on existing legal and administrative structures in Canada, the Roadmap identifies opportunities for new collaborations and infrastructure at the Basin level. Outlining what is needed to support the goal of virtual elimination of toxic chemicals in the Great Lakes, its suggestions have the potential to result in significant reductions of toxic chemical levels, and ultimately advance protection of human health and the Basin's ecosystem. For additional background information on the historical and legislative framework surrounding chemicals management the Great Lakes-St. Lawrence River Basin in Canada, as well as a brief description of the challenges in the current policy and legislative framework, please refer to the Backgrounder.

ENDNOTES

¹⁴Protocol Amending the Agreement Between Canada and the United States of America on Great Lakes Water Quality, 1978, as Amended on October 16, 1983 and on November 18, 1987”, ISBN:978-1-100-21204-3; Catalogue No.: EN14-73/2012E-PDF, online: http://www.ec.gc.ca/Publications/9DD80B8C-7E7A-4131-8055-D47B0B3E004F/EN-Canada-USA-GLWQA--FINAL_web.pdf. For access and information on the Revised *Great Lakes Water Quality Agreement of 1978*. For additional information on the GLWQA see Environment Canada website: <http://www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=A1C62826> and the IJC website: <http://www.ijc.org/en/activities/consultations/glwqa/agreement.php>

² “The Challenge of Substances of Emerging Concern in the Great Lakes Basin: A Review of chemicals policies and programs in Canada and the United States: A Report prepared for the International Joint Commission Multi-Board Working Group on Chemicals of Emerging Concern in the Great Lakes Basin, prepared by the Canadian Environmental Law Association and the Lowell Centre for Sustainable Production” (2 June 2009), online: <http://www.cela.ca/sites/cela.ca/files/667IJC.pdf> [The Great Lakes Review Report].

³ For example, see: *Toxics Reduction Act*, 2009.S.O. 2009, c. 19. This Act requires facilities to prepare pollution prevention plans for a list of toxic chemicals.

⁴ Advancing Prevention on Toxic Chemicals in the Great Lakes St. Lawrence River Basin: A Roadmap for promoting Safer Alternatives: Backgrounder - Inventory of Regulations and Policies on chemicals management in Canada and Ontario. June 2015. www.cela.ca

⁵ The Great Lakes Review Report, *supra* note 2.

⁶ *Ibid.*

⁷ *Ibid.*

⁸ It is important to note that industrial releases continue to be problematic in the Basin and require a renewed commitment to achieve continued reductions particularly legacy chemicals like mercury, PCBs, and dioxins. While toxic chemicals have been a focus of previous GLWQA's, monitoring data indicate that levels of many of these toxic chemicals continue to be a threat to the Great Lakes and human health.

⁹ The Great Lakes Review Report, *supra* note 2.

¹⁰ For a more fulsome discussion on the chemicals of concern in the Great Lakes Basin, please refer to the Backgrounder. See also: The Great Lakes Review Report, *supra* note 2.

¹¹ Bhavsar SP1, Gewurtz SB, McGoldrick DJ, Keir MJ, Backus SM. 2010 May. Changes in mercury levels in Great Lakes fish between 1970s and 2007. *Environ Sci Technol.* 1;44(9):3273-9. .

¹² Bhavsar, SP, Jackson, DA, Hayton, A, Reiner, EJ, Chen, and Bodnar, J. Are PCB Levels in Fish from the Canadian Great Lakes Still Declining? 2007. *J. Great Lakes Res.* 33:592–605,

¹³ It is important to note that after many years of a downward trend in the levels of these chemicals, current levels appear to be persisting in a relatively steady state. See: Bhavsar, S. P., et al., “Are PCB Levels from Fish in Canadian Great Lakes still Declining?” *J. G. L. R.* 33: 592 – 605 (2007), online: <http://jackson.eeb.utoronto.ca/files/2012/10/Bhavsar-et-al-JGLR-2007.pdf>

¹⁴ For example, see: PCB Regulations (SOR/2008-273) under Canadian Environmental Protection Act, 1999, Registration 2008-09-05.

¹⁵ The concept ‘cradle to cradle’ refers to a theory of product design whereby a product’s entire lifecycle is considered and it’s design takes into account it’s component parts’ viability for continuous recovery and reutilization. The term “cradle to cradle” was coined by William McDonough and Michael Braungart in their 2002 book “Cradle to Cradle: Remaking the Way we Make Things”. It is a registered trademark of McDonough Braungart Design Chemistry (MBDC) consultants. See: William McDonough and Michael Braungart, “*Cradle to Cradle: Remaking the Way We Make Things*” (2002) North Point Press.

¹⁶ Environment Canada and U.S. Environmental Protection Agency. Great Lakes Water Quality Agreement Annex 3 Chemicals of Mutual Concern (CMCs) Subcommittee to the Great Lakes Executive Committee (GLEC): Proposed Terms of Reference, dated September 20, 2013. Provided to members of the Annex 3 Subcommittee and Extended Subcommittee.

¹⁷ Also see: <http://binational.net/annexes/a3/>

¹⁸ Environment Canada, Canada – Ontario Agreement Respecting the Great Lakes Basin Ecosystem , online: <http://www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=B903EE0D-1>

¹⁹ Government of Canada, Environment Canada website, “Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem”: <http://www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=B903EE0D-1>

²⁰ See: Canadian Environmental Law Association and Lowell Center for Sustainable Production, 2009. The Challenge of Substances of Emerging Concern in the Great Lakes Basin: A review of chemicals policies and programs in Canada and the United States. www.cela.ca

²¹ The criteria of persistence should also address those substances which are ubiquitous in the Great Lakes due and therefore considered pseudo-persistence. Furthermore, measures should be considered for substances that may not meet the criteria of persistence or bioaccumulation but are considered inherently toxic.

²² *Ibid.* See also: Possible Persistent and Bioaccumulative Chemicals: New Results and Future Work,” (Presented at Great Lakes Binational Toxics Strategy Meeting, Chicago, IL, 2008).

²³ For information on the US EPA’s PBT Action Plans, see: <http://www.epa.gov/pbt/pubs/epaaction.htm>

²⁴ The Design for the Environment Program works in partnership with industry, environmental groups, and academia to reduce risk to people and the environment by finding ways to prevent pollution. It evaluates human health and environmental concerns associated with traditional and alternative chemicals and processes to assist manufacturers in selecting safer chemicals and technologies, and has also developed tools to assist consumers in choosing safer products. For information on the US EPA’s Design for the Environment Program, see: <http://www.epa.gov/dfef>

²⁵ Information on the IMERC can be accessed online: <http://www.newmoa.org/prevention/mercury/imerc.cfm>

²⁶ This may also include the re-evaluation of pesticides, chemicals managed through the federal *Food and Drug Act* (R.S.C., 1985, c. F-27), or Cosmetic Regulations (C.R.C., c. 869).

²⁷ GLWQA 2012. <https://www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=A1C62826-1>

²⁸ Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health, 2014. <http://ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=E9A42FF1-1>

²⁹ See the Specific Objectives as listed under the GLWQA Article 3, s. 1 (b) (ii) which state that “[t]he parties... shall... identify and work to attain Specific Objectives for the Waters of the Great Lakes, including: (ii) Substance Objectives,” which are “numeric targets that may be established binationally by the Parties, except where specific to Lake Michigan, to further direct actions to manage the level of a substance or combination of substances to reduce threats to human health and the environment in the Great Lakes Basin Ecosystem. The Parties shall identify Substance Objectives, where deemed essential to achieve the General Objectives and Lake Ecosystem Objectives of this Agreement. The Parties shall develop the Substance Objectives: (A) using approaches appropriate to the substance or combination of substances; (B) using binational processes established by the Parties, domestic programs implemented by the Parties, or programs developed and implemented by other entities having relevant jurisdiction coordinated binationally as appropriate.”

³⁰ Canadian Environmental Law Association. 2015. Advancing Prevention on Toxic Chemicals in the Great Lakes St. Lawrence River Basin: A Roadmap for promoting Safer Alternatives – Background: Inventory of Regulations and Policies on chemicals management in Canada and Ontario. www.cela.ca

³¹ Note that Minnesota has passed a legislative ban on “sanitizing or cleansing hand and body” products containing triclosan. See: Minn. Bill S.F. No. 2192 (passed in Senate and House in 2013-2014 Biennium Eighty-Eighth Legislature), online: <http://www.senate.leg.state.mn.us/bills/billinf.php?ls=88&billnum=SF%202192>

Note also several other noteworthy consumer campaigns include: Environmental Defence’s “Toxic Nation”: <http://environmentaldefence.ca/issues/toxic-nation/tips-and-guides> and “The Just Beautiful Pledge”: <http://environmentaldefence.ca/issues/just-beautiful/just-beautiful-pledge> The US campaign “Mind the Store” is another example of a campaign urging retailers to take responsibility for the toxicity of the products they sell: <http://mindthestore.saferchemicals.org/>.

³² GreenScreen™ is a tool that provides a method for comparative Chemical Hazard Assessment (CHA) that can be used for identifying chemicals of high concern and safer alternatives. It is used by industry, government, and NGO’s to support product design and development, materials procurement, and as part of alternatives assessment to meet regulatory requirements. Additional information is available on the website of Clean Production Action: www.cleanproductionaction.org/Greenscreen.php

³³ See the Clean Production Action website: www.cleanproductionaction.org. See also Great Lakes Report, *supra* note 2.

³⁴ Great Lakes Green Chemistry Network: www.glgc.org

³⁵ Environmental Working Group, Skin Deep Cosmetics Database, online: <http://www.ewg.org/skindeep/>



Canadian Environmental Law Association

T 416 960-2284 • F 416 960-9392 • 130 Spadina Avenue, Suite 301 Toronto, Ontario, M5V 2L4 • cela.ca