

## Appendix A

# LaMP Pollutants: Process for Biennial Updates of Lake Michigan LaMP Pollutant List

This appendix discussion outlines a proposed process for updating the Lake Michigan LaMP pollutant list. The discussion is organized in three sections: (1) Background on LaMP pollutants, (2) LaMP pollutants proposed for 2002, and (3) adaptive management approach for LaMP pollutants. Comments are requested. A more detailed discussion is being added to LaMP 2000 at [www.epa.gov/glnpo/lamps](http://www.epa.gov/glnpo/lamps).

### 1. Background

Under Annex 2 of the Great Lakes Water Quality Agreement (GLWQA), “critical pollutants” are to be addressed through the LaMP process. In 1992 and 1993, a list of Lake Michigan pollutants was developed by the Federal and State Lake Michigan LaMP agencies. The pollutants were categorized into three groups: critical pollutants, pollutants of concern, and emerging pollutants. This list was adopted and incorporated in Lake Michigan LaMP 2000. LaMP partners have adopted an adaptive management approach to the LaMP list of pollutants. Ongoing reviews ensure efforts are focused on pollutants still causing beneficial use impairments.

This appendix outlines a proposed procedure to implement adaptive management by evaluating the previously listed LaMP pollutants and unlisted, candidate pollutants. The new procedure is consistent with the previous categorization of pollutants into three groups, but renames the emerging pollutants as a pollutant “watch list.” Comments are requested on the new procedure described in this appendix. Listed in descending order with regard to the potential level of impairment or importance to the lake, the three categories of LaMP pollutants are:

- (1) Critical Pollutants, to be addressed through LaMP reduction targets;

- (2) Pollutants of Concern, to be addressed by local actions facilitated by the LaMP, and
- (3) A Pollutant Watch List to be addressed by monitoring and research encouraged by the LaMP.

This proposal also compares the 1993 LaMP pollutant list (adopted in LaMP 2000) with the new pollutant identification criteria and makes recommendations for the LaMP 2002 list of pollutants based upon preliminary information gathered from the States. Additional information will need to be collected and assessed to fully implement the pollutant identification criteria, such as a review of open water data to assess compliance with Great Lakes Water Quality Initiative criteria. Additional pollutants, beyond those identified in 1993, are also considered for inclusion in LaMP 2002 based upon the proposed pollutant identification criteria.

Early in 2001, state and tribal partners expressed concern that a new LaMP pollutant identification process would be inconsistent with existing regulatory programs or not benefit from information gathered through existing programs. In response to these concerns, the pollutant review process builds on the existing requirements found at Sections 303(d) and 305(b) of the Clean Water Act (CWA). Section 303(d) requires each State to prepare lists of waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality standard applicable to such waters. Section 305(b) requires each State to report, to U.S. EPA, the water quality of all navigable waters biennially. Because the implementing CWA regulations were in flux during 2000, EPA waived the requirement for States to submit their lists that year; the lists are next due by October 1, 2002.

Other partners expressed concern about the potential inconsistencies between State water quality criteria and standards. Nationally, water quality monitoring and data analysis are the foundation of water resource management decisions. Beginning with stakeholder meetings in 2000, EPA and its partners have been working together to develop a consolidated 305(b)/303(d) assessment approach that addresses water quality monitoring strategies, data quality and quantity needs, and data interpretation



methodologies. In November 2001, EPA published the 2002 Integrated Water Quality Monitoring and Assessment Report, which will result in a more comprehensive and consistent description of states' waters, including impaired waters. The Consolidated Assessment and Listing Methodology (CALM) aims to help states improve the accuracy and completeness of 303(d) lists and 305(b) reports as well as streamline these two reporting requirements. In addition, the Great Lakes Environmental Indicators (GLEI) Project is a four-year cooperative agreement, among scientists from a consortium of Great Lakes universities and institutions, with two goals. The first goal is to develop environmental indicators of the condition of Great Lakes coastal and near shore zones. The second goal is to link indicators with specific stressors so managers can relate causes of impairment for future monitoring. The GLEI effort is relevant to the identification of impaired waters in tributary mouths and nearshore lake waters. Once indicators are developed, trends in these waters can be tracked.

It is expected that the comparability of the 303(d)/305(b) reports relevant to Lake Michigan will improve over time. As state lists of impaired waters change, the LaMP pollutant identification process will reflect those changes.

The timing of the LaMP pollutant review and identification process is outlined in Table A-1.

## 2. LaMP Pollutants Proposed for 2002

The criteria for identifying pollutants within each of the three categories identified by the LaMP are outlined below. For critical pollutants and pollutants of concern, these criteria are consistent with the approach taken in 1993 and 2000, but are more clearly stated.

In a limited effort to update the data evaluated to categorize chemicals as critical pollutants, background information was gathered to support the analysis of the proposed 2002 pollutant identification criteria, including the rationale for the 1993 LaMP pollutant list. In addition, the States submitted information to document the basis for listing the open and near-shore waters of Lake Michigan

on CWA Section 303(d) lists prepared by Lake Michigan States. Figure A-1 summarizes the information that allows for an analysis of the proposed 2002 pollutant identification criteria. Specifically, the figure identifies those pollutants that have been identified as impairing the open or near-shore waters of Lake Michigan on CWA Section 303(d) lists. In addition, fish consumption advisories in the open waters of the lake, which are not otherwise addressed as part of CWA Section 303(d) listings, are indicated as an "action level exceedance." Pollutants that are identified as sources of impairment in an Area of Concern are identified as an action level exceedance in near-shore waters. Comments are requested on whether releases to tributary mouths and nearshore waters addressed by Superfund remedial and RCRA corrective action programs should also be considered action level exceedances.

Based on this review, the pollutants in each category may be compared from the LaMP 2000 to the proposed categories in this 2002 update (see Table A-2). This will be revised biannually.

### Lake Michigan LaMP Critical Pollutants

Under this proposal, any one of these four criteria may be relied upon to define the Lake Michigan LaMP critical pollutants:

- Pollutants identified on Illinois, Indiana, Michigan, or Wisconsin Clean Water Act Section 303(d) lists or in Section 305(b) reports as sources of impairment to the open waters of the lake;
- Pollutants that have been found to exceed Great Lakes Water Quality Initiative (GLI) water quality criteria in the open waters of the lake;
- Pollutants that exceed or trigger a relevant Action Level, such as a fish consumption advisory (FCA) or maximum contaminant level (MCL), in the open waters of the lake; or
- Pollutants associated with other lakewide designated use impairments (e.g., impairment to aquatic life).

Comments are solicited on the proposed use of any one of these four criteria to define critical pollutants for the Lake Michigan LaMP.



Table A-1 Timing of LaMP Pollutant Review Process

Partners\ Input	Spring 2002	Summer 2002	Fall 2002	Winter 2002/2003	Spring 2003	Summer 2003	Fall 2003	Winter 2003/2004	Spring 2004
Federal, State, and Tribal LaMP staff serving on the LaMP Toxic Reduction Subcommittee (TRS)	LaMP 2002 critical pollutants, pollutants of concern, watch list, and review process proposed; comments requested	LaMP Toxic Reduction Subcommittee (TRS) receiving and reading comments	TRS receiving and reading comments	TRS receiving and reading 2002 303(d) lists and 305(b) reports and other comments	TRS receiving and reading comments	TRS collects & reviews additional data submitted since 2002 303(d) lists and 305(b) report	TRS meets to review pollutant data submitted and to evaluate comments on LaMP pollutant process	TRS Proposal to Man. Committee	LaMP 2004
Great Lakes National Program Office	Lake Michigan Mass Balance (LMMB) data reports; sample Lake Michigan	data from 2000 fish; sample Lake Michigan	2002 fish collected		data from 2002 fish; sample Lake Michigan	sample Lake Michigan	2003 fish collected		
States Programs	305(b) reports due, unless consol. with 303(d) lists		2002 305(b) reports due 303(d) lists due biannually						
Tribes	Individually solicited for data				Deadline for data for 2004 LaMP				
Scientists			SOLEC papers		IAGLR papers				
Forum, Private Sector and the Public	LaMP 2002 proposals				June 30 deadline for LaMP pollutant proposals & data for 2004 LaMP		State of Lake Michigan Conference; Preliminary Results of TRS review		

Because dieldrin has been dropped from state fish consumption advisories for the open waters of Lake Michigan, the LaMP 2002 proposal removes dieldrin from the critical pollutant list. The TRS therefore proposes that dieldrin be categorized as a pollutant of concern rather than a critical pollutant and requests comment on this proposal.

### Pollutants of Concern

Any one of the following three criteria are proposed to define the Lake Michigan LaMP pollutants of concern:

- Pollutants on State 303(d) lists identified as causing impairments in near-shore waters and Lake Michigan tributary mouths;
- Pollutants exceeding an Agency action level in near shore waters or tributary mouths, including pollutants identified as a source of impairment in a Great Lakes Area of Concern; or
- Pollutants associated with regional use impairments (e.g., impairment of local fish communities or populations).

Comments are solicited on the proposed use of any one of these three criteria to define pollutants of concern for the Lake Michigan LaMP.



Many of the LaMP 2002 Pollutants of Concern do not appear on State 303(d) lists for near-shore waters, although some of those pollutants are still identified as sources of impairment in the Areas of Concern. Two additional categories of pollutants and the addition of three specific chemicals as Pollutants of Concern are proposed on the LaMP 2002 list because these substances are included on State 303(d) lists as causes of impairment for near-shore waters: pathogens, nutrients, endrin, heptachlor epoxide, and BHC (lindane). Nutrients and pathogens are proposed as pollutants of concern in LaMP 2002 because they are causes of impairment for nearshore and tributary waters to the lake. For example, see the basis for the 303(d) listing of the Manistique River and Little Black Creek in Michigan and Lower Green Bay in Wisconsin. Furthermore, the Great Lakes Water Quality Agreement recognizes the need to address pollutants other than toxic substances as demonstrated by Annex 3 and Annex 13. Comments are solicited on this proposal to include these substances as pollutants of concern for the Lake Michigan LaMP.

### Pollutant Watch List

All three of the following three criteria are proposed to define the Lake Michigan LaMP watch list:

- potential to impact the Lake Michigan ecosystem;
- presence in the Lake Michigan Watershed; and
- bioaccumulation potential, persistence in water or sediment, or toxicity singly or through synergistic effects.

Comments are solicited on the proposed use of all three criteria to define the pollutant watch list for the Lake Michigan LaMP.

Participants in the LaMP process expressed some concerns about whether these criteria are specific enough to include endocrine disrupting and other toxic effects. In identifying pollutants on the Watch List, this proposal adapts the CWA definition of “toxic pollutant”. “The term ‘toxic pollutant’ means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, or inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the [U.S. EPA] Administrator, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring” (United States Code, Title 33, Section 1362(13)). While citing the CWA definition, the evaluation of watch list pollutants will also consider other definitions of toxicity, including but not limited to definitions found in the Food Quality Protection Act (1996), the Federal Insecticide, Fungicide, and Rodenticide Act (1947), the Safe Drinking Water Act (1974), and the Toxic Substances Control Act (1976), any amendments to these statutes, and their implementing programs. Similarly, a variety of definitions for the terms bioaccumulative and persistent likely exist. For example, the U.S. Environmental Protection Agency (EPA) issued its final policy statement on November 4, 1999 (64 FR 60194) for new persistent,

**Table A-2 Comparison of LaMP 2000 Pollutants to Pollutants Identified through Proposed Process**

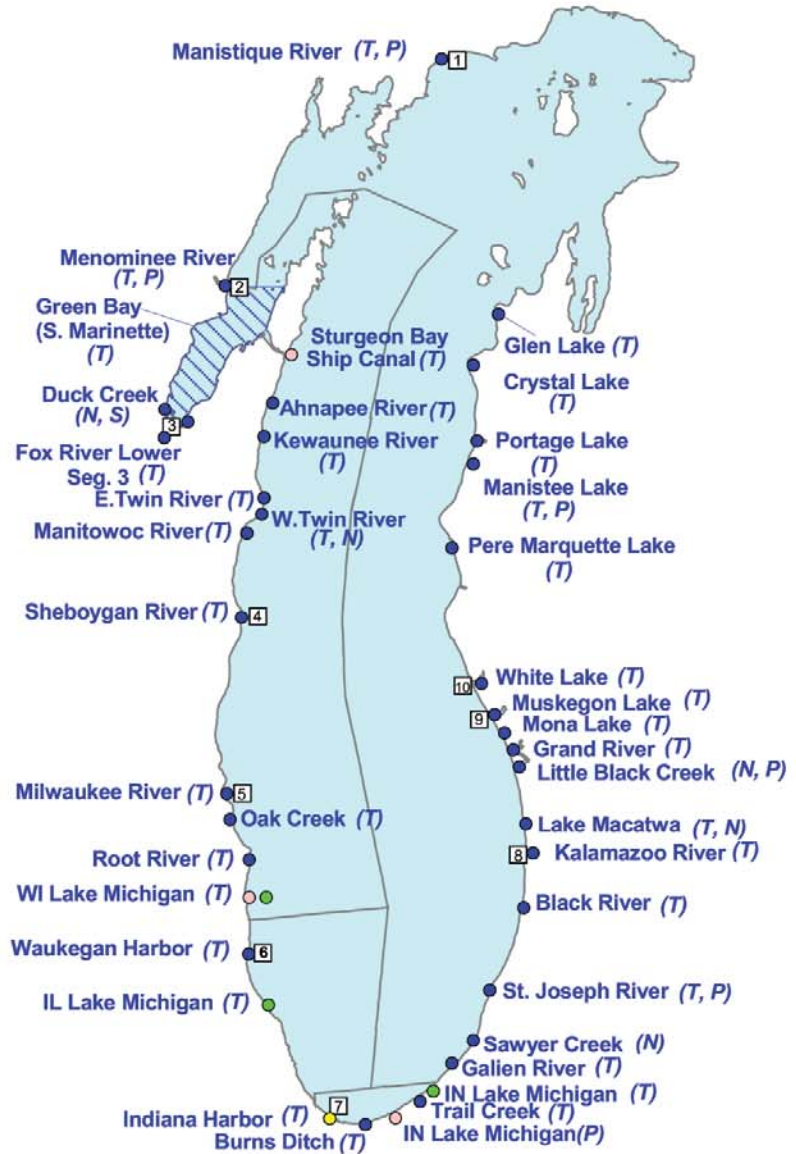
	2000	2002
Critical Pollutants	PCBs, Dieldrin, chlordane, DDT/DDE, mercury, dioxin	PCBs, chlordane, DDT/DDE, mercury, dioxin
Pollutants of Concern	PAHs, Hexachlorobenzene, lead, cadmium, chromium, copper, zinc, arsenic, cyanide	PAHs, lead, cadmium, chromium, copper, zinc, arsenic, cyanide, endrin, heptachlor epoxide, lindane, nickel, nutrients, pathogens
2000 Emerging Pollutants 2002 Watch List	atrazine, selenium, PCB substitute compounds	atrazine, selenium, PCB substitute compounds



# Lake Michigan Impairments Summary

## Tributary mouths, near shore waters, open waters with AOCs

CWA - 303(d) Water Bodies	Pollutant Basis for Impairment
<b>Wisconsin</b>	
Ahnapee River	PCBs
Duck Creek	Nutrients, Sediments
East Twin River	PCBs
Fox River Lower Seg. 3	PCBs
Green Bay - South of Marinette and its tributaries including the Menominee, Oconto, Fox & Peshtigo River	PCBs
Kewaunee River	PCBs
Lake Michigan	PCBs
Lower Green Bay AOC	Nutrients
Manitowoc River	PCBs
Menominee River AOC	Arsenic, PCBs
Milwaukee River Estuary AOC (out Harbor to Lake Michigan)	PCBs
Oak Creek	Metals (Cr, CU, Pb, Zn)
Root River	PCBs
Sheboygan River	PCBs
Sturgeon Bay, Ship Canal	Metals
West Twin River	PCBs, Nutrients
<b>Illinois</b>	
Lake Michigan	PCBs, Chlordane, Hg
Waukegan Harbor	PCBs
<b>Indiana</b>	
Indiana Harbor	PCBs, Hg, Chlordane, Dieldrine, DDT/DDE/DDD, Endrin, Heptachlor Epoxide, BHC (Lindane), PAH, As, Cd, Pb, Ni, Zn
Lake Michigan	PCBs, Hg, Pathogens
Burns Ditch	Hg, Pb
Trail Creek	PCBs, Hg
<b>Michigan</b>	
Black River	PCBs
Crystal Lake	PCBs, Chlordane
Galien River	PCBs
Glend Lake	PCBs, Chlordane, Mercury
Grand River	PCBs, Mercury
Kalamazoo River	PCBs
Lake Macatwa	PCBs, Chlordane, Nutrients
Little Black Creek	Nutrients, Pathogens
Manistee Lake	PCBs, Mercury, Pathogens
Manistique River	PCBs, Pathogens
Menominee River	Pathogens
Mona Lake	PCBs, Mercury
Muskegon Lake	PCBs, Mercury
Pere Marquette Lake	PCBs, Mercury
Portage Lake	PCBs, Mercury
Sawyer Creek	Nutrients
St. Joseph River	PCBs, Pathogens
White Lake	PCBs, Chlordane, Mercury



**Areas of Concern:**

- 1 Manistique River
- 2 Menominee River
- 3 Fox River
- 4 Sheboygan River
- 5 Milwaukee Estuary
- 6 Waukegan Harbor
- 7 Grand Calumet River
- 8 Kalamazoo River
- 9 Muskegon Lake
- 10 White Lake

**Legend:**

- Green Bay
- Lake Michigan
- States Boundaries
- (N = Nutrients, T = Toxics, S = Sediments, P = Pathogens)

**Locations:**

- Harbor
- Nearshore
- Open Waters
- Tributary Mouths



Map created by: Martha Aviles-Quintero, ORISE Research, US EPA Region 5, 02/13/02



### Supporting Information for Placing a Chemical on the Watch List

Information supporting the placement of a chemical on the watch list will be drawn from a number of sources by necessity. For example, Manchester-Neesvig and Sonzogni presented data for polybrominated diphenyl ethers (PBDEs) in Lake Michigan coho and chinook salmon at the 44th Conference of the International Association for Great Lakes Research in June 2001. As another example, the U.S. Geological Survey (USGS) Toxic Substances Hydrology (Toxics) Program provides scientific information on the behavior of toxic substances in the Nation's hydrologic environments. The USGS Toxics Program conducts: (1) intensive field investigations of representative cases of subsurface contamination at local releases; and (2) watershed- and regional-scale investigations of contamination affecting aquatic ecosystems from nonpoint and distributed point sources. In 1999-2000, the USGS Toxics Program monitored several Lake Michigan tributaries for these categories of pollutants: veterinary and human antibiotics, human drugs, industrial and household wastewater products, sex and steroidal hormones and published results in 2002 (Kolpin et al., "Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams, 1999 - 2000: A National Reconnaissance" in *Environmental Science and Technology*, volume 36, 1202-1211). In addition, the U.S. EPA Great Lakes National Program Office (GLNPO) is funding a fish monitoring program conducted by the University of Minnesota to identify emerging pollutants in Great Lakes fish tissue. The GLNPO fish monitoring will likely include polybrominated diphenyl ethers (PBDEs), polychlorinated naphthalenes (PCNs), polybrominated biphenyl (PBB) 153, perfluorooctane sulfonate (PFOS), tetrabromobisphenol A, short-chain chlorinated paraffins, alkylphenol ethoxylates (APES), and chorothalon.

Finally, Federal and State regulatory programs may periodically reassess regulated substances, and the TRS may consider information from those reassessments for Watch List pollutants or forward concerns about Watch List pollutants for consideration during reassessment. For example, an update on the Federal Insecticide, Fungicide and Rodenticide Act's Tolerance Reassessment and Reregistration for Atrazine and CWA proposal for an Atrazine water quality standard is provided elsewhere in this document.

bioaccumulative, and toxic (PBT) chemicals. Comments have been received recommending that endocrine disrupting chemicals be included on the watch list as a category of chemicals. EPA has been

interpreting endocrine disruption as fitting within the toxicity definitions listed above and intends to focus on this category when updating the watch list. Comments are solicited concerning alternative or supplemental definitions of toxicity.

The renaming of the Emerging Pollutants category to the pollutant Watch List better represents the LaMP's assessment of the pollutants' potential threat to human health and the environment in Lake Michigan. Data corresponding to the LaMP 2000 emerging pollutants are not provided on CWA Section 303(d) lists; the 2004 LaMP will depend on other sources of information to evaluate the LaMP 2000 emerging pollutants. A potentially large number of pollutants could be placed on the Watch List as information is gathered in the basin. Pollutants may be removed from the Watch List through a determination that no potential to impact Lake Michigan exists or by a determination that the pollutant is not present in the watershed. Comments are solicited regarding the process for removal of pollutants from the Watch List.

### 3. Adaptive Management Approach for LaMP Pollutants

The LaMP envisions an ongoing adaptive management process to continually review and update the pollutant lists. In practice, parties will submit data to the LaMP for review on a biennial basis to support identification of a chemical in one or none of the pollutant categories (see table above for timing). The updated lists will then become part of the biennial Lake Michigan LaMP report.

### Load Reduction Targets for LaMP Pollutants

It should be noted that this effort is not intended to replace other, ongoing processes at multiple levels of government to identify and reduce persistent, bioaccumulative toxic substances in the Great Lakes. For example, the load reduction targets identified in this document do not replace the total maximum daily load (TMDL) required by Section 303(d) of the CWA. In addition, EPA and Environment Canada continue with the implementation of the Binational Toxics Strategy (BTS) for the virtual elimination of persistent toxic substances in the Great Lakes.



## Endocrine Disruptors

The endocrine system is responsible for regulating and maintaining biological functions that are critical for normal growth, development, and reproduction. It includes the brain, reproductive organs, and various endocrine glands. Endocrine glands monitor biological processes through hormones with unique receptor sites; hormones binding to their specific receptor sites is a crucial step in the endocrine system's normal operations. Endocrine disruption by exogenous chemicals is not a new concept—the important question is whether the health of humans and wildlife is being adversely affected by the presence of small amounts of different types of man-made chemicals in air, water, and food.

Endocrine disrupting chemicals work through several mechanisms, usually by mimicking natural hormones, blocking receptor sites, or delivering an inappropriate “message”. Human health concerns include increases in reproductive tract cancers and abnormal sexual development. In wildlife, documented observations include decreased hatching success in birds, alligators, and turtles, the synthesis and secretion of a female hormone by male fish, changes in immune response, and behavioral modification. Some of the chemical classes that are receiving significant endocrine-related research are alkyphenols, carboxylate derivatives, and dioxins.

For more information on endocrine disruptors, see [www.epa.gov/oscmont/oscpendo](http://www.epa.gov/oscmont/oscpendo)

Now in its fifth year, the BTS recently reported on the activities of its workgroups addressing mercury, polychlorinated biphenyls, dioxins/furan, hexachlorobenzene/benzo(a)pyrene, octachlorostyrene, pesticides, alkyl-lead, and integration activities (Great Lakes Binational Toxics Strategy 2001 Annual Progress Report, Draft January 16, 2002). The LaMP pollutant process described in this memorandum is not intended to replace these other, ongoing activities. Rather, the Lake Michigan TRS proposes to draw upon these other sources of information to fulfill the GLWQA Annex 2 requirements for Lake Michigan.

Consistent with this intent and Annex 2 of the GLWQA, the overall Lake Michigan goal as expressed in this document is to improve ecosystem health. Given the current, overall “mixed” condition of Lake Michigan, the target is to be headed toward “good” in 2010 and to achieve an overall condition of “good” by 2020. Zeroing in on this target requires activities related to specific pollutants and

the recognition that other stressors, including food web changes, influence the progress toward the targets.

## Research and Regulatory Attention for the Watch List

As substances that may cause an impairment are identified, the LaMP encourages additional research to determine whether there is a Great Lakes impact. While no water, air or land disposal regulatory standards currently exist for many of the substances on the watch list, the Great Lakes research findings are communicated nationally for regulatory attention. These research findings may result in substances being addressed through voluntary product ingredient substitution rather than new regulations.

EPA has developed a PBT Profiler to encourage voluntary product ingredient substitution. The PBT Profiler is a subset of methods included in the U.S. EPA's Office of Prevention, Pesticides and Toxic Substance's P2 Framework (<http://www.epa.gov/opptintr/p2framework>) which is an approach to risk screening that incorporates pollution prevention principles in the design and development of chemicals. The objective of the P2 Framework approach is to inform decision making at early stages of development and promote the selection and application of safer chemicals and processes. The PBT Profiler integrates methods for estimating environmental persistence (P), bioconcentration potential (B), and aquatic toxicity (T). The PBT Profiler will predict P, B, and T characteristics from chemical structure. When the user accesses the PBT Profiler on the Internet, the program prompts the user to enter the Chemical Abstract Service (CAS) number of chemicals under consideration. The PBT Profiler is linked a database containing CAS numbers and associated chemical structure for over 100,000 discrete chemical substances. If the CAS number is in the database, the PBT Profiler will translate the CAS number into a chemical structure, predict the PBT characteristics, and provide a PBT Profile in a easy to understand format.

