

**A Multimedia Strategy  
for Priority Persistent, Bioaccumulative, and  
Toxic (PBT) Pollutants**

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## CONTRIBUTORS

The PBT Plenary Group is comprised of program and technical experts from seven EPA Program Offices (i.e., the Office of Air and Radiation; the Office of Enforcement and Compliance Assurance; the Office of International Activities; the Office of Prevention, Pesticides and Toxic Substances; the Office of Research and Development; the Office of Solid Waste and Emergency Response, and the Office of Water), the Great Lakes National Program Office, and the Regions. OPPTS chairs the group. The mission of the Plenary Group is to develop the PBT strategy and identify and resolve issues associated with strategy implementation.

The Office Directors' Multi-Media and Pollution Prevention (M2P2) Forum was established by Deputy Administrator Fred Hansen in 1997 to examine a variety of multi-media and pollution prevention issues. The PBT Strategy is a central focus of the M2P2 Forum. More than 20 of EPA's program offices and regions are represented in the Forum. The Office of Prevention, Pesticides and Toxic Substances (OPPTS) and the Office of Water currently co-chair the Forum.

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## EXECUTIVE SUMMARY

### Purpose and Goal

**The goal of this strategy is to further reduce risks to human health and the environment from existing and future exposure to priority persistent, bioaccumulative, and toxic (PBT) pollutants.**

The U.S. Environmental Protection Agency (EPA) has developed this draft strategy to overcome the remaining challenges in addressing priority PBT pollutants. These pollutants pose risks because they are toxic, persist in ecosystems, and accumulate in fish and up the food chain. The PBT challenges remaining stem from the pollutants' ability to travel long distances, to transfer rather easily among air, water, and land, and to linger for generations, making EPA's traditional single-statute approaches less than the full solution to reducing risks from PBTs. Due to a number of adverse health and ecological effects linked to PBT pollutants -- especially mercury, PCBs, and dioxins -- it is key for EPA to aim for further reductions in PBT risks. The fetus and child are especially vulnerable. EPA is committing, through this strategy, to create an enduring cross-office system that will address the cross-media issues associated with priority PBT pollutants.

### Building on a Strong Foundation

This strategy reinforces and builds on existing EPA commitments related to priority PBTs, such as the 1997 Canada – U.S. Binational Toxics Strategy (BNS), the North American Agreement on Environmental Cooperation, and the recently released Clean Water Action Plan. EPA is forging a new approach to reduce risks from and exposures to priority PBT pollutants through increased coordination among EPA national and regional programs. This approach also requires the significant involvement of stakeholders, including international, state, local, and tribal organizations, the regulated community, environmental groups, and private citizens.

### Approach to PBT Reductions

1. ***Develop and Implement National Action Plans for Priority PBT Pollutants.*** EPA is initially focusing action on the 12 BNS Level 1 substances: aldrin/dieldrin, benzo(a)pyrene, chlordane, DDT, hexachlorobenzene, alkyl-lead, mercury and compounds, mirex, octachlorostyrene, PCBs, dioxins and furans, and toxaphene. EPA is developing action plans that will use the full range of its tools to prevent and reduce releases of these 12 (and later other) PBTs. These tools include international, voluntary, regulatory, programmatic, remedial, compliance monitoring and assistance, enforcement, research, and outreach tools. EPA will analyze PBT pollutant sources and reduction options as bases for grouping pollutants, activities, and sectors to maximize efficiencies in achieving reductions. EPA will integrate and sequence actions within and across action plans, and will seek to leverage these actions on international and industry-sector bases.

*Activities ready for near-term action include:*

- ▶ Conduct process-specific and pollution prevention (P2) projects under the mercury action plan, including regulatory actions to reduce mercury and voluntary reductions through potential partnerships with various industries (e.g., chloralkali industry, hospitals using mercury-containing products).
  - ▶ Focus enforcement and compliance assistance activities on PBTs, analyzing compliance within PBT-related sectors for problems and opportunities. Select industries, sectors, or regulations that would benefit from focused compliance attention/assistance. Target actions with high potential to reduce PBT releases.
  - ▶ Develop or revise water quality criteria for mercury and other priority PBTs, and revise methodology for mercury water quality criteria.
  - ▶ Conduct research and analysis on PBTs, especially on mercury emission control approaches for coal-fired utility boilers, and on the transport, fate, and risk management of mercury. Develop P2 options for preventing mercury/dioxin risks from industrial combustion.
  - ▶ EPA is actively engaged in international efforts beyond the BNS to reduce PBT risks, including the recently negotiated Persistent Organic Pollutants (POPs) and Heavy Metals protocols to the UN Economic Commission for Europe's Long Range Transboundary Air Pollution Convention, the preparation for the upcoming negotiation of a global POPs convention under UN Environmental Program auspices, and the Regional Action Plans on DDT, chlordane, PCBs, and mercury developed under auspices of the North American Commission for Environmental Cooperation.
2. ***Screen and Select More Priority PBT Pollutants for Action.*** Beyond the BNS Level 1 substances, EPA will select additional PBT pollutants for action. EPA will apply selection criteria in consultation with a technical panel. Candidate chemicals will be those highly scored by EPA's Waste Minimization Prioritization Tool and other chemicals of high-priority to EPA offices. EPA will seek internal and external comment on the proposed selection methodology in 1999.
  3. ***Prevent Introduction of New PBTs.*** EPA is acting to prevent new PBT chemicals from entering commerce by: (a) proposing criteria for requiring testing/restrictions on new PBT chemicals; (b) developing a rule to control attempts to re-introduce out-of-use PBT chemicals into commerce; (c) developing incentives to reward the development of lower-risk chemicals as alternatives to PBTs; and (d) documenting how PBT-related screening criteria are taken into account for approval of new pesticides and re-registration of old pesticides.
  4. ***Measure Progress.*** EPA is defining measurable objectives to assess progress. EPA will use direct and indirect progress measures, including: (a) human health or environmental indicators (such as National Health and Nutritional Examination Surveys and a national study of chemical residues in fish); (b) chemical release, waste generation or use indicators (such as enhancing the Toxics Release Inventory and using other release

reporting and monitoring mechanisms); and, (c) program activity measures (such as EPA compliance/enforcement data).

### **Mercury -- An Action Plan Example**

EPA's PBT Strategy is a living document that supports the development and implementation of action plans on priority PBTs. Attached to the strategy is EPA's draft Mercury Action Plan. It illustrates an action plan that is national and even international in scope, and describes the kinds of actions EPA may take to reduce risks posed by other priority PBT pollutants. Each substance or group of substances will present its own set of action opportunities.

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# A MULTIMEDIA STRATEGY FOR PRIORITY PERSISTENT, BIOACCUMULATIVE, AND TOXIC (PBT) POLLUTANTS

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## I. PURPOSE -- THE CASE FOR COORDINATION

A key purpose of this strategy is to overcome the remaining challenges in addressing priority persistent and bioaccumulative toxic (PBT) pollutants. EPA has a long history of successful programs in controlling PBT pollutants -- pollutants that are toxic, persist in the environment, and bioaccumulate in food chains, and thus pose risks to human health and ecosystems. The challenges remaining on PBT pollutants stem from the fact that they transfer rather easily among air, water, and land, and span boundaries of programs, geography, and generations, making single-statute approaches less than the full solution to reducing these risks. To achieve further reductions, a multi-media approach is necessary. Accordingly, EPA is committing, through this strategy, *to create an enduring cross-office system that will address the cross-media issues associated with priority PBT pollutants.*

Many single-medium offices have established a sequence of activities aimed at further reducing PBT risks within their media. To better address the cross-media aspects of PBT pollutants, however, EPA programs must integrate their work across media more thoroughly and align their domestic and international activities more effectively. The intention of this strategy is to make the whole of the Agency's efforts on PBT pollutants more than the sum of its parts. EPA will coordinate its use of statutory authorities and resources to maximize public health and environmental protection. Environmental results anticipated from implementing this strategy will derive from stronger multi-media coordination among national and regional EPA programs, and through the significant involvement of stakeholders.

Groups outside EPA also recognize the need for a cross-program, multi-media approach to environmental problems like PBTs. Recommendations consistent with this strategy are in three recent reports: (a) the 1998 Natural Resources Defense Council Report, "Contaminated Catch -- The Public Health Threat from Toxics in Fish" (prevent persistent pollution, control pollutants that cross media); (b) the National Academy of Public Administration's 1995 Report, "Setting Priorities, Getting Results -- A New Direction for EPA" (set priorities by risk, integrate efforts across media/statutes); and, (c) the Organization for Economic Cooperation and Development's (OECD) 1996 Report, "Environmental Performance Review of the United States" (coordinate/integrate EPA chemical programs with EPA media programs).

*99. 9092 -- REDUCE RISKS FROM PBT POLLUTANTS*

The goal of this strategy must be measurable in terms of environmental results. **EPA's strategic goal is to identify and reduce risks to human health and the environment from current and future exposure to priority PBT pollutants.** PBTs are associated with a range of adverse human health effects, including effects on the nervous system, reproductive and developmental problems, cancer, and genetic impacts. People who eat large amounts of fish from local waters contaminated with certain PBTs are at risk for adverse effects. The developing fetus and young child are at particular risk for developmental problems. Birds and mammals at the top of the food chain are also at risk. The most famous example is the serious decline of the bald eagle in the 1960's because the fish they ate contained DDT. The DDT did not kill them or make them sick, but it did make their eggshells so thin it seriously threatened their ability to reproduce.

### **Characterizing Chemicals as Persistent, Bioaccumulative, and Toxic**

This strategy characterizes PBT chemicals as those that partition primarily to water, sediment or soil, and are not removed at rates adequate to prevent their bioaccumulation in aquatic or terrestrial species. Chemicals characterized as suspected persistent bioaccumulators typically have been confirmed as such based on accepted test methods. Follow-on toxicity testing leads to their identification as persistent and bioaccumulative toxic chemicals.

## **III. FOUNDATION AND GUIDING PRINCIPLES**

***Building on a Strong Foundation.*** This strategy reinforces and builds on an existing federal commitment to deal with PBT pollutants. EPA's commitment to control, remediate, and prevent releases of PBTs (such as lead, mercury, PCBs, and DDT) is reflected in efforts that span 25 years. Among EPA's current commitments on PBTs are the 1997 Canada-U.S. Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes (Binational Toxics Strategy or BNS), its cross-Agency Task Forces on lead, mercury, and dioxin, its Waste Minimization National Plan, its Contaminated Sediment Management Strategy, its recently announced Clean Water Action Plan, and the PBT emphasis in its new Chemical Right-to-Know program announced by the Vice President in April 1998.

Identifying and managing PBT pollutants is a priority for key international organizations at both regional and global levels.<sup>1</sup> Recognizing that many PBTs circulate at regional and even global scales, nations find they must cooperate to reduce PBT risks. Often spurred by U.S. Government leadership, these international organizations are developing and implementing risk reduction measures ranging from technical assistance programs to build institutional capacities for dealing with PBTs to legally-binding international agreements for phasing out production and use of selected PBTs.

***Guiding Principles.*** EPA will follow these principles in carrying out its PBT strategy:

- \* Address problems on multi-media bases through integrated use of all Agency tools.
- \* Coordinate with and build on relevant international efforts.
- \* Coordinate with relevant Federal programs and agencies.
- \* Emphasize cost-effectiveness (e.g., amount of PBT removed per dollar spent).
- \* Involve stakeholders.
- \* Emphasize use of innovative technologies and pollution prevention.
- \* Protect vulnerable sub-populations.
- \* Base decisions on sound science.
- \* Use measurable objectives and assess performance (see page 10 on GPRA).

#### IV. APPROACH TO PBT RISK REDUCTIONS

Four elements are central to EPA's PBT strategy. They are: (1) developing and implementing national action plans for priority PBT pollutants using the full range of EPA tools to achieve risk reduction; (2) screening and selecting more priority PBT pollutants for action; (3) preventing the introduction of new PBT pollutants into commerce; and, (4) measuring progress by linking activities to environmental results. All of these elements require a heightened level of multi-office integration in planning, budgeting, and implementation. Figure 1 on page 7 shows the framework EPA is using to carry out these elements.

Below is a description of activities being undertaken in 1998-1999. Following that is a more detailed explanation of each of the four strategy elements.

#### *Activities Underway or Planned for Near-Term Action<sup>2</sup>*

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<sup>1</sup>PBT pollutants are addressed by such fora as the North American Commission for Environmental Cooperation (CEC), the UN Economic Commission for Europe Convention on Long Range Transboundary Air Pollution (LRTAP), the Arctic Council, the UN Environment Program (especially its negotiations on a global Persistent Organic Pollutants Convention), and the Intergovernmental Forum on Chemical Safety (IFCS).

<sup>2</sup>Office abbreviations for this section are OAR (Office of Air and Radiation), OECA (Office of Enforcement and Compliance Assurance), OIA (Office of International Activities), OPPTS (Office of Prevention, Pesticides, and Toxic Substances), ORD (Office of Research and Development), OSWER (Office of Solid Waste and Emergency Response), OW (Office of Water) and GLNPO (Great Lakes National Program Office).

Offices abbreviated in parentheses are funding the stated activity. Generally, all other offices are also participating.

- ***Develop and Integrate National Action Plans.***
  - ▶ Support/build upon evolving BNS Level 1 action plans as bases for developing national action plans on 12 Level 1 pollutants (as listed on p. 6) (GLNPO, OIA, OW -- Fall 1998 - ongoing).
  - ▶ Focus on appropriate risk, use, and release reduction actions, and sequence them as needed for implementation. When possible, group chemicals for action to achieve efficiency and consistency (Fall/Winter 1998 - ongoing).
  - ▶ Align work and roles across Headquarters and Regional programs to prepare for implementing action plans (OPPTS, OSWER, Regions -- Fall 1998 - ongoing).
  
- ***Engage Stakeholders Nationwide*** (OPPTS).
  - ▶ Engage stakeholders on (1) draft strategy, (2) development/implementation of action plans, and (3) criteria for selecting more PBTs for action (Fall 1998 -- ongoing).
  
- ***Implement Process-Specific and Pollution Prevention (P2) Projects Under Draft Mercury Action Plan*** (OAR, OECA, OPPTS, OSWER, OW, Regions).
  - ▶ Use regulatory authorities to reduce mercury emissions. (Recently-final municipal waste combustor and medical waste incinerator rules will get significant reductions.) Evaluate linkages between air emissions and water quality impacts for targeted, regulatory action. Develop pollution prevention (P2) guidelines and incentives in rulemakings addressing mercury (Summer 1998 and ongoing).
  - ▶ Seek voluntary reductions in uses of mercury through partnerships with the chlor-alkali industry, hospitals using mercury-containing products, laboratories, and manufacturers and users of mercury switches (Fall 1998 and ongoing).
  - ▶ To improve citizens' right-to-know on mercury, seek to lower the reporting threshold for mercury under the Toxics Release Inventory, which could lead to more reporting of mercury releases (end of 1998).
  
- ***Focus Enforcement and Compliance Assurance Activities on PBTs*** (OECA, Regions, Winter 98/99 - ongoing).
  - ▶ Analyze compliance within PBT-related sectors to identify problems and opportunities for action.
  - ▶ Select industries, sectors, or regulations that would benefit from focused compliance attention and/or assistance.
  - ▶ Target actions with best potential to reduce PBT releases.
  - ▶ Develop Supplemental Environmental Projects and models to use with enforcement actions to enhance P2/reduction opportunities.
  
- ***Identify PBT chemicals to measure national reductions in hazardous wastes*** (OSW, Regions).

- ▶ Using the Waste Minimization Prioritization Tool and selection criteria reflecting Resource Conservation and Recovery Act (RCRA) concerns, publish a draft RCRA PBT List in a *Federal Register* notice (early November 1998).
  - ▶ Hold stakeholder meetings to discuss criteria (Fall 1998).
  - ▶ Finalize and release list of RCRA PBT chemicals (Winter 1998/99).
- ***Develop or Revise Water Quality Criteria*** for mercury and other specific priority PBTs. Revise methodology for mercury water quality criteria. (OW, Spring 1999)
- ***Support International Efforts beyond the Binational Toxics Strategy*** (OAR, OECA, OIA, OPPTS, ORD, OSWER, OW, 1998 and ongoing).
    - ▶ Support the North American Commission for Environmental Cooperation's (CEC) Sound Management of Chemicals work program, including the implementation of the Regional Action Plans on DDT, chlordane, PCBs, and mercury.
    - ▶ Promote the early implementation of the Persistent Organic Pollutants (POPs) and Heavy Metals Protocols recently negotiated under the UN ECE's Convention on Long Range Transboundary Air Pollution.
    - ▶ Provide leadership in the negotiations on a global POPs convention under the auspices of the UN Environment Program.
    - ▶ Continue working with developing countries to phase out use of lead in gasoline.
- ***Conduct Research and Analysis on PBTs*** (ORD, OAR, OPPTS, OSWER, OIA, Regions, 1999 and ongoing).
    - ▶ Develop/promote mercury emission control approaches for coal-fired utility boilers.
    - ▶ Conduct research on mercury and POPs transport, fate, and risk management.
    - ▶ Use P2 tools (Design for the Environment tools, environmental accounting materials management, etc.) in voluntary components of action plans.
    - ▶ Develop and improve test methodologies for environmental persistence.
    - ▶ Conduct Science Workshops on mercury and emerging PBTs.
    - ▶ Develop P2 options for mercury and dioxin risks from industrial combustion.
    - ▶ Publish "Status and Needs" paper on use of bioaccumulation data to assess sediment quality (Fall 1998).
- ***Screen and Select Additional Priority PBTs for Action*** (OPPTS, OSWER, Regions).
    - ▶ Finalize Waste Minimization Prioritization Tool for use in prioritizing PBTs (Summer 1998).
    - ▶ Catalog chemicals and modify data systems as needed (Fall 1998 - ongoing).
    - ▶ Select chemicals beyond the Level 1 list (1999).
- ***Prevent the Introduction of New PBT Chemicals*** (OPPTS-led).
    - ▶ Propose criteria for requiring testing/restrictions on new PBTs (Fall 1998).
    - ▶ Develop rule to control re-introducing out-of-use PBTs into commerce (1999).
    - ▶ Develop incentives to reward development of lower-risk alternatives to PBTs (Ongoing).

- ▶ Document how PBT screening criteria are taken into account when approving new pesticides and re-registering existing ones (Fall 1998).
- **Measure Progress** (OAR, OECA, OPPTS, OSWER, OW, OIA, Regions).
  - ▶ Help develop *National Health and Nutrition Examination Surveys* to analyze U.S. population for pesticides/dioxin in serum, and mercury in blood/hair (Summer '98).
  - ▶ Begin working with the National Institutes of Health (NIH) to monitor PBTs in fetal cord blood of Alaskan native groups (Fall 1998 - ongoing).
  - ▶ Design and peer review *National Study of Chemical Residues in Fish* for estimating trends in environmental measures (1998-early 1999). Begin sampling in 1999.
  - ▶ Propose a rule adding dioxins/possibly other PBTs to the Toxics Release Inventory (TRI); lower reporting thresholds for dioxins and PBTs listed on TRI (end of 1998). Update air emission inventory, especially for dioxin/mercury sources (Fall 1998 - ongoing), and support coal sampling and stack testing for mercury at utilities (Fall 1998 - ongoing).
  - ▶ Design activity measures (1999).

## Strategy Elements

### 1. Develop and Implement National Action Plans

***Developing National Action Plans.*** In this strategy, EPA is affirming the priority given by the United States and Canada to the Level 1 substances under the Binational Toxics Strategy (BNS), and making these substances the first focus for action. The Level 1 substances are:

aldrin/dieldrin	mercury and compounds
benzo(a)pyrene	mirex
chlordane	octachlorostyrene
DDT(+DDD+DDE)	PCBs
hexachlorobenzene	PCDD (Dioxins) and PCDF (Furans)
alkyl-lead	toxaphene

EPA is focusing on these substances first because the BNS reduction goals for them are national, and most of these substances are already targets of existing and pending international agreements. EPA believes there is much to gain by building on the efforts of its Great Lakes National Program Office (GLNPO) and EPA Region 5 to virtually eliminate these PBT pollutants in the Great Lakes Basin.

EPA will use the work plans being developed by BNS multi-stakeholder work groups as starting points for national action plans under this strategy. The BNS framework relies heavily on stakeholder involvement, and has a preference for voluntary action when adequate to meet BNS goals. BNS work plans will likely yield regionally-specific model actions that can serve as foundations for national action plans under this strategy. EPA is evaluating whether, for the Level 1 substances, assembling national workgroups (or some other configuration) to involve

Regions and complement BNS workgroups may help in the timely development of national action plans. For a summary of linkages between this strategy and the BNS, see page 15.

*National action plans will draw on the full array of EPA statutory authorities and national programs.* EPA may use regulatory action where voluntary efforts are insufficient. EPA will likewise pursue, in the short-term or longer-term as appropriate, actions for enforcement of and compliance with current regulations, international coordination, place-based remediation of existing PBT contamination, research, technology development and monitoring, community and sector-based projects, and use of outreach and public advisories. EPA will focus on action, while bearing in mind the need to address uncertainties and data gaps through data collection and scientific and technical research. EPA will sequence activities to lay any groundwork necessary for longer-term action.

# Strategy Elements Framework

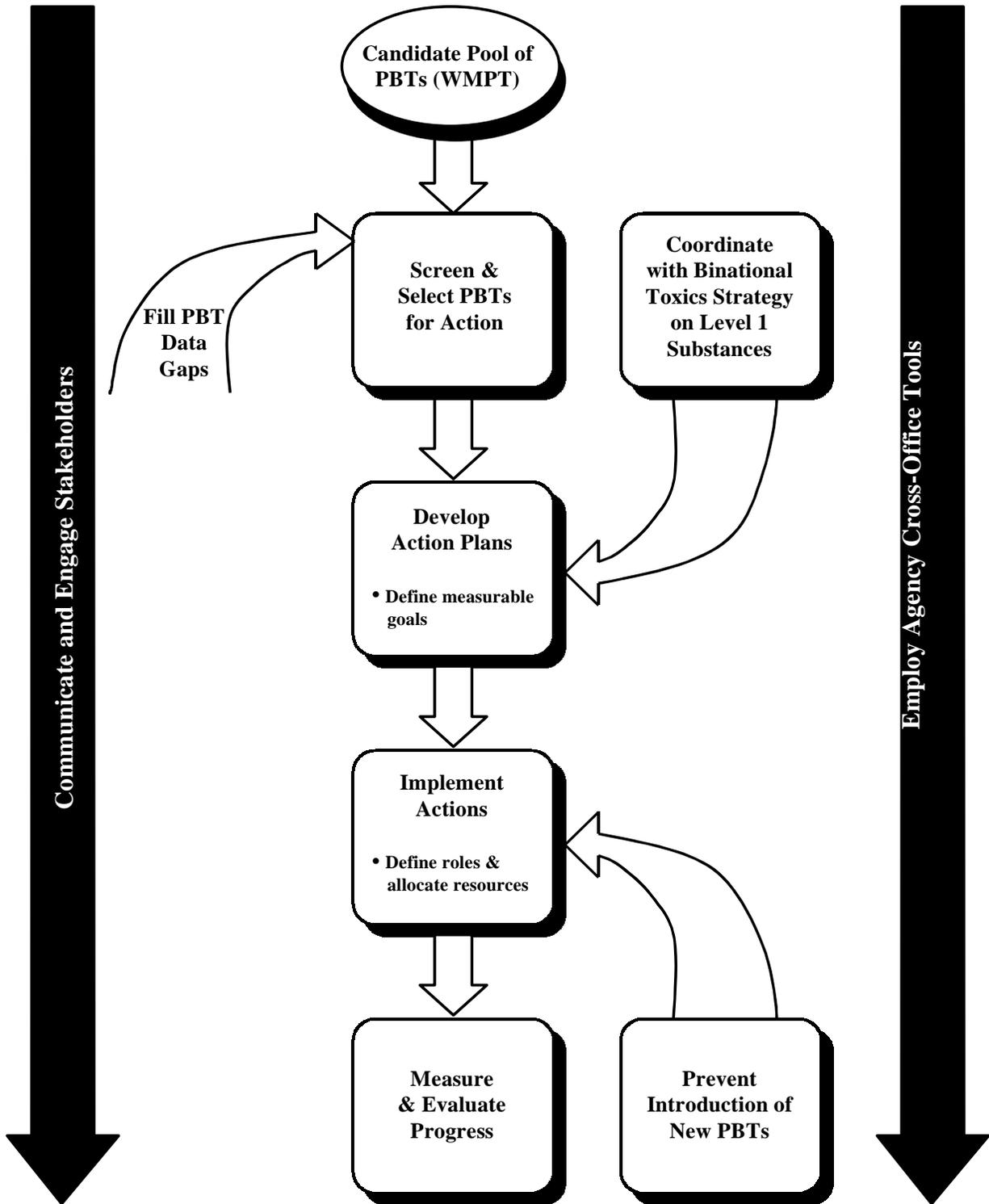


Figure 1.

The Draft Mercury Action Plan in *Attachment 1* illustrates how EPA can coordinate the use of its tools to achieve reductions for a PBT pollutant. This plan represents EPA's preferred approach, since it involves multi-media and cross-office actions, quantitative challenge goals, stakeholder engagement, international coordination, and long-term emphasis on pollution prevention. Such an action plan is possible because EPA has extensive knowledge of and a mature program on mercury, more so than for most other PBT pollutants. Action plans for banned substances like canceled pesticides or PCBs, or substances with much less risk characterization like octachlorostyrene, will differ substantially from the draft mercury action plan. EPA has begun implementing some reduction activities for mercury. See the next section and *Appendix B* for the status of developments on all 12 BNS Level 1 substances.

***Maximizing Opportunities for Integration.*** As EPA develops action plans, it will align program efforts and integrate actions across media. Whenever possible, EPA will address groups of pollutants rather than individual pollutants, to prevent or reduce risks for multiple pollutants at the same time. As individual action plans mature, EPA may see opportunities to integrate activities in ways that achieve greater cost savings in amounts of each PBT removed per dollar spent. EPA may also be able to identify facility-wide pollution prevention and technology transfer opportunities for specific industry sectors. Maximizing opportunities for integration will avoid transferring problems across media or to chemical substitutes.

***Implementing PBT Reduction Actions.*** Some of the activities being planned for the 12 BNS Level 1 substances are already reasonably well outlined. This is especially true for mercury, as noted above on pages 4 and 6. What follows highlights some of the activities on some of the other 11 substances on the BNS Level 1 list.

- ▶ EPA will prepare a BNS status report by December 31, 1998 on the use or release of chlordane, DDT, aldrin-dieldrin, mirex, and toxaphene from sources that enter the Great Lakes Basin. EPA will continue "Clean Sweeps"<sup>3</sup> in the Great Lakes Basin, and will seek to extend Clean Sweeps on a national basis. EPA will work with Mexico to reduce DDT/chlordane reliance, speed registration of reduced-risk pesticides, and encourage states' promotion of biological controls through State Management Plans.
- ▶ EPA will prepare a BNS status report by December 31, 1998 on alkyl-lead to confirm no use in automotive gasoline. EPA will encourage stakeholder minimization of use/release from aviation and racing sources in the Great Lakes Basin, and will seek to extend these efforts on a national basis.
- ▶ EPA will publicly release the final Dioxin Reassessment in Spring 1999.

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<sup>3</sup> Agricultural "Clean Sweeps" is a popular term for waste pesticide collections undertaken at State and local levels to dispose of pesticides that are suspended, canceled, or no longer fit for use. States conduct Clean Sweeps as a prudent investment to avoid potential spills and costly clean-up.

## 2. Screen and Select More Priority PBT Pollutants for Action

Looking beyond its initial focus on the BNS Level 1 substances, the Agency will screen and select additional PBT pollutants for action. It is likely that the opportunities for pollution prevention will be greater for the additionally selected PBT pollutants. EPA will use a primary and secondary screening process to make these selections.

**Primary Screening: Preliminary Criteria.** EPA will apply a primary screening process to candidate PBT pollutants. EPA is defining candidate pollutants as (a) those highly scored by EPA's *Waste Minimization Prioritization Tool* (WMPT) for human or ecological concern, and (b) other high-priority chemicals for EPA headquarters and regional program offices. The WMPT prioritizes chemicals based on their cumulative persistence, bioaccumulation, and chronic human and ecological toxicity. The purpose of the primary screen is to reduce the number of candidate pollutants under consideration. A chemical will pass the primary screen if it meets at least one of the following criteria:

- The chemical is currently produced within the U.S. or imported;
- The chemical is being released to the environment;
- The chemical is generated/managed in waste; or
- The chemical has been detected in the environment at levels of concern (as yet undefined).

**Secondary Screening: Ranking Criteria and Technical Panel.** EPA will then use secondary criteria to rank those PBT pollutants that pass the primary screen. EPA's Office Directors and the PBT Plenary Group are developing the secondary criteria. EPA is carefully crafting these criteria to represent its priorities and will define them, in part, by the availability of sound scientific and technical data. The criteria will be related to PBT characteristics (especially hazard), potential exposure, pollution prevention opportunity, and suitability for an EPA-wide national focus (including potential for grouping chemicals for action). EPA will apply the secondary criteria in consultation with a technical panel which, in turn, may consult with a network of experts to ensure that chemical selection is based on sound science. Details about the selection criteria, process, and technical panel remain under development.

The proposed methodology will undergo internal and external review in 1999. The methodology and decisions will also be periodically reassessed as more data become available that may affect EPA's selection process.

## 3. Prevent the Introduction of New PBT Pollutants

EPA will be taking four actions to prevent new PBT chemicals from entering commerce, using authorities under the Toxics Substances Control Act (TSCA) and the Federal Insecticide, Fungicide and Rodenticide Act.

- EPA will propose a PBT category for screening new chemicals, to enhance EPA's ability to evaluate the potential risks of new PBTs and to use testing requirements and other restrictions as necessary to protect the public. Under its TSCA-based New Chemicals Program, EPA groups new chemicals with shared structural and toxicological properties into categories. These categories allow submitters of Premanufacture Notices and EPA reviewers to benefit from accumulated data and decisional precedents. If EPA identifies a new substance as being in the PBT category, EPA will evaluate the potential health or environmental concerns associated with the category, and the potential exposures and releases of the new chemical. If EPA concludes the new substance may pose an unreasonable risk to human health or the environment, EPA may require testing and restrictions.
- EPA will develop a significant new use rule to control attempts to re-introduce out-of-use PBT chemicals into commerce. This rule will apply to PBTs previously in commerce but not being manufactured, as identified from updated reporting on U.S. production, including polychlorinated terphenyls and hexachlorobenzene.
- EPA is developing incentives to reward the development of lower-risk chemicals as alternatives to existing, higher-risk PBT chemicals. EPA will create these incentives through its New Chemicals Program and its green chemistry activities.
- EPA will document how PBT-related screening criteria are taken into account for approval of new pesticides and re-registration of existing ones. EPA will seek acceptance of these criteria by international organizations working on persistent organic pollutants (POPs), including the OECD chemical/pesticide program, the Binational Toxics Strategy, the IFCS, and the CEC.

#### 4. Measure Progress: Link Activities to Environmental Results

EPA will measure progress on actions under this strategy through: (1) environmental or human health indicators, (2) chemical release, waste generation, or use indicators, or (3) programmatic output measures. EPA believes that tying its indicators of progress to environmental results through real world measures (e.g., reduced levels of PBTs in human blood or fish tissue) will encourage the Agency and its stakeholders to think creatively about how to achieve the progress in risk reduction that both seek.

This approach to measuring progress meets the requirements of the Government Performance and Results Act of 1993 (GPRA). GPRA requires federal agencies to define measurable goals and objectives, measure progress, and report accomplishments. Appendix A shows that the goal of this strategy matches EPA's goals and objectives under GPRA, including Goal # 1 clean air, Goal # 2 clean and safe water, Goal # 4 preventing pollution and reducing risk, Goal # 6 reducing global and cross-border environmental risks, Goal # 8 sound science, and Goal # 9 credibly deterring pollution and increasing compliance with the law.

EPA will use the following measures to track progress in reducing risks from PBT pollutants, as shown in Figure 2. EPA will evaluate and use other progress measures as appropriate.

- **Human Biomarkers.** EPA will use the National Health and Nutrition Examination Surveys (NHANES) as its primary measure of human exposure. Conducted by the CDC's National Center for Health Statistics (NCHS), NHANES trace the health and nutritional status of U.S. civilians. Surveys use adult, youth, and family questionnaires, followed by standardized physical examinations. The primary NHANES objective is to obtain national population health and nutrition parameters, using suitably precise estimates for age, gender, and race/ethnicity (whites, blacks, and Mexican-Americans). EPA expects NHANES IV to analyze most Level 1 substances. EPA has worked with NCHS to add analysis for mercury in blood and hair for some survey participants. EPA also will begin working with NIH and other U.S. government entities to conduct fetal cord blood monitoring for PBTs in Alaskan native groups.
- **Food Chain/Environmental Measures.** A cornerstone of the measurement effort will be a National Study of Chemical Residues in Fish. This EPA study will statistically evaluate the incidence and severity of mercury and other PBT residues in fish, both downstream from suspected problem areas and in background areas. On a national basis, the study will calculate concentrations of priority PBT chemicals in fish. On a regional basis, it will also calculate concentrations of some other PBT chemicals in fish. The study will allow for estimating trends over time. EPA will work with State Departments of Health and Environmental Protection, coordinating with state fish advisory programs to help fill data needs identified in the survey. Study design and peer review will be completed in fiscal year 1998 (FY98) or early FY99. Sampling begins in FY99 and concludes in Summer FY01. Study results will be available in FY02.
- **Environmental Release Data.** To help characterize trends in environmental releases and waste management, EPA intends to propose a rule to add dioxins and possibly other PBT substances to the Toxics Release Inventory (TRI). This rule will also propose lowering reporting thresholds for PBT chemicals -- some already listed on TRI, like mercury and mercury compounds, and some being added, like dioxins. Lowering reporting thresholds could increase reporting of PBT chemicals and thereby enhance TRI's value for tracking progress in reducing PBT pollution. Plans are to propose the TRI PBT rule by close of 1998. EPA expects a final rule by the end of 1999, with reporting to begin in 2000. The first public release of the data obtained through the TRI PBT rule would be in 2001.

Reductions of volumes of hazardous wastes containing PBTs will also be measured using the 1991 Biennial Reporting System<sup>4</sup> data as a baseline on hazardous waste generation

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<sup>4</sup> The Biennial Reporting System contains data on hazardous waste generation and management for facilities regulated by the Resource Conservation and Recovery Act (1976). EPA collects the data every two years pursuant to the Hazardous and Solid Waste Amendments of 1984, and publishes it in the Biennial RCRA Hazardous Waste Report.

trends. Reductions of specific high-priority PBT chemicals in hazardous wastes will also be measured using TRI data. Reductions of chemicals in hazardous wastes is one indicator of whether the reductions are occurring at the source, prior to generation of hazardous wastes. EPA will use these methods to report progress on reducing PBTs in hazardous wastes by 50% by 2005, a subobjective under GPRA Goal 4 (see discussion of GPRA on page 10).

Beyond TRI, EPA will also evaluate the results of ongoing monitoring programs, such as the Integrated Atmospheric Deposition Network and those used by other Federal agencies like the U.S. Geological Survey. EPA will also evaluate and support improving outputs from international monitoring and modeling programs. These include national emission inventories and related modeling of long-range transboundary fluxes, conducted pursuant to the POPs and heavy metals protocols to the UN ECE's Convention on Long Range Transboundary Air Pollution.

- **Activity Measures.** EPA will also use PBT-related activity measures, especially at the start, since risk reductions might not be readily apparent in the short term. Activity measures include negotiation and implementation of international agreements; Federal or State compliance assistance; public/industry workshops and educational outreach; pollution prevention agreements or other voluntary activities by the regulated community; focused compliance monitoring and enforcement; and regulatory and permitting changes.

## V. MANAGING FOR SUCCESS

To manage the effort under this strategy, EPA will rely on sustained senior-level support, a strong organizational structure for coordination, sustained resources, a well-defined framework for carrying out the elements of this strategy, and stakeholder involvement.

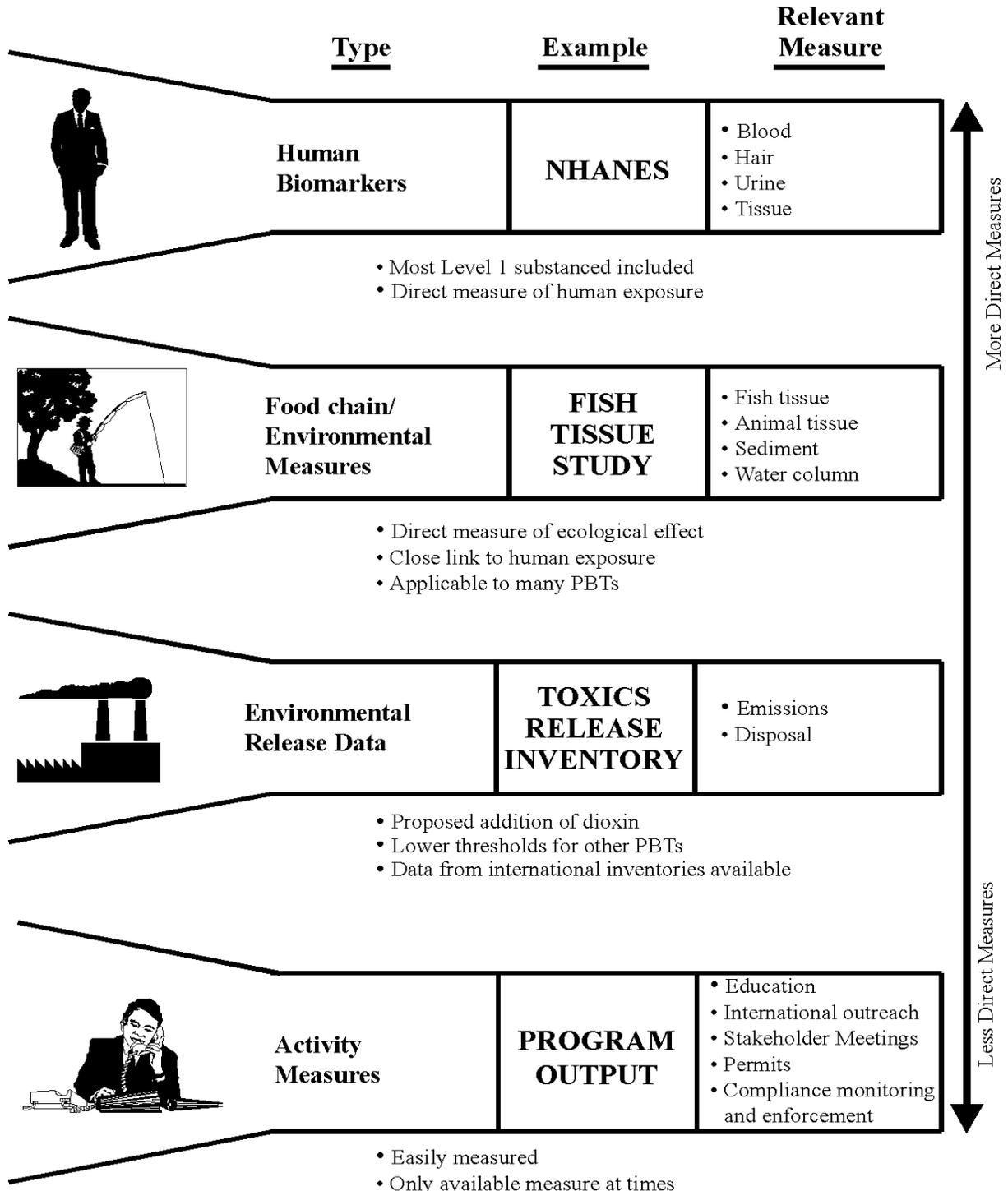
### Managing the Implementation of the Strategy

EPA is using the following organizational structure to coordinate and sequence activities under this strategy.

- The PBT Plenary Group, a body of EPA personnel instrumental in developing this strategy, will be responsible for integrating actions across Agency programs and recommending action priorities. This group will forward its recommendations to the Office Directors for decisions. It will also help track progress toward the strategy's goals.
- EPA's Office Directors' Multi-Media and Pollution Prevention Forum will define actions to be taken each fiscal year, based on Plenary Group recommendations. The Forum will also incorporate these actions into EPA's program planning process, and evaluate progress on activities towards the strategy's goal.

Figure 2

## A Continuum of Activities that Measure Environmental Results



CD/Thomas/1-2

- Program and Enforcement Offices at the Headquarters and Regional levels will implement defined actions with the support of ad-hoc groups such as the Mercury Task Force and Dioxin Assessment Group. EPA has also established a network of Regional PBT contacts to facilitate these efforts at the Regional level.

## Establish Linkages Among Current Program Efforts

Establishing linkages among programs is key to achieving the goal of this strategy.

***Linkages with the Canada – U.S. Binational Toxics Strategy.*** EPA is coordinating its implementation of this strategy with that of the Binational Toxics Strategy. These efforts mutually contribute to the success of one another, as summarized in Table 1.

**Table 1. Relationship Between the PBT Strategy and Binational Toxics Strategy (BNS)**

Binational Strategy	PBT Strategy
Initial focus on Level 1 substances	Initial focus on Level 1 substances. Will select additional substances, providing a basis for BNS implementation decisions on Level 2 substances.
Much of the focus is regional in scope for water, and national in scope for air.	National in scope for all media, including Everglades, Gulf of Mexico, Chesapeake Bay, Lake Champlain.
Establishes quantitative challenge goals for virtual elimination of Level 1 substances	Provides scientific support for deciding whether more action is needed after challenge goals are met.
Progress tracking and accountability related to specific reduction (use/release) goals.	Builds on use/release tracking of BNS and expands progress tracking to measures closer to human and ecological levels and effects.
Identify key stakeholders and bring stakeholders' current technology to light	Coordinates research on new technologies and provides Agency tools such as environmental accounting, models, etc.
Specifies coordination with international efforts to ensure consistency	Expands coordination with international efforts

***Linkages with International Chemical Management Efforts.*** To the extent that international voluntary activities and legally-binding agreements result in meaningful PBT risk reductions in other countries, these international steps would be a positive complement to this strategy. Likewise, domestic actions implemented by this strategy could serve as models for other countries. A number of international efforts in which EPA participates, including those listed below, are relevant to this strategy.

- ▶ The North American Commission for Environmental Cooperation (CEC), made up of the U.S., Canada, and Mexico, is conducting a Sound Management of Chemicals Program.
- ▶ Through CEC, the U.S. is working to implement Regional Action Plans on DDT, chlordane, PCBs, and mercury.
- ▶ EPA is continuing long-standing efforts to provide technical assistance to developing countries to eliminate the use of lead in gasoline.
- ▶ EPA is supporting the implementation of the Persistent Organic Pollutants (POPs) and Heavy Metal Protocols to the UN ECE's LRTAP Convention.
- ▶ EPA is a key US government participant in the ongoing negotiations of a global POPs Convention under UNEP auspices.

***Linkages with the Waste Minimization National Plan.*** EPA is coordinating this strategy with its Waste Minimization National Plan which EPA launched four years ago. Supporting this National Plan is EPA's GPRA subobjective to "reduce the most persistent, bioaccumulative, and toxic chemicals in hazardous waste 50% by the year 2005." In furtherance of the Plan and this subobjective, EPA: (1) has developed the Waste Minimization Prioritization Tool ; (2) is proposing this fall and finalizing this winter a list of those PBTs of most concern for tracking national reductions in hazardous wastes; (3) is using the RCRA Implementation Plan and its guidance on core measures for National Environmental Performance Partnerships with states to reinforce the PBT reduction goals for hazardous wastes; and, (4) will be finalizing methods this year to measure reductions of PBTs in hazardous wastes and reductions of hazardous wastes containing PBTs. The PBT Strategy will likewise be making use of the Waste Minimization Prioritization Tool and will seek consistency with other activities of the Waste Minimization National Plan to the maximum extent possible.

***Linkages with Sector- and Community-Based Efforts.*** The chemical-based PBT Strategy is complementary to sector-based and place-based approaches. Aspects of this strategy – assessing risk, overcoming single-medium approaches in establishing national baseline regulations and policies, targeting research, controlling more PBTs from entering commerce, creating incentives for safer substitutes, and facilitating coordination with U.S. and international agencies – can serve the needs of sector- and place-based approaches. Indeed, constructive collaboration can occur among all three approaches.

EPA, with the Common Sense Initiative Council, is developing a Sector-Based Action Plan to integrate the sector-based approach into core Agency operations. The Plan will, among other things, identify objective criteria for selecting future sector-based opportunities. EPA's regulatory framework already starts with "source categories" of releases to air, water, or land, and may serve as a point of reference. This PBT strategy may also be able to identify source categories by use or release of chemicals or chemical groups. Once a sector could be earmarked for significant PBT use or release, then sector-based and chemical-based approaches could use complementary analysis and stakeholder outreach to tackle PBT problems on a sector-basis.

EPA also seeks to implement Community-Based Environmental Protection (CBEP), a place-based, collaborative, multi-media, and multi-disciplinary approach to environmental protection. Embracing principles of ecosystem management and sustainable development, it

convenes stakeholders within a geographic area to identify local concerns (including urban sprawl, shrinking biodiversity, and remediation of in-place PBT contaminants), set priorities and goals, and forge comprehensive solutions. CBEP promotes integration of EPA programs and activities to complement and enhance community decision-making. Regional activities on the Chesapeake Bay and Great Lakes exemplify the CBEP approach and are also integral to the PBT Strategy (see Table 1).

***Linkages with EPA Regional Programs.*** EPA Regional programs are essential to implementing this strategy. Among the roles they may take on are the following:

- Participating in GLNPO or national work groups as appropriate.
- Identifying geographic sources and sinks of priority PBTs.
- Participating in the chemical selection process.
- Assuming lead responsibilities for action plan development teams.
- Managing region-specific projects during action plan implementation.
- Promoting compliance assurance and enforcement efforts.
- Supporting States and Tribes in addressing PBT issues in their jurisdictions.
- Carrying out PBT-related actions under EPA's National Waste Minimization Plan.

## Stakeholder Involvement

Building on the stakeholder involvement begun under the Binational Toxics Strategy is essential to this strategy. EPA's Region 5 and GLNPO are successfully engaging state and tribal program partners, industry, environmental groups, and others in taking actions on Level 1 substances. For example, the Council of Great Lakes Industries has helped educate and bring to the table other industries and sectors to identify possible voluntary actions. In cooperation with EPA, the National Wildlife Federation has begun mercury and dioxin reduction projects at Great Lakes hospitals. EPA will build on these efforts to engage stakeholders in areas of the country beyond the Great Lakes Basin.

EPA will seek stakeholder input on this draft strategy, the development and implementation of specific action plans for PBT pollutants, and the criteria for selecting more PBTs for risk reduction action. EPA will make *Federal Register* announcements of meetings in Washington, DC and EPA regional city locations for stakeholders to comment on the draft strategy. EPA will invite State and tribal representatives to join the teams that develop the action plans, and will invite all others to review and comment on draft action plans. EPA will also invite all interested partners to join in developing voluntary agreements with EPA, agreements EPA considers essential to reaching the goal of this strategy.

For answers to general questions about the PBT Strategy or to find out who to contact regarding particular aspects of the PBT Strategy, please contact Sam Sasnett, (202)260-8020, [sasnett.sam@epa.gov](mailto:sasnett.sam@epa.gov).

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EPA Air Docket: (202) 260-7548  
EPA Water Docket: (202) 260-3027  
EPA RCRA Docket: (703) 613-9230

## GLOSSARY

BNS	June 1997 Canada-U.S. Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes (also referenced as “Binational Toxics Strategy”).
CEC	North American Commission for Environmental Cooperation
GLNPO	EPA’s Great Lakes National Program Office
GPRA	Government Performance in Results Act of 1993
IFCS	Intergovernmental Forum on Chemical Safety
LRTAP Convention	-- the UN ECE’s Convention on Long Range Transboundary Air Pollution
NHANES	National Health and Nutrition Examination Surveys
NIH	National Institutes of Health (U.S. Department of Health and Human Services)
OAR	EPA’s Office of Air and Radiation
OECA	EPA’s Office of Enforcement and Compliance Assurance
OECD	Organization for Economic Cooperation and Development
OIA	EPA’s Office of International Activities
OPPTS	EPA’s Office of Prevention, Pesticides, and Toxic Substances
ORD	EPA’s Office of Research and Development
OSWER	EPA’s Office of Solid Waste and Emergency Response
OW	EPA’s Office of Water
P2	Pollution prevention
PBTs	Persistent, bioaccumulative, and toxic pollutants
POPs Protocol	-- the Persistent Organic Pollutants Protocol negotiated under the UN ECE’s LRTAP Convention
RCRA	Resource Conservation and Recovery Act
TRI	Toxics Release Inventory
UN ECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Program
WMPT	Waste Minimization Prioritization Tool

## **APPENDIX A**

### **GPRA Goals and Objectives Supported by the PBT Strategy**

Table A-1. The PBT Strategy Will Help Meet Goals and Objectives Stated in EPA's Strategic Plan

EPA Strategic Plan Goals and Objectives
<ul style="list-style-type: none"> <li>■ <b>GPRA Goal 1: Clean Air</b> <ul style="list-style-type: none"> <li>● By 2010, improve air quality for Americans living in areas that do not meet the National Ambient Air Quality Standards (NAAQS) for ozone and particulate matter (PM).</li> <li>● By 2010, reduce air toxics emissions by 75 percent from 1993 levels to significantly reduce the risk to Americans of cancer and other serious adverse health effects caused by airborne toxics.</li> <li>● By 2005, improve air quality for Americans living in areas that do not meet the NAAQS for carbon monoxide, sulfur dioxide, lead, and nitrogen dioxide.</li> <li>● By 2010, ambient sulfates and total sulfur deposition will be reduced by 20-40% from 1980 levels due to reduced sulfur dioxide emissions from utilities and industrial sources. By 2000, ambient nitrates and total nitrogen deposition will be reduced by 5-10% from 1980 levels due to reduced emissions of nitrogen oxides from utilities and mobile sources.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>■ <b>GPRA Goal 2: Clean and Safe Water</b> <ul style="list-style-type: none"> <li>● By 2005, protect human health so that 95 percent of the population served by community water systems will receive water that meets drinking water standards, consumption of contaminated fish and shellfish will be reduced, and exposure to microbial and other forms of contamination in waters used for recreation will be reduced.</li> <li>● Conserve and enhance the ecological health of the nation's (state, interstate, and tribal) waters and aquatic ecosystems – rivers and streams, lakes, wetlands, estuaries, coastal areas, oceans, and groundwater – so that 75 percent of waters will support healthy aquatic communities, by 2005.</li> <li>● By 2005, pollutant discharges from key point sources and nonpoint source runoff will be reduced by at least 20 percent from 1992 levels. Air deposition of key pollutants impacting water bodies will be reduced.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>■ <b>GPRA Goal 4: Preventing Pollution and Reducing Risk in Communities, Homes, Workplaces and Ecosystems</b> <ul style="list-style-type: none"> <li>● By 2005, public and ecosystem risk from pesticides will be reduced through migration to lower-risk pesticides and pest management practices, improving education of the public and at-risk workers, and forming "pesticide environmental stewardship" partnerships with pesticide user groups.</li> <li>● By 2005, the number of young children with high levels of lead in their blood will be significantly reduced from the early 1990's.</li> <li>● By 2005, of the approximately 2,000 chemicals and 40 genetically engineered microorganisms expected to enter commerce each year, we will significantly increase the introduction by industry of safer or "greener" chemicals, which will decrease the need for regulatory management by EPA.</li> <li>● By 2005, 15 million more Americans will live or work in homes, schools, or office buildings with healthier indoor air than in 1994.</li> <li>● By 2005, reduce by 25% (from 1992 levels) the quantity of toxic pollutants released, disposed of, treated, or combusted for energy recovery. Half of this reduction will be achieved through pollution prevention practices.</li> <li>● By 2005, EPA and its partners will increase recycling and decrease the quantity and toxicity of waste generated.</li> <li>● By 2003, 60% of Indian Country will be assessed for its environmental condition, and Tribes and EPA will be implementing plans to address priority issues.</li> </ul> </li> </ul>

Table A-1. The PBT Strategy Will Help Meet Goals and Objectives Stated in EPA's Strategic Plan (Continued)

EPA Strategic Plan Goals and Objectives
<ul style="list-style-type: none"> <li>■ <b>GPR A Goal 6: Reduction of Global and Cross-Border Environmental Risks</b> <ul style="list-style-type: none"> <li>● By 2005, reduce transboundary threats to human health and shared ecosystems in North America, including marine and Arctic environments, consistent with our bilateral and multilateral treaty obligations in these areas, as well as our trust responsibility to tribes.</li> <li>● By 2000 and beyond, US greenhouse gas emissions will be reduced to levels consistent with international commitments agreed under the Framework Convention on Climate Change, building on initial efforts under the Climate Change Action Plan.</li> <li>● By 2005, ozone concentrations in the stratosphere will have stopped declining and slowly begun the process of recovery.</li> <li>● By 2005, consistent with international obligations, the need for upward harmonization of regulatory systems, and expansion of toxics release reporting, reduce the risks to U.S. human health and ecosystems from selected toxics (including pesticides) that circulate in the environment at global and regional scales. Results will include a 50% reduction of mercury emissions from 1990 levels in the United States. Worldwide levels of lead in gasoline will be below 1995 levels.</li> <li>● By 2005, increase the application of cleaner and more cost-effective environmental practices and technologies in the U.S. and abroad through international cooperation.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>■ <b>GPR A Goal 8: Sound Science, Improved Understanding of Environmental Risk, and Greater Innovation to Address Environmental Problems</b> <ul style="list-style-type: none"> <li>● By 2008, provide the scientific understanding to measure, model, maintain, or restore, at multiple scales, the integrity and sustainability of ecosystems now and in the future.</li> <li>● By 2008, improve the scientific basis to identify, characterize, assess, and manage environmental exposures that pose the greatest health risks to the American public by developing models and methodologies to integrate information about exposures and effects from multiple pathways.</li> <li>● By 2008, establish capability and mechanisms within EPA to anticipate and identify environmental or other changes that may portend future risk, integrate futures planning into ongoing programs, and promote coordinated preparation for and response to change.</li> <li>● By 2006, develop and verify improved tools, methodologies, and technologies for modeling, measuring, characterizing, preventing, controlling, and cleaning up contaminants associated with high priority human health and environmental problems.</li> <li>● Provide services and capabilities, including appropriate equipment, expertise, and intramural support necessary to enable ORD to research innovative approaches to current and future environmental problems and improve understanding of environmental risks.</li> <li>● By 2005, EPA will increase the number of places using integrated, holistic partnership approaches, such as community-based environmental protection (CBEP), and quantify their tangible and sustainable environmental results in places where EPA is directly involved.</li> <li>● By 2005, test innovative facility- and sector-based strategies to achieve improved environmental protection, and make successful approaches broadly available.</li> <li>● By 2005, Regions will have demonstrated capability to assess environmental conditions in their Region, compare the relative risk of health and ecological problems, and assess the environmental effectiveness of management action in priority geographic areas.</li> <li>● Conduct peer reviews and provide guidance on the science underlying Agency decisions.</li> <li>● Incorporate innovative approaches to environmental management into EPA programs, so that EPA and external partners achieve greater and more cost-effective public health and environmental protection.</li> </ul> </li> </ul>

Table A-1. The PBT Strategy Will Help Meet Goals and Objectives Stated in EPA's Strategic Plan (Continued)

<b>EPA Strategic Plan Goals and Objectives</b>	
■	<b>GPRA Goal 9: A Credible Deterrent to Pollution and Greater Compliance with the Law.</b> <ul style="list-style-type: none"><li>• Identify and reduce significant non-compliance in high priority program areas, while maintaining a strong enforcement presence in all regulatory program areas.</li><li>• Promote the regulated communities' voluntary compliance with environmental requirements through compliance incentives and assistance programs.</li></ul>

## **APPENDIX B**

### **Status of Developments on Binational Toxics Strategy Level 1 Substances**

**Table B-1. Status of Developments on the Level 1 Substances under PBT Strategy**

<b>Binational Toxics Strategy Level I Substances</b>		
<b>Effort Level</b>	<b>Timing</b>	<b>Features</b>
<b>Mercury and Compounds</b>		
High, probably the highest	U.S. challenge goal is, by 2006, 50% reduction in deliberate use and 50% reduction in release from human-activity sources. Draft action plan is complete. Many activities ongoing, with the BNS workgroup initiating others.	Activity is occurring in all National Program Offices and the Regions. EPA, through its draft mercury action plan, Mercury Task Force, BNS work group activities, and the PBT Strategy, will ensure activities are coordinated and complement each other. BNS work group activities have begun with a focus on voluntary action. The best description is in the attached draft Mercury Action Plan.
<b>PCDD (Dioxins) and PCDF (Furans)</b>		
High	U.S. challenge goal is 75% reduction in releases from human-activity sources by 2006. EPA will finalize an action plan after public release of its final Dioxin Reassessment, due Spring 1999, and a concurrent draft Cross-Media Dioxin Strategy. Meanwhile, the BNS work group will begin voluntary reduction efforts. EPA is addressing dioxins/furans in the negotiation of the global POPs convention, which began 6/98.	Beyond key steps already taken, actions will include BNS work group and PBT Strategy activities such as a Great Lakes state pilot to target air emissions using cross-media authorities, a national study of chemical residues in fish, new watershed decision-making using air data, research, and Gulf of Mexico activity. The BNS dioxin group will work closely with PBT Strategy dioxin efforts. EPA will work with other partners to better quantify dioxin/furan sources and release levels in representative developing countries as an input to the global POPs negotiations.

Table B-1. Status of Developments on the Level 1 Substances  
(Continued)

Binational Toxics Strategy Level   Substances		
Effort Level	Timing	Features
<b>PCBs</b>		
Medium to high (much is already done, given EPA's mature PCB program).	U.S. challenge goal is 90% reduction of PCBs used in electrical equipment by 2006. The BNS workgroup is developing a work plan. A draft national action plan is expected in 1999. EPA will address PCBs in the implementation of the LRTAP POPs protocol and the negotiation of the UNEP POPs convention, which began 6/98.	EPA heavily regulates PCBs. Problems include disposing of collected PCBs, remediating contaminated sediments, and motivating other countries (e.g., Russia) to reduce risks from PCBs. Two rules (one complete, one nearly so) will further facilitate industry's remediation, disposal, and replacement of PCBs. The BNS work group is pursuing voluntary reductions through expanding Region 5's PCB phase down program, encouraging national replication of the phase down program, a clean sweep pilot in Chicago, and encouraging a national PCB reduction effort. International capacity building efforts for PCB identification, management, and disposal are underway and will grow in volume and importance with the negotiation and conclusion of the UNEP POPs convention.
<b>The Pesticides (Chlordane, DDT, Aldrin/Dieldrin, Mirex, Toxaphene)</b>		
Medium low (collective level of effort, but possibly large impact of BNS)	EPA will submit a BNS status report on use or release from sources that enter the GL Basin by 12/31/98. BNS workgroup is developing a work plan this summer. A draft national action plan is expected in 1999. EPA is also addressing these pesticides through the UN negotiations on a legally binding global POPs convention, which began June 1998.	EPA will continue clean sweeps to reduce stockpiles in GL Basin, and work with stakeholders and GL states (NEPPS process) to reduce pesticide reliance. The possible contribution of long range transport to U.S. loadings is a significant issue to be resolved. OPP will work with Mexico to reduce DDT/chlordane reliance, speed registration of reduced-risk pesticides, and work with GLNPO to foster states' promotion of biological controls through State Management Plans. OPPTS and OIA will lead the EPA component of the U.S. delegation to the UNEP POPs negotiations.

Table B-1. Status of Developments on the Level 1 Substances  
(Continued)

Binational Toxics Strategy Level I Substances		
Effort Level	Timing	Features
<b>Alkyl-Lead</b>		
Low (air emissions estimated under 0.5 tons annually).	U.S. challenge goal is to confirm no use in automotive gasoline by 1998. Draft national action plan to be developed by 1999 based on BNS work plan.	EPA will submit "confirmation of no use in automotive gasoline" report under BNS by 12/31/98, broaden stakeholder involvement, encourage stakeholder minimization of use/release from other sources (e.g., aviation, racing), and track efforts to develop unleaded alternatives for aviation and racing fuel. The OECD risk management program and EPA's efforts to promote phasing out use of lead in gasoline are ongoing.
<b>Hexachlorobenzene</b>		
Low (collective level of effort, but possibly large impact of BNS).	BNS workgroup work plan is under development. Completion of final action plan may have contingencies (baseline levels not established and percentage goal not yet set under BNS).	An initial step under BNS is to quantify loadings to set a realistic percentage goal. The effect of long range transport remains a key issue. The BNS work group will consider approaches to reducing releases during pesticide manufacturing and use, chlorinated solvent manufacture, and possibly aluminum manufacturing. EPA may be able to address incineration sources through actions aimed at other PBTs, e.g., actions taken by other BNS work groups or recent MACT standards. A total phaseout is required under the LRTAP POPs protocol and will be proposed under the global POPs convention being negotiated under UNEP auspices.
<b>Benzo(a)pyrene</b>		
Low (collective level of effort, but possibly large impact of PBT Strategy and BNS).	BNS workgroup developing a work plan this summer. A draft national action plan is expected by 1999.	Benzo(a)pyrene is a polycyclic aromatic hydrocarbon, a subset of polycyclic organic matter (POM), which is a large class of substances that are by-products of incomplete combustion. POM is an area needing more research. In the LRTAP POPs context, B(a)P will be used as one of several indicators for overall releases of PAHs, with the intention of ultimately reducing such releases.

**Table B-1. Status of Developments on the Level 1 Substances  
(Continued)**

<b>Binational Toxics Strategy Level I Substances</b>		
<b>Effort Level</b>	<b>Timing</b>	<b>Features</b>
<b>Octochlorostyrene (OCS)</b>		
Low (collective level of effort, but possibly large impact of PBT Strategy and BNS).	U.S. challenge goal is to confirm no use or release by 1998. In January 1998, the PBT Plenary Group prepared a preliminary draft action plan for use in discussions with BNS stakeholders. BNS workgroup is developing a work plan.	GLNPO will submit a BNS status report on use or release from sources that enter the GL Basin by 12/31/98. The BNS work group is leading the OCS effort with a focus is on defining sources, releases, and environmental loadings (and to some extent toxicity and bioaccumulation). Near-term reduction activities may need to rely on efforts directed at other PBTs to accomplish associated reductions in OCS.

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## ACTION PLANS FOR PBT POLLUTANTS

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### INTRODUCTION

To illustrate EPA's approach to PBT pollutants under the PBT Strategy, the draft Mercury Action Plan is attached. This action plan focuses on regulatory and voluntary actions, enforcement and compliance, research, and outreach to characterize and reduce risks associated with mercury. It involves multimedia and cross-office actions, quantitative challenge goals, stakeholder engagement, international coordination, and long-term emphasis on pollution prevention. In these ways, the draft Mercury Action Plan is representative of the overall Agency approach to PBT pollutants. Nonetheless, mercury is different from other PBT pollutants in terms of the maturity of EPA's knowledge base and program actions. Action plans for banned substances like canceled pesticides or PCBs, or for substances with less well characterized risk like octachlorostyrene, may differ significantly in substance and format from the action plan for mercury. Also, as the Agency moves forward in developing action plans for more PBT pollutants, opportunities will begin to appear for addressing multiple PBTs at a time, through orchestrated use of available multi-media, sector-based, and place-based approaches.

Table 1 summarizes the actions within the draft Mercury Action Plan.

**Table 1. Significant Actions Underway to Identify and Reduce Risks from Mercury**

Lead EPA Office	Action	Milestone
OAR, OECA	Implement Municipal Waste Combustion (MWC) And Medical Waste Incinerator (MWI) Regulations	New MWC and MWI units must comply at start up. Existing MWC units must comply by December 2000, existing MWI units by September 2002.
OSW	Promulgate Hazardous Waste Combustion Facilities Regulations	Final hazardous waste combustion facilities (incinerators, cement kilns, and lightweight aggregate kilns) regulations by February 1999
OAR, OPPTS	Develop Recommendations to Limit Emissions from Additional Source Categories	Proposed Industrial Combustion Coordinated Rulemaking – end of 2000
OAR	Require coal fired plants to submit information pertaining to the quantity and species of mercury emissions.	Public comment period on proposal notice in Federal Register closes October 22, 1998
OAR	Issue standard for mercury cell chlorine production	Proposed rule by November 1999
OAR, ORD, OW, OECA	Provide States and Tribes with Tools for Developing and Implementing Enforceable Total Maximum Daily Loads (TMDL) for Mercury	<ul style="list-style-type: none"> <li>• Complete the pilot TMDL for mercury by end of CY 1999</li> <li>• Complete studies on identifying sources by tracing emissions by end of CY 2000</li> <li>• Initiate the “National Survey of Chemical Residues in Fish” in FY 1999</li> </ul>
OW	Revise Mercury Water Criterion	Draft human health criteria methodology by the end of CY 1999; final criterion for methyl mercury by end of CY 2000.
OPPTS, Regions 1 and 5	Pursue Voluntary Reductions in Industrial Use and Releases	Ongoing Region 1 is piloting a recognition program for hospitals that reduce mercury emissions
OPPTS	Reduce TRI Reporting Threshold for Mercury	<ul style="list-style-type: none"> <li>• Proposed Rule – end of 1998</li> <li>• Final Rule – end of 1999</li> </ul>
OSW	Develop Disposal Options for Hazardous Wastes Containing Mercury	Advance Notice of Proposed Rulemaking (ANPRM) in 1999
OIA, OPPTS, ORD, Regions 1, 5, 10	Give High Priority to Mercury in International Efforts	Representation and Leadership for Heavy Metals (including mercury) at AMAP Expert and Working Group meeting, Anchorage, AK, April 20-24, 1998; Representation and Leadership at Arctic Council Meeting, London, UK August 1998 Representing Region 1 in the NEG/ECP Mercury Action Plan
ORD	Develop a Mercury Research/Monitoring Strategy and Implement an EPA Mercury Research/Monitoring Plan	Draft Mercury Research Strategy – October 30, 1998

Lead EPA Office	Action	Milestone
Region 9, OW	Develop Options for Addressing Abandoned Mines Mercury Problem	ANPRM in 1998
Regions, OAR, OSW, OW, OECA	Support Regional, State and Local Actions to Reduce Mercury	Ongoing

## **EPA Action Plan for Mercury**

## INTRODUCTION

Mercury has long been known to have toxic effects on humans and wildlife. For centuries, mercury miners have had their work time-limited. In the nineteenth century, observation of toxicity in hatmakers using mercury brought the phrase "mad as hatters" into our lexicon. Mercury is a toxic, persistent, bioaccumulative pollutant that affects the nervous system. Methylmercury is the chemical species that bioaccumulates in fish. People who consume large amounts of fish are at risk of adverse effects of methylmercury on the nervous system. Because the developing nervous system is more vulnerable to mercury toxicity, children exposed to methylmercury through their mother's consumption of fish and individuals who eat large amounts of fish from local waters because of economic or cultural reasons are particularly at risk of adverse effects. Mercury is the most frequent basis for fish advisories, represented in 60 percent of all water bodies with advisories. Forty-one states have advisories for mercury in one or more water bodies, and eleven states have issued statewide mercury advisories.

Every Environmental Protection Agency (EPA) program, both regulatory and voluntary, is concerned with some aspect of exposure to mercury. Under these programs, the Agency has taken many actions to reduce human and environmental exposure to mercury, but there is still more work to be done. Both the 1995 and 1997 *Great Waters Reports to Congress* highlighted the risks of mercury in the Great Lakes, Chesapeake Bay, the Gulf of Mexico, Lake Champlain, and our coastal waters. In April 1997, President Clinton issued an Executive Order requiring each federal agency to assess risks that disproportionately affect children, including risks from mercury. On April 7, 1997, the United States and Canada signed the Binational Toxics Strategy, developed under the Great Lakes Water Quality Agreement. The Binational Toxics Strategy sets a challenge of 50 percent reduction by 2006 in the deliberate use of mercury nationwide and in the aggregate of releases to the air nationwide and to the water within the Great Lakes Basin.

Most recently, on February 19, 1998, President Clinton and Vice President Gore released the *Clean Water Action Plan*, which provides a blueprint for restoring and protecting the nation's water resources. The *Clean Water Action Plan* includes many key actions to ensure that the nation's waters support healthy people, including specific actions to address mercury and other contaminants. In the *Clean Water Action Plan*, EPA commits to developing in 1998, a multimedia strategy addressing mercury and other persistent, bioaccumulative and toxic pollutants that cannot be fully addressed through single media controls and approaches.

As required by the Clean Air Act (CAA) Amendments of 1990, in December 1997 EPA issued the *Mercury Study Report to Congress*. The extensively peer-reviewed *Mercury Study Report to Congress* inventories the quantity of mercury emissions to the air from a number of sources related to human activity; assess mercury transport and environmental exposure to wildlife and human populations; estimates the health and environmental impacts associated with this exposure; and describes the technologies (and associated costs) available to control these mercury emissions. Recent and planned EPA actions will greatly reduce releases of mercury to the environment and mercury exposures. Building on this foundation, more remains to be done.

The recommendations in *EPA's Action Plan for Mercury* are an example of how the Agency can work cooperatively across media programs to address persistent, bioaccumulative, toxic pollutants that move from land, to air, water and sediment.

## **OVERVIEW OF THE MERCURY PROBLEM**

As it moves through environmental media, mercury undergoes a series of complex chemical and physical transformations. These scientific issues were addressed in the *Mercury Study Report to Congress*:

*Mercury cycles in the environment as a result of natural and human (anthropogenic) activities. The amount of mercury mobilized and released into the biosphere has increased since the beginning of the industrial age. Most of the mercury in the atmosphere is elemental mercury vapor, which circulates in the atmosphere for up to a year, and hence can be widely dispersed and transported thousands of miles from likely sources of emission. Most of the mercury in water, soil, sediments, or plants and animals is in the form of inorganic mercury salts and organic forms of mercury (e.g. methylmercury). The inorganic form of mercury, when either bound to airborne particles or in a gaseous form, is readily removed from the atmosphere by precipitation and is also dry deposited. As it cycles between the atmosphere, land, and water, mercury undergoes a series of complex chemical and physical transformations, many of which are not completely understood.*

*Mercury accumulates most efficiently in the aquatic food web. Predatory organisms at the top of the food web generally have higher mercury concentrations. Nearly all of the mercury that accumulates in fish tissue is methylmercury.*

*Fish consumption dominates the pathway for human and wildlife exposure to methylmercury. The Mercury Study Report to Congress supports a plausible link between anthropogenic releases of mercury from industrial and combustion sources in the United States and methylmercury in fish. However, these fish methylmercury concentrations also result from existing background concentrations of mercury (which may consist of mercury from natural sources, as well as mercury which has been re-emitted from the oceans or soils) and deposition from the global reservoir (which includes mercury emitted by other countries). Given the current scientific understanding of the environmental fate and transport of this element, it is not possible to quantify how much of the methylmercury in fish consumed by the U.S. population is contributed by U.S. emissions relative to other sources of mercury (such as natural sources and re-emissions from the global pool).*

*The typical U.S. consumer eating fish from restaurants and grocery stores is not in danger of consuming harmful levels of methylmercury from fish and is not advised to limit fish consumption. The levels of methylmercury found in the most frequently*

*consumed commercial fish are low, especially compared to levels that might be found in some non-commercial fish from fresh water bodies that have been affected by mercury pollution. While most U.S. consumers need not be concerned about their exposure to methylmercury, some exposures may be of concern. Those who regularly and frequently consume large amounts of fish -- either marine species that typically have much higher levels of methylmercury than the rest of seafood, or freshwater fish that have been affected by mercury pollution -- are more highly exposed. Because the developing fetus may be the most sensitive to the effects from methylmercury, women of child-bearing age are regarded as the population of greatest interest.*

*Cost-effective opportunities to deal with mercury during the product life-cycle, rather than just at the point of disposal, need to be pursued. A balanced strategy which integrates end-of-pipe control technologies with material substitution and separation, design-for-environment, and fundamental process change approaches is needed. In addition, international efforts to reduce mercury emissions as well as greenhouse gases will play an important role in reducing inputs to the global reservoir of mercury.*

## **STRATEGIC APPROACH**

A successful action plan for identifying and reducing risks from exposure to mercury requires a new multimedia approach. As first step, EPA has analyzed current regulations, initiatives, and programs which manage and control mercury, and has identified a set of cost-effective options to move toward achieving further reductions. The cross-agency work group that developed this Action Plan is continuing to look for opportunities to address mercury through a more integrated multimedia approach. The Agency proposes to take the following actions, in consultation with other federal agencies, and with the involvement of states, tribes and other stakeholders:

- **Control emissions from air point sources.** EPA has taken several important steps to reduce the levels of mercury and other pollutants, including reducing emissions from municipal waste combustors and medical waste incinerators. These actions, once fully implemented, will reduce mercury emissions caused by human activities by 50 percent from 1990 levels. Several other regulations that will limit mercury emission are under development, as well. Actions to reduce emissions of carbon dioxide to control climate change will also have a significant co-benefit in reduced mercury emissions. Additional work is being done in EPA's Total Maximum Daily Load (TDML) program to evaluate the linkage of air emissions to water quality impacts, to help determine appropriate geographically targeted reduction actions. In addition, EPA intends to gather high quality emissions data on coal-fired electric generating plants to address current uncertainties about mercury emissions and support a regulatory action.

- **Revise water quality criteria, and improve measurement of mercury in water.** EPA will revise its water quality human health criterion for mercury and publish new analytical methods for measuring mercury levels in water.
- **Seek reductions in uses of mercury and improve information and citizens' right to know.** These use-reduction measures will reduce the levels of mercury in waste streams as well as the danger of accidental releases. Generally, EPA will look to voluntary rather than regulatory approaches to reduce mercury use. Additionally, EPA is considering changing the reporting requirements for mercury under the Toxic Release Inventory (TRI), which could result in additional reporting of mercury releases.
- **Develop an environmentally acceptable disposal method for mercury wastes designated as hazardous wastes.** Currently, EPA requires that hazardous wastes containing high levels of mercury be treated to recover the elemental mercury from the waste. This requirement may no longer be the preferred approach in all cases since the demand for mercury has been reduced to the point where the supply of recovered mercury exceeds it. Also, there are some air emissions of mercury associated with the recovery process. Therefore, EPA is evaluating alternative treatment technologies which would permanently stabilize mercury wastes to allow their disposal in hazardous waste landfills.
- **Seek reduction in exposure to highly exposed populations.** Because of the long time before reductions in releases will be reflected in lower fish-tissue levels, EPA will continue public information and outreach programs, including continued support and strengthening of the states' and tribes' fish advisory programs.
- **Decrease further environmental contamination from illegal use/disposal of mercury through focused compliance monitoring and enforcement of mercury restrictions and requirements.** Focus compliance assistance and outreach, monitoring and/or enforcement on sectors/sources that are significant contributors of mercury loadings to the environment. Where enforcement actions are warranted, use Supplemental Environmental Projects (SEPs) to encourage pollution prevention activities or mitigate damage. Expand compliance and enforcement activities for direct and indirect dischargers of mercury to surface waters.
- **Continue international efforts to reduce mercury releases.** The global circulation of mercury requires concerted efforts by all countries to solve the mercury problem in any one country.
- **Perform and support further research on all aspects of the mercury problem.** A research strategy is being developed that will permit targeting of federal and other research on the most important data gaps.
- **Support regional, state, tribal and local actions to reduce mercury.** State, Tribal and local governments play a key role in achieving mercury reductions. EPA will support

state and local efforts through funding, information sharing, and coordination. For example, EPA will expand outreach to publicly-owned treatment works about preventing mercury pollution in sewage discharges.

## **KEY MERCURY ACTION ITEMS**

The list below provides more detail about the most significant actions that EPA is undertaking to deal with the problem of mercury exposure. It is not an exhaustive list, and many other EPA activities related to mercury will continue. For further information on these or other mercury activities, please contact the offices involved.

### **1. Air Regulations**

#### Municipal Waste Combustion Regulation

The Clean Air Act requires EPA to establish stringent emission limits for new and existing municipal waste combustion (MWC) units and medical waste incinerators (MWI). The limits are to be based on "maximum achievable control technology" (MACT) and must address a range of pollutants including organic emissions (such as dioxin and furans), acid gases emissions (such as SO<sub>2</sub>, HCl, and NO<sub>x</sub>), and metal emissions (including cadmium, lead, and mercury).

EPA established the emission limits for MWCs in December 1995. New MWC units must comply at start-up and existing MWC units must comply by December 2000. The control system used at MWCs is acid gas/PM scrubbing to reduce organic emissions, acid gas emissions, and metals emissions, other than mercury. To control mercury, the scrubbing system is supplemented with activated carbon injection. A number of acid gas/PM scrubbing systems with carbon injection have been installed and other retrofits are underway. Available data indicates the control systems achieve over 90% mercury control. At the same time, battery manufacturers are reducing the mercury content of batteries which will also reduce the mercury emissions. Based on available data, overall mercury emissions from MWCs were estimated to be 54 tons per year (tpy) in 1990, were reduced to 29 tpy in 1995, and will be less than 5 tpy when all retrofits are completed.

Office : Office of Air and Radiation, Office of Enforcement and Compliance Assurance

Milestones: New MWC units must comply at start-up and existing MWC units must comply by December 2000.

#### Medical Waste Incinerators Regulations

EPA set emission limits for MWIs in September 1997. New MWI units must comply at start-up and existing MWI units must comply by September 2002. The most common control system used at MWIs is a wet scrubbing system that reduces organic emissions, acid gas emissions, and metals emissions, including mercury. Where MWI's are controlled with dry scrubbing systems, activated carbon must be injected for mercury control. Based on available data, overall mercury emissions from MWIs were estimated to be 50 tpy in 1990, were reduced to 16 tpy in 1995 (primarily as a result of state regulations), and will be less than 1 tpy when the MWI regulations are fully implemented.

Office: Office of Air and Radiation, Office of Enforcement and Compliance Assurance

Milestones: New MWI units must comply at start up and existing MWI units must comply by September 2002.

### Promulgate Hazardous Waste Combustion Facilities Regulations

Section 112 of the Clean Air Act requires the Agency to promulgate regulations for the control of hazardous air pollutants emissions from specified source categories, including several types of combustion units that burn hazardous waste. In April 1996, EPA proposed emission standards for incinerators, cement kilns, and light weight aggregate kilns that burn hazardous waste. This proposal, which the Agency anticipates finalizing in December, 1998, requires the sources to control mercury emissions, as well as other hazardous air pollutants. Since the proposal, the Agency has received extensive public comment, including new emissions data and comments on the methodology used to estimate mercury emissions from these facilities.

As required by the Clean Air Act, the final mercury standard will embody the maximum degree of reduction in emissions taking into consideration, as appropriate, the cost of achieving the emissions reduction. This strict, protective mercury standard will be based on mercury feedrate control (in the hazardous waste) and possibly also on other air pollution control technologies. The final rule is expected to achieve a substantial overall reduction in mercury emissions from these hazardous waste combustion facilities.

Office: Office of Solid Waste, Office of Enforcement and Compliance Assurance

Milestones: Final hazardous waste combustion facilities (incinerators, cement kilns, and lightweight aggregate kilns) regulations will be promulgated by February 1999.

### Develop Recommendations to Limit Emissions from Additional Source Categories

Based in part on the recommendations of a Federal Advisory Committee, EPA is developing regulations to limit emissions of hazardous air pollutants, including mercury, and criteria pollutants for the following five source categories: industrial, commercial, and institutional boilers; process heaters; industrial, commercial, and other non-hazardous solid waste combustors (excluding municipal waste combustors and medical waste incinerators); gas turbines; and stationary internal combustion engines.

Office: Office of Air and Radiation

Milestones: Proposed regulations by end of 2000

### Mercury Emissions from Power Plants

Emissions from coal-fired electric power plants represent the largest source category of mercury emissions to the atmosphere. EPA has just completed a report to Congress that examines technologies and strategies to control mercury emissions from this source. While there are currently no cost effective control technologies for mercury that are commercially available for utility boilers, some may become available in a few years. With implementation of the new National Ambient Air Quality Standards for fine particulate matter and ozone, and the second phase of the acid rain program, EPA expects to see a reduction of mercury emissions from utility boilers. Actions that power plants may take to reduce their emissions of the greenhouse gases that are responsible for climate change could also reduce mercury emissions from utilities. These reductions will occur largely as powerplants switch to cleaner fuels and use fuels more efficiently.

EPA intends to gather high quality emissions data about coal-fired electric generating plants to address current uncertainties about mercury emissions and support a regulatory action. To accomplish this, the Agency is requesting comments on a proposal to require all coal-fired power plants above 25 MW to provide the results of analysis to determine the mercury content of the coal they are burning. In addition a sample of plants would be required to perform stack testing for quantity and species of mercury emissions. The information obtained from this effort will allow EPA to calculate the amount and species of mercury emitted by each coal fired plant above 25 MW. This information will be available to the public.

Office: Office of Air and Radiation

Milestones: Public comment period on notice closes on October 22, 1998

After OMB approval, EPA will send out letters requiring emissions information in the fall of 1998.

### Promulgate Emissions Standard for Chlorine Production Facilities

EPA is developing a rule that would limit mercury emissions from plants that produce chlorine using the mercury cell method. The rule will include emissions limits based on control technology and on management practices.

Office: Office of air and Radiation

Milestones: Proposed standard- November, 1999  
Final standard - November, 2000.

## **2. Linking Air Emissions to Water Quality Impacts to Prioritize Control Actions**

EPA will combine tools in the Clean Air Act and Clean Water Act to foster an air deposition/water quality management approach with state and local partners, including providing states and tribes with tools for developing and implementing total maximum daily loads (TMDL) for mercury from air deposition. EPA is also working on improving methods to identify sources by developing ways to trace pollutants back to sources, distinguishing between anthropogenic and natural sources, and attributing atmospheric loads to particular sources.

The goal of the TMDL pilot project is to demonstrate how to develop a TMDL for a waterbody that receives mercury from air deposition. The project will evaluate how to access and use existing air and water data to develop the TMDL, as well as how existing air and water modeling methods can be used. The project will also examine linkages between the Clean Air Act and Clean Water Act, and specifically, what state, local, tribal, or federal regulatory authorities that can be used to modify source air emissions to meet needed loading reduction goals.

To evaluate progress and emerging problems, EPA needs an updated information base on levels of mercury and other persistent, bioaccumulative toxics in fish. EPA will conduct a "National Study of Chemical Residues in Fish". This survey will evaluate the incidence and severity of mercury and other persistent, bioaccumulative toxicants in fish downstream of suspected problem areas and in background areas. EPA will work in partnership with state and tribal Departments of Health and Environmental Protection to carry out the study.

Office: Office of Air and Radiation, Office of Research and Development, Office of Water, Office of Enforcement and Compliance Assurance

Milestones: Complete the TMDL for mercury by end of 1999  
Complete studies on identifying sources by tracing emissions by end of 2000  
Initiate the "National Survey of Chemical Residues in Fish" in FY 1999.

## **3. Revision of Mercury Water Quality Criterion**

Under the Clean Water Act, EPA establishes water quality criteria, that are used by states and tribes to establish enforceable water quality standards. Water quality standards may reflect a variety of site-specific considerations. Water quality standards are reflected in permits for dischargers to surface waters and in a variety of other regulatory actions.

The current national water quality criterion for mercury uses a method for estimating fish-tissue levels, the bioconcentration factor (BCF), which does not include biomagnification in the food chain. EPA subsequently published a water quality criterion for mercury in the Great Lakes basin which is based on use of a bioaccumulation factor (BAF), which does include biomagnification in the food chain.

The Office of Water (OW) is accelerating development of a revised water quality human health criterion for mercury, which will reflect two major elements:

- A revised Human Health Methodology -- this provides for use of BAFs rather than BCFs, and improved means for estimation of fish consumption;
- An updated human health risk assessment.

The combined effect of these changes will be to make the criterion more reflective of sound science and current risk assessment practice. The preferred approach to the revised criterion will be a methylmercury fish level to be used with measured fish tissue methylmercury levels. States and tribes which elect to depart from the preferred approach will be referred to defaults which will include mercury and methylmercury water levels. These water levels are likely to be more stringent than the current criterion. The direct effect of a more stringent water quality criterion may be to include new or more stringent discharge limits for direct dischargers to surface water (both industries and municipalities). Currently, direct water discharges are believed to be small compared to input from air deposition. Nonetheless, limits on direct discharges may be an important part of achieving mercury reduction goals. In parallel with the revision of the water quality criterion, OW will be revising its required analytical method to be more sensitive (below the new criterion level) and less subject to sample contamination. Together, these changes will lead to a more precise measure of mercury levels in water discharges and to more effective water quality-based effluent limits when the discharges are contributing to exceedances of water quality standards. EPA expects that permittees will most likely first consider pollution prevention to find and control sources of mercury into the wastewater, rather than end-of-pipe treatment to meet limits.

Indirectly, but no less importantly, revision of the water quality criterion will contribute to EPA's efforts to integrate assessment of watersheds and airsheds in order to target air pollution control and other activities to reduce mercury levels in water and ultimately, in fish and the humans and animals that eat fish.

With the release of the Mercury Study Report to Congress, the Agency committed to participate in an interagency review of recent human data on methylmercury. This review will

concentrate on levels of exposure to mercury associated with subtle neurological endpoints and is aimed at achieving consensus among Federal agencies on estimates of human risk. A workshop is scheduled for November 1998. In addition, Congress has required an 18-month National Academy of Sciences study and recommendation on the reference dose for methyl mercury.

Office: Office of Water

Milestones: Draft human health criteria methodology by the end of calendar 1999.

Peer review of application of new methodology to methyl mercury completed by mid-2000.

Final development of mercury criterion in 1999.

#### **4. Pursue Voluntary Reductions in Industrial Use and Releases**

Mercury consumption in the United States is attributable primarily to a few categories of products and processes, including the manufacture of chlorine and caustic soda, wiring devices and switches, measuring and control instruments, dental amalgam and laboratories. EPA is pursuing a number of voluntary reduction initiatives in these industrial uses and releases of mercury. Ongoing and planned mercury reduction actions include:

- collaboration with the chlor-alkali industry to achieve a 50 percent reduction in mercury use and releases by this sector by 2005, a commitment made by this industry through its representative, the Chlorine Institute. In addition, EPA will work with the industry to develop improved estimates of releases from this sector;
- outreach to hospitals, including Veterans Administration hospitals and other public and private hospitals to encourage them to discontinue purchases of mercury-containing devices and products and to properly dispose of existing mercury. In addition, EPA will explore opportunities to work with the American Hospital Association, other medical facilities, dentists, and veterinary clinics on reducing use and release of mercury;
- outreach to manufacturers and users of mercury switches and relays on mercury-free alternatives;
- outreach to the utility industry to encourage implementation of voluntary efforts to control mercury release, including elimination of the use of mercury-containing equipment, and exploration of potentially cost-effective options such as fuel-switching and optimization for mercury reduction of controls whose primary purpose is reducing emissions of other pollutants; and

- collaboration with laboratories on reduction of mercury use. As part of this effort, EPA will work with other standard-setting bodies to address mercury pollution prevention opportunities through revisions to approved analytical methods and directions for laboratory use, handling and recycling or proper disposal of mercury.

Office: Office of Prevention, Pesticides, and Toxic Substances, Regions 1 and 5

## **5. Reduce Reporting Threshold for Mercury Under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA).**

Mercury and mercury compounds are currently listed under section 313 of EPCRA and reports are received from facilities that manufacture, process, use, release into the environment, or otherwise manage as waste mercury and mercury compounds. These reports are made available to the public through the Toxics Release Inventory (TRI). However, to date the reports have come from a fairly small number of large sources, such as chlor-alkali plants. In 1997, the categories of industrial facilities required to report under EPCRA section 313 were expanded to cover, among others, electric utilities, and hazardous waste treatment, storage and disposal (TSD) facilities. Combustion of fossil fuels for energy has been identified as a major source of mercury. Therefore, the facilities expansion could result in significant increases in reporting of mercury under EPCRA section 313.

It is likely that, to date, few reports on mercury releases have been received under EPCRA section 313 because reporting thresholds have been too high to capture mercury releases from many covered facilities. In order to ensure that reporting on mercury under EPCRA section 313 will be fully effective, especially taking into account releases from industrial facilities newly subject to EPCRA section 313, EPA is considering reducing the reporting threshold for mercury. EPA can reduce reporting thresholds from the levels set out under EPCRA section 313 as long as the new threshold "shall obtain reporting on a substantial majority of total releases of the chemical at all facilities subject to the requirement of this section." EPA is currently reviewing data on mercury in light of the criteria established in the statute for revision of the TRI reporting threshold.

EPA expects to propose a rule lowering the reporting thresholds for chemicals that persist and bioaccumulate (including mercury and mercury compounds) by the end of 1998. A final rule is expected by the end of 1999. Reporting under the final rule would be expected to begin in 2000, with the first reports covered by the new rule released in 2001.

Office: Office of Prevention, Pesticides, and Toxic Substances

Milestones: Proposed Rule - end of 1998  
Final Rule - end of 1999

## **6. Develop Disposal Options for Hazardous Wastes Containing Mercury**

Current waste treatment standards for many hazardous wastes containing mercury are based on recovery of mercury through retorting. EPA is planning to evaluate other options because 1) the supply of recycled mercury is increasing while the demand is decreasing and 2) there are concerns over potential emissions from retorting. In addition, for organic hazardous wastes which contain mercury, the current treatment standards are often based on incineration, which also raises concerns over air emissions.

Therefore, EPA is considering an Advance Notice of Proposed Rulemaking (ANPRM) to revise its hazardous waste treatment standards to include alternatives based on permanent stabilization of mercury. These alternatives could also apply to elemental mercury. The Agency hopes to issue this ANPRM in 1999.

Office: Office of Solid Waste

Milestones: ANPRM in 1999

## **7. Give High Priority to Mercury in International Efforts**

Mercury's ability to be cycled globally poses both a challenge and an opportunity to the U.S. As long as mercury is produced, used and released into the environment in other countries, the U.S. will be on the receiving end of some mercury, thus reducing the overall impact of our domestic mercury control measures. Yet, this problem represents a real opportunity for the U.S. to demonstrate leadership internationally on mercury risk characterization and risk reduction.

EPA is participating in bilateral and international fora to encourage the cooperative development and use of relevant scientific and technical information about mercury. These fora include the U.S.-Canada Great Lakes Binational Toxics Strategy, the North American Commission for Environmental Cooperation (CEC) and its Sound Management of Chemicals Initiative, the U.N. Economic Commission for Europe's Convention on Long-Range Transboundary Air Pollution (LRTAP) and its legally-binding protocol on mercury and other heavy metals, the Organization for Economic Cooperation and Development (OECD) and its programs on heavy metals risk management and the elimination of environmentally adverse economic subsidies, the Arctic Monitoring and Assessment Program (AMAP), and the New England Governors/Eastern Canadian Premiers (NEG/ECP) Mercury Action Plan.

On April 7, 1997, the United States and Canada signed the Great Lakes Binational Toxics Strategy. The 50% emissions reduction goal of the binational strategy is detailed on page 2 of this action plan. At the present time the EPA and Environment Canada are working with all industrial sectors that release mercury, States, Tribes, environmental groups and the public, to help identify and undertake specific mercury reduction activities.

Under the CEC Resolution #95-5 mercury was identified as one of the first four chemicals selected for the Sound Management of Chemicals Initiative. A North American Regional Action Plan (NARAP) on mercury has been developed that establishes a number of cooperative initiatives among Mexico, Canada, and the United States to improve the scientific understanding of the mass balance of mercury in North America, to promote pollution prevention actions across the continent, and to assist Mexico in capacity building. By June of 1999, phase II of the NARAP will be completed. It will establish specific action-oriented commitments for activities addressing mercury use and reductions.

In February 1998 the U.S. and other Parties to the U.N. Economic Commission for Europe's Convention on Long-Range Transboundary Air Pollution (LRTAP) concluded negotiations on a legally-binding protocol on mercury and other heavy metals. The protocol includes obligations to control mercury emissions from stationary sources and to establish and report mercury emissions inventories. It also contains obligatory and voluntary provisions regarding the use of mercury in products. The U.S. can take a number of steps to encourage other ECE countries to comply with the protocol.

Through the Arctic Monitoring and Assessment Program and other international initiatives, the U.S. is collaborating with other countries to better characterize and understand the international or transboundary nature of mercury sources, transport, deposition and fate. In addition, the U.S. will continue to encourage other countries to undertake domestic mercury risk reduction measures, with a focus on pollution prevention approaches. This could involve working bilaterally on a government-to-government basis and multilaterally through the OECD, the LRTAP Convention or other international fora.

On June 8, 1998 The New England Governors/Eastern Canadian Premiers signed a resolution concerning mercury and its impacts on the environment. In addition, the Governors and Premiers adopted the Mercury Action Plan which has as its regional goal "The virtual elimination of the discharge of anthropogenic mercury into the environment." The NEG/ECP has established a task force, which includes the New England states, the Eastern Canadian Provinces, to coordinate and implement the Mercury Action Plan. The action plan identifies 45 specific actions to reduce mercury emissions. Including emission reduction targets from specific source categories, such as municipal waste combustors, medical waste incinerators, sludge incinerators, utility and non-utility boilers, industrial and area sources and source reduction and safe waste management of mercury.

Office: Office of International Activities, Office of Prevention, Pesticides, and Toxic Substances, Office of Research and Development, Regions 1, 5, and 10

Milestones: Representation for Heavy Metals (including mercury) at AMAP Expert and Working Group Meeting, Anchorage AK, April 20-24, 1998

Representation For Mercury at the Arctic Council Senior Officials meeting, London, UK, August 1998

Signing of LRTAP Heavy Metals Protocol, Denmark, June 1998

Development and implementation of cooperative mercury monitoring programs with other Arctic countries

By June of 1999, phase II of the CEC NARAP will be completed.

The Mercury Task force will report back to the NEG/ECP Committee of the Environment in June 1999.

## **8. Develop a Mercury Research/Monitoring Strategy and Implement an EPA Mercury Research/Monitoring Plan**

The Office of Research and Development (ORD), in cooperation with scientists from EPA program offices and regions, will develop a mercury research/monitoring strategy to facilitate coordination and communication on mercury-related research plans and projects among organizations in the public and private sectors, including other Federal agencies, state governments, academia and industry. This brief strategy document will be developed using as its basis the risk-based framework in the Mercury Study Report to Congress and will include the following summary information:

- (1) description of research needed to better assess potential health and ecological risks, to more completely document exposures, and to better manage such risks, and
- (2) description of ongoing EPA research activities, including various modeling and monitoring studies, e.g., in South Florida and in the Great Lakes region and participation in international fora, e.g, the North American Task Force on Mercury (pursuant to the North American Commission on Environmental Cooperation established under NAFTA).

The strategy will identify the scientific and technical information needs and priorities for research in the relevant areas. Some of the research areas that may be addressed are: emission characterization, atmospheric transport and fate, deposition, fate in terrestrial and aquatic media, bioaccumulation, ecological toxicity, health effects, exposure, monitoring, risk communication, and risk management-related prevention, control, and remediation of mercury and mercury compounds. ORD initiated the strategy development effort in January 1998 and will make available a draft that is ready for peer review by October 30, 1998.

Based on the mercury research/monitoring strategy, ORD and other EPA offices, in cooperation with the greater scientific community, will develop and implement an EPA research/monitoring plan. The plan will build on ongoing research efforts in the areas of mercury fate and transport modeling and monitoring, assessment methods development for health and ecological impacts, risk communication, and advances in pollution prevention and

other risk management technologies and approaches. The plan will include consideration of the following research areas:

- the development and evaluation of emission control technology for coal-fired utilities and other mercury emitters in support of the Office of Air and Radiation (OAR) and the Office of Solid Waste and Emergency Response (OSWER) programs. This effort will include attention to speciation issues, control option costs and the ultimate disposal of the mercury-containing wastes resulting from the control options.
- the development of fate, transport and transformation data in support of Office of Water (OW) determinations of total maximum daily loads (TMDLs) for mercury.
- the provision of deposition monitoring technology to determine the effectiveness of control options.
- the virtual elimination of the use of mercury in products and improved management of mercury wastes in support of the Office of Prevention, Pesticides, and Toxic Substances (OPPTS), OSWER, and the Regions.
- the refinement and improvement of health and environmental risk assessments for mercury that reflect evaluation of recent studies of health and environmental effects of mercury exposure, with particular attention to sensitive sub-populations, e.g., the developing fetus and children, to support risk-based decision-making.

Work under this plan will include research conducted in-house by ORD, as well as a component of extramural research supported through ORD's Science To Achieve Results (STAR) grants program.

Office: Office of Research and Development

Milestones: Draft mercury research strategy - October 30, 1998

## **9. Develop Options For Addressing Abandoned Mines Mercury Problem**

Mercury at abandoned mine sites is a problem faced by many western States. The mercury at the abandoned mine sites is either from abandoned mercury mines (No active mercury mining occurs in the United States), or from gold and silver mining sites, where mercury was either used as an amalgamation agent in historic large scale placer mining and traditional hard rock mining operations, or from recent small scale "recreational" placer mining operations, which continue to flourish in the western states.

To address the potential for mercury contamination of watersheds that drain these abandoned mine sites, EPA will support efforts to fully research the extent and nature of this problem, including efforts to characterize and map the sites, and study watershed impacts downstream. EPA will also support efforts to locate responsible parties where feasible. EPA will also assist in the cleanup and remediation of sites, undertaken by “Good Samaritans” as defined by the law in different States. EPA will consider whether it would be appropriate for certain abandoned sites to be issued NPDES permits, or general storm water permits, where such permits are not currently required or have not been issued.

Disposal options will also need to be developed for the disposal of mercury contaminated mining wastes. Currently the common options are to cover the site soils with clean soil, paving, or some other material, or to excavate and transport the contaminated soil to an offsite landfill. Another alternative for small and large sites that should be considered is permanent stabilization of mercury. This has been proposed for an ANPRM in 1998, and the ANPRM could be required to address the potential use of permanent stabilization as a disposal method for mine wastes, including a study of its scientific feasibility and costs. Another alternative to control mercury disposal at small “recreational” placer mining sites, may be to provide specially marked and designed disposal containers for use in small scale placer mining, and education on how and why these containers should be used. Methods to safely dispose these containers must also be developed and implemented.

Office:           Region 9, Office of Water

Milestones:    ANPRM in 1998

## **10.    Support Regional, State and Local Actions to Reduce Mercury**

State and local governments are vital to the achievement of mercury reductions. They have a central role to play in outreach to the business community and to the general public about the importance of properly disposing of mercury-containing products and the alternatives to such products. In addition to this important pollution prevention role, State and local governments have developed innovative mercury reduction laws and regulations that supplement, and in some cases provide a model for, national efforts. EPA supports State and local efforts through funding of mercury reduction projects, provision of information about mercury sources and reduction opportunities, and coordination of joint efforts. This support will be expanded under implementation of the Great Lakes Binational Toxics Strategy.

Funding Support: EPA supports State and local efforts through grants to worthwhile projects. Examples of current projects funded by EPA include: an exploration in Minnesota of innovative ways to regulate the release of mercury comprehensively, including from currently-unregulated sources, such as a mercury emissions “cap-and-trade” program; State mercury task forces, which are bringing together stakeholders to make and implement recommendations for sectors that use

or release mercury;\* mercury “clean sweeps” that collect and properly dispose of household and small business stores of unneeded mercury; mercury pretreatment programs at sewage treatment districts; investigation of use of mercury in ethnic practices, and a variety of outreach efforts to small business. State business outreach efforts funded by EPA include a program to encourage heating, ventilation, and air conditioning contractors and suppliers to promote the use of non-mercury thermostats and to properly dispose of mercury thermostats that they replace, and outreach to hospitals and other medical care facilities to encourage them to avoid or limit the use of mercury-containing products and to properly manage the disposal of existing mercury. EPA will continue to fund State and local projects that create innovative ways to reduce mercury or that follow a path of proven success.

In addition, EPA will work with states to incorporate mercury reduction activities into the day-to-day work of state environmental agencies by making these activities a priority in Environmental Performance Partnership Agreements (EnPPAs). EnPPAs define the working relationship among state environmental agencies and describe the work that state agencies will do with federal funds.

Information and Coordination: EPA also plays an important role by providing information and facilitating information exchange about mercury among States. Currently, this function is most highly developed among the Great Lakes States, where EPA leads a Mercury Workgroup that promotes information exchange about mercury and encourages cooperation among local, state and federal agencies in their mercury reduction efforts. The workgroup has allowed participants to help each other develop more effective programs for the control of mercury, and has helped educate participants on the latest mercury-related research. It also provides a forum for coordination of mercury-related work among staff with responsibilities for different environmental media. The workgroup seeks to reduce mercury releases in the Great Lakes states through the regulatory process and through voluntary pollution prevention programs. Activities that the workgroup engages in include: identification of mercury sources; identification of alternatives to mercury use; refinement of public outreach information and materials; commenting on draft legislation and regulation; development of conferences, and updates on mercury-related research.

EPA will expand this role nationally under implementation of the Binational Toxics Strategy, with a Mercury Web Site and list-server to disseminate information about mercury sources and reduction opportunities more broadly, including to State and local governments outside of the Great Lakes basin. This effort will include publicizing model pollution prevention programs that State, Tribal and local governments can adopt.

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\* For instance, Michigan’s Mercury Pollution Prevention Task Force secured the commitment of the auto industry to eliminate the use of mercury switches used for convenience lighting.

In addition, EPA will support State, Tribal and local efforts to educate the public on appropriate ways to reduce mercury exposure. As part of this effort, EPA will continue to provide State, Tribal and local agencies with technical assistance in the development of fish consumption advisories that reflect local mercury levels and local fish consumption patterns, and which balance the risks of exposure to mercury with the health benefits of including fish in the diet.

Finally, the mercury reduction work undertaken through the Binational Toxics Strategy will be coordinated, as much as possible, with other ongoing national, binational, trilateral and international efforts, such as the Commission for Environmental Cooperation (CEC).

Legislation and Regulation: Under the Binational Toxics Strategy, EPA plans to compile and disseminate information on model State, Tribal and local mercury-related legislation and regulation. In addition to the pollution prevention programs described above, individual States have developed legislation or regulations prohibiting incineration or landfilling of mercury-containing lamps and other devices, phasing out the use of mercury in dairy manometers and other products, and requiring manufacturers of mercury relays to develop take-back programs. Publicizing these innovative laws and regulations will provide a possible model for other governments to follow.

Recently, Region 5 has begun to coordinate with States on possible expansion of the “Universal Waste Rule” to cover additional mercury-containing wastes beyond the thermostats, batteries and pesticides encompassed by this regulation. Inclusion in the Universal Waste Rule can streamline waste handling requirements and encourage the safe disposal or recycling of mercury-containing products. EPA will consider expansion of this effort on a national basis.

EPA will assist States in adoption of regulations to control mercury emissions from medical waste incinerators and municipal waste combustors, and will work with States and sources to develop schedules for compliance with the regulations.

Assistance to Sewage Treatment Works: Local sewage treatment works will play an important role in mercury reduction through implementation of pretreatment programs that encourage or require industrial users and households to limit mercury discharges. EPA has funded model mercury pretreatment programs in Duluth, Minnesota and Detroit, Michigan and has developed a compendium of mercury pollution prevention information useful for pretreatment program managers. EPA will provide information to sewage treatment works nationwide on different strategies to reduce mercury releases. These strategies could be considered for development of required pollutant minimization programs, and State and/or Federal compliance assistance efforts. This outreach to sewage treatment works could be part of a multi-media approach for municipalities, including mercury reduction opportunities for all municipal “wastestreams”: wastewater, solid waste, and air emissions.

Compliance Monitoring and Enforcement: Decrease further environmental contamination from illegal use/disposal of mercury through focused compliance monitoring and enforcement of

mercury restrictions and requirements. Focus compliance assistance and outreach, monitoring and/or enforcement on sectors/sources which are significant contributors of mercury loadings to the environment. Where enforcement actions are warranted, use Supplemental Environmental Projects (SEPs) to encourage pollution prevention activities or mitigate damage.

To further the Agency's goals to protect and enhance public health and the environment, in applicable circumstances EPA advocates the inclusion of Supplemental Environmental Projects (SEPs) in the settlement of environmental enforcement actions. A SEP is an environmentally beneficial project which a defendant agrees to undertake as part of such a settlement, but which the defendant is not otherwise legally required to perform. This may include cleaning up a damaged area beyond the regulatory requirements or providing some additional protection not required by regulation or statute. A defendant's willingness or ability to perform a SEP is considered as a factor in establishing the final penalty paid by the defendant. EPA particularly encourages SEPs in communities where there are environmental justice concerns, to help ensure that persons who spend significant portions of their time in areas, or depend on food and water sources located near where violations have occurred, are protected.

Office:           Regions, Office of Air and Radiation, Office of Solid Waste, Office of Water,  
                    Office of Enforcement and Compliance Assurance

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