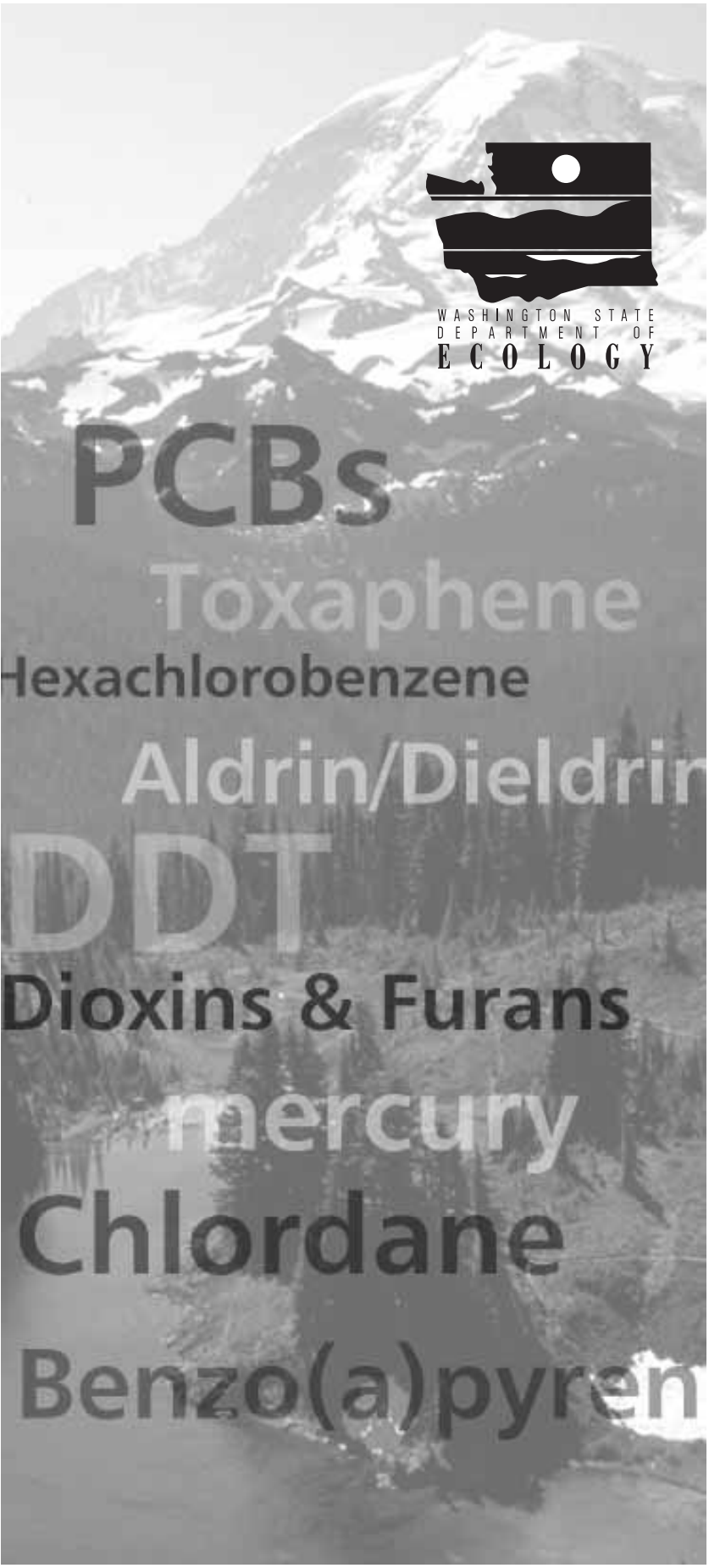

Proposed Strategy to Continually Reduce Persistent, Bioaccumulative Toxics (PBTs) in Washington State

December 2000
Publication #00-03-054

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Proposed Strategy to Continually Reduce Persistent, Bioaccumulative Toxics (PBTs) in Washington State

By

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with contributions from the
Ecology PBT Technical Committee

December 2000
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Appendix E of this document includes a more detailed description of Ecology's proposal for screening and prioritizing additional PBT chemicals. Ecology welcomes comments on this proposed approach by March 19, 2001.

Persistent, Bioaccumulative Toxics: A Legacy We Can Do Without

"If policy-makers in the United States and Canada, including policy-makers in government, industry, and other walks of life, even slightly suspected that their child or grandchild might have learning difficulties, immune suppression, or reproductive deficiencies just because of what the policy-makers ate or where they lived or how they conducted their business, I am sure policy regarding the discharge of persistent substances would change immediately. I am convinced that this is true, but somehow that message is not being effectively communicated."

Gordon K. Durnil "The Making of a Conservative Environmentalist," p. 158

Durnil is the former United States Chairman of the International Joint Commission (1989-1994) and Indiana Republican Party State Chairman (1981-89).

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Table of Contents

Letter from the Director . . . . . page 1

Foreword . . . . . page 3

Executive Summary . . . . . page 5
- The Need for a Washington PBT Strategy . . . . . page 5
- Vision and Goals of the PBT Strategy . . . . . page 6
- Which PBTs will be the Initial Focus of this Strategy? . . . . . page 6
- Specific Activities . . . . . page 7
- Measuring Progress . . . . . page 8

Introduction . . . . . page 9
- What are Persistent, Bioaccumulative Toxics? . . . . . page 9

Purpose of the PBT Strategy . . . . . page 10

Need for a Washington PBT Strategy . . . . . page 11
- Breaking Down Barriers to Further Progress in Reducing PBTs . . . . . page 13
- EPA's National Strategy to Develop and Implement PBT Chemical Action Plans . . . . . page 14

Vision, Goals, and Guiding Principles . . . . . page 15
- Vision of Change . . . . . page 15
- Precautionary Principle . . . . . page 16
- Goals . . . . . page 17
- Guiding Principles . . . . . page 17

Statutory Foundation for Washington's PBT Strategy . . . . . page 18

Elements of the PBT Strategy . . . . . page 19
- Strategic Framework . . . . . page 19
- Actions to Reduce and Phase Out PBTs . . . . . page 19
- Building Blocks for Success . . . . . page 23
- Current and Proposed Actions . . . . . page 27
- Ecology Activities Specific to the PBT Strategy . . . . . page 29

Proposals for Measuring Progress . . . . . page 30
- Specific Timing and Milestones . . . . . page 30
- Requested Funding to Begin Implementing of the PBT Strategy During the 2001-2003 Biennium: . . . . . page 31

How to Get Further Information . . . . . page 32

Appendices . . . . . page 33
- Appendix A: Fish and Shellfish Consumption Advisories Due to Chemical Contamination . . . . . page 33
- Appendix B: 303(d) Water Segments where PBTs have Violated Surface Water Quality Criteria . . . . . page 36
- Appendix C: Information and Health Effects for the PBTs Identified in this Strategy . . . . . page 43
- Appendix D: Public Comments . . . . . page 47
- Appendix E: Proposed Approach to Screen and Prioritize PBTs in Washington State . . . . . page 53

Reference Information . . . . . page 62

Glossary of Terms . . . . . page 65

Letter from the Director

Dear Legislator:

I am pleased to provide you with Ecology's proposed strategy for how we want to address a distinct group of chemicals that threatens our health and the health of our environment. These chemicals are toxic, they last for a long time without breaking down into safer components, they accumulate in our bodies and in the bodies of animals, and they threaten the balance of an intricate and complex web of life. Thus, we refer to them as persistent, bioaccumulative toxics (PBTs).

After engaging in a forum with citizens more than two years ago, I became convinced that we need to look at, better understand, and take actions to further reduce PBTs in Washington's environment.

Every day, we allow harmful chemicals to be discharged at low or non-detectable concentrations, expecting them to be diluted in the air or water. This treatment method is effective for many chemicals. However, chemicals that are persistent, bioaccumulative, and toxic slip through the safety net of this traditional dilution method. Even at very low discharge concentrations, they remain indefinitely in the environment. Because they tend to "stick" to organic material, they can accumulate in animals to higher and higher concentrations. As these same animals are eaten, the chemicals continue to accumulate and move through the food chain.

PBTs are not just a problem for business and industry. Many of the everyday activities we do as individuals, such as driving cars, using wood stoves, and disposing of certain waste products and materials (e.g., fluorescent lights and household thermometers) factor into the equation. And even though a number of PBTs, such as DDT, toxaphene, and other pesticides, have been banned for many years, they
remain in the environment. In some cases, they're still being stored in our garages and sheds, where they're available for continued use.

Finding the solutions to our PBT problems will not be easy. It will take time, a concerted effort, and commitment by our state's residents to reduce and, where possible, eliminate these chemicals from our environment. Our department heard several messages clearly and repeatedly during our fall 2000 public meetings about the Draft PBT Strategy: "*20 years is too long a time frame*," "*We need to do more sooner*," and "*Why wait so long?*" We believe it is realistic that a generation (or approximately 20 years) is needed to move our society beyond and away from our most toxic polluting activities, particularly driving gas-powered vehicles. The challenge will be daunting, but it is one we must tackle, and we must begin immediately.

This proposed strategy will be controversial. Some believe we are going too far, while others believe we are not being bold enough. The Department of Ecology not only has the authority to address the environmental hazards posed by PBTs, we also have an unequivocal mandate and responsibility to take action where human and environmental health are concerned.

The Department of Ecology believes it is important that we tackle PBTs in partnership with others, including our fellow state agencies and lawmakers, along with other states, the federal government, and even other nations. Already, steps have been taken by the U.S. Environmental Protection Agency (EPA), Environment Canada, and the United Nations Environment Programme to address this challenge on the national and international levels. Likewise, the Department of Ecology will work closely with EPA to ensure consistency among our actions while also identifying Washington-specific needs.

We owe it to ourselves and to future generations to take deliberate steps now to reduce and, where possible, eliminate these chemicals from our environment and work to preserve the unique quality of life our state now enjoys. We can do no less, and I ask you to support us in this effort.

Tom Fitzsimmons, Director
Washington State Department of Ecology
December 2000

Foreword

In December 1998, the Department of Ecology held a public symposium to introduce and begin discussions on the need to take deliberate steps to reduce and, where possible, eliminate chemicals that are known as "PBTs" from our state's environment. When I took the position of Ecology PBT coordinator, it clearly was a journey into "uncharted territory." For two years, I have been involved in public meetings, meetings with business, industry, agricultural interests, legislators, public interest organizations, and internal meetings with dedicated Ecology staff and management. I have received hundreds of letters and e-mails, and had countless individual conversations. There is a very high interest in this topic, and the following are the most frequent concerns that I have heard:

- For many people, concerns about PBTs in our environment and their effects on human health are a very real and emotional issue. I have heard personal testimony from many who are experiencing health effects they attribute to direct and indirect exposures to PBTs and other hazardous chemicals. I have also received several hundred e-mails and letters expressing the need to take deliberate and urgent actions.
- There is and will continue to be a strong passion about PBTs in our environment.
- A local public-interest organization — WashPIRG — collected and submitted to the Department of Ecology more than 10,600 signed postcards asking Ecology to:
  - Prohibit releases of PBTs from new sources,
  - End releases from existing sources by 2010,
  - Address more, not fewer, PBTs, and
  - Include phase-out language in Ecology-issued pollution control permits.

- Many business owners have expressed concern that there will not be safer alternatives and that their ability to compete in an open market system as a business in Washington state will be harmed. Other interested parties have expressed concern about "uncertainty" in a regulatory environment that specifically address PBTs.
- Industry representatives in several sectors want citizens to know about changes they have already made to address PBTs.
- In many cases, the sources of PBTs are a reflection of what we do as individuals. We drive our cars, burn outdoors, and dispose of certain products that should not go into landfills. As consumers, we demand products where production results in releases of PBTs into our environment.

I have worked with many extremely dedicated and committed Ecology co-workers and senior management who, over the past two years, have contributed to the development of this strategy. They have done this in addition to their assigned responsibilities, because they have a strong personal and scientific interest in elevating this issue as part of Ecology's stewardship mission for toxic chemical management and providing an approach to solve it.

I hope you will find that Ecology's proposed PBT strategy reflects the importance and urgency that many individuals and organizations throughout Washington have expressed over these past two years. We have tried to capture the balance between the many (often opposing) views about this issue. The concern about PBTs and their potential effect on current and future generations runs very deep with many of your fellow citizens. As more people become aware of PBTs in Washington's air, land, and water, this concern will continue to grow.

Sincerely,

Michael J. Gallagher

Michael J. Gallagher
Ecology PBT Coordinator

Executive Summary

We have a responsibility to make sure our environment is healthy not only during our lifetimes, but during the lifetimes of our children and grandchildren

Washington Governor
Gary Locke

The Need for a Washington PBT Strategy

Persistent, bioaccumulative toxics (PBTs) raise special challenges for our society and the environment because they share common properties:

- PBTs are durable and break down very slowly when released into the environment.
- Animals and people accumulate PBTs in their bodies, primarily from the food they eat. As these chemicals move up the food chain, they increase in concentration.
- Exposure to PBTs has been linked to a wide range of toxic effects in fish, wildlife, and humans, including effects on the nervous system, reproductive and developmental problems, immune-response suppression, cancer, and endocrine disruption.

In addition, some PBTs can be transported long distances on wind and water currents as air particulates or sediments.

A wide range of activities produces and releases PBTs into Washington's environment. These include highly visible sources (e.g., large industrial processes) that have been the traditional focus of pollution control strategies. However, there are also numerous other sources of PBTs that cumulatively may release an equal or greater amount of PBTs. Examples of these (often considered "non-point") sources are internal-combustion engines, various consumer products, and the past applications of agricultural and residential pesticides.

Releases from these sources (both ongoing and historical) have resulted in measurable levels of PBTs in the air, water, soils, and sediments throughout the state, as referenced by the state Department of Health's Fish and Shellfish Consumption Advisories and Washington's Clean Water Act Section 303(d) list *(See Appendices A and B)*.

State and federal regulatory programs have been in place for several years and have significantly reduced the uses, releases, and environmental concentrations of several PBTs. However, the present system is oriented toward implementing single-medium (air, land, or water-based) statutes that do not fully address the potential for the cross-media effects that PBTs present. The current, single-medium focus has produced a system that emphasizes treatment of pollution, rather than preventing pollution through process/product changes. Unfortunately, this contributes to PBT contamination because low levels of PBTs can escape detection and/or end-of-pipe treatment, and then can persist in the environment where they are able to accumulate in human and animal tissues to potentially harmful levels.

Members of the public and numerous public-interest organizations have urged the Washington State Department of Ecology (Ecology) to take the lead on this issue. In addition, during the 2000 session of the Washington State Legislature, lawmakers adopted legislation directing Ecology to develop for review by the legislature "…a proposed long-term strategy to address persistent, bioaccumulative, and toxic chemicals in the environment." This past fall, Ecology conducted an

extensive public comment period on a draft of this proposed PBT strategy. Public meetings were held in Bellingham, Spokane, Kennewick, Vancouver and Seattle. Ecology received extensive comments from public interest organizations, business and agricultural interests, other government agencies, and from individual citizens (See Appendix D). Ecology is submitting this proposed PBT strategy to the House Agriculture & Ecology Committee and the Senate Environment, Energy, and Water Resources Committee for their consideration during the 2001 legislative session.

Vision and Goals of the PBT Strategy

This proposed strategy envisions continually reducing risks to human health and Washington's environment from exposures to PBTs, by the year 2020. Key actions for reducing and, where possible, eliminating the use and production of these chemicals include:

- Reduce and, where possible, phase-out existing sources of PBTs.
- Clean up PBTs from historical sources.
- Prevent new sources of PBTs.
- Build partnerships to promote efforts to reduce and eliminate PBTs and coordinate with other jurisdictional programs.
- Ensure regulatory and non-regulatory approaches address cross-media (air, land, and water) effects.
- Identify and prioritize additional PBTs.
- Improve public awareness and understanding of PBT problems and solutions.
- Improve and promote the development of information needed to make informed decisions on measures to reduce PBTs.

Which PBTs will be the Initial Focus of this Strategy?

This proposed strategy initially identifies nine PBTs (listed in the margin) that are known to be present in Washington's environment. In addition, this strategy includes a process for screening these and additional chemicals (See Appendix E) and prioritizing them for future reduction actions. *Chemical action plans*, to be developed by Ecology in collaboration with others for specific high-priority chemicals, will be the primary means by which specific reduction actions and activities will be developed and implemented. This strategy includes a process for adding chemicals in the future (See figure 1).

Starter list of PBTs

- Aldrin/Dieldrin
- Benzo(a)pyrene
- Chlordane
- DDT (& DDD/DDE)
- Dioxins & Furans
- Hexachlorobenzene
- Mercury
- PCBs
- Toxaphene

Figure 1: Persistent, Bioaccumulative, and Toxic Chemical Strategy Implementation

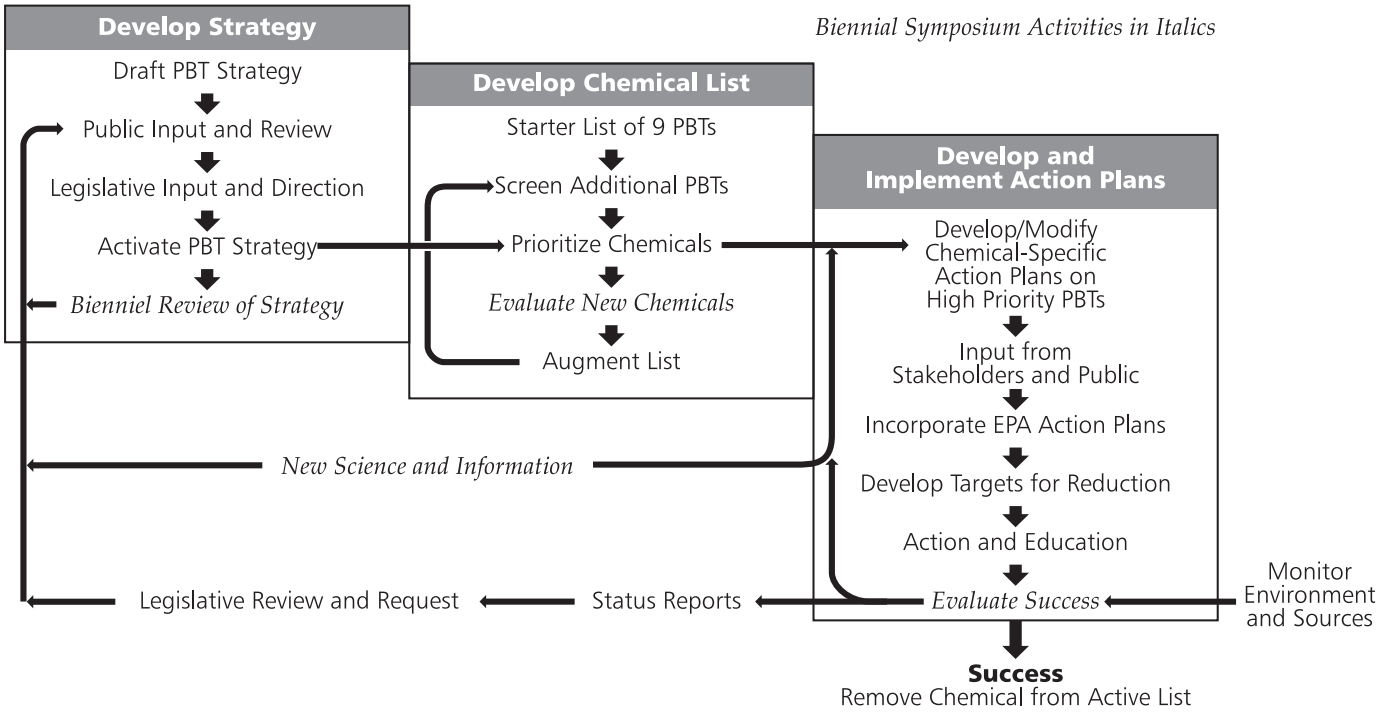


Figure 1 provides a description of how the proposed key actions and "building block" steps will work in unison over time.

Specific Activities

Ecology proposes to take the following actions during the current (1999-2001) and next (2001-03) biennia to further implement this strategy. The first set of bulleted items would not require additional funding:

- Use the Environmental Protection Agency's (EPA) Waste Minimization Prioritization Tool (WMPT)* defining characteristics to add PBTs. A list of 65 chemicals that Ecology plans to screen is identified in Appendix E.
- Coordinate among Ecology programs to ensure increased collaboration on cross-media effects from both point and non-point sources of PBTs.
- Work with EPA, other state and local agencies, and interested parties on continued development and implementation of both this state-specific strategy and national PBT-related initiatives.
- Continue to pursue grant opportunities from EPA.
- Coordinate existing indicators to track PBT-reduction successes and failures.

** See the Glossary for more information.*

If funding is procured or additional resources become available, Ecology proposes to do the following, beginning July 1, 2001:

- Develop and begin implementation of chemical-specific action plans for high-priority PBTs.
- Develop a public education program for PBTs.
- Develop and implement a PBT Baseline Monitoring Program for long-term monitoring.
- Continue to use the State Environmental Policy Act (SEPA) process to ensure necessary public review and involvement.
- Convene a biannual (every other year) symposium, starting in fall 2001.
- Establish new, measurable indicators to track PBT-reduction successes and challenges.

Measuring Progress

To evaluate the overall success of this strategy in reducing PBT uses, releases and environmental concentrations, Ecology proposes to initially quantify and track the following measures:

- Number of pounds of PBTs released annually into Washington's environment, using EPA's Toxics Release Inventory.
- Number of hazardous-waste sites cleaned up where PBTs are known to be present.
- Number of PBT-contaminated waterway segments listed as impaired water bodies.
- Continued reduction of PBT concentrations recorded in the sediments deposited in key water bodies throughout the state.
- Continued reduction of PBT concentrations found in fish and shellfish in waters with consumption advisories. In addition, Ecology will establish meaningful performance measures to judge progress toward phasing out PBTs.

Ecology also proposes to establish a baseline monitoring program that will be used in combination with existing monitoring and reporting programs to measure progress in reducing PBTs.

"These [British Columbia/Washington resident] killer whales can now be considered among the most contaminated marine mammals in the world"

Dr. Peter Ross,
Institute of Ocean Studies

"The fish-eating river otters were studied to evaluate organochlorine pesticides, PCBs, dioxins, furans, and heavy metals in the Lower Columbia River. Baculums and testicles of young males were shorter or smaller than in animals of the same age class from non-polluted areas."

Dr. Charles J. Henny,
National Biological Service

Introduction

Background

In August 1998, the Department of Ecology (Ecology) released a Dioxin Source Assessment and announced plans to develop a long-term strategy to reduce and eliminate certain chemicals that accumulate in human and animal tissues.

As a starting point, Ecology proposed focusing on chemicals identified by the Province of Ontario's Ministry of Environment. Public comments on that proposal in early 1999 ranged from concerns about the applicability of the "Ontario List" for this state to questions about which pollutants to include or exclude from the list. Since then, Ecology has evaluated available information on defining characteristics of PBTs to use in developing a targeted list of chemicals for use in Washington state.

Based on that evaluation, Ecology is proposing to focus efforts on chemicals that have been: (1) identified in EPA's National PBT Strategy or receiving a high PBT characteristics score in EPA's Waste Minimization Prioritization Tool, (2) found in Washington, and (3) used or produced.

What are Persistent, Bioaccumulative Toxics?

These are chemicals and/or pollutants that:

- remain in the environment for a long time (persist) without breaking down;
- accumulate in the environment and build up in the tissues of humans, fish, and animals ("bioaccumulative"); and
- are toxic (causing cancer and other health problems) to living organisms, including humans.

The Washington State Department of Ecology (Ecology) is interested in these chemicals and pollutants because they act very differently than most chemicals we currently regulate. Unlike other chemicals we release into the environment, these do not dissipate or break down over time. They may even go undetected because the quantities are so small, yet they can build up to harmful levels in humans and the environment.

Over the years, huge strides have been made to reduce our exposure to these chemicals and to remove them from our environment. In the past 10 to 20 years, Washington's waters have become cleaner, our air clearer, and our land less polluted from traditional sources of pollution.

At the same time, our technology also has changed. So have the ways we operate our businesses, the distance we drive to work, and the products we purchase. We all contribute to the health – or "un-health" — of our environment, which is why we are interested in persistent, bioaccumulative toxic substances.

Already, there are many state and federal regulations in place to help clean up areas where these and other types of contamination are found. But the way we approach these contaminants needs to change if we are to continue to provide a safe and healthy environment for the people of the state of Washington.

We can't do this alone. We need to work with the public, the business community and other agencies to find solutions so we can address these chemicals while meeting the needs of a changing society.

Purpose of the PBT Strategy

The mission of the Department of Ecology is to protect, preserve and enhance Washington's environment, and to promote the wise management of our air, land, and water for the benefit of current and future generations. This mission reflects the goals and aspirations of Washington citizens, as expressed by the Washington state Legislature and voters themselves over the last 30 years. The department believes that reducing and phasing out PBTs is consistent with Washington's environmental and health laws.

Identifying sustainable solutions to the problems posed by PBTs will require significant changes in the way we currently address these chemicals. While Ecology believes it must provide leadership on meeting those challenges, the department cannot unilaterally bring about all of the changes needed to reduce and eliminate PBTs. For example, Ecology does not regulate use or registration of pesticides applied to land, nor does it regulate chemicals used in most products purchased in Washington. For this endeavor to be successful, there must be partnerships among all affected agencies, interest groups, and citizens to bring about change.

Ecology believes this strategy will be useful only if it encourages discussion on key issues and inspires reduction efforts by citizens, businesses, and government agencies. This proposed strategy has been organized to achieve the following purposes:

- Describe the broad outlines of a long-term strategy to reduce and, where possible, eliminate PBTs.
- Promote dialogue and discussion on key environmental, economic, and societal issues associated with implementing a long-term strategy for protecting Washington residents.
- Introduce listing criteria and an initial list of PBTs for action in Washington state.

"In general, a strict prevention strategy means not using dangerous substances or their precursors since human factors can lead to accidental releases, or the processes cannot be completely controlled."

Geoffrey Thornburn, International Joint Commission

Need for a Washington PBT Strategy

What Are Some of the Sources of PBTs?

Dioxins & Furans – Pentachlorophenol-treated wood, municipal- and medical-waste incinerators, forest fires, cement kilns, coal combustion, residential and industrial wood combustion, residential waste combustion, diesel and gasoline fuel combustion, bleached-chemical wood pulp and paper mills.

Mercury – Coal-fired power plants; disposal of fluorescent lamps, thermometers, thermostats, manometers, and switches; medical-waste incinerators.

PCBs - Disposal of fluorescent lamp ballasts, older televisions, appliances, transformers, capacitors.

Benzo(a)pyrene - Internal combustion engines (cars, buses, trucks, water craft, gasoline-powered lawn equipment), used motor oils, forest fires, residential wood and waste combustion, residential and commercial cooking of meat products.

Hexachlorobenzene - Previously used as a pesticide. Currently manufactured as a by-product or impurity in the production of chlorinated solvents, pesticides, and in other chlorination processes.

Aldrin/Dieldrin - **Chlordane** - **DDT** - **Toxaphene** - Former widely used pesticides. Now banned for use in the U.S. Residual levels still present in soils, sediments, water, and fish tissue.

Persistent, bioaccumulative toxics (PBTs) are of concern to the Washington State Department of Ecology (Ecology) because of mounting evidence that PBTs cause long-term harm to human health and the environment.

A wide range of activities produce and release PBTs into Washington's environment. These include highly visible sources (e.g., large industrial processes) that have been the traditional focus of pollution control strategies. However, there are also numerous smaller sources of PBTs that cumulatively may release an equal or greater amount of PBTs. Examples of these smaller (and often "non-point") sources include automobiles, consumer products, and agricultural and home-use pesticides.

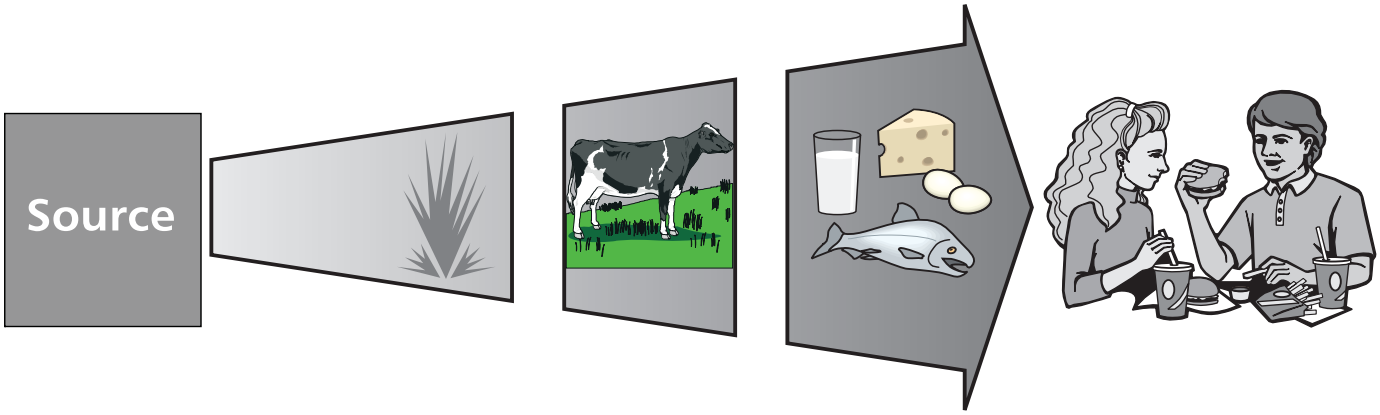
Although many chemicals can have toxic effects on humans and the environment, PBTs pose a regulatory challenge primarily because of their unique properties. When non-PBTs are released into the environment under permit, the concentration of the chemicals decrease or dilute as they move away from the original source and are dispersed. They may also break down due to reactions with other chemicals or exposure to sunlight. By the time an individual may be exposed to the chemicals, the concentration is so diluted that it is well below any health concern.

PBTs do not break down or react with other chemicals as easily as other chemicals (e.g., they are *persistent*). They also adhere to fatty tissues in living organisms. These two properties prevent PBTs from diluting as they move away from a source. In many cases, their concentration can actually increase in the environment. As PBTs are passed "up the food chain," their concentrations can also increase as they accumulate in fatty tissues of animals such as fish, poultry, and cows. This concept is illustrated in Figure 2.

Releases from these sources (both ongoing and historical) have resulted in measurable levels of PBTs in the air, water, soils, and sediments throughout Washington. For example, many PBTs have accumulated in state waters, sediments, and fish tissue to levels that require Ecology and the federal Environmental Protection Agency (EPA) to clean up these waters and prevent further degradation.

While scientists have yet to fully understand the long-term health effects associated with current levels of contamination, there is a growing body of scientific evidence supporting the need to take actions to reduce and, where possible, eliminate exposures to PBTs. For example, scientists have associated individual persistent, bioaccumulative, toxic chemicals with a wide range of effects in animals in natural and laboratory situations. These include behavioral changes, mortality, reproductive failure, eggshell thinning, developmental abnormalities, impaired growth and development, altered blood chemistry, an increased rate of disease outbreaks, organ and central-nervous-system damage, and impaired immune-system response (Gilbertson et al., 1991; Fox, 1992; Leatherland, 1992;

Figure 2: As PBTs move up the food chain, their concentrations can increase.



Tillett et al., 1992, 1993; Anthony et al., 1993; Henny et al., 1996; U.S. Environmental Protection Agency, 1997). Potential effects on human health involve the nervous system, reproductive and developmental problems, immune-response suppression, and cancer (EPA, 1997; EPA, 2000). Particular risks may be posed to a developing fetus or young child where important organs, such as the central nervous systems, are still under development (EPA, 1997). Animals and people who eat large amounts of fish from contaminated areas are likely to be exposed to these chemicals at higher-than-average levels.

Ecology and other agencies currently implement a wide range of environmental programs to protect human health and the environment. These programs have been in place for many years and have produced significant reductions in the uses, releases, and environmental concentrations of several PBTs.

- Ecology and EPA have established pollution-control sources for all of the large to medium-sized industrial operations in Washington state. This has significantly reduced the amount of contaminants (including PBTs) released to Washington's environment.
- Steps are being taken around the state to clean up contaminated sites. Nearly half (3,966, or 49%) of these known sites have been cleaned up in the past decade. Many remaining cleanups still need to be completed, including sites with PBTs.
- The federal Environmental Protection Agency and the Washington Department of Agriculture have limited and/or banned the use of high-risk pesticides, significantly reducing environmental concentrations in several cases. For example, DDT in body fat declined by almost 80 percent between 1970 and 1983 after EPA banned agricultural uses of the pesticide (Ecology, 1992). However, DDT levels in some Washington waterbodies continue to exceed EPA water quality criteria due to historical practices (See Appendix B).
- Ecology and other state and federal agencies operate a wide variety of monitoring programs to assess a limited spectrum of environmental conditions and evaluate the effectiveness of reduction efforts.

"With evidence of long-range transport of these substances to remote regions and the consequent threats they pose, many countries recognize that cooperative actions for the sound management of these substances are needed."

Dr. Andrew Gilman,
Health Canada

Significant strides have been made to reduce and clean up pollution of PBTs. Yet, new and growing information is showing that PBTs remain in our environment and may pose a greater threat to our health and quality of life than previously believed. As Washington enters the 21st century, further progress on reducing and eliminating PBTs needs to be made by changing how we do business and in some of our day-to-day activities. A strategy is needed to make these changes and achieve further reductions in PBT uses and releases. The strategy also is needed to address the unique environmental and institutional problems posed by these chemicals.

In November 1998, EPA issued a draft National PBT Strategy and accepted public comment on it in 1999. EPA identified the need for a strategy as a way for "EPA to harness all of its agency's tools — voluntary, regulatory, international, enforcement, compliance, and research — and direct them at a set of priority pollutants of common concern to all EPA program offices." More information about EPA's national PBT strategy can be found at *www.epa.gov/opptintr/pbt/home.htm* or by calling *the Pollution Prevention Information Clearinghouse at (202) 260-1023.*

Breaking Down Barriers to Further Progress in Reducing PBTs

- **Cross-media focus for all environmental statutes:** Our present regulatory systems are oriented toward implementing laws that do not fully address the potential for cross-media transfer of chemicals after they are released. We need to pay more attention to what's going on *collectively* with the land, air, water, and sediments.

- **More emphasis on pollution prevention:** The current, single-media focus has produced a system that emphasizes treating pollution rather than preventing it from being generated. PBTs are a special problem because the initial release of these chemicals may be so small that we may not be able to measure or detect them until they've reached harmful levels. We need to focus efforts on preventing production of these chemicals.

- **Better methods to address all sources of pollution:** Our past and existing focus largely has been to target large producers or dischargers of toxic substances and regulate these chemicals in discharges and to focus on large cleanup sites. This approach has been effective, but many sources still remain. We need to find ways to address all pollution sources, even ones that come from individual sources or "non-point" sources.

- **Better information:** Agencies, businesses, and individuals currently lack information (e.g., scientific, technical, economic, and environmental) needed to identify and implement sustainable measures to reduce and/or prevent PBT uses, releases, and/or exposures. We need to work in partnership with other entities to make this information available, so we can reduce and even prevent exposure to PBTs and releases.

- **Precautionary approaches for addressing PBTs:** Most regulatory programs currently embody approaches that require agencies to quantify the problems caused by low levels of toxic chemicals before taking action to prevent those effects. Consequently, reasonable preventive measures are often delayed because scientists are unable to precisely define all of the complex interactions between toxic releases and environmental damage. More precautionary approaches are needed to prevent the environmental harm associated with PBTs.

- **More awareness and understanding of the problems and solutions:** Most people are unaware of how day-to-day activities generate or release PBTs. PBTs come from activities that we all participate in every day. We need to find a way to provide accessible public education so people can see how these everyday activities (like driving a car or spilling oil on the road) contribute PBTs in the environment, and what they can do to prevent it.

- **Integrate economic and environmental goals:** Our current regulations fail to systematically integrate economic and environmental goals. This approach leads to less-integrated decision-making and hinders our ability to regulate production and releases of PBTs. Additionally, many of the PBTs released into our environment come from daily activities we have become accustomed to and even rely on. We will all need to make intentional shifts in activities and even the products we purchase to begin supporting a healthy economy and our environment.

EPA's National Strategy to Develop and Implement PBT Chemical Action Plans

In November 1998, the U.S. Environmental Protection Agency (EPA) announced a national strategy to address PBTs, the *Multimedia Strategy for Priority Persistent, Bioaccumulative, and Toxic (PBT) Pollutants*. The EPA strategy has four main elements:

- Develop and implement national action plans to reduce priority pollutants, using the full range of EPA tools.
- Continue to screen and select more priority PBTs for action.
- Prevent new PBTs from entering the marketplace.
- Measure progress of these actions against the Government Performance and Results Act (GPRA) goals and national commitments.

The EPA has identified 12 *Priority PBT Pollutants* (listed in the margin) for its initial focus strategy and is developing national action plans for each of the pollutants. Each action plan is expected to provide background information on the pollutant, identify ongoing sources, identify actions to reduce or eliminate those sources, and identify measures for evaluating the success of those actions.

The Washington state Department of Ecology has reviewed and commented on EPA's national action plans that are available. Ecology proposes to use the national action plans' broad scope and develop chemical action plans to address priority chemicals specific to Washington state. We also will coordinate with bordering states and provinces on issues related to PBTs.

Priority PBT Pollutants Identified by the U.S. Environmental Protection Agency

- Aldrin/Dieldrin
- Benzo(a)pyrene
- Chlordane
- DDT (and DDE, DDD)
- Hexachlorobenzene
- Alkyl-lead
- Mercury & compounds
- Mirex
- Octachlorostyrene
- PCBs
- Dioxins & Furans
- Toxaphene

Vision, Goals, and Guiding Principles

"In summary, large numbers of chemicals are widely used in consumer products and regularly discharged to the environment, resulting in widespread exposures. Our limited understanding of their full neurotoxic potential, has one particularly unsettling implication: What we already know about neuro-developmental toxic threats to children is likely to be only the tip of the iceberg."

In Harm's Way: Toxic Threats to Child Development, Greater Boston Physicians for Social Responsibility

This strategy expresses the intent of the Department of Ecology to change the way we look at PBTs, including how we reduce their presence and potential harm. This is crucial in order to keep stride with the technological changes around us. This strategy is intended to challenge our thinking and modify the way we do business.

Vision of Change

Current Situation		Future
❍ Unacceptable levels of PBTs in the environment	→	❍ Steadily declining environmental levels
❍ Manage PBT chemical uses and releases	→	❍ PBT uses and releases have been phased out/prevented
❍ Heavy reliance on end-of-pipe treatment	→	❍ Sustainable operations with "life-cycle" practices
❍ Single-medium decisions (air, land, water and biota** separately)	→	❍ Multi-media decisions (air, land, water, and biota** combined)
❍ Heavy reliance on risk assessment	→	❍ Precautionary approaches based on scientific data for addressing PBTs
❍ Command-and-control approach, focused on medium-to-large industrial facilities	→	❍ Integrated approach (rules, incentives & information) for all sources of PBT chemicals
❍ Limited public awareness of PBT problems & solutions	→	❍ Public understands problems posed by PBT chemicals and is a full participant in solutions
❍ Large gaps in information needed to make informed decisions on measures to reduce PBT chemicals	→	❍ Information available to make informed decisions on measures to reduce and prevent PBT chemicals
❍ Healthy Washington economy	→	❍ Healthy and sustainable Washington economy and quality of life for all generations
❍ Lack of integrated economic and environmental goals	→	❍ Approaches to reduce/eliminate PBTs are effectively linked with Washington transportation, agricultural, energy, and economic strategies

*** Biota: animal and plant life in a region.*

Precautionary Principle

The precautionary principle is designed to promote a "better safe than sorry" approach for dealing with hazardous substances and technologies. The principle originated in Europe in the early 1970s and appears in more than a dozen international treaties. For example, the 1992 Rio Declaration on the Environment and Development states:

"When there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

The precautionary principle is one of 10 principles that the Department of Ecology identified to help guide the development and implementation of the PBT strategy. The department received numerous comments that both support and oppose including this principle in the revised strategy. Ecology has carefully reviewed those comments and continues to believe it should be included as one of the strategy's guiding principles. However, based on that review, Ecology believes there are several issues associated with the practical application of the principle that require clarification.

- *Role of Scientific Information:* Measures to address environmental problems must have a sound scientific and policy basis. A rigorous scientific review will be conducted when identifying what substances should be included on the list of PBTs. However, Ecology believes that respect for the limits of our scientific knowledge means that the inability to develop a precise risk assessment value should not be used as a reason to postpone measures to prevent threats of serious, cumulative, and/or irreversible environmental damage.
- *New and Existing Sources of PBTs:* Once a substance has been identified as a PBT, a full range of response options (e.g. control, prevention, use reduction, phase-out) need to be identified and evaluated. Consistent with many current environmental laws, applying the precautionary principle creates a preference for using safer alternatives. However, that presumption can be overcome by considering the technical, economic, and social circumstances surrounding the specific activity.
- *Cleaning-up Historical Releases of PBTs:* Once a PBT has been released into the environment, cleanup measures must consider the environmental threats posed by these contaminants as well as threats posed by the cleanup measures themselves. Consequently, efforts to clean up historical releases will continue to be guided by risk-assessment/risk-management concepts.
- *Consistency with Current Laws and Regulations:* Most state and federal laws are based upon precautionary/preventative approaches to environmental problems. Consequently, applying the precautionary principle is consistent with current laws. This was acknowledged by the U.S. delegation to the recently concluded (December 2000) United Nations Treaty Negotiations on Persistent Organic Pollutants (POPs).

"Precaution is an essential element of the U.S. regulatory system as regulators often have to act on the frontiers of knowledge and in the absence of full scientific certainty. Yet precaution must be exercised as part of a science-based approach to regulation, and not as a substitute for such an approach."

Official U.S. Government Statement at the POPs Treaty Negotiations – Johannesburg, South Africa, December 2000

Goals

To promote and sustain a healthy environment supporting human populations and ecosystems. This can happen if we:

- Reduce and, where possible, phase out existing sources of PBTs.
- Clean up PBTs from historical sources.
- Prevent new sources of PBTs.
- Build partnerships to promote reducing and eliminating PBTs.
- Improve regulatory and non-regulatory approaches.
- Identify and prioritize additional PBTs.
- Improve public awareness and understanding of PBT problems and solutions.
- Improve and promote the development of information needed to make informed decisions on measures to reduce PBTs.

Guiding Principles

- PBTs in the environment are a societal problem that consumers, agricultural sectors, businesses and industries, government agencies, transportation sectors, and utilities all contribute to and must work together to solve.
- Strategies to phase out current uses and production of PBTs, where possible, need to be sustainable and should be integrated with Washington's transportation, agricultural, energy, and economic plans.
- Sound science and public-policy principles need to be used to develop and implement the PBT strategy. Lack of scientific certainty should not delay reasonable measures to prevent environmental harm.
- Meeting the needs of the present should not compromise the ability of future generations to meet their own needs. Individuals, organizations, business, and government should take full responsibility for the environmental, economic, and social consequences of their actions.
- Regulatory agencies and programs working together can promote pollution prevention and multi-media approaches that consider emissions to air, discharges to water, and solid wastes.
- Long-term success depends on having a knowledgeable public with access to high-quality information about problems and solutions.
- Open public processes are important to implementing this strategy. We value meaningful opportunities for individuals, business, and communities to participate in decisions that affect them.
- Collaboration will be needed among all sectors and interest groups, as well as local, state, provincial, tribal, national, and appropriate foreign governments.
- Realistic transition periods, where necessary, are needed to effectively phase out existing products and technologies and phase in new products and technologies.
- Strategies to phase out PBTs need to be designed and implemented in ways that reduce disparities in environmental risk from one community or population to another (environmental justice).

Statutory Foundation for Washington's PBT Strategy

The Department of Ecology's statutory framework consists of laws that establish responsibilities and authorities for protecting human health and the environment. An approach to successfully reduce and, where possible, eliminate PBTs requires an innovative blend of these legal mandates and procedures to effectively integrate air, water, and waste requirements. Consequently, the foundation for the proposed PBT strategy is derived from state laws. These include:

- Washington Clean Air Act (Chapter 70.94 RCW)
- Water Pollution Control Act (Chapter 90.48 RCW)
- Pollution Disclosure Act of 1971 (Chapter 90.52 RCW)
- Hazardous Waste Management Act (Chapter 70.105 RCW)
- Pollution Prevention Planning Act (Chapter 70.95C RCW)
- Solid Waste Management Act (Chapter 70.105 RCW)
- Model Toxics Control Act (Chapter 70.105D RCW)
- State Environmental Policy Act (Chapter 43.21C RCW)
- Worker and Community Right to Know Act (Chapter 49.70 RCW)

These laws provide a sound basis for developing and implementing a comprehensive approach for addressing PBTs. As collaboratively developed action plans are completed, amendments to individual statutes may be needed to implement specific elements of the strategy. As part of the effort to implement this strategy, Ecology proposes to review key statutes and regulations to identify potential gaps, if any, and then work with the Governor's Office and the Legislature to develop solutions.

"Most environmental laws in the U.S. seek to control only the release of potentially dangerous wastes into the air and water, not the amount of contact people actually have with those pollutants… The result was that officials often focused on limiting pollution from the most important sources, such as automobiles and factories, while failing to address many other important but less obvious ones."

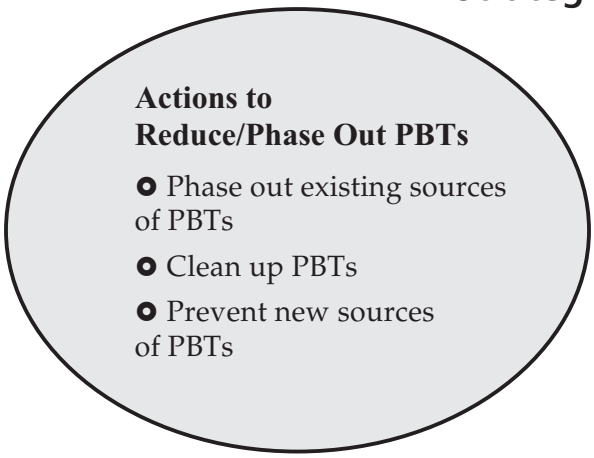
Wayne R. Ott and
John W. Roberts,
Scientific American,
November 1, 1999

Elements of the PBT Strategy

This proposed PBT strategy is designed to provide a comprehensive approach for addressing the problems associated with PBTs. The strategy is guided by a vision for both a healthy environment and economy. The proposed strategy has been designed to help overcome the limitations of current programs and approaches and includes two main components. These components (illustrated below) include:

- Actions to Reduce/Phase Out PBTs: The strategy identifies short- and long-term measures to reduce threats posed by (1) production and/or uses of PBTs currently occurring in Washington (existing sources); (2) PBTs already in Washington's environment (historic sources); and (3) future production/releases/uses (new sources).
- Building Blocks for Success: Ecology believes that efforts to reduce and phase out PBTs require coherent decision-making frameworks, a sound scientific and economic information base, strong working partnerships and continuing citizen support and involvement.

Strategic Framework



Building Blocks for Success

- Build partnerships to promote efforts to reduce and, where possible, eliminate PBTs
- Improve regulatory and non-regulatory approaches
- Identify and prioritize additional PBTs
- Improve public awareness and understanding of PBT problems and solutions
- Improve information needed to make informed decisions on measures to reduce PBTs

Actions to Reduce and Phase Out PBTs

1. Phase Out Existing Sources of PBTs

Federal and state regulatory programs have been in place for many years and have produced significant reductions in PBT uses and releases from existing sources. However, as discussed in "The Need for a Washington PBT Strategy," Ecology believes that further reductions from existing sources are needed to prevent additional accumulation of these chemicals. Ecology's long-term goal is to reduce and, where possible, phase out current uses and production of these chemicals. Achieving this long-term goal will require evaluation and implementation frameworks that enable agencies, businesses, and citizens to systematically integrate environmental choices with business, consumer, and agricultural decisions. Ecology's PBT strategy includes the following measures designed to promote such integration.

- *Develop and implement PBT chemical action plans.* Ecology proposes to collaboratively develop and implement chemical-specific action plans for reducing and phasing out existing sources of PBTs in Washington. The

plans will build upon information and measures included in the national action plans prepared by the Environmental Protection Agency. PBT chemical action plans will be designed to address PBT releases from both currently regulated point sources and unregulated non-point sources and individual sources. Ecology intends to use a four-step process for preparing individual plans that is modeled after the approach described in the *Great Lakes Binational Toxics Strategy:*

— *Gather Information.* Compile information on sources and uses of each PBT.

— *Assess Current Regulations and Programs.* Analyze regulatory and non-regulatory mechanisms that affect current uses, releases, and management of PBTs.

— *Identify Cost-Effective Options for Further Reductions.* Identify cost-effective measures to achieve further reductions in PBT sources and uses.

— *Recommend and Implement Actions.* Identify and implement regulatory and non-regulatory approaches to require and/or foster further reductions in PBT sources and uses.

The Department of Ecology anticipates developing at least two chemical action plans during the 2001-03 biennium (July 1, 2001-June 30, 2003). The decision about which PBTs to focus on for action plan development will be made after the department prioritizes the list of identified PBTs. Each action plan may need to follow Washington's *State Environmental Policy Act (SEPA)* to ensure adequate public discussion and comments on any adverse environmental effects that may result from the long-term implementation of completed chemical action plans.

❍ *Phase out PBTs in Washington.* A wide range of PBTs are used and generated in this state. Sources include both large industrial processes and non-point origins (e.g., internal combustion engines, various consumer products, and the past applications of agricultural and residential pesticides). Examples of regulatory and non-regulatory approaches to require and/or foster further reductions in PBT sources and uses:

— Identify and implement pollution prevention measures.

— Revise environmental regulations to address cross-media effects of PBT releases.

— Lower emission limits.

— Develop operating restrictions/requirements.

— Restrict product content or uses.

— Require product labeling.

— Develop economic incentives.

— Update monitoring/reporting requirements.

— Promote energy conservation measures.

Over the last several years, Ecology, several other government agencies, and many businesses and organizations in the private sector have implemented a wide range of activities designed to reduce the use and release of PBTs. An example of Ecology's efforts to date is provided in the margin.

Washington Chemical-Specific Action Plans will address:

✹ Current and historical use(s) of the chemical.

✹ Educational information on the specific chemical addressed in the action plan.

✹ Environmental effects of the chemical.

✹ Potential exposure routes and health effects.

✹ PBT emissions in Washington state.
- Historical trends, such as in sediment cores, of past chemical releases.
- Where reductions have already occurred.
- Potential sources from outside of state/country.

✹ Sources and sectors where the chemical is used.
- Economic effects and commerce.

✹ Sensitive sub-populations within geographic areas of use.

✹ Current regulations and programs in Washington affecting the chemical.
- Where existing regulations have reduced releases.
- Where existing regulations fall short in leading to further reductions.

✹ Goals and steps to reduce and, where possible, eliminate the chemical over time.

✹ Performance and completion schedules.

✹ Possible economic incentives and environmental credits.

✹ Opportunity for all parties to state effects on their business practices.

Walking Our Talk

In the continuing effort to further reduce releases of PBTs into Washington's environment, the Department of Ecology is taking the following steps to reduce the releases of PBTs and other toxic chemicals into Washington's Environment:

- Purchasing paper-stock that is partially recycled and made from the "elemental chlorine free" pulping process. *[Reduces dioxin]*
- Purchasing paper towels and toilet paper that are partially recycled and made from elemental chlorine free pulping processes. *[Reduces dioxin]*
- Adding "electric/gasoline fueled vehicles" to its fleet of state cars. *[Reduces benzo(a)pyrene, and green-house gases]*
- Promoting and encouraging car and van-pooling, telecommuting, and other alternative methods for commuting to work. *[Reduces dioxin, benzo(a)pyrene, and green-house gases]*
- As Ecology purchases new computer equipment, older computers are sent to a program that refurbishes them for use in public schools, thus reducing demand for new computer equipment and the toxic substances within them. *[Reduces mercury and other toxic substances (i.e., lead and cadmium)]*
- Purchasing low-mercury fluorescent lighting. Burned-out fluorescent lights are collected and sent to a fluorescent-light recycler for proper disposal. *[Reduces mercury]*
- Ecology is also working with other state agencies such as the departments of Agriculture, Corrections, Fish and Wildlife, General Administration, Health, Labor and Industries, Natural Resources, and Transportation, to promote and encourage the reduction of PBTs and other toxic chemicals.

2. Clean Up PBTs

Ongoing and historic activities have created two distinctly different types of PBT problems in Washington. One includes localized areas with high concentrations of PBTs resulting from past operations and/or waste disposal. The other type includes large areas of low-level contamination resulting from the gradual migration and buildup of PBTs in areas beyond the original source or waste-disposal boundaries (e.g., area-wide contamination). Many of these contamination problems are currently being investigated and cleaned up under the state Model Toxics Control Act (MTCA), the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and other state and federal programs. Ecology proposes the following measures to enhance current efforts to clean up PBTs.

- *Increase focus on PBTs found at contaminated sites.* Ecology is proposing to give increased focus to sites that are known to be contaminated with PBTs. The department also plans to take several steps to improve the agency's ability to address these types of problems:
  - Develop clear technical approaches and policies needed to establish cleanup requirements for individual sites.
  - Enhance the agency's geographic information system (GIS) capabilities to better support site-cleanup decision-making.
  - Integrate cleanup measures for area-wide contamination problems with local land-use planning and permitting processes.
- *Enhance efforts to clean up mercury and other PBTs at abandoned mining sites.* There are an estimated 3,500 abandoned mines in Washington. Available information shows that many of the state's watersheds have been contaminated by releases of mercury and other metals from these sites. Ecology plans to work with other agencies to identify abandoned mining sites, to evaluate the potential for releases of PBTs and other hazardous substances, to take interim measures to prevent releases into downstream watersheds, and to oversee cleanup activities.
- *Enhance efforts to clean up sediment contamination problems.* Ecology has identified more than 100 sites with sediments that are contaminated with PCBs, mercury, and other PBTs. The agency plans to place greater emphasis on establishing site-specific sediment-cleanup requirements to prevent harm to human health and the environment associated with the accumulation of PBTs in the aquatic food web. Ecology also plans to better integrate sediment cleanup measures with source controls, dredging, and habitat protection projects through a variety of mechanisms, including bay-wide planning and water cleanup plans (total maximum daily loads, or TMDLs).

3. Prevent New Sources of PBTs

Regulatory policies and processes by state agencies should encourage the development of new and cleaner facilities, processes, and products that could replace current sources of PBTs. In addition, they should be designed to minimize or prevent additions to the existing environmental burden of PBTs in Washington. The following proposed measures are designed to navigate a path to achieve both.

- *Enhance efforts to prevent the use and release of PBTs from new industrial and commercial sources.* Ecology and local air authorities currently review and establish requirements for new sources of air and water pollution. Ecology has identified several ways that current programs could be enhanced to prevent the use and release of PBTs from new industrial and commercial facilities:

— Create incentives/reduce barriers.

— Revise regulations.

— Provide information and technical assistance.

- *Encourage extended product responsibility for new sources and products.* The President's Council on Sustainable Development (1996) concluded that greater progress on resource conservation and pollution prevention can be achieved by adopting a "life cycle," or "extended product responsibility," approach. The council recommended adopting a voluntary system that ensures responsibility for environmental effects throughout a product's life-cycle by all those involved in the life cycle (e.g., designers, suppliers, manufacturers, distributors, users, and disposers). Ecology plans to follow the council's recommended process to evaluate and, where appropriate, use this concept to encourage measures to prevent new uses and releases of PBTs. Other concepts include:

— Form private/public partnerships to develop voluntary demonstration projects.

— Evaluate demonstration projects.

— Develop and adopt policies and practices that have been successfully demonstrated.

Examples of Potential Measures to Prevent Uses and Releases of PBTs

- Emission-based fees.
- Revenue-neutral tax shifts to encourage pollution prevention.
- Record-keeping/reporting requirements.
- Phase out mixing zones for PBTs for new sources (similar to the Great Lakes PBT Strategy).
- Review/implement available pollution-prevention measures.

Extended Product Responsibility

The President's Council on Sustainable Development identified several tools that could be used to help implement this concept:

- Product stewardship programs and public/private partnerships
- Take-back, buy-back, leasing or re-use/recycling
- Education/information and training
- Government subsidies, tax credits and procurement preferences
- Taxes/fees or deposit/refund systems

Building Blocks for Success

4. Build Partnerships to Promote Efforts to Reduce and Eliminate PBTs

The Department of Ecology has researched other regional, national, and international initiatives and strategies. The resulting proposed strategy is based on EPA's PBT strategy, but is tailored to Washington's needs. Ecology's goal is to build and strengthen partnerships that promote efforts to reduce and eliminate PBT chemicals by:

- *Build upon existing partnerships with the Department of Agriculture and the agricultural community.* Ecology plans to continue coordinating with the state Department of Agriculture (Agriculture) and the agricultural community to enhance the success of Agriculture's pesticide collection program. In cases where other pesticide alternatives may be promoted or recommended, Ecology intends to coordinate with Agriculture and EPA to help ensure that alternative pesticides that become available do not exhibit PBT characteristics.

- *Organize a statewide network of individuals, interest groups, associations and governments, and other jurisdictional programs to work together to educate citizens on PBT problems and solutions*. Ecology plans to develop a network of interested parties to educate constituents and supporters on the long-term environmental and human health problems that PBTs can pose and on solutions and alternatives.

5. Improve Regulatory and Non-Regulatory Approaches

Over the long term, the continual reduction and long-term phase out of PBTs will require fundamental changes in business and agricultural practices, government agency operations, and a need for alternative products. Ecology expects this transition will take several years and believes that improvements in current regulatory and non-regulatory approaches can help speed that transition. To maximize the effectiveness of regulatory and non-regulatory approaches for reducing and phasing out the use and production of PBTs, key objectives include:

- *Improve collaboration among regulatory programs to ensure that cross-media effects are considered when making decisions about PBTs under media-specific regulations and statutes.* During the last several years, greater awareness has been given to the potential for contamination to spread between the media of land, air, and water. A variety of cross-media approaches are needed to reduce pollution and regulatory compliance costs among multiple agencies and programs. For the greatest success, we need to:
  - — Consider cross-media effects when making decisions where PBTs are involved.
  - — Promote greater use of pollution prevention approaches (as opposed to end-of-pipe treatment) to reduce and eliminate PBTs.

- *Improve regulatory and economic incentives for preventing pollution.* Economic and regulatory barriers and lack of information are frequently cited as reasons why business and industry do not more actively pursue pollution prevention measures or alternative approaches. Ecology will continue to explore and evaluate options that will improve existing or establish new economic or regulatory

incentives that will encourage more pollution prevention, along with alternatives that move away from more-toxic chemical processes.

- *Provide increased access to technical information and assistance.* Ecology will increase the availability of relevant technical information such as the chemical-specific action plans (when completed) on Ecology's PBT Web page. Focus sheets, telephone lists of agency expertise, and Web page links to relevant sources will also be part of the site.

6. Screen and Prioritize Additional PBTs

The Department of Ecology has evaluated a wide range of regional, national, and international approaches for identifying chemicals that are persistent, bioaccumulative, and toxic. Based on that evaluation, Ecology proposes to use the following approach to identify and add PBTs to the initial list of nine chemicals.

Process for screening and prioritizing additional PBTs

To identify priority PBTs for the state of Washington, Ecology proposes to use part of the U.S. Environmental Protection Agency's (EPA) Waste Minimization Prioritization Tool (WMPT) to reflect Washington-specific conditions. This approach will be consistent with EPA but will use information that is relevant to our state. The process and the proposed adjustments are described below.

As indicated in the August 2000 draft PBT strategy, Ecology will use the chemical scoring system from the "PBT" portion of the WMPT. All chemicals that have a PBT "characteristics" score of 8 and 9 (Appendix E) will be combined with the original list of nine chemicals. In addition, a few of the chemicals which received a PBT characteristics score of 7 will also be considered.

After this list has been compiled, each chemical will be screened to determine if it has been detected in Washington's water, soils, fish tissue, or sediments (e.g., environmental presence) or if it is emitted from existing pollution sources such as industries, mobile sources or residential sources (e.g., wood stoves). If the chemical appears on one of the following information sources, Ecology will consider the chemical to be present in Washington's environment:

- Washington State Fish Consumption Advisory List
- ATSDR Hazdat database for Washington state
- Water Quality 303d list for Washington state
- Ecology's sediment Quality database (SEDQUAL)
- Ecology's Environmental Information Management (EIM) database

The presence of PBTs in Washington's environment can also be evaluated through chemical emissions or discharge reports. These reports are contained in two primary databases: the Toxics Release Inventory (TRI) and the National Toxics Inventory. Chemicals stored or potentially released from industrial facilities into Washington's water or land can be estimated from the TRI database. Chemical emissions to Washington's air will be obtained from the National Toxics Inventory since it contains TRI industrial sources along with mobile and smaller source air emissions (e.g., dry cleaners).

"To gain more insight into the effects that these chemicals have on reproduction and development, the nervous system, the immune system, the incidence of cancer, and other aspects of the biology of humans and wildlife, new studies should be conducted that follow groups of at-risk subjects from conception through adulthood."

The National Academy of Science Report on Hormonally Active Agents - August 3, 1999

"At the moment, there are more questions than answers about the impact of hormone disrupting chemicals on humans."

Dr. Theo Colburn, Our Stolen Future, p. 196

Environmental Education Plan

With adequate funding, Ecology will develop and implement a public education program to provide a basic understanding of:

- Problems caused by PBTs,
- Measures individuals can take to reduce their exposures to PBTs, and
- Steps organizations can take to reduce their discharges of PBTs into the environment.

PBT Presentation
Ecology will prepare a program that will give an overview of PBT problems and examples of actions that individuals and organizations can take to reduce those problems.

PBT Web site
www.ecy.wa.gov/programs/eap/pbt/pbtfaq.html
Ecology will regularly update the PBT Web site to provide access to current information, links to related information, and report the status of Ecology's efforts on the strategy.

Existing Education Programs
Where appropriate, PBT information will be integrated into Ecology's existing education programs.

Technical Assistance
Ecology will share information with individuals and organizations seeking to reduce or eliminate PBT releases and uses. Information will include "Focus" sheets describing the PBT strategy and related activities, as well as links to other sources. Much of this information will be available on Ecology's PBT Web site.

PBT Symposium
Ecology will host regularly scheduled public symposiums focused on PBTs found in Washington's environment. These symposiums will be designed to share new science and information about sources of PBTs in Washington state, provide a forum that fosters discussion, evaluates new chemicals, collects and incorporates feedback, and evaluates the success of the strategy along the way.

The next step will consist of Ecology ranking the PBTs identified in the screening process. The proposed ranking method is also described in Appendix E. Ecology may also consider programmatic concerns or opportunities for reduction. Possible opportunities can include:

- PBTs identified as a priority in specific Ecology program rankings.
- PBTs that are already heavily regulated under existing laws and programs.
- PBTs that can be further reduced where there are clear opportunities for reduction(s).

The expected outcome of this process is to develop a prioritized list of PBTs specific to Washington state by late spring 2001.

Public process for adding chemicals to the Washington PBT list
After the evaluation process is completed, the Department of Ecology will distribute the prioritized list of PBTs for review and comment. The department will review comments and make a final determination about which chemicals will be assigned for further reduction actions via chemical action plans or program-specific priorities or opportunities.

7. Improve Public Awareness and Understanding of PBT Problems and Solutions

Inform, build support, and involve the public, interested groups, and other organizations to take steps to continually reduce and, where possible, phase out uses and releases of PBTs (*see details in the margin*). Objectives include:

- *Improve the public's awareness and understanding* of the problems caused by PBTs and the sources of those chemicals.
- *Improve the ability of individuals and communities* to take steps to reduce individual PBT uses, production, and exposures.
- *Provide education and access to updated reference sources* so individuals and communities can make informed decisions.

We also heard several recommendations about content for an environmental education effort during the comment period. These recommendations will be considered in the development of the education plan and include the following ideas:

- Discuss natural processes that create PBTs, past and current levels measured in the environment, and known levels of risk posed, relative to other risks.
- Provide information about PBTs associated with activities such as barbecuing/smoking foods, smoking, lawn-mower or vehicle exhaust, using a wood stove or outdoor burning.
- Address the difficulties of getting to zero PBTs in a global environment.
- Provide balanced and scientifically accurate information on sources and reduction opportunities as well as human and environmental health benefits.
- Develop a public information campaign about the issues.
- Acknowledge significant reductions made to date.
- Expand the audience to include individuals, government, business, industry, and the Legislature.

8. Improve Information for Making Informed Decisions on Measures to Reduce PBTs

Accurate information is essential to sound decision-making. Under the current system, decision-makers often lack information (e.g., environmental levels, sources, engineering solutions, health or environmental impacts, economic effects) necessary to make effective decisions on reducing PBTs. Ecology proposes two approaches to improve the information needed to make informed decisions on measures to reduce PBTs.

- *Strengthen information on environmental concentrations and trends by integrating existing monitoring programs and databases.* Ecology proposes to develop a "baseline monitoring program" to determine concentrations of PBTs in the environment and to establish a basis to measure the success of PBT reductions with future monitoring. In addition, Ecology will continue to integrate existing monitoring programs and databases. Further integration will provide a more complete picture of the extent of environmental contamination by PBTs throughout the state.
- *Improve information on sources of PBTs.* Chemical-specific action plans will include current and historical use(s) of the chemical, environmental effects, how exposure can occur, health effects, and where the chemical is used or was previously used.

Two Views

"The ecologically destructive path we are on is as if all of humanity is in a giant car heading at a brick wall at 100 miles per hour and everyone in it is arguing about where to sit. There are a few screaming to put on the brakes and turn the wheel, but they are locked in the trunk."

David Suzuki

"… many more people die each year from filthy air and dirty water than from asbestos, dioxin, electromagnetic radiation, nuclear wastes, PCBs, pesticide residues and ultraviolet rays — the sorts of ecological issues that obsess Western environmentalists."

Gregg Easterbrook

Current and Proposed Actions

Many of the Department of Ecology's ongoing activities are involved in the effort to improve the way PBTs are addressed. New activities have also been suggested in response to the challenges raised by this strategy. Examples of these ongoing and proposed actions are listed below (actions that have been implemented are marked with a ☑).

☑ Continue a vigorous pollution-prevention education and technical assistance effort that helps businesses reduce waste and pollution by preventing their initial production, as well as by encouraging the recycling and re-use of waste. Ecology is exploring ways to maximize pollution prevention efforts (including the use of alternative technologies and raw materials) by increasing emphasis on facilities that generate PBTs.

❍ Require pollution prevention plans in NPDES (discharge) permits that are issued to oil refineries. These plans will focus on opportunities to reduce or eliminate PBTs from process waste water and storm water runoff.

❍ Encourage the federal Department of Energy to adopt the PBT strategy at Hanford by including it in pollution prevention planning.

☑ Continue the Toxics Reduction Engineer Exchange (TREE) program which works with businesses to prevent pollution.

☑ Make steel-mill flue dust subject to the same standards as other hazardous wastes and waste-derived fertilizers applied to land. This waste contains dioxin, arsenic, cadmium, lead, and mercury, and was widely used in fertilizers in Washington until the state convinced EPA to reverse an exemption that encouraged its use in fertilizers.

☑ Develop a regulation to limit concentrations of metals (including mercury, lead, cadmium, and arsenic) in fertilizers sold within Washington state.

❍ Implement final federal guidelines (adopted in April 1998) requiring new effluent limits at pulp and paper plants. These will further reduce dioxin and furan discharges by imposing final effluent limits for absorbable organic halides (AOX) and the bleach-plant effluent limits for certain dioxins and furans, chloroform, and 12 additional chlorinated phenolics.

❍ Develop strategies to control dioxin discharges from wood-treating facilities.

❍ Draft guidance for the proper disposal of building demolition materials that contain PBTs. These materials include thermostats and fluorescent lights (which can contain mercury), light ballasts (which can contain PCBs), and treated wood (when burned, can produce dioxins).

❍ Complete the analysis of the cross-media (i.e., air, land, water) effects of various "reasonably available control technologies" (RACTs) for wood-fired boilers. This analysis will address the generation and management of PBTs.

❍ Include persistence and bioaccumulation when ranking air contaminants and setting Air Quality Program priorities.

- Address the need to develop an understandable translation between human-health-based, water-quality criteria and effluent limits for waste water and storm water. Currently, there are challenges posed in translating Ecology's human-health-based, water-quality criteria for PBTs into effluent limits for waste water and storm water. Concentrations in storm water and waste water are usually too low to measure, even when contamination is found in fish or shellfish. An "implementation plan" describing how Ecology will address these challenges is being re-evaluated. The purpose of this review is to make the translation from fish-tissue contamination to wastewater controls more effective.

- ☑ As part of EPA's National Study of Chemical Residues in Lake Fish Tissue, collect predator and bottom fish from selected Washington lakes for PBT analysis. Report results as they become available.

- Revise Ecology's open-burning rules to decrease generation and dispersal of PBTs (e.g., dioxins, furans, and benzo(a)pyrene).

- As decisions are made to clean up contaminated sites and tanks at Hanford, specifically evaluate the PBTs associated with these cleanup actions.

- Encourage the federal Department of Energy and its subcontractors to limit the use of persistent, bioaccumulative, toxic substances in controlling weeds and vegetation at the Hanford site.

- Implement water cleanup plans for rivers, lakes, and estuaries that are contaminated with PBTs.

- For sites contaminated with PBTs, Ecology will emphasize remedies that address these pollutants.

- When Ecology ranks hazardous-waste sites for cleanup, toxicity of the contaminants on site (including PBTs) is a factor in scoring/ranking and priority setting of those sites.

- Ecology will establish site-specific sediment cleanup requirements designed to prevent harm to human health and the environment associated with the accumulation of PBTs in the aquatic food chain.

- During the next triennial review of the water quality standards, Ecology will evaluate and prioritize policy and technical updates to the standards. If funding becomes available, the use of "mixing zones" will be reviewed in light of current state and federal regulations to determine whether stricter controls are needed on the use of dilution areas for PBTs. (Mixing zones are limited areas of dilution that are commonly used in regulatory programs to allow ambient air, water, or sediment to mix with pollutants in discharges. These areas are useful in attaining chemical concentrations in the environment that protect larger areas.)

Following the State Environmental Policy Act (SEPA)

A decision to adopt the PBT strategy would be an action under SEPA. While the strategy, in general, is designed to promote and enhance environmental quality, indirect or secondary adverse effects may result.

Since, at this time it is impossible to determine whether the full implementation of this strategy could result in significant environmental harm, Ecology has issued a determination of significance (DS) and initiated scoping. Scoping will run concurrently with public comment on the proposed strategy, and if it appears likely that significant environmental harm would result, Ecology will prepare an Environmental Impact Statement (EIS). If further information and analysis indicates no likely effects, Ecology will consider withdrawing the DS and issuing a determination of nonsignificance.

Ecology Activities Specific to the PBT Strategy

There are several activities the Department of Ecology expects to accomplish by the end of the 1999-2001 biennium.

- Use EPA's Waste Minimization Prioritization Tool (WMPT) to define characteristics for persistence, bioaccumulation, and toxicity and combine with Washington-specific environmental presence, use, and production data to screen additional PBTs and prioritize with the strategy's starter list of nine PBTs.
- Coordinate among Ecology programs to ensure increased collaboration on regulatory decisions with cross-media effects.
- Work with EPA, other agencies, and interest groups.
- Continue to pursue grant opportunities from EPA.
- Coordinate existing indicators to track PBT reduction successes and failures.

If funding is procured or resources become available, Ecology proposes to do the following beginning July 1, 2001:

- Develop and implement chemical-specific action plans.
- Develop a PBT public education program.
- Provide grant opportunities for local governments to reduce PBTs.
- Coordinate with other state agencies to identify and track PBT uses and reduction needs.
- Develop and implement a PBT baseline monitoring program.
- Convene a biannual (every other year) symposium, starting in fall 2001.
- Establish new measurable indicators to track PBT reduction successes and challenges.

Proposals for Measuring Progress

The Department of Ecology proposes to evaluate the overall success of this strategy toward reducing PBT uses, releases, and environmental concentrations. Ecology will prepare and report those evaluations at biannual PBT symposiums. The department proposes to initially quantify and track the following measures to gauge the success of this long-term strategy:

- Number of PBTs released annually into Washington's environment – using EPA's Toxics Release Inventory.
- Number of hazardous-waste sites cleaned up where PBTs are known to be present.
- Number of PBT-contaminated waterway segments listed as impaired water bodies.
- Continued reduction in the concentrations of PBTs recorded in the sediments deposited in key water bodies throughout the state.
- Continued reduction of PBT concentrations found in fish and shellfish in waters with consumption advisories. In addition, Ecology will establish meaningful performance measures to judge progress toward phasing out PBTs.
- Ecology also proposes to establish a baseline monitoring program that will be used in combination with existing monitoring and reporting programs to measure progress in reducing PBTs.

Specific Timing and Milestones

Specific, shorter-term goals and milestones are considered fundamental to the strategy's success. The two-year budget cycle is perhaps the most important time frame to work under. The proposed PBT strategy is focusing the majority of its efforts into the 2001-03 biennium (July 2001 through June 2003). In the 2001 legislative session, funding can be committed only for the two-year period. Ecology expects the legislature will continue to review progress towards meaningful PBT reductions in future biennia and allocate funding according to state priorities.

During the first two years (July 2001 through June 2003), if funding is procured, this PBT strategy proposes that Ecology will:

1. Issue a draft list of prioritized PBTs for Washington state for public comment.

2. Develop and begin implementation of chemical action plans for high priority PBTs.

3. Detail and begin a long-term, statewide PBT monitoring program.

4. Develop and implement a PBT public education program.

5. Update the strategy's longer-term goals, resource requirements, and budgetary considerations to ensure appropriate continuity for at least the following two years (2003-2005).

6. Conduct another PBT public symposium to bring in the most recent knowledge available, review progress to date, and discuss opportunities for improvements.

7. Show where and how PBT reductions can be realized within specific classes of permits.

8. Work with EPA and other states to develop and carry out consistent PBT tracking, reduction, and elimination strategies and opportunities.

9. Apply for all appropriate funding opportunities available from grants.

Over the next five years Ecology proposes to:

1. Build the PBT reductions into all applicable and appropriate permits managed by Ecology.

2. Continue to refine the selection criteria applied to candidate PBTs and compounds.

3. Convene an additional PBT symposium in the 2003-05 biennium.

4. Consider and implement changes in appropriate Ecology-based rules and regulations that support the PBT strategy.

5. Work with other state agencies and applicable/appropriate regulations that will support the strategy's targets.

Requested Funding to Begin Implementing of the PBT Strategy During the 2001-2003 Biennium:

The Governor's budget proposal supports the Department of Ecology request for $1,216,000 from the State Toxics Control Account to implement this strategy during the 2001-03 biennium. With this amount, 2.3 FTEs will be funded ($190,000 per FTE for the biennium), and the remaining dollars ($779,000) will be dedicated to developing and implementing:

- A PBT public education program.
- A PBT baseline monitoring program.
- Chemical-specific action plans.

$54,000 of this amount will be allocated to the Department of Health to assist Ecology with this effort.

How to Get Further Information

Ecology's PBT Web site: http://www.ecy.wa.gov/programs/eap/pbt/pbtfaq.html

Here you can find:

- Answers to the most-frequently-asked questions
- Focus sheets about the strategy
- Reference information
- Links to additional information

Department of Ecology publications
You can view this publication on the Internet at:
http://www.ecy.wa.gov/biblio/0003054.html

For a printed copy of this publication, you can call or write our Publications Distributions Office at:

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Appendices

Appendix A
Fish and Shellfish Consumption Advisories in Washington State Due to Chemical Contamination

Draft Washington State Department of Health Document
Contact: *Glen Patrick* (360-236-3177), *G.Patrick@doh.wa.gov*
Web site: *http://www.doh.wa.gov/ehp/default.htm.*
This Web site is continually updated.
This information is from August 8, 2000.

1.
Advisory Location: Budd Inlet
Nearest Community: Olympia
Chemicals of Concern: creosote, volatile organic compounds, pentachlorophenol, and dioxins
Species affected: all shellfish
Issued by: Thurston County Health Department
Advisory Method: Signs posted, Ecology fact sheets
Recommendations: That shellfish not be consumed from the south end of Budd Inlet near Eastbay Marina due to chemical contamination from the hazardous waste site known as Cascade Pole. The Health Department further recommends that shellfish not be consumed from any location in south Budd Inlet due to bacteriological contamination.
Contact: *Sue Davis*, Thurston County Health Department, and (360) 754-4111

2.
Advisory Location: Commencement Bay
Nearest Community: Tacoma
Chemicals of Concern: polychlorinated biphenyls (PCBs), diethylphthalates, tetrachloroethylene (TCE), and metals
Species affected: all bottom fish and all shellfish, including crab
Issued by: Tacoma-Pierce County Health Department
Advisory Method: Signs posted
Recommendations: That no consumption of fish or shellfish occurs from the waterways at the south end of Commencement Bay.
Contact: *Ray Hanowell*, Tacoma-Pierce County Health Dept, (253) 798-2845

3.
Advisory Location: Dogfish Bay
Nearest Community: Keyport
Chemicals of Concern: metals, vinylchloride
Species affected: all shellfish and all bottom fish
Issued by: Bremerton-Kitsap County Health District
Advisory Method: Unknown
Recommendations: Unknown
Contact: *Keith Grellner*, Bremerton-Kitsap County Health District, (360) 692-3611

4.
Advisory Location: Dyes Inlet
Nearest Community: Bremerton
Chemicals of Concern: Naval ordnance
Species affected: all shellfish, all bottom fish, including crab
Issued by: Bremerton County Health Department
Advisory Method: Signs posted
Recommendations: The Health Department recommends that no shellfish, fish, or crab be consumed from the west side of Ostrich Bay in Dyes Inlet in the vicinity of the Jackson Park housing development.
Contact: *Keith Grellner*, Bremerton-Kitsap County Health District, (360) 692-3611

5.
Advisory Location: Eagle Harbor
Nearest Community: Bainbridge Island
Chemicals of Concern: polycyclic aromatic hydrocarbons (PAHs), mercury
Species affected: all shellfish, all bottom fish and crab
Issued by: Bremerton-Kitsap County Health District
Advisory Method: Signs posted, notice in State fishing guide
Recommendations: The Health Department recommends that no seafood consumption occur within Eagle Harbor west of a line drawn between Wing Point south to creosote light # 1, then west to the shore of Bainbridge Island.
Contact: *Keith Grellner*, Bremerton-Kitsap County Health District, (360) 692-3611

6.
Advisory Location: Sinclair Inlet
Nearest Community: Bremerton
Chemicals of Concern: mercury, polycyclic aromatic hydrocarbons
Species affected: all shellfish including crab, and all bottom fish including rockfish
Issued by: Bremerton-Kitsap County Health District
Advisory Method: Signs posted
Recommendations: The Health Department recommends that no seafood consumption occur within Sinclair Inlet south of a line between the narrows entrance and the community of Gorst on the south shore.
Contact: *Keith Grellner*, Bremerton-Kitsap County Health District, (360) 692-3611

7.
Advisory Location: Manchester State Park
Nearest Community: Port Orchard
Chemicals of Concern: polychlorinated biphenyls (PCBs) and dioxins
Species affected: all shellfish
Issued by: Bremerton-Kitsap County Health District
Advisory Method: unknown
Recommendations: The Health Department recommends that no shellfish harvesting occur from beaches in Clam Bay identified by a line drawn from Middle Point to Orchard Point, which includes a portion of beaches within Manchester State Park.
Contact: *Keith Grellner*, Bremerton-Kitsap County Health District, (360) 692-3611

8.
Advisory Location: Indian Island
Nearest Community: Port Townsend
Chemicals of Concern: pesticides, metals
Species affected: shellfish
Issued by: U.S. Navy, Engineering Field Activities Northwest, Facilities Engineering Command, Poulsbo, WA
Advisory Method: Signs posted, most areas are off limits to non-military personnel in general
Recommendations: The Navy recommends that no consumption of shellfish occur from the north end of Indian Island in and around the Boggy Spit area.
Contact: *Larry Tucker*, Engineering Field Activities NW, Poulsbo, (360) 396-0053.

9.
Advisory Location: King County
Nearest Community: Seattle
Chemicals of Concern: general - historical industrial discharges
Species affected: all bottom fish, all shellfish including crab, and seaweed
Issued by: Seattle-King County Department of Public Health
Advisory Method: Signs posted
Recommendations: The Seattle-King County Department of Public Health recommends against the collection and consumption of bottom fish, shellfish, and seaweed from Puget Sound waters in King County, particularly where warning signs are posted.
Contact: *Wally Swafford*, Seattle-King County Department of Public Health, Chemical Physical Hazards Program, Seattle, (206) 296-4784

10.
Advisory Location: Lake Roosevelt
Nearest Community: Grand Coulee
Chemicals of Concern: dioxins, mercury
Species affected: walleye, whitefish, sturgeon
Issued by: Washington State Department of Health
Advisory Method: Signs posted, pamphlets, newspaper articles
Recommendations: DOH recommends that anglers consume no more than 20 fish meals per month of sport fish caught from Lake Roosevelt.
Contact: Washington State Dept of Health, Office of Assessments, 1-877-485-7316

11.
Advisory Location: Yakima River
Nearest Community: Yakima
Chemicals of Concern: DDT, DDE
Species affected: Mountain Whitefish, Common Carp and all bottom fish including Bridgelip Sucker
Issued by: Washington State Department of Health
Advisory Method: Pamphlets in English and Spanish
Recommendations: Anglers are recommended to limit their consumption of the above species to one meal per week and eat fish such as trout instead of bottom fish.
Contact: Washington State Dept of Health, Office of Assessments, 1-877-485-7316

Appendix B
303(d) Water Segments in Washington State where Persistent, Bioaccumulative, Toxic Chemicals have Exceeded (Violated) Surface Water Quality Criteria

WRIA*	Waterbody Name	Parameter	Medium
01	Bellingham Bay (Inner) and Whatcom Waterway	Mercury	Sediment
01	Bellingham Bay (Inner) and Whatcom Waterway	Benzo(a)pyrene	Sediment
01	Nooksack River	Mercury	Water
01	Strait of Georgia	Benzo(a)pyrene	Sediment
03	Padilla Bay, Fidalgo Bay, and Guemes Channel	PCB-1254	Tissue
07	Chain Lake	Mercury	Water
07	Port Gardner and Inner Everett Harbor	Mercury	Sediment
07	Port Gardner and Inner Everett Harbor	Benzo(a)pyrene	Sediment
07	Snohomish River	Dioxin	Tissue
07	Snohomish River	Mercury	Water
08	Bear-Evans Creeks	Mercury	Water
08	Kelsey Creek	Aldrin	Water
08	Kelsey Creek	Dieldrin	Water
08	Kelsey Creek	Chlordane	Water
08	Kelsey Creek	DDT	Water
08	Mercer Slough	4,4'-DDD	Water
08	Mercer Slough	DDT	Water
08	Mercer Slough	Dieldrin	Water
08	Union Lake / Lake Washington Ship Canal	Dieldrin	Tissue
09	Duwamish Waterway and River	PCB-1260	Tissue
09	Duwamish Waterway and River	Benzo(a)pyrene	Sediment
09	Duwamish Waterway and River	Mercury	Sediment
09	Duwamish Waterway and River	Hexachlorobenzene	Sediment
09	Duwamish Waterway and River	PCB-1254	Tissue
09	Elliott Bay	Mercury	Sediment
09	Elliott Bay	Benzo(a)pyrene	Sediment
09	Elliott Bay	Hexachlorobenzene	Sediment
09	Elliott Bay	Benzo(a)pyrene	Water
09	Green River	Mercury	Water
09	Green River	PCB-1242	Water

WRIA*	Waterbody Name	Parameter	Medium
09	Green River	PCB-1254	Water
09	Green River	Toxaphene	Water
09	Smay Creek	Dieldrin	Water
09	Soos Creek System	Mercury	Water
09	Springbrook (Mill) Creek	Mercury	Water
10	Commencement Bay (Inner)	Mercury	Sediment
10	Commencement Bay (Inner)	Benzo(a)pyrene	Sediment
10	Commencement Bay (Inner)	Hexachlorobenzene	Sediment
10	Commencement Bay (Inner)	Dioxin	Water
10	Commencement Bay (Inner)	Dieldrin	Tissue
10	Commencement Bay (Outer)	Mercury	Sediment
10	Commencement Bay (Outer)	Dioxin	Water
10	Thea Foss (City) Waterway	Benzo(a)pyrene	Sediment
10	Thea Foss (City) Waterway	PCB-1260	Tissue
10	Thea Foss (City) Waterway	PCB-1254	Tissue
10	Thea Foss (City) Waterway	Mercury	Sediment
10	White (Stuck) River	Mercury	Water
12	Chambers Creek	PCB-1254	Tissue
12	Chambers Creek	PCB-1260	Tissue
13	Budd Inlet (Inner)	Benzo(a)pyrene	Sediment
13	Budd Inlet (Inner)	PCB-1254	Tissue
13	Budd Inlet (Inner)	Mercury	Sediment
13	Deschutes River	Mercury	Water
13	Ward Lake	PCB-1260	Tissue
15	Dyes Inlet and Port Washington Narrows	Mercury	Sediment
15	Dyes Inlet and Port Washington Narrows	Mercury	Tissue
15	Eagle Harbor	Benzo(a)pyrene	Tissue
15	Eagle Harbor	PCB-1254	Tissue
15	Eagle Harbor	Mercury	Sediment
15	Eagle Harbor	Benzo(a)pyrene	Sediment
15	Port Gamble Bay	Dieldrin	Tissue
15	Quartermaster Harbor	Dieldrin	Tissue
15	Sinclair Inlet	Aldrin	Tissue
15	Sinclair Inlet	PCB-1260	Tissue
15	Sinclair Inlet	PCB-1254	Tissue
15	Sinclair Inlet	Mercury	Sediment

WRIA*	Waterbody Name	Parameter	Medium
15	Sinclair Inlet	Dieldrin	Tissue
18	Elwha River	PCB-1254	Water
22	Grays Harbor (Inner)	Dioxin	Tissue
23	Black River	Mercury	Water
23	Chehalis River	PCB-1254	Tissue
23	Chehalis River	PCB-1260	Tissue
25	Sacajawea Lake	Dieldrin	Tissue
25	Sacajawea Lake	Chlordane	Tissue
25	Sacajawea Lake	PCB-1254	Tissue
25	Sacajawea Lake	4,4′-DDE	Tissue
25	Sacajawea Lake	PCB-1260	Tissue
32	Walla Walla River	Dieldrin	Tissue
32	Walla Walla River	PCB-1260	Tissue
32	Walla Walla River	Hexachlorobenzene	Tissue
32	Walla Walla River	Chlordane	Tissue
32	Walla Walla River	4,4′-DDE	Tissue
32	Walla Walla River	4,4′-DDT	Tissue
33	Snake River	Dioxin	Tissue
34	Palouse River	PCB-1260	Tissue
34	Palouse River	4,4′-DDE	Tissue
34	Palouse River	Dieldrin	Tissue
35	Snake River	DDT	Water
35	Snake River	Aldrin	Water
35	Snake River	Dieldrin	Water
35	Snake River	Toxaphene	Water
35	Snake River	4,4′-DDD	Water
35	Snake River	PCB-1260	Water
35	Snake River	Dioxin	Tissue
35	Snake River	4,4′-DDE	Water
36	Esquatzel Coulee	Dieldrin	Water
37	Granger Drain	Dieldrin	Water
37	Granger Drain	DDT	Water
37	Granger Drain	4,4′-DDD	Water
37	Granger Drain	4,4′-DDE	Water
37	Marion Drain	4,4′-DDE	Water
37	Marion Drain	Dieldrin	Water
37	Moxee (Birchfield) Drain	DDT	Water

WRIA*	Waterbody Name	Parameter	Medium
37	Moxee (Birchfield) Drain	4,4′-DDD	Water
37	Snipes Creek	DDT	Water
37	Snipes Creek	Dieldrin	Water
37	Snipes Creek	4,4′-DDE	Water
37	Snipes Creek	4,4′-DDD	Water
37	Snipes Creek	Dieldrin	Water
37	Snipes Creek	4,4′-DDE	Water
37	Snipes Creek	4,4′-DDD	Water
37	Spring Creek	4,4′-DDE	Water
37	Spring Creek	DDT	Water
37	Spring Creek	4,4′-DDD	Water
37	Spring Creek	Dieldrin	Water
37	Status Creek	4,4′-DDE	Water
37	Status Creek	Dieldrin	Water
37	Sulphur Creek Wasteway	Dieldrin	Water
37	Sulphur Creek Wasteway	DDT	Water
37	Sulphur Creek Wasteway	4,4′-DDE	Water
37	Sulphur Creek Wasteway	4,4′-DDD	Water
37	Toppenish Creek	4,4′-DDE	Water
37	Toppenish Creek	Dieldrin	Water
37	Toppenish Creek	4,4′-DDD	Water
37	Toppenish Creek	DDT	Water
37	Wide Hollow Creek	4,4′-DDE	Water
37	Wide Hollow Creek	Dieldrin	Water
37	Wide Hollow Creek	DDT	Water
37	Wide Hollow Creek	4,4′-DDD	Water
37	Yakima River	Aldrin	Water
37	Yakima River	Dieldrin	Tissue
37	Yakima River	Mercury	Water
37	Yakima River	PCB-1260	Tissue
37	Yakima River	4,4′-DDE	Water
37	Yakima River	4,4′-DDE	Tissue
37	Yakima River	Dieldrin	Water
37	Yakima River	DDT	Water
37	Yakima River	DDT	Tissue
37	Yakima River	4,4′-DDD	Water
37	Yakima River	Mercury	Tissue

WRIA*	Waterbody Name	Parameter	Medium
37	Yakima River	PCB-1254	Tissue
39	Cherry Creek	4,4′-DDE	Water
39	Cherry Creek	Dieldrin	Water
39	Cherry Creek	DDT	Water
39	Wilson Creek	Dieldrin	Water
39	Yakima River	Dieldrin	Tissue
41	Crab Creek	Chlordane	Water
41	Crab Creek	4,4′-DDE	Water
41	Crab Creek	Dieldrin	Water
41	Crab Creek	PCB-1254	Tissue
41	Crab Creek	PCB-1260	Tissue
41	Crab Creek	DDT	Water
41	Goose, Lower Lake	Dieldrin	Water
41	Potholes Lake	Dieldrin	Tissue
41	Potholes Lake	Dieldrin	Water
45	Mission Creek	4,4′-DDE	Tissue
45	Mission Creek	4,4′-DDT	Tissue
45	Mission Creek	DDT	Water
47	Chelan Lake	PCB-1260	Tissue
47	Chelan Lake	4,4′-DDE	Tissue
47	Chelan Lake	PCB-1254	Tissue
47	Roses (Alkali) Lake	4,4′-DDE	Tissue
48	Andrews Creek	4,4′-DDE	Water
49	Ninemile Creek	DDT	Water
49	Okanogan River	Dieldrin	Water
49	Okanogan River	Aldrin	Water
49	Okanogan River	DDT	Water
49	Okanogan River	4,4′-DDE	Water
49	Okanogan River	PCB-1260	Tissue
49	Okanogan River	4,4′-DDD	Tissue
49	Okanogan River	4,4′-DDE	Tissue
49	Okanogan River	PCB-1254	Tissue
49	Okanogan River	4,4′-DDD	Water
49	Osoyoos Lake	4,4′-DDD	Water
49	Osoyoos Lake	4,4′-DDE	Water
49	Osoyoos Lake	Dieldrin	Water
49	Osoyoos Lake	4,4′-DDE	Water

WRIA*	Waterbody Name	Parameter	Medium
49	Osoyoos Lake	Aldrin	Water
49	Osoyoos Lake	DDT	Water
49	Similkameen River	Aldrin	Water
49	Similkameen River	Dieldrin	Water
49	Similkameen River	4,4′-DDE	Water
49	Similkameen River	DDT	Water
49	Similkameen River	4,4′-DDD	Water
49	Tallant Creek	DDT	Water
49	Unnamed Creek	DDT	Water
54	Long Lake (Reservoir)	DDT	Water
54	Long Lake (Reservoir)	Chlordane	Water
54	Long Lake (Reservoir)	PCB-1254	Tissue
54	Long Lake (Reservoir)	PCB-1260	Tissue
54	Long Lake (Reservoir)	PCB-1248	Tissue
54	Long Lake (Reservoir)	PCB-1254	Water
54	Long Lake (Reservoir)	Dieldrin	Water
54	Long Lake (Reservoir)	PCB-1242	Tissue
54	Long Lake (Reservoir)	4,4′-DDE	Water
54	Long Lake (Reservoir)	Aldrin	Water
54	Long Lake (Reservoir)	4,4′-DDD	Water
54	Spokane River	Dieldrin	Water
54	Spokane River	PCB-1260	Tissue
54	Spokane River	PCB-1254	Tissue
54	Spokane River	PCB-1248	Tissue
54	Spokane River	Mercury	Water
54	Spokane River	DDT	Water
54	Spokane River	PCB-1242	Tissue
54	Spokane River	4,4′-DDE	Water
55	Little Spokane River	PCB-1260	Tissue
55	Little Spokane River	PCB-1248	Tissue
55	Little Spokane River	PCB-1254	Tissue
56	Hangman Creek	4,4′-DDE	Water
56	Hangman Creek	Dieldrin	Water
62	Pend Oreille River	Aldrin	Tissue
62	Pend Oreille River	Aldrin	Water
62	Pend Oreille River	4,4′-DDE	Water
62	Pend Oreille River	4,4′-DDD	Water

WRIA*	Waterbody Name	Parameter	Medium
62	Pend Oreille River	DDT	Water
62	Pend Oreille River	Dieldrin	Water
CR	Columbia River	Benzo(a)pyrene	Water
CR	Columbia River	PCB-1254	Tissue
CR	Columbia River	Dioxin	Tissue
CR	Columbia River	Dioxin	Water
CR	Columbia River	Mercury	Water
CR	Columbia River	Aldrin	Water
CR	Columbia River	4,4'-DDE	Water
CR	Columbia River	Dieldrin	Water
CR	Columbia River	Chlordane	Water
CR	Columbia River	Hexachlorobenzene	Water
CR	Columbia River	Toxaphene	Water
CR	Columbia River	4,4'-DDE	Tissue
CR	Columbia River	Dieldrin	Tissue
CR	Columbia River	PCB-1248	Tissue
CR	Columbia River	PCB-1260	Tissue
CR	Franklin D. Roosevelt Lake	Mercury	Tissue
CR	Franklin D. Roosevelt Lake	Dioxin	Tissue
CR	Franklin D. Roosevelt Lake	Mercury	Water
CR	Franklin D. Roosevelt Lake	Dioxin	Water
PS	Hood Canal (North)	Mercury	Sediment
PS	Hood Canal (North)	Benzo(a)pyrene	Sediment
PS	Possession Sound (North)	4,4'-DDE	Water
PS	Possession Sound (North)	Dieldrin	Water
PS	Possession Sound (North)	Mercury	Sediment
PS	Puget Sound (Central)	Mercury	Sediment
PS	Puget Sound (Central)	Benzo(a)pyrene	Sediment
PS	Tacoma Narrows	Dieldrin	Tissue

* Water Resource Inventory Area

Appendix C
Information and Health Effects for the PBTs Identified in this Strategy

Below is current information about health effects from the Environmental Protection Agency (EPA) and the federal Agency of Toxic Substances and Disease Registry (ATSDR). Previous trade names for these substances come primarily from Ecology's 1992 report on "Chemicals of Concern in Washington State." More information is available from EPA (at 1-513-569-7254 or viewing the Web site at: *http://www.epa.gov/iris*) and ATSDR (at 1-888-422-8737 or viewing its Web site at: *http://www.atsdr.cdc.gov/toxfaq.html*). Exposure to the chemicals listed below can happen through eating foods contaminated with these chemicals, inhaling them in the air, or having skin contact.

Aldrin/Dieldrin

Trade names: Aldrin: *Octalene, Aldrex, Aldrosol, Drinox, and Aldrite.* Dieldrin: *Octalox, Alvit, Quintox, Diedrex, Dieldrite, Panaram D-31, Illoxal, Dielmoth, Dorytox, Insectlack, Kombi-Alberta, Moth Snub D, Red Shield, SD 3417,* and *Termitox.*

Previous uses: Its use began in the 1950s as a pesticide. In 1974, the EPA banned all uses except termite control. In 1987, all uses were banned.

Health effects: Both *aldrin* and *dieldrin* are classified as probable human carcinogens by EPA. Increased rates of liver tumors were found in both rats and mice that ingested low levels of *aldrin* and *dieldrin* in the diet. Human studies reviewed by EPA found no increased cancer rates in workers exposed to *aldrin* and *dieldrin*, but EPA found these studies to be inconclusive[1]. More-recent literature reviews conducted by ATSDR also found human studies to be inconclusive, but found strong support for cancer associated with exposure in laboratory animals[2].

Other health effects associated with higher exposures: The central nervous system is mainly affected. Other symptoms from lower levels of exposure include headache, irritability, dizziness, vomiting, and loss of muscular coordination.

Benzo(a)pyrene

Trade names: none

Previous and current sources: Benzo(a)pyrene is part of a larger group of similar chemicals (polycyclic aromatic hydrocarbons – PAHs). It is usually found in the soot when gasoline, garbage, or plant/animal material is burned. It can also be found in creosote, which is a wood preservative.

Health effects: Benzo(a)Pyrene (BaP) is associated with cancer in a variety of laboratory animals through several exposure pathways, including ingestion, inhalation, and dermal applications. EPA rates BaP as a probable human carcinogen, based on increased rates of stomach tumors in mice, hamsters, and rats fed BaP in their diet. A number of human studies have shown increased cancer rates associated with exposure to airborne BaP. However, the study subjects were also exposed to a number of other chemicals at the same time so that it is not clear if BaP was the primary cause of the increased cancer[3].

Other health effects associated with higher exposures: Health affect studies are still incomplete, although the U.S. Department of Health and Human Service findings show it is likely a carcinogen.

[1]EPA Integrated Risk Information System. *Substance files for Dieldrin and Aldrin*. Last EPA File review July 1993. Obtained by Ecology staff and reviewed for changes December 2000.

[2]ATSDR. *Draft Toxicological Profile for Aldrin/Dieldrin*. Prepared by Syracuse Research Corporation, contract # 205-1999-00024. September 2000.

[3]EPA Integrated Risk Information System. *Substance file for Benzo(a)pyrene*. Last EPA File review on June 1994. Obtained by Ecology staff and reviewed for changes December 2000.

Chlordane

Trade names: *Ortho-Klor (Chevron), Kow-Klor (Dow), Belt, Chlordan, Gamma Chlordan, Kypchlor, Corodane, Dowchlor, Oktaterr, Topichlor, Snyklor, Octacholor and Velsicol 1068.*

Previous uses: Chlordane was used as a pesticide from 1948 to 1988. EPA banned all uses in 1983 except to control termites. All uses were banned by 1988.

Health effects: Chlordane is rated by EPA as a probable human carcinogen. Chlordane is associated with liver tumors in five different strains of laboratory mice. However, EPA notes that chlordane did not produce cancer in two strains of laboratory rats. EPA reviewed a number of human studies conducted among people exposed to chlordane either in work settings or through home pesticide applications. Some of these studies found cancer (non-Hodgkin's lymphoma) associated with exposure, but the majority of studies did not find any increased cancer rates among exposed individuals. EPA found the studies to be inadequate to draw firm conclusions, and based their cancer assessment on the laboratory animal studies[4]. Similar findings were noted in a review conducted by ATSDR[5].

Other health effects associated with higher exposures: The central nervous system, digestive system, and the liver are affected by exposure to Chlordane. Other symptoms associated with large doses include vision problems, confusion, irritability, stomach cramps, vomiting, diarrhea, weakness, convulsions, headaches, and jaundice.

Dioxins and Furans

Trade names: none

Previous and current sources: Dioxin does not have any commercial uses. It has been found in the environment, in the products and emissions of chemical plants manufacturing chlorinated phenols, and in the ash residues and emissions of municipal waste incinerators. Emissions may also occur from pulp and paper manufacturing plants, industrial accidents, combustion, and gasoline and diesel exhaust.

Health effects: EPA recently completed its review of the health literature on dioxin in the Dioxin Reassessment. EPA currently considers dioxin to be a known human carcinogen based on limited evidence in humans. Studies on dioxin health effects in animals have also demonstrated possible developmental effects, reproductive effects such as endometriosis, and immunological effects such as thyroid problems[6].

Other health effects associated with higher exposures: The most noted health effect in people who have been exposed to large amounts of the form 2.3.7.8-TCDD is chloracne – a severe skin disease. Other symptoms include skin rashes, discoloration, and excessive body hair. There have also been reported changes in individual's blood and urine that indicate liver damage.

DDT (and DDE, DDD)

Trade names: *Neocid, p,p-DDT, Anofex, Neocoid, Zerdane, Dinocide, Gespon, Gesarex, Guespon, Guesarol, Pentech, Arkotine, Gyron, Ixodex, and Gesarol.*

Previous uses: DDT was one of the most widely used agricultural pesticides in the U.S. and other countries from 1946 to 1972. It has been banned in the U.S. except for public health emergencies.

[4]EPA Integrated Risk Information System. *Substance File for Chlordane*. Last Revised by EPA February 1998. Obtained by Ecology staff and reviewed for changes December 2000.

[5]ATSDR. *Toxicological Profile for Chlordane (Update).* Prepared by Syracuse Research Corporation, contract # 205-88-0608. 1994.

[6] EPA. Office of Research and Development. *Exposure and Human Health Resassessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds. Part III: Integrated Summary and Risk Characterization for 2,3,7,8 - Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds*. EPA/600/P-00/001Bg. September 2000. Science Advisory Board Review Draft.

Health effects: EPA rates DDT, DDE, and DDD as probable human carcinogens. These ratings are based on liver tumors found in several strains of laboratory mice, hamsters, and rats fed DDT, DDE, and DDD in their diet.

Human studies that examined the relationship between DDT exposure and cancer have found conflicting results. DDT levels were found to be higher in cancer victims than those of other diseases. However, EPA notes that this is not a definitive finding that DDT is the primary cause in these deaths. In addition, studies examining worker exposures to DDT were found to be inadequate to draw firm conclusions about cancer and DDT in exposed humans[7]. No human studies were found for DDD or DDE[8,9]., More-recent reviews of the literature continue to find mixed results in human cancer studies and DDT exposure[10].
Other health effects associated with higher exposures: At high levels, damage to the nervous system can occur. The main symptoms include tremors, seizures, and excitability.

Hexachlorobenzene

Trade names: *Amatin, Anticaries, Bunt-cure, No-bunt, No Bunt 40, No Bunt Liquid, Sanocide, and Captan 40%.*
Previous uses: It was widely used as a pesticide until 1965. It was also used to make fireworks, ammunition, and synthetic rubber. It's also reported to be used as a fungicide, in dye manufacturing, as a solvent, a degreasing agent, and a cutting fluid.
Health effects: Hexachlorobenzene is rated as a probable human carcinogen based on its association with liver, thyroid, and kidney tumors in laboratory rats, hamsters, and mice. Humans accidentally exposed to hexachlorobenzene in their diet reported severe skin, thyroid, and neurological disorders[11]. However, these exposures are much greater than those associated with any concentrations measured or predicted in Washington's environment. ATSDR recently reviewed the health literature and agreed with EPA that the animal studies provide sufficient evidence of cancer in animals but inconclusive evidence in humans[12].
Other health effects associated with higher exposures: Symptoms include skin sores, change in skin color, arthritis, and problems with the liver, nervous system, and stomach.

Mercury

Trade names: none
Previous uses: Mercury is used as a cleaning agent in some soaps and as a base for pesticides. It is also used in chemical production, batteries, dental fillings, thermometers, switches, and in pharmaceuticals.
Health effects: Individuals exposed to mercury are most likely exposed to the organic species of this chemical (e.g., methylmercury). Human health effects associated with methylmercury include severe neurological disorders in infants exposed during pregnancy. Other health effects noted in adults include numbing in the extremities such as fingertips and toes[13]. Mercury has not been classified by EPA as a probable or known human carcinogen. More-recent reviews conducted by ATSDR continue to find supporting evidence in humans of neurological effects associated with low levels of methylmercury. However, more-recent studies have reported mixed findings with regards to the developmental effects of methylmercury (e.g., mean age in children to begin walking or talking[14]).

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[7]EPA Integrated Risk Information System. *Substance File for DDT*. Last Revised by EPA in May 1991. Obtained by Ecology staff and reviewed for changes December 2000.

[8]EPA Integrated Risk Information System. *Substance File for DDE*. Last Revised by EPA in August 1988. Obtained by Ecology staff and reviewed for changes December 2000

[9]EPA Integrated Risk Information System. *Substance File for DDD*. Revised by EPA in August 1988. Obtained by Ecology staff and reviewed for changes December 2000

[10]ATSDR. *Draft Toxicological Profile for DDT/DDE/DDD*. Prepared by Syracuse Research Corporation under contract # 205-1999-00024. September 2000.

[11]EPA Integrated Risk Information System. *Substance File for Hexachlorobenzene*. Last Revised by EPA in November 1996. Obtained and reviewed for changes December 2000

[12]ATSDR. *Draft Toxicological Profile for Hexachlorobenzene*. Prepared by Syracuse Research Corporation, contract # 205-1999-00024. September 2000.

[13]EPA Integrated Risk Information System. *Substance File for Methylmercury*. Last Revised by USEPA in May 1995. Obtained by Ecology staff and reviewed for changes December 2000

[14]ATSDR. *Toxicological Profile for Mercury (Update).* Prepared by Research Triangle Institute, contract # 205-93-0606. March 1999.

Other health effects associated with higher exposures: The nervous system is very sensitive to all forms of mercury. Symptoms include irritability, shyness, tremors, changes in vision or hearing, and memory problems. Exposure to the vapors can cause effects such as lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

PCBs

Trade names: *Aroclor, Dykanol, Noflamol, Chlorentol, Inerteen, Pyranol, Therminol, Chlorophen, Cholorextol, Clophen, Colphen, Fenclor, Kanachlor, Montar, Pyralene, Santotherm, Therminol FR.*
Previous uses: Commercial use began in 1929 and was widespread. Manufacture of PCBs was stopped in 1977 (in the United States). Major uses of PCBs included insulation for electrical cables and wires, coolants and lubricants, and in the production of electrical condensers.
Health effects: PCBs are considered to be probable human carcinogens based on its association with liver tumors in several species of laboratory rats. EPA evaluated a number of human studies but found these studies to be inadequate to draw firm conclusions about the relationship between PCB exposure and human cancer. However, more-recent EPA documents have termed the findings of some human studies as "suggestive" of an association between human cancer and PCB exposure[15]. More-recent reviews of the literature have not found any new human studies examining exposure to PCBs and cancer[16]. PCBs are also associated with immunological effects in animals and some developmental effects in humans[17].
Other health effects associated with higher exposures: People who have been exposed to PCBs for a long time have problems such as irritation of the nose and lungs, and skin irritations consisting of acne and rashes.

Toxaphene

Trade names: *Phenatox*.
Previous uses: Toxaphene was used heavily as an insecticide until 1982 when EPA set restrictions on its use. All uses were banned in 1990. It was also used as a pesticide on cotton and other crops, to control pests on livestock, and to kill unwanted fish in lakes.
Health effects: Toxaphene has been rated as a probable human carcinogen by EPA, based on its association with liver tumors in laboratory mice and thyroid tumors in rats. No human studies were found that examined exposure to toxaphene and human cancer[18]. More-recent reviews by ATSDR have still not found any human studies examining toxaphene exposure and human cancer[19].
Other health effects associated with higher exposures: Symptoms include damage to the lungs, nervous system, and kidneys.

For more information

Call ATSDR at 1-800-422-8737 or view the Web site at:
http://www.atsdr.cdc.gov/toxfaq.html.

[15]EPA Integrated Risk Information System. *Substance File for Polychlorinated Biphenyls (PCBs)*. Last Revised by EPA in June 1997. Obtained by Ecology staff and reviewed for changes December 2000

[16]ATSDR. Toxicological Profile for Polychlorinated Biphenyls. Prepared by Research Triangle Institute under contract # 205-93-0606. September 1997.

[17]ATSDR. 1997.

[18]EPA Integrated Risk Information System. *Substance File for Toxaphene*. Last Revised by EPA in January 1991. Obtained by Ecology staff and reviewed for changes December 2000

[19]ATSDR. *Toxicological Profile for Toxaphene (Update).* Prepared by Research Triangle Institute under contract # 205-93-0606. August 1996.

Appendix D
Public Comments

Who Ecology has Received Comments From

The Department of Ecology received comments from representatives of the following groups and from several thousand individuals. These groups and individuals had diverse comments on PBT-related issues, and we appreciate their time and effort in reviewing the August 2000 draft PBT strategy, developing comments, and submitting them to us.

- **Agriculture/Business/Industry/Related Organizations**

— National Electrical Manufacturers Association - *Washington, D.C.*

— Tesoro Northwest Company - *Anacortes*

— Tosco Refining Company - *Ferndale*

— Western States Petroleum Association - *Seattle*

— Murray Chemical Supply - *Spokane*

— Reynolds Metals Company - *Longvie*w

— General Plastics Manufacturing Company - *Tacoma*

— The Boeing Company - *Seattle*

— Hop Growers of Washington - *Yakima*

— American Chemistry Council - *Arlington, VA*

— Washington State Dental Association - *Seattle*

— Washington Friends of Farms and Forest - *Olympia*

— Northwest Pulp 7 Paper Association - *Bellevue*

— TreeSource Industries, Inc. - *Portland, OR*

— Schnitzer Steel Products Company - *Portland, OR*

— Peter Hildebrandt - *Olympia*
(on behalf of the Primary Aluminum and Magnesium Facilities in Washington)

— Boise Cascade Corporation - *Boise, ID*

— Avista Corporation - *Spokane*

— Association of Washington Business - *Olympia*

— Snohomish County PUD - *Everett*

— Goldendale Aluminum Company - *Goldendale*

— King and Spalding - *Washington, D.C.* (on behalf of the Lead Industries Association)

— Taylor Enterprises - *Mansfield*

— Weyerhaeuser - *Federal Way*

— Western Wood Preservers Institute - *Vancouver*

— Pentachlorophenol Task Force - *unknown (via e-mail)*

— Heller Ehrman White & McAuliffe - *Seattle*

⭘ Government Agencies

— Puget Sound Clean Air Agency - *Seattle*

— King County Department of Natural Resources - *Seattle*

— City of Seattle - *Seattle*

— NOAA Office of Exxon Valdez Oil Spill Research and Restoration - *Juneau, AK*

— Representative Kelli Linville - *Bellingham*

⭘ Environmental and Public Interest Organizations

— Olympic Labor Council - *Olympia*

— Center for Environment, Health, and Justice - *Falls Church, VA*

— WashPIRG - *Seattle*

— Lutheran Social Services of Washington and Idaho - *Seattle*

— Washington Toxics Coalition - *Seattle*

— The Coalition for Clean Air in Washington - *Seattle*

— Washington Environmental Council - *Seattle*

— Olympic Environmental Council - *Port Townsend*

— People for Puget Sound - *Seattle*

— Columbia Riverkeeper - *Bingen*

— League of Women Voters - *Seattle*

— ReSources - *Bellingham*

— Puget Soundkeeper Alliance - *Seattle*

— PCC Natural Markets (Puget Consumers Co-op) - *Seattle*

— Oregon Environmental Council - *Portland, OR*

— Heart of America Northwest - *Seattle*

— People for Environmental Action and Children's Health (PEACH) - *Spokane*

— The Edmonds Institute - *Edmonds*

— Coalition for Environmentally Safe Schools - *Bainbridge Island*

— Northwest Coalition for Alternatives to Pesticides - *Eugene, OR*

— Don't Waste Michigan - *Grand Rapids, MI*

— Washington Physicians for Social Responsibility - *Seattle*

⭘ In addition

— 72 letters received from individuals

— 317 e-mails received from individuals

— 10,620 post cards developed and distributed by WashPIRG

Summary total of comment-related documents

27 Letters from agriculture, business, industry, and related stakeholders
5 Letters from government agencies
22 Letters from environmental and public interest organizations
72 Letters from individuals
317 E-mails from individuals
10,620 Post cards from individuals
11,063 Total

Summary of public comments heard at the five public meetings
Listed below is a sampling of the comments heard at the public meetings during the fall of 2000. To view individual comments, go to the PBT Web page at *http://www.ecy.wa.gov/programs/eap/pbt/pbtfaq.html*

- *Comments related to the timeline (38 comments)*

— The timelines aren't clear in the strategy. How can they be measured?

— Timeline – please do it quicker (PBTs mess up reproductive and immune systems).

- *Comments related to the chemicals on the list — including the number of chemicals on the list (23 comments)*

— Nine chemicals are now on the list. The number is inadequate and most are already banned. Go back to at least original list of 27.

— Pentachlorophenol – no one denies it's a PBT. Why isn't it on the list?

- *Comments related to adding chemicals to the list (36 comments)*

— Pentachlorophenol is recognized as a PBT. It should be on the list.

— Also add lead and Diazinon to the list.

- *Comments related to Georgia Pacific in Bellingham and other pulp and paper mills (33 comments)*

— Phase out Pentachlorophenol in two years in Bellingham Bay.

— Eliminate the use of chlorine in pulp and paper mills. Must have forceful language in the permits for Georgia Pacific and others to stop putting dioxins and other PBTs into the environment.

— Pulp and paper — we're at 95% pure – getting that last 5% would be cost-prohibitive.

- *Comments related to fluoridation of drinking water (8 comments)*

— Concerned about fluorides and hydrogen fluoride being flushed into water at waste-water treatment plant.

— Re: ballot issues on fluoridation of water – don't want.

- *Comments related to the draft strategy document (62 comments)*

— The strategy needs more meat. What's being proposed to comment on? Pollution control doesn't always work. It's too vague/general.

— Strategy needs to be stronger and more inclusive. It needs to go further and fully show what we need.

— Use phase-out language in pollution permits and include incentives for business to cut back pollution.

— The strategy relies too heavily on voluntary action.

- *Comments related to mercury and dental amalgam (31 comments)*

— *Dentist* – he put mercury amalgam fillings in patients for 20 years – and has spent the last 15 years taking them out. In that time, he has seen thousands of patients get well. The World Health Organization says fillings are the largest source of mercury exposure to people. With fillings, you're exposed to one of the most toxic elements known to man, 24 hours a day. Prohibit mercury amalgam fillings!

— *Representative of the Seattle/King County Dental Association* — Amalgam alloy with mercury is safe, durable, and affordable for use in dental procedures, has an indisputable safety record, and has been extensively reviewed. Safe for vast majority of people.

- *Comments related to other specific industries (8 comments)*

— Weyerhaeuser knows how to make paper chlorine free and they should do so.

— Dept. of Agriculture can stop apple industry from using pesticides with PBTs but it doesn't.

— Ecology is allowing increased discharges of a PBT from original list of 27 chemicals (namely, pentachlorophenol) at Cascade Pole in Tacoma. Keep on industries, enforce permits, educate permit managers.

- *Comments related to Bellingham Bay (3 comments)*

— Mercury is a pollution problem, yet there is no notification to the public about safety – no signs are posted near bay.

- *Comments related to fertilizers (30 comments)*

— Prohibit use of PBTs, including industrial wastes, in fertilizers.

— Farmers fear confrontation with chemical company and are afraid of lawsuits.

— Over 90% dioxin exposure comes from food.

- *Comments related to synergistics (2 comments)*

— Little data available on synergistic effects.

- *Comments related to water quality (8 comments)*

— Water quality standards – mixing zones/dilution zones – industries should meet standards at end of pipe.

— Ecology is moving forward with water quality standards and are silent on PBTs. How can you be serious?

- *Comments related to Ecology's authority and business practices (43 comments)*

— Want Ecology to act in more of a leadership capacity so the public can chose to back or not back.

— Concerned that there's only voluntary for companies. Need to have strict regulations for them.

- *Comments related to the Legislature (7 comments)*

— How much public discussion is going on with the Legislature? How can the public get in the door?

- *Comments related to government in general (20 comments)*

— Government has failed to protect children's health – comments from Physicians for Social Responsibility.

— All need to get involved – many sources of pollution – sources need to be on local maps and in Growth Management Act.

- *Comments related to the need for education (32 comments)*

— Education is critical and needs to include the legislators and government (including permit writers) in addition to individuals and stakeholders.

— Education needs to include information about point and non-point sources.

— Strongest role Ecology can take is an educational role. Stay out of jobs vs. environment argument.

- *Comments related to cancer (14 comments)*

— Cancer is now the number one disease for children.

— Causes of cancer are not looked at, and they need to be!

- *Other comments and suggestions (109 comments)*

— Individuals have power to choose products and make decisions – America is the most consumptive country in the world.

— Good start! We're glad Ecology is taking the initiative to move in this direction.

— Avoid "us vs. them." Find common ground. Choices can be made by individuals.

— Much national and international discussion going on about PBTs.

- *Comments related to the "Precautionary Principle" (16 comments)*

— Precautionary Principle possibility of harm – don't wait for 100% proof of act.

- Comments related to pesticides (16 comments)

— Afraid to make waves. Farmers feel stuck.

— Can farmers be reimbursed for loss of chemicals that cannot be used?

— Require labeling on pesticides similar to warning on cigarettes: "This product may cause birth defects, cancer, or major disability."

- *Comments related to air quality (7 comments)*

— People given too much leeway in things such as outdoor burning (individuals).

- *Comments related to SEPA (1 comment)*

— Significance of chemicals being removed. Need copy of SEPA/Scoping Rules – so public can know how it functions. Business may say it's non-significant, but it may play bigger role in PBTs and strategy to reduces/eliminate. Designation of significance is important.

- *Comments related to food (11 comments)*

— Children have more exposure to these chemicals.

— Job of government is to provide for the general welfare of the public. We need to have safe foods to eat.

- *Comments related to endocrine disrupters (4 comments)*

— Chemicals masquerade as hormones and affect children as they enter into puberty.

- *Comments related to monitoring (3 comments)*

— Consider buy-back programs. List products with PBTs.

- *Comments related to children (22 comments)*

— 17% of children under 17 suffer from learning disabilities (due to toxic substances exposure).

— Epidemic of learning and behavioral disabilities – comments from Physicians for Social Responsibility.

— One in 11 children has lead poisoning.

- *Comments related to labor (24 comments)*

— Phase out PBTs. There are serious health hazards — put workers health as a priority.

— There needs to be a just transition for employees.

— DDT – companies still allowed to manufacture and ship to other countries; it all comes back to us!

— A new book on risk assessment should be used to counter the "jobs vs. environment" argument.

- *Comments related to economics (27 comments)*

— Consider buy-back programs.

— Economic effect on business and families should be considered – comments from Franklin County Farm Bureau.

- *Comments related to hazardous waste (2 comments)*

— A couple of times each year, fire departments have bio-hazard disposal days. More folks need to know.

Appendix E
Proposed Approach to Screen and Prioritize PBTs in Washington State

Overview

The Department of Ecology is developing a state-specific ranking system for PBTs using Washington state information from several national databases, state databases, and other information sources. The framework for the state ranking system is based on the September 1998 version of the EPA Waste Minimization Prioritization Tool (WMPT)[1]. This system was developed and used by EPA to rank PBTs based on potential PBT exposures across the entire U.S. While the EPA analysis is appropriate for the national perspective, it may not reflect potential PBT exposures across Washington. Consequently, Ecology is proposing to modify the national model based on information specific to Washington. This proposed ranking system is described in the balance of this appendix.

Purpose

During the comment period on the strategy, Ecology was asked to provide further information on how PBTs would be identified. Adapting EPA's WMPT for Washington state needs, this tool is intended to rank chemicals, relative to one another, with respect to their chemical characteristics (persistence, bioaccumulation, and toxicity) and their presence and/or potential release in Washington. It is important to note that the data and information used in this ranking has some degree of uncertainty associated with it. As a result, Ecology would expect to use the list of ranked chemicals as a general guide for allocating resources. The ranking would not be intended as a rigid set of priorities, but as one of several tools for developing policies and action plans around PBTs. There was a high interest from the public in the ranking methodology. Since Appendix E is a new addition to the strategy, the department is interested in receiving your comments by March 19, 2001 about the information provided in it. Ecology expects to adjust the proposed method to reflect comments received during the comment period.

Background

In August 1998, the Department of Ecology announced plans to develop a long-term strategy to reduce and eliminate certain chemicals that accumulate in human and animal tissues.

As a starting point, Ecology proposed focusing on chemicals identified by the Province of Ontario's Ministry of Environment ("The Ontario List")[2]. Ecology held a public symposium (December 1998) and a series of public meetings in early 1999 to receive public comments on the use of the Ontario List and other elements of the draft strategy. With respect to the use of the Ontario List, comments ranged from concerns about the applicability to Washington state to questions about which pollutants to include or exclude from the list.

In response to public comment, Ecology identified and evaluated a broader range of approaches for developing a targeted list of chemicals for use in Washington state. Based on that review, Ecology developed the revised approach that was distributed for public review and comment in August 2000. The main elements of the August 2000 draft strategy include:

[1] The Waste Minimization Prioritization Tool (WMPT) is a screening and ranking tool developed by EPA to assess the persistence, bioaccumulation, and toxicity of individual chemicals. With this tool, available scientific data are used to assign scores for *persistence*, *bioaccumulation*, and *toxicity*. When sufficient data are available, EPA develops separate scores based on human health and ecological protection.

[2] The Ontario List includes 27 pollutants or pollutant groups.

- Establish an initial Washington PBT List that includes those chemicals that are (1) identified in EPA's National PBT Strategy and (2) found in Washington's environment and/or are produced or released by Washington sources.
- Develop a Washington system for ranking PBTs (based on EPA's Waste Management Prioritization Tool (WMPT)) and use that system to identify additional PBTs and then prioritize this combined list (initial chemicals identified by EPA plus additional chemicals). This prioritized list would be used to guide allocation of resources for chemical-specific action plans and monitoring needs.

The approach described below is consistent with the August 2000 draft strategy. The most significant difference is one of timing. Specifically, after reviewing public comments, Ecology has decided to move forward to implement the identification and ranking process during the current (1999 - 2001) biennium.

Process

In August 2000, Ecology proposed to use EPA's Waste Minimization Prioritization Tool (WMPT) to identify and rank additional PBTs. The department received a variety of comments on this proposal including general support or opposition, the application of the tool to specific classes of pollutants (e.g. metals), and requests for additional details. Because the current proposal (December 2000) includes a more detailed description of Ecology's proposal, **Ecology will accept additional comments on this proposed approach until March 19, 2001**. In addition to comments on the general approach and applicability to individual chemicals, Ecology is specifically looking for comments on the following:

- Criteria used to identify and screen candidate PBTs.
- Range of factors to be considered when ranking and prioritizing PBTs.
- Appropriateness of data sets representing environmental presence, quantity, and frequency in Washington.
- Parameter apportionment for the ranking algorithm.

Ecology will review all comments received on or before March 19, 2001. Ecology will then refine the ranking model and use that model to (1) screen the candidate chemicals and (2) rank and prioritize the chemicals that remain after the screening process. Ecology intends to distribute the refined model and ranked list for public review and comment during the summer of 2001.

Methods

The screening and ranking approach is divided into four basic steps:

1. Identify chemicals to be evaluated for inclusion on the PBT list (Candidate chemicals).

2. Screen for environmental presence to identify Washington PBTs (Washington PBT list).

3. Rank the Washington PBTs based on their chemical characteristics and their presence in the environment (Ranked list).

4. Prioritize the Washington PBTs based on the chemical ranking results, programmatic concerns, and opportunities for reduction (Prioritized List).

The Ecology ranking method varies slightly from the EPA WMPT method in that the fourth step, or Programmatic Concerns, will be conducted after the initial ranking. The first three steps of the ranking focus on issues that can be easily categorized (e.g., pounds reported per year, measured concentrations in the environment), even though some degree of uncertainty is associated with various aspects of the scientific information.

Ecology elected to rank the PBTs before considering programmatic concerns so that the more intricate and/or political issues, such as existing regulations, costs, or feasibility, would receive more review and comment from interested parties throughout the process. In addition, the ranking process can be completed even if agreement is not reached regarding the potential for chemical reductions.

Identify PBTs

In the first step, PBTs are those chemicals with PBT scores of 7, 8, and 9 from the EPA's WMPT and the initial nine chemicals from the "starter list." The initial list is shown in this Appendix. The information that is used to describe the chemical characteristics (e.g., toxicity, persistence, and bioaccumulation) was compiled by EPA staff and has undergone considerable public review. Public comments received by EPA are summarized and discussed in that agency's response-to-comment document[3]. EPA has also assigned numeric scores to each of the candidate chemicals based on their respective chemical characteristics. Numeric scores for each chemical are based on the following system:

Table 1: PBT Scoring Method

Chemical	Persistence	Bioaccumulation	Toxicity		Total Score
			Human	Ecological	
	0 -3	0 -3	0 -3	0 -3	0-9

As stated above, candidate chemicals for Washington's PBT ranking will include chemicals that received a score of 7[4], 8, or 9 on the WMPT PBT section.

Screen for Environmental Presence

In the second step of our ranking, candidate chemicals receive further consideration only if they are found or have the potential to be found in Washington's environment. The WMPT method considers a PBT to be present in the national environment if it has been detected in air, water, soil, sediments, or fish tissue. EPA readily compiles this information by submitting queries to several databases. The Department of Ecology will consider the candidate chemical to be present in Washington's environment if it is found in one of the following databases or datasets:

Environmental Detection – Appears on at least one of the following[5]:

- Washington State Fish Consumption Advisory List
- ATSDR Hazdat database for Washington state
- Water Quality 303d list for Washington state
- Ecology's Sediment Quality database (SEDQUAL)
- Ecology's Environmental Information Management (EIM) database

OR

[3] EPA. Waste Minimization Prioritization Tool Comment Response Document for the RCRA Waste Minimization PBT Chemical List Docket (# F-98-MMLP-FFFFF), September 1998.

[4] Ecology is proposing to limit consideration of chemicals receiving a PBT score of 7 to those chemicals that have individual persistence, bioaccumulation, and toxicity scores of 2 or 3. Consequently, a chemical that received a "persistence" score of 3, a "bioaccumulation" score of 3 and a "toxicity "score of 1 (total score of 7) would not be identified as a candidate chemical.

[5] Additional data sets or published information, as available and appropriate, may be used to inform these screening steps.

Reported from Washington Source - Appears on at least one of the following[5]:

- Toxics Release Inventory (TRI) for treatment, storage, and disposal facilities (TSDs) and water discharges in Washington state.
- National Toxics Inventory for air emissions from Washington facilities. This inventory includes air emissions reporting from TRI as well as air emissions from other sources such as mobile and area sources.

Other sources of information may be considered for environmental screening. These include, but are not limited to, USGS monitoring studies, Puget Sound Ambient Monitoring Program (PSAMP) data, and information contained in other general documents.

PBTs that do not appear on any of the above-mentioned data sources[5] will not receive further consideration under the ranking process outlined here. However, after the ranking has been completed, Ecology may evaluate those chemicals that did not have environmental data associated with them in order to identify reporting or monitoring needs. These chemicals may then be prioritized for further data collection.

The following process is proposed for ranking the chemicals identified during the first two steps.

Ranking

The chemicals identified above will be ranked using the information contained in the environmental databases along with the PBT numeric scores from the WMPT. It is important to recognize that this step is different from Step 2 in that information obtained from the screening is then used quantitatively to rank the chemicals. For example, in Step 2 a chemical may be listed in the Toxics Release Inventory and thus be included in the screening step. However, its quantity and number of generators in the state may be comparatively low, and thus it would receive a lower score on the overall rank.

Ecology is proposing to use the following scoring algorithm (or equation) to rank PBTs:

PBT Score + Environmental Presence Score + (The higher of the Quantity Score and the Prevalence Score) = Total Score

PBT Score + Environmental Presence Score + (The higher of the Quantity Score and the Prevalence Score) = Total Score

Scores for each of these categories will range from 0 to 3 points, for a total maximum score of 9 points.

- *PBT Score* = The score assigned to each chemical based on considerations of persistence, bioaccumulation, and toxicity. Ecology is proposing to use the scores published in EPA (1998). Ecology intends to review and update those scores based on current toxicity information found in the EPA Integrated Risk Information System (IRIS). The method used by EPA's WMPT to determine a chemical's initial PBT score is summarized in Table 1. Chemicals with a WMPT PBT score of 7 will be assigned 0 points, those with a score of 8 will be assigned 1.5 points, and those with a score of 9 will be assigned 3 points.
- *Environmental Presence Score* = This score assigned to each chemical would be based on information regarding the chemical's occurrence in

the Washington environment. Ecology is proposing to base this score on the chemicals frequency of occurrence and concentrations found in fish tissue, sediments, surface water, and the general environment (e.g., present at Superfund sites). Scores for each chemical would be assigned based on the procedures summarized in Table 2. Additional, relevant sources of data may be included as they are identified. Scores would range from 0 to 3.

- *Quantity/Prevalence Score* = The higher of these two scores will be used. The quantity score assigned to each chemical would be based on information regarding the amount of each chemical released into the Washington environment. Ecology is proposing to base this score on estimated releases to air, water, and land. Scores for each chemical would be assigned based on the procedures summarized in Table 3. Additional, relevant sources of data may be included as they are identified. Scores would range from 0 to 3.

  The prevalence score assigned to each chemical would be based on information regarding the number of sources of each chemical in Washington state. Ecology is proposing to base this score on the estimated number of Washington sources. Scores for each chemical would be assigned based on the procedures summarized in Table 4. Additional, relevant sources of data may be included as they are identified. Scores would range from 0 to 3.

- *TOTAL Score* = The total score equals the sum of the PBT score, Environmental Presence Score, the higher of the Quantity Score or the Prevalence Score. The total score for any individual chemical would range from 0 to 9 points.

The proposed scoring method is based on the approach contained in the WMPT model. However, Ecology elected to make several adjustments to the WMPT method to meet the needs of this project.

First, Ecology elected to base the chemical ranking on three main factors (e.g., PBT characteristics, environmental presence, and quantity/prevalence). This differs from the EPA model, which also includes a fourth ranking component Resource Conservation and Recovery Act (RCRA) programmatic concerns). Ecology decided to drop this parameter from the ranking equation because of the difficulty in quantifying programmatic concerns, the need to address all programs (not just the RCRA program), and corollary information could not be easily replaced with Washington-specific information. However, Ecology recognizes that program concerns are an important element in setting final priorities for action. Consequently, programmatic concerns will be explicitly considered when establishing overall priorities after the quantitative analysis has been completed.

Second, the decision to separate programmatic concerns from the ranking process required some adjustment in the relative weights assigned to each element of the scoring algorithm. Ecology's proposed algorithm allocates the ranking score equally among the PBT characteristics score, the environmental presence score, and the quantity/prevalence scores.

Ecology is also considering alternative weighting schemes. For example, one proposal is to allocate the scoring equally between the PBT score and a combination score of environmental presence, quantity, and prevalence scores. This option is based on the fundamental concept that risk is a function of both exposure and toxicity. In the case of the ranking,

quantity, prevalence, and environmental presence are considered surrogates for potential exposure. Toxicity, in this case, includes regulatory measures of toxicity (e.g., EPA IRIS database information) along with two other chemical characteristics, persistence and bioaccumulation. Ecology recognizes that the latter are not directly associated with toxicity but considers them to be inherent chemical characteristics that are relevant to the PBT initiative.

Environmental presence and quantity/prevalence scores were given equal weights. These three categories are subdivided further to reflect the available data. For example, environmental presence can be measured from various sets of monitored data. These data sets include fish and shellfish data, sediment data, and surface water data from SEDQUAL and EIM. Fish tissue data are given greater weight in the environmental presence subscoring because they are considered closer to the exposure point than the other types of measured data. Our equation allocates 40% of the environmental presence score to fish tissue detections and fish advisories.

Quantity and prevalence scores are each subdivided to reflect two different but overlapping data sources. The Toxics Release Inventory (TRI) is used to estimate potential land and water releases by both quantities in overall tonnage per year, and in the number of generators or sources located throughout the state. Air emissions are estimated using the National Toxics Inventory (NTI) because it has more complete inventory data for area sources and other point sources. Mobile sources are also included in the NTI.

Details for individual chemical scoring for environmental presence and quantity/prevalence are described in the tables below:

*Table 2: Enviro*nmental Presence

Database/Information Source	Value Range	Score
Washington State Fish Advisory *(number of advisories+ fish tissue samples from SEDQUAL and EIM)*	01 2 3	0 2 4 6
Washington SEDQUAL and EIM *(relative frequency with which a chemical, when searched for, is detected)*	lowest 25% 25-50% 50-75% highest 25%	0 1 2 3
ATSDR Hazdat (NPL sites) *(relative frequency with which a chemical is reported at these 144 sites)*	lowest 25% 25-50% 50-75% highest 25%	0 1 2 3
Water Quality 303d List *(relative frequency with which a chemical is shown as responsible for placing waterbodies on this list.)*	lowest 25% 25-50% 50-75% highest 25%	0 1 2 3
		Total Score (0-15)/(5) for a total score from 0 - 3

Table 3: Quantity

Information	Range of Values	Score
Total Lbs./Year from: *- Toxics Release Inventory (potential water or land discharges)* *- National Toxics Inventory (potential air emissions, including mobile and area sources*	lowest 25% 25-50% 50-75% highest 25%	0 1 2 3
		Total Score 0-3

Table 4: Prevalence

	Range of Values	Score
Total Number of Generators from: *- Toxics Release Inventory (water or land discharges)* *- National Toxics Inventory (potential air emissions)*	lowest 25% 25-50% 50-75% highest 25%	0 1 2 3
		Total Score 0-3

Priority-Setting

The final step in the Department of Ecology proposed process is to establish priorities for action. This includes priorities for developing chemical-specific action plans, monitoring programs, etc. Priorities for action will be established based on consideration of chemical ranking (Step 3) and a variety of programmatic issues. These issues include, but are not limited to:

- PBTs identified as priorities in specific program rankings (e.g., Air Quality Program ranking)
- Opportunities for reduction
- Cost issues
- Public concerns

Ecology expects that the consideration of programmatic concerns will be the most difficult step of the ranking to conduct, and will require considerable review and comment from program staff. However, existing regulations and limited resources play an integral role in decisions regarding PBTs. For example, the department's Air Quality Program strategies designed to reduce particulate matter will also address some PBTs such as benzo(a)pyrenes, even though they are not explicitly regulated as PBTs. These types of programmatic policies and regulations also need to be considered in allocating resources for reducing PBTs. This will adjust our priorities to reflect the efficacy of existing regulations or other chemical-specific issues.

Chemicals to be Screened and Prioritized

The following chemicals have been selected from EPA's 1998 Waste Minimization Prioritization Tool Screening Evaluation. These chemicals have the highest "persistence," "bioaccumulation," and "toxicity" scores, as evaluated by EPA:

CAS #	Chemical Name
95943	1,2,4,5-Tetrachlorobenzene
120821	1,2,4-Trichlorobenzene
25973551	2-(2'-Hydroxy-3',5'-(di-t-amyl)phenyl)benzotriazole
95954	2,4,5-Trichlorophenol
79743	2,5-Di-(1,1-dimethylpropyl)hydroquinone
128370	2,6-Di-tert-butyl-p-cresol
101553	4-Bromophenyl phenyl ether
83329	Acenaphthene
309002/60571	Aldrin/Dieldrin
120127	Anthracene
1861401	Benefin
56038892	Benzenamine, N-(1-ethylpropyl)-3,4-dimethyl-
50328	Benzo(a)pyrene
191242	Benzo(g,h,i)perylene
117817	Bis(2-ethyhexyl)phthalate
1689992	Bromoxynil octanoate
85687	Butyl benzyl phthalate
7440439	Cadmium
57749	Chlordane
5598130	Chlorpyrifos methyl
1861321	Dacthal
50293	DDT
78488	DEF
132649	Dibenzofuran
84742	Dibutyl phthalate
115322	Dicofol
117840	Di-n-octyl phthalate
1746016	Dioxins & Furans
298044	Disulfoton
959988	Endosulfan, alpha-
33213659	Endosulfan, beta-
206440	Fluoranthene
86737	Fluorene
58899	Gamma-hexachlorocyclohexane (Lindane)
1024573	Heptachlor epoxide
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
319846	Hexachlorocyclohexane, alpha-
319857	Hexachlorocyclohexane, beta-
319868	Hexachlorocyclohexane, delta-
77474	Hexachlorocyclopentadiene
67721	Hexachloroethane
7439921	Lead
72435	Methoxychlor
7439976	Mercury

CAS #	Chemical Name
91203	Naphthalene
40487421	Pendimethalin
608935	Pentachlorobenzene
82688	Pentachloronitrobenzene
87865	Pentachlorophenol
85018	Phenanthrene
732263	Phenol, 2,4,6-tris(1,1-dimethylethyl)-
599644	Phenol, 4-(1-methyl-1-phenylethyl)-
25154523	Phenol, nonyl-
92842	Phenothiazine
1336363	Polychlorinated biphenyls
9003536	Polystyrene
129000	Pyrene
13071799	Terbufos
8001352	Toxaphene
2303175	Triallate
1582098	Trifluralin
639587	Triphenyltin chloride
1120214	Undecane
7440622	Vanadium

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Glossary of Terms

Bioaccumulative: A chemical is bioaccumulative in the environment if it accumulates when taken up by humans or animals at a rate faster than the human or animal can metabolize or eliminate it.

Cross-media Transfer of Chemicals: The movement of a chemical from one medium, such as air, water, soil, or sediment, to another.

Endocrine Disrupters: Chemicals that can mimic the actions of hormones and have been associated with adverse reproductive and developmental effects in wildlife.

Media or Medium: A component of the environment (air, water, soil or sediment) in which a contaminant is measured, an organism lives its life, and from which an organism can accumulate contaminants.

Persistent: A chemical is persistent in the environment if it breaks down slowly or not at all, causing it to remain for long periods of time. Persistence is often measured by the "half-life" - the time it takes for half of the chemical to dissipate or break down.

State Environmental Policy Act (SEPA): State law that requires all state and local governments to use a systematic, interdisciplinary approach to ensure integration of the natural and social sciences and environmental design in the planning and decision-making for projects or activities which may effect the environment. SEPA also ensures that environmental amenities and values will be given appropriate consideration along with economic and technical considerations when decisions are made.

TMDL: Section 303(d) of the federal Clean Water Act requires the states and EPA to establish Total Maximum Daily Loads (TMDLs) for all waterbodies that are not meeting water quality standards because of inadequate controls of point or nonpoint sources.

Toxic: A level of exposure to a chemical that harms the health of plants and/or animals (including humans).

Waste Minimization Prioritization Tool (WMPT): Screening tool developed by EPA to assess the persistence, bioaccumulation, and toxicity of individual chemicals. With this tool, available scientific data are used to assign scores for persistence, bioaccumulation, and toxicity. When sufficient data are available, EPA develops separate scores based on human health and ecological protection.

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