

EPA 2006-2011 Strategic Plan: Charting our Course

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Contents

Introduction	X
Goal 1: Clean Air and Global Climate Change.....	X
Goal 2: Clean and Safe Water	X
Goal 3: Land Preservation and Restoration	X
Goal 4: Healthy Communities and Ecosystems	X
Goal 5: Compliance and Environmental Stewardship	X
Cross-Goal Strategies.....	X
Results and Accountability.....	
Innovation and Collaboration	
Best Available Science	
Appendix 1: Social Costs and Benefits	X
Appendix 2: Program Evaluations (to be added)	X
Appendix 3: Consultation Efforts (to be added)	X
Appendix 4: Coordination with Other Federal Agencies (to be added)	X

INTRODUCTION

The 2006–2011 *Strategic Plan* sets out an ambitious road map for environmental protection. Tremendous progress has been made in the protection and restoration of our air, water, and land since the establishment of the U.S. Environmental Protection Agency (EPA) in 1970. This work, accomplished jointly with our federal, state, tribal, and local government partners, has helped us advance our mission to protect human health and the environment, but much remains to be addressed.

While recognizing these successes, the environmental problems we face in 2006 are more complex and possible solutions are more challenging to implement. Recent national and worldwide events, such as the devastation left by Hurricane Katrina, the advance of Avian flu, homeland security threats, population growth and its effect on resource consumption, are altering the environment in unprecedented ways. Scientific advances and emerging technologies pose new challenges and opportunities for human health and environmental protection. Today more than ever, we recognize the need to look toward the future to anticipate potential threats to human health and the environment, establish clear priorities, and prepare ourselves for addressing them.

EPA's 2006-2011 *Strategic Plan* reflects a sharpened focus on achieving measurable environmental results. In this *Plan*, EPA maintains the five goals that were first described in the 2003-2008 *Strategic Plan*. These goals are established around the results we are striving to achieve: Clean Air and Global Climate Change, Clean and Safe Water, Land Preservation and Restoration, Healthy Communities and Ecosystems, and Compliance and Environmental Stewardship. While the Agency's overall goal structure has been maintained in this new *Strategic Plan*, we have focused on a number of critical improvements. Within each Goal chapter, you will find an "Emerging Issues and External Factors" section that includes a discussion of important new challenges and opportunities that are likely to arise in the coming years. The Goal chapters also include new information about the development of the long-term measures that are found in the *Plan*, particularly their relationship to annual measures, the influence of measures from the Office of Management and Budget's Program Assessment Rating Tool (PART), and the impact of new environmental indicators developed for the *Report on the Environment* (RoE). This *Plan* also reflects a heightened emphasis on identifying and incorporating activities and measures that address tribes, environmental justice, environmental stewardship, and strategic management of human capital.

The Administrator has established three key principles as the framework governing the Agency's work:

- **Results and Accountability:** EPA is committed to being a good steward of our environment and a good steward of our tax dollars. To provide the public with the environmental results they expect and deserve, the Agency must operate as

efficiently and effectively as possible. This is a key focus of the President's Management Agenda, designed to make government citizen-centered, results-oriented, and market-based.

- **Innovation and Collaboration:** EPA's ability to make progress depends both on our ability and continued commitment to identify and use innovative tools, approaches, and solutions to address environmental challenges, as well as to engage more extensively with partners, stakeholders, and the public through meaningful collaboration. Today's problems cannot be solved fully with conventional regulatory controls, and they can't be solved without the expertise, perspectives, and resources of others. A heightened focus on environmental stewardship, with a shared responsibility for addressing today's challenges, is required.
- **Best Available Science:** EPA needs the best scientific information available to anticipate potential environmental threats, evaluate risks, identify solutions, and develop protective standards. We must be responsive to emerging information to gain new understanding, reduce uncertainties, and, as necessary, change our assumptions about the impacts of environmental problems and how they should be addressed. The Agency must ask the right questions, carefully assess information, and clearly characterize problems to aid Agency decision makers.

These principles serve as the organizing theme for the three cross-goal strategies supporting achievement of the five strategic goals contained in this *Strategic Plan*.

In setting out EPA's goals for the next 5 years and describing how we intend to achieve them, this *Strategic Plan* is the foundation for the Agency's planning, budgeting, and performance and accountability processes. The long-term goals in this *Plan* form the basis for the annual performance goals and measures which accompany the President's budget request to Congress. Performance against these annual goals and measures is reported in each year's Performance and Accountability Report, and this information is then an important consideration in the development of future budget submissions. The process comes full circle as the Agency evaluates these performance data in the revision of future Strategic Plans. The Agency also works to develop new environmental indicators, particularly in the context of development of EPA's *Report on the Environment*. These new indicators are then available as potential improvements to the articulation of long-term measures in the *Strategic Plan*.

We hope that within these pages you see a vision for realizing our common desire for a cleaner, healthier environment for all Americans.

GOAL 1 – CLEAN AIR AND GLOBAL CLIMATE CHANGE

Protect and improve the air so it is healthy to breathe and risks to human health and the environment are reduced. Reduce greenhouse gas intensity by enhancing partnerships with businesses and other sectors.

Air quality in the United States has steadily improved, according to EPA's annual summary of air quality trends since the 1970s.ⁱ This trend toward cleaner air has occurred even as our economy has increased by 195 percent in gross domestic product, miles traveled by cars and trucks have increased by 178 percent, and energy consumption has increased by 48 percent (Figure 1). EPA continues to look for progressive solutions to remaining indoor and outdoor air pollution problems, which can cause breathing difficulties, long-term damage to respiratory and reproductive systems, cancer, and premature death.

Air pollution also can affect the environment by reducing visibility; damaging crops, forests, and buildings; acidifying lakes and streams; and stimulating the growth of algae in estuaries and the build-up, or bioaccumulation, of toxics in fish. Bioaccumulation poses particular risks to Native Americans and others who subsist on plants, fish, and game. Certain chemicals emitted into the air diminish the protective ozone layer in the upper atmosphere, resulting in overexposure to ultraviolet radiation and increased rates of skin cancer, cataracts, and other health and ecological effects. Rapid development and urbanization in other countries is creating air pollution that threatens not only those countries but also the United States, since air pollution can travel great distances and across international boundaries. EPA is working with key developing countries to reduce air pollution, with the goals of reducing the impact of transboundary air pollution on the United States, improving health in developing countries and in the United States, and reducing greenhouse gas emissions.

EPA is addressing this broad range of ambient air problems strategically by applying a variety of approaches and appropriate tools. We have found that problems with broad national or global impact—emissions from power plants and other large sources, pollution from motor vehicles and fuels, and stratospheric ozone depletion—are best handled primarily at the federal level. A national approach allows for the use of traditional regulatory tools when appropriate, and enables us to implement innovative, market-based techniques such as emissions trading, banking, averaging, and other national programs cost-effectively.

States, tribes, and local agencies can best address the regional and local ambient air problems that remain after federal measures have been fully applied. EPA works closely with public- and private-sector partners and stakeholders to develop the tools—such as monitoring, modeling, and emission inventories—that allow states, tribes, and localities to address these more localized problems. Many of these tools employ innovative techniques, such as partnership programs for retrofitting diesel engines or community-based approaches to toxics, which are well-suited to the local nature of these problems.

The importance of the indoor environment to human health has been highlighted in numerous environmental risk reports, including the 1997 report of the Presidential/Congressional Commission on Risk Assessment and Risk Management. Addressing indoor air quality is uniquely challenging because regulatory solutions are not a viable option—especially in private residences. Instead, EPA relies on partnership-based information and outreach programs, which encourage and promote voluntary action in homes, schools, and commercial buildings. These programs have been highly effective in achieving an array of positive health outcomes including: reduced lung cancer deaths from radon; reduced emergency room visits, hospitalizations and other adverse health outcomes in people with asthma from reduced exposure to asthma triggers; and reduced childhood asthma, respiratory ailments, ear infections from exposure to environmental tobacco smoke.

Ongoing research continues to identify new air pollution issues, in areas from indoor air to radiation. EPA will work with our local, state, tribal, and international partners and stakeholders to achieve results through a suite of innovative approaches and programs that encourage cost-effective technologies and practices.

OBJECTIVE 1.1 – HEALTHIER OUTDOOR AIR. Through 2011, working with partners, protect human health and the environment by attaining and maintaining health-based air quality standards and reducing the risk from toxic air pollutants.

Sub-objective 1.1.1. Ozone and PM_{2.5}. By 2015, working with partners, improve air quality for ozone and PM_{2.5} as follows:

Strategic Targets:

- By 2015, reduce the population-weighted ambient concentration of ozone in all monitored counties by 14 percent from the 2003 baseline.
- By 2015, reduce the population-weighted ambient concentration of PM_{2.5} in all monitored counties by six percent from the 2003 baseline.
- By 2011, reduce annual emissions of fine particles from mobile sources by 184,000 tons from the 2000 level of 515,550 tons (134,700 tons reduced through federal emissions standards for new engines and 50,000 tons reduced from existing engines through the National Clean Diesel Campaign).
- By 2011, reduce annual emissions of nitrogen oxides (NO_x) from mobile sources by 4.0 million tons from the 2000 level of 11.8 million tons (3.7 million tons reduced through federal emissions standards for new engines and 0.3 million tons reduced through the National Clean Diesel Campaign).

- By 2011, through federal emission standards, reduce annual emissions of volatile organic compounds from mobile sources by 1.9 million tons from the 2000 level of 7.7 million tons.
- By 2018, visibility in eastern Class I areas will improve by 15 percent on the 20 percent worst visibility days, as compared to visibility on the 20 percent worst days during the 2000-2004 baseline period.
- By 2018, visibility in western Class I areas will improve by five percent on the 20 percent worst visibility days, as compared to visibility on the 20 percent worst days during the 2000-2004 baseline period.
- By 2011, with EPA support, 17 additional tribes will have completed air quality assessments, such as air quality and deposition monitoring, emissions inventories, and air toxics assessments. (FY 2005 baseline: 53 tribes).
- By 2011, 20 additional tribes will possess the expertise and capability to implement the Clean Air Act in Indian country (as demonstrated by successful completion of an eligibility determination under the Tribal Authority Rule). (FY 2005 baseline: 30 tribes).

Sub-objective 1.1.2. Air Toxics. By 2011, working with partners, reduce air toxics emissions and implement area-specific approaches to reduce the risk to public health and the environment from toxic air pollutants, as follows:

Strategic Targets:

- By 2010, continue to reduce toxicity-weighted (for cancer risk) emissions of air toxics to a cumulative reduction of 19 percent from the 1993 baseline.
- By 2010, continue to reduce toxicity-weighted (for non-cancer risk) emissions of air toxics to a cumulative reduction of 55 percent from the 1993 baseline.
- By 2011, through the Clean Air Mercury Rule, reduce mercury emissions from electric generating units by 10 tons from the 2000 level of 48 tons.
- By 2011, through federal standards, reduce air toxics emissions from mobile sources by 1.4 million tons from the 1996 level of 2.7 million tons.

Sub-objective 1.1.3. Chronically Acidic Water Bodies. By 2011, reduce the number of chronically-acidic water bodies in acid-sensitive regions by two percent from 1984 levels.

Strategic Targets:

- By 2011, reduce national annual emissions of sulfur dioxide (SO₂) from utility electrical power generation sources by approximately 8.45 million tons from the 1980 level of 17.4 million tons, through implementation of the Acid Rain Program and Clean Air Interstate Rule, achieving and maintaining the Acid Rain statutory SO₂ emissions cap of 8.95 million tons.
- By 2011, reduce total annual average sulfur deposition and mean ambient sulfate concentration by 30 percent from 1990 monitored levels.
- By 2011, reduce total annual average nitrogen deposition and mean total ambient nitrate concentration by 15 percent from 1990 monitored levels.

Means and Strategies for Achieving Objective 1.1

Our strategy for reducing outdoor air pollution combines national, regional and local measures, reflecting different federal, state, tribal, and local government roles. EPA, states, tribes, local agencies and multi-jurisdictional organizations (MJOs) work together to meet clean air goals in a cost-effective manner through innovative, regulatory, market-based, and partnership approaches and programs. EPA recognizes that states are primarily responsible for maintaining and improving air quality and meeting national ambient air quality standards (NAAQS). They develop emission inventories, operate and maintain air monitoring networks, perform air quality modeling, and develop State Implementation Plans (SIPs) that lay out their control strategies for improving air quality and meeting the NAAQS. MJOs play a vital role in the air quality management effort by addressing regional issues, collaborating with states on control strategies, and providing technical assistance in data analyses and air quality modeling.

EPA assists states, tribes, local agencies, and MJOs by providing technical guidance and financial assistance, and by issuing regulations and implementing programs designed to reduce pollution from the most widespread and significant sources of air pollution: mobile sources, such as cars, trucks, buses, and construction equipment; and stationary sources, such as power plants, oil refineries, chemical plants, and dry cleaning operations. Interstate transport of pollutants—a problem no state can solve on its own—makes a major contribution to air pollution problems in the eastern United States. To address this issue, EPA requires control of upwind sources that contribute to downwind problems in other states.

EPA has a trust responsibility to protect air quality in Indian country, but tribes may choose to request authorization to develop and implement Clean Air Act programs. EPA and tribes are working to increase the currently limited information on air quality on tribal lands, build tribal capacity to administer air programs in Indian country, and establish EPA and state mechanisms to work effectively with tribal governments on regulatory development and regional and national policy issues. Once a tribe completes an air quality assessment so that they and EPA agree that they have a satisfactory

understanding of their base air quality conditions, the tribe will either develop an air quality management program appropriate for their needs, or EPA will work with the tribe to develop options so that it can continue to participate in local, regional, and national policy and regulatory development.

Over the next several years, EPA will continue to focus on implementing the fine particulate matter (PM_{2.5}) standards and 8-hour ozone standards, reducing SO₂ and NO_x (precursor emissions of both particulate matter and ozone) and mercury from electric-generating units, and implementing EPA's air toxics program using progressive, market-oriented methods to improve air quality most cost-effectively. EPA will continue to work with MJOs to develop strategies for reducing regional haze and with individual states to develop approaches to reduce emissions of PM and ozone precursors. In addition, EPA will work with states to better integrate ozone and PM efforts, such as through improved emission inventories, comprehensive air quality modeling approaches, controlling sources of precursors common to both pollutants, and coordinated control strategy planning cycles.

Recognizing that meaningful public involvement produces better environmental results, EPA will actively seek the involvement of communities, civic organizations, members of the public, and other stakeholders in designing programs to achieve healthier outdoor air. In addition, we continue to work closely with the National Environmental Justice Advisory Council, community-based organizations, and other stakeholders (e.g., state/tribes, local government, academia, environmental organizations, and business and industry) to ensure that environmental justice is integrated into our programs, policies, and activities.

Improving Air Quality

To help states meet the outdoor air objective, EPA will continue to develop federal programs for mobile and stationary sources aimed at achieving large, nationwide, cost-effective reductions in emission of PM and its contributors: SO₂, NO_x, and elemental and organic carbon; ozone-forming NO_x; and volatile organic compounds (VOCs).

Our strategy for the next few years is to implement the Clean Air Interstate Rule (CAIR) that was promulgated on May 12, 2005. CAIR takes what we have learned about cap-and-trade programs from the Acid Rain program, and provides states with a solution to the problem of power plant pollution that drifts from one state to another. CAIR is an important component of EPA's plan to help states in the eastern United States meet EPA's health-based air quality standards (Figure 2). Through CAIR and other Clean Air Act (CAA) programs, 92 of the 108 areas that did not meet the standards for 8-hour ozone and 17 of the 36 areas that did not meet the standards for PM_{2.5} (both as of April 2005) will achieve these health-based national standards by 2011. Using a market-based approach, CAIR is projected to reduce SO₂ emissions by 4.3 million tons (over 70 percent) and NO_x emissions by 1.7 million tons (over 60 percent) from 2003 levels (Figure 3), and will not significantly change national electricity prices. Power generators will continue to rely on diverse sources of fuel, including our

abundant domestic coal resources. CAIR provides incentives for power plant operators to find the best, fastest, and most efficient ways to make the required emission reductions. It is estimated that air quality improvements from CAIR with other CAA programs will generate over \$100 billion in health and visibility benefits per year by 2015 and substantially reduce premature mortality in the eastern United States. These programs are also projected to reduce the incidence of chronically acidic lakes and streams through reductions in sulfur and nitrogen deposition. The health and environmental benefits of these programs will continue to grow each year with further implementation.

Our strategy for achieving cleaner air also will include implementing a series of national programs that will dramatically reduce emissions from a wide-range of mobile sources. EPA's Tier 2 Vehicle and Gasoline Sulfur Program, which will be fully implemented in 2009, will make new cars, SUVs, pickup trucks, and vans 77 to 95 percent cleaner than 2003 models, while reducing sulfur levels in gasoline by 90 percent. EPA's Clean Diesel Truck and Bus Program will require that, beginning in 2007, all new highway diesel engines be as much as 95 percent cleaner than current models, while reducing sulfur levels in highway diesel fuel by more than 97 percent. EPA's Clean Air Nonroad Diesel Rule will cut emission levels from construction, agricultural and industrial diesel-powered equipment by more than 90 percent, while removing 99 percent of the sulfur in nonroad diesel fuel by 2010. As part of this nonroad effort, more stringent standards for locomotives, large marine diesel engines, and small gasoline engines (such as those used in lawn and garden equipment) are also being developed. The emission reductions resulting from the clean fuel and vehicle standards finalized over the past several years will prevent more than 24,000 premature deaths and, when fully implemented in 2030, produce annual net benefits of approximately \$175 billion, compared to \$11 billion in costs.

EPA will continue to address diesel emissions not only through new engine and fuel standards, but also through partnership programs aimed at reducing emissions from the existing inventory of diesel engines currently in use. These programs will greatly reduce emissions of air toxics and criteria pollutants, and help achieve cost-effective air quality improvements. For instance, EPA will expand its efforts to create voluntary diesel-retrofit projects to reduce PM emissions from older, high-polluting trucks and buses, concentrating on areas with sensitive populations, and on raising public awareness of the problem of children riding in older, high-emitting diesel school buses. EPA will provide grants for retrofitting and replacing diesel school buses and reducing idling, and will work with the trucking and railroad industries to adopt pollution control and energy-saving technologies.

Environmental Justice: Reducing diesel exhaust in higher impact areas

EPA's National Clean Diesel Campaign (NCDC, in establishing diesel retrofit projects to achieve PM, NO_x and other emissions reductions, seeks to include areas that experience disproportionate impacts from diesel exhaust as one criterion for distributing grant funds. The program also targets the reduction of diesel emissions from school buses to reduce children's exposure to particulate matter and other pollutants. The program takes an environmental stewardship approach by focusing on both partnership efforts to address the existing diesel fleet in addition to a regulatory approach for the new engines that are subject to more stringent emissions standards.

Implementing provisions of the Energy Policy Act of 2005 also will be a major undertaking for EPA in the FY 2006 to 2011 timeframe. Central to this effort will be the development and implementation of the Renewable Fuel Standard (RFS) program, which will require that the U.S. gasoline supply contain specific volumes of renewable fuel each calendar year, starting with four billion gallons in 2006 and increasing to 7.5 billion in 2012. Development and implementation of the RFS program will require a substantial investment of resources, including expertise on renewable fuels (production, distribution, blending), vehicle testing to assess the impacts of renewable fuels on emissions, refinery modeling, transportation modeling and life-cycle analysis, energy security impacts, and economic analyses (including farm/agricultural impacts).

EPA also will continue to implement the reformulated gasoline program while working to address issues associated with the use of oxygenates, such as MTBE and ethanol. We also will continue to help states and local agencies implement the transportation conformity regulation, to ensure that federally-funded or approved highway and transit activities are consistent with State Implementation Plans (SIPs), and will finalize changes to the regulation to address the revised ozone and PM standards. Finally, recognizing that efforts to reduce emissions need to be accompanied by efforts to reduce the effects of unmanaged growth and development, EPA will work with state and local governments, assisting them in crafting comprehensive strategies that accommodate necessary growth and economic development while minimizing adverse effects on air quality and other quality-of-life factors.

Reducing Risks From Toxic Pollutants

EPA regulates the emissions of 186 toxic air pollutants, including dioxin, asbestos, toluene, and such metals as cadmium, mercury, chromium, and lead compounds.ⁱⁱ To further reduce exposure to air toxics, EPA developed and issued federal standards for major stationary sources which, when fully implemented through state programs, will reduce toxic emissions by 1.7 million tons. In addition, EPA is conducting national, regional, and community-based efforts to reduce multimedia and cumulative risks. Characterizing emissions and the risks they pose on national and local scales, such as in Indian country, will require significant effort. We will need to update the science and

to keep the public informed about these issues. Toxics pollutants are of particular interest to the environmental justice community because of the proximity of many low-income and minority communities to sources of toxics emissions (e.g., industrial facilities, waste transfer stations, roadways, and bus terminals). To better address areas that may suffer disproportionate impacts, EPA will use tools and indicators, such as those developed by EPA's Office of Environmental Justice, to identify areas with potential environmental justice concerns.

EPA is implementing the Clean Air Mercury Rule (CAMR), which was promulgated on May 18, 2005. CAMR is the first-ever federal rule to permanently cap and reduce mercury emissions from coal-fired power plants. CAMR establishes "standards of performance" limiting mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program that will reduce nationwide utility emissions of mercury in two distinct phases. The first phase cap is 38 tons and emissions will be reduced by taking advantage of "co-benefit" reductions, i.e., mercury reductions achieved by reducing sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions under CAIR. In the second phase, beginning in 2018, coal-fired power plants will be subject to a second cap, which will reduce emissions to 15 tons with full implementation. Like CAIR, the CAMR program has stringent emissions monitoring and reporting requirements modeled after those developed and implemented in the Acid Rain program. The flexibility of allowance trading creates financial incentives to look for new and low-cost ways to reduce emissions and improve the effectiveness of pollution control equipment.

The Clean Air Act (CAA) also requires EPA to establish standards to reduce emissions of air toxics from motor vehicles and their fuels. In March 2006, EPA proposed standards to limit the benzene content of gasoline and to reduce emissions from passenger vehicles and portable gasoline containers. EPA will finalize this rule in 2007 and implement it in subsequent years.

EPA continues to develop and refine tools, training, handbooks, and information to assist our partners in characterizing risks from air toxics, and we will work with them on strategies for making local decisions to reduce those risks. As EPA implements its community-based air toxics programs, including Community Action for a Renewed Environment (CARE), we will evaluate how program activities affect areas with potential Environmental Justice concerns. As areas with potential environmental justice concerns have been identified, EPA will work with those communities so they can identify and address risk and track progress. Working with our state and local partners, EPA has designed and implemented a national toxics monitoring network. Data from the monitoring network and from local assessments allow us to better characterize risk and assess priorities.

Working with Tribes and Other Partners

EPA is committed to working with tribes on a government-to-government basis to develop the infrastructure and skills tribes need to assess, understand, and control air

quality on their lands. We will support tribes in their efforts to build capacity, and encourage the development of programs to help tribes participate in discussions of national policy and operations and in regional planning and coordination activities. Recognizing that many tribal programs are still in development, we will support the growth of programs to enhance measurable air quality and human health outcomes. We will continue to encourage tribes to assess¹ their air quality and develop the capacity to address identified concerns. We will continue to support air monitoring in Indian country and are exploring opportunities for mercury and other deposition monitoring. In consultation with tribes, we will establish needed federal regulatory authorities and help tribes develop and manage their own air programs in a manner consistent with EPA Indian Policy and tribal traditions and culture. We will support tribal air programs by providing technical support, assistance with data development and analysis. Where tribes choose not to develop their own programs, we will implement air quality programs directly. EPA has developed new rules for new or modified major and minor sources in Indian country, and will work with tribes to delegate or directly implement these rules in all of Indian country.

As we develop and implement clean air strategies, we will involve the public in meaningful ways and work with other federal agencies to ensure a coordinated approach. Our federal partners include the Department of Agriculture (in the areas of animal feeding operations, agricultural burning, and controlled burning), the Department of Transportation (for transportation-related air quality issues), the Department of Energy (for electric utilities, electricity generation, and energy efficiency issues), and the Department of Interior (concerning visibility in national parks and wilderness areas).

EPA also will work to address sources of air pollutants that lie outside our borders, but pose risks to air quality and public health within the United States. The pollutants that are subject to international transport include traditional criteria air pollutants, such as ozone and fine particles, as well as persistent bioaccumulative toxins (PBTs), such as mercury, dioxins, and polychlorinated biphenyls (PCBs). We will work with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, and other agencies to improve our capability to detect, track, and forecast the effects of these air pollutants from international sources. By engaging with the international scientific community, we hope to improve our understanding of international flows and our tools for analyzing and evaluating response policies. Working through bilateral agreements, international partners, and multilateral international organizations (such as the United Nations Environment Program and the Organization for Economic Cooperation and Development), we will promote capacity building, technology transfer, and other strategies to reduce foreign sources of pollution.

¹ A tribal air quality assessment is completed when the tribe and Regional Office both agree that the tribe has completed the appropriate steps to understand any air quality issues and concerns, and their activities have changed to focus on program development and implementation, if appropriate. Further assessments may be carried out as part of their ongoing activities, but the focus is no longer on gaining an initial understanding of air quality issues and activities.

EPA will continue to work with partners to implement sustainable development public-private partnerships launched at the World Summit for Sustainable Development in 2002. The goals of the Partnership for Clean Fuels and Vehicles (<http://www.unep.org/pcfvr>) are to achieve global phase-out of leaded gasoline and to work with developing countries and transition economies to reduce sulfur in fuels and to adopt clean vehicle technologies. The goal of the Partnership for Clean Indoor Air (<http://www.pciaonline.org>) is to reduce the increased environmental health risk faced by more than two billion people who burn traditional biomass fuels indoors for cooking and heating.

EPA also will help represent the United States in existing multilateral international agreements (such as the Convention on Long-Range Transboundary Air Pollution (<http://www.unece.org/env/lrtap>) and the Stockholm Convention on Persistent Organic Pollutants (<http://www.pops.int>) to control sources of internationally transported pollutants and protect U.S. interests. In North America, we will work with Canada and Mexico within such existing agreements as the U.S.-Mexico La Paz Agreement (<http://air.utep.edu/bca/jac/agreement.html>), the U.S.-Canada Air Quality Agreement (<http://www.epa.gov/airmarkt/usca/agreement.html>), and the North American Agreement on Environmental Cooperation (http://www.naaec.gc.ca/eng/agreement/agreement_e.htm), to control the cross-border flow of pollutants. We will also work with Canada, Mexico, and key stakeholders to identify and explore new approaches to managing air quality along our common borders.

OBJECTIVE 1.2 – HEALTHIER INDOOR AIR. Through 2012, working with partners, reduce human health risks by reducing exposure to indoor air contaminants through the promotion of voluntary actions by the public.

Sub-objective 1.2.1. Radon. By 2012, the number of future premature lung cancer deaths prevented annually through lowered radon exposure will increase to 1,250 from the 1997 baseline of 285 future premature lung cancer deaths prevented.

Sub-objective 1.2.2. Asthma. By 2012, the number of people taking all essential actions to reduce exposure to indoor environmental asthma triggers will increase to 6.5 million from the 2003 baseline of 3 million. EPA will place special emphasis on children and other disproportionately impacted populations.

Sub-objective 1.2.3. Schools. By 2012, the number of schools implementing an effective indoor air quality management plan will increase to 40,000 from the 2002 baseline of 25,000.

Sub-objective 1.2.4. Environmental Tobacco Smoke. By 2012, the percentage of children six and under regularly exposed to environmental tobacco smoke in the home will be reduced to 8 percent from a 1998 baseline of 20 percent, and the disparity of exposure between low-income children and the general population will be reduced.

Means and Strategies for Achieving Objective 1.2

Air within homes, schools, and workplaces can be more polluted than outdoor air in the largest and most industrialized cities.ⁱⁱⁱ And because people typically spend close to 90 percent of their time indoors,^{iv} many may have a greater exposure to indoor pollution than to outdoor air pollution. Relative risk reports issued by EPA,^v the Science Advisory Board,^{vi} and several states^{vii} rank indoor air pollution among the top four environmental risks. Moreover, people who may spend the most time indoors, thus exposed to indoor air pollutants for long periods of time, are often those who may be most susceptible to their effects: the young, the elderly, and the chronically ill, especially those suffering from respiratory or cardiovascular disease. Further, underserved populations often face higher exposures and unique mitigation challenges.

To address indoor air quality issues, EPA develops and implements innovative, non-regulatory, outreach and partnership programs that inform and educate the public about indoor air quality and actions that can reduce potential risks in homes, schools, and workplaces. Through these partnership programs, EPA disseminates information and works with state, tribal, and local governments; industry and professional groups; and the public to promote actions to reduce exposures to possibly harmful levels of indoor air pollutants, including radon. EPA's indoor air quality program places particular emphasis on reaching children and underserved populations who often face greater risks from indoor air quality problems.

EPA works in partnership with a wide array of constituencies such as health care providers in urban areas who treat children prone to asthma attacks, including children disproportionately impacted by asthma, school personnel who manage school environments, county and local environmental health officials, and housing and building organizations. EPA's partnership network also engages a wide array of other constituencies who care about and impact indoor air quality and who have the expertise and credibility that allow EPA to reach a larger audience than we could on our own. To support these partnership approaches, we will base our policy and technical recommendations for reducing potential exposure to indoor contaminants on the most current science available. We will develop data on households affected by radon, mold, and asthma triggers in Indian country, to better measure pervasiveness and to quantify successful implementation of programs such as Tribal Effective Asthma Management and Tools for Schools, as well as the health benefits of those programs.

In addition to offering targeted assistance and guidance to urban, low-income, and minority populations across the nation, EPA also will provide tribes with appropriate tools and assistance to address indoor air toxics, such as radon, environmental tobacco smoke, indoor asthma triggers, mold, and other biological and chemical contaminants. We will work with other federal agencies to provide guidance and assistance on how to reduce the exposure levels of these contaminants in all Indian communities.

EPA will broaden awareness and increase action by working with national as well as local community-based organizations to design and implement programs that address critical indoor air quality problems, including radon, secondhand smoke, asthma triggers, and mold contamination in homes, child care and school facilities, and other commercial indoor environments. These same issues have become evident in Indian country as tribal governments develop a better understanding of indoor air quality issues. EPA will help tribes develop improved baseline data for indoor air issues in Indian country and assist tribes and reservations as they address these critical indoor air quality problems. Through the State Indoor Radon Grant Program, EPA will continue to help states and tribes develop and implement effective radon assessment and mitigation programs and will support innovation and expansion of these programs.

OBJECTIVE 1.3 – PROTECT THE OZONE LAYER. By 2030, through worldwide action, ozone concentrations in the stratosphere will have stopped declining and slowly begun the process of recovery, and overexposure to ultraviolet radiation, particularly among susceptible subpopulations, such as children, will be reduced. Specifically:

Sub-objective 1.3.1. Stratospheric Chlorine Concentrations. By 2011, total effective equivalent stratospheric chlorine will have reached its peak, and begun its gradual decline to a value less than 3.4 parts per billion of air by volume.

Strategic Targets:

- By 2011, 65 percent of all hydrochlorofluorocarbon (HCFC) production and import will be phased out, further accelerating the recovery of the stratospheric ozone layer—with further reduction steps in 2015 and 2020, concluding with complete elimination of Class II substances in 2030.
- Through 2011, continue the transition away from ozone-depleting compounds in a way that reduces overall risks to human health and the environment by acting on 100 percent of petitions for substitutes within 90 days of receipt.

Means and Strategies for Achieving Objective 1.3

Scientific evidence amassed over the past three decades has shown that chlorofluorocarbons and hydrochlorofluorocarbons (used as refrigerants, solvents, and for other purposes), halons, (fire-extinguishing agents), methyl bromide (a pesticide), and other halogenated chemicals used around the world are depleting the stratospheric ozone layer. As a result, more harmful ultraviolet (UV) radiation is reaching the earth,^{viii} increasing the risk of overexposure to radiation and consequent health effects, including skin cancer, cataracts, and other illnesses. More than a million new cases of skin cancer are diagnosed each year,^{ix} one in five Americans is expected to experience skin cancer, and more than half of all Americans develop cataracts by the time they are 80 years old.^x

As a signatory to the *Montreal Protocol on Substances That Deplete the Ozone Layer* (Montreal Protocol),^{xi} the United States is obligated to regulate and enforce its terms domestically. In accordance with this international treaty and related Clean Air Act requirements,^{xii} EPA will continue to implement the domestic rule-making agenda for the reduction and control of ozone-depleting substances (ODS) and enforce rules controlling their production, import, and emission. This implementation includes combining market-based regulatory approaches with sector-specific technology guidelines and facilitating the development and commercialization of alternatives to hydrochlorofluorocarbons. We will strengthen outreach efforts to ensure efficient and effective compliance, and continue to identify and promote safer alternatives to curtail ozone depletion. We will work with stakeholders to advance voluntary and other partnerships that will smooth the transition to ODS substitutes and provide important co-benefits such as greenhouse gas emission reduction and energy savings. To help reduce international emissions, we will assist with the transfer of technology to developing countries and work with them to accelerate the phase-out of ODS. EPA estimates that in the United States alone between 1990 and 2165, the worldwide phase-out of ODS will save 6.3 million lives from fatal cases of skin cancer, avoid 299 million cases of nonfatal skin cancers, and avoid 27.5 million cases of cataracts.^{xiii}

Because the ozone layer is not expected to recover until the middle of this century at the earliest,^{xiv} the public will continue to be exposed to higher levels of UV radiation than existed prior to the use and emission of ODS.^{xv} Recognizing this fact and the public's current sun-exposure practices, EPA will continue education and outreach efforts to encourage behavioral changes as the primary means of reducing UV-related health risks, particularly for school children and their caregivers. The SunWise program, which we expect to grow from 200 participating K-8 schools in 2000 to 20,000 by 2011, will teach thousands of school children and adults how to protect themselves from overexposure to the sun.

OBJECTIVE 1.4 – RADIATION. Through 2011, working with partners, minimize unnecessary releases of radiation and be prepared to minimize impacts to human health and the environment should unwanted releases occur.

Strategic Targets:

- By 2011, 77 percent of the U.S. land area will be covered by the RadNet ambient radiation air monitoring system. (2001 Baseline is 35 percent of the U.S. land area).
- By 2011, the radiation program will maintain a 90 percent level of readiness of radiation program personnel and assets to support federal radiological emergency response and recovery operations. (2005 Baseline is 50 percent level of readiness).

Means and Strategies for Achieving Objective 1.4

EPA continues to meet the statutory mandates for managing radiation waste and controlling radioactive emissions and to fulfill its responsibilities under Presidential decision directives for radiological emergency preparedness and response. These responsibilities form the core of our strategy to protect the public and the environment from unnecessary exposure to radiation. EPA works with states, tribes, and industry to develop innovative training, public information, and voluntary programs to minimize these exposures.

Mining and processing naturally occurring radioactive materials for use in medicine, power generation, consumer products, and industry inevitably generate emissions and waste. EPA provides guidance and training to other federal and state agencies in preparing for emergencies at U.S. nuclear plants, transportation accidents involving shipments of radioactive materials, and acts of nuclear terrorism. EPA also develops guidance for cleaning up radioactively-contaminated Superfund sites. We will ensure that appropriate methods are used to manage radioactive releases and exposures. These include health-risk site assessments; risk modeling, cleanup, and waste management activities; voluntary programs to minimize exposure to radiation in commercial products and industrial applications; national radiation monitoring; radiological emergency response; and provision of federal guidance to our international, federal, state, and local partners.

EPA will continue to provide advice and guidance, as requested, to help state and local organizations locate, identify, and dispose of radioactive sources that find their way into non-nuclear facilities, particularly scrap yards, steel mills, and municipal waste disposal facilities. We also will continue to work with the International Atomic Energy Agency and other federal agencies to prevent metals and finished products suspected of having radioactive contamination from entering the country. We will create partnerships with states, local agencies, and tribes to locate and secure lost, stolen, or abandoned radioactive sources within the United States and to develop innovative partnership programs with state and local agencies and industry to investigate and promote pollution prevention and operational practices and technologies that reduce industrial radioactive releases. We will continue and expand our ongoing efforts to ensure that tribes receive assistance in dealing with radon exposures in their homes and schools.

EPA also operates RadNet, formerly known as the Environmental Radiation Ambient Monitoring System (ERAMS), the only national ambient radiation monitoring program that provides information about the wide-scale spread of radioactive material from nuclear or radiological incidents. Over the next several years, EPA will upgrade RadNet by adding portable and quickly deployable monitors that can be shipped to affected areas, by conducting real-time monitoring for contamination in air, and by replacing old equipment with state-of-the art air samplers.

One of EPA's major responsibilities related to radiation is certifying that all radioactive waste shipped by the Department of Energy (DOE) to the Waste Isolation Pilot Plant (WIPP) is disposed of safely and according to EPA's standards. We inspect waste generator facilities and biennially evaluate DOE's compliance with applicable environmental laws and regulations. Every 5 years, EPA will have to recertify that the WIPP is in compliance with EPA's radioactive waste disposal regulations.

OBJECTIVE 1.5 – REDUCE GREENHOUSE GAS INTENSITY. Through EPA's voluntary climate protection programs, contribute 80 million metric tons of carbon equivalent (MMTCE) annually to the President's 18 percent greenhouse gas (GHG) intensity goal by 2012. (An additional 24 MMTCE to result from the sustained growth in the climate programs are reflected in the Administration's Business-as-Usual projection for GHG intensity improvement.)

Sub-objective 1.5.1. Buildings Sector. Through EPA's ENERGY STAR® program, prevent 26 MMTCE in the buildings sector in 2012, in addition to the 20 MMTCE prevented annually in 2002.

Sub-objective 1.5.2. Industrial Sector. Through EPA's industrial sector programs, prevent 64 MMTCE in 2012, in addition to the 34 MMTCE prevented annually in 2002.

Sub-objective 1.5.3. Transportation Sector. Through EPA's transportation programs, prevent 13 MMTCE in 2012, in addition to the 2 MMTCE prevented annually in 2002.

Means and Strategies for Achieving Objective 1.5

In 2002, the President announced a U.S. climate policy to reduce the GHG intensity of the U.S. economy by 18 percent over the next decade. EPA's strategy for helping to improve GHG intensity is to enhance its partnerships with a diverse set of private and public organizations through programs that deliver multiple benefits in addition to reducing GHG intensity—from cleaner air to lower energy bills. At the core of these efforts are government-industry partnership programs designed to capitalize on the opportunities that consumers, businesses, and organizations have for making sound investments in energy efficient equipment, policies and practices, and transportation choices.

EPA manages a number of partnership efforts to improve information in the marketplace and more quickly deploy technology in the residential, commercial, and transportation sectors of the economy. The ENERGY STAR partnership (<http://www.energystar.gov/>) has been successful in cost-effectively avoiding GHG emissions in the residential, commercial, and industrial sectors. EPA's programs on methane and other potent greenhouse gases successfully engage energy, industrial and agricultural sectors to deliver cost effective GHG emission reductions (<http://www.epa.gov/nonco2/voluntaryprograms.html>). In addition, the clean energy

partnership programs promote the development and purchases of renewable energy through the Green Power Partnership and Combined Heat and Power Partnership (<http://epa.gov/cleanenergy/>) EPA's goals for these efforts are to cost-effectively return emissions of methane to 1990 levels or below by 2012; to cost-effectively limit emissions of the more potent GHGs (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride); and to facilitate the use of clean energy technologies.

EPA will continue its SmartWay Transport Partnership (<http://www.epa.gov/smartway/>) efforts with the trucking and railroad industries to reduce GHGs through efficiency or energy-saving technologies and to promote cleaner vehicles and the adoption of pollution control and energy-saving technologies that reduce NO_x and PM emissions. SmartWay also addresses environmental justice because rail yards, truck stops, border crossings, etc. are often located near communities with environmental justice concerns. EPA's Best Workplaces for Commuters program (<http://www.commuterchoice.gov/>) also develops innovative solutions to commuting challenges faced by U.S. employers and employees by promoting commuter benefits that reduce vehicle trips and miles traveled. Other activities at EPA will further advance fuel-efficient and clean automotive technology, thus saving energy and reducing GHG emissions.

We also will continue the Partnerships for Home Energy Efficiency (PHEE)—a joint effort of the U.S. Department of Energy, EPA, and the U.S. Department of Housing and Urban Development. One of the main objectives of this partnership is to deliver energy-efficiency savings to low income and subsidized housing. PHEE will help address energy shortages and rising natural gas prices and thus will help make housing more affordable.

EPA will continue its efforts to provide state, tribal, and local governments with technical, outreach, and education services about climate change impacts, mitigation and adaptation options, and related issues so that they can more effectively and comprehensively address their goals.

EPA also promotes international partnerships to reduce GHGs and deploy clean technologies. Through the Methane to Markets Partnership, EPA will work with partner countries around the world, as well as the U.S. private sector, to reduce global methane emissions, enhance economic growth, promote energy security, and improve the environment by using cost-effective methane recovery technologies (<http://www.methanetomarkets.org/>). In addition, the United States has joined with Australia, China, India, Japan, and South Korea to launch the Asia-Pacific Partnership on Clean Development and Climate. EPA will support this Partnership to advance the President's goal of developing and accelerating the deployment of cleaner and more efficient technologies and practices.

OBJECTIVE 1.6 – ENHANCE SCIENCE AND RESEARCH. Through 2011, provide and apply sound science to support EPA's goal of Clean Air by conducting leading-edge

research and developing a better understanding and characterization of human health and environmental outcomes under Goal 1.

Sub-objective 1.6.1: Use Science and Technology to Support Air Programs.

Through 2011, use the best available scientific information, monitoring, models, methods, and analyses to support air-program-related guidance, policy decisions, and accountability. Through the Clean Automotive Technology program, EPA and industry partners will demonstrate cost-effective engineering vehicles using cost-effective ultra clean and fuel efficient automotive technology as follows:

Strategic Targets:

- By 2011, demonstrate that the fuel economy of sport utility vehicles, urban delivery vehicles, refuse trucks, and buses can be cost-effectively improved by 60 percent over the 2001 baseline.
- By 2011, demonstrate that the fuel efficiency of automotive gasoline engines can be cost-effectively improved by 15 percent over the 2001 baseline.
- By 2011, technologies developed under the Clean Automotive Technology program will be in two percent of the new light/medium duty trucks sold.

Sub-objective 1.6.2: Conduct Air Pollution Research. Through 2011, achieve progress toward reducing uncertainty in standard setting and air quality management decisions through advances in understanding in the air pollution sciences and achieve progress in assessing source to health linkages by reducing uncertainties in these linkages.

Means and Strategies for Achieving Objective 1.6

EPA's science and research efforts are designed to provide the best information available to support our policies and regulations. First, we identify the research necessary to develop the quality information and tools we need for decision-making, standard-setting, and implementation work. Once these scientific tools are in use, we can identify data gaps and determine our needs for further research. Progress toward research goals is assessed through a suite of metrics that is tailored to measuring the impacts of the outcomes of the respective research programs. Among the measurable factors are: independent expert review panel ratings on the extent to which clients utilize EPA research products; composite scores on a client survey designed to gather data on product utility and perceptions of use; and the results of bibliometric and/or client document analyses demonstrating the actual use of EPA research products. These factors are applied to measure success in providing the results identified in the research program below.

Science to Support Air Programs

EPA will continue to use sound science to determine the relative risks that air pollution poses to human health and the environment; identify the best means to detect, abate, and avoid environmental problems associated with air pollutants; and evaluate the effectiveness of control programs in reducing exposure to harmful levels of air pollution. The Agency will base its efforts to reduce environmental risks on the best available scientific information and will continue to integrate critical scientific assessment with policy, regulatory, and non-regulatory activities. Science activities related to air quality fall into three broad categories: (1) risk assessment, (2) program development and assessment, and (3) technology development and assessment.

Exposure and Risk Assessment

EPA conducts exposure and risk assessments on both criteria and hazardous air pollutants to support our air toxics program and to assist in estimating the risks associated with exposure to criteria pollutants, such as fine particles. Our exposure and risk assessments integrate monitoring and modeling information to characterize the impacts of sources of air pollution within the United States, as well as the impacts of pollution coming from outside the United States. We also conduct radiation-risk assessments to evaluate health risks from radiation exposure; to determine appropriate levels for cleaning up contaminated sites; and to develop radiation protection and risk management policy, guidance, and rules.

Program Development and Assessment

Using mathematical models, EPA works with states and tribes to evaluate control options, control plans, the impacts of alternative emission scenarios, and the effect of federal rules. EPA's Acid Rain program uses deposition models to evaluate our allowance trading program and to support the National Acid Precipitation Assessment Program, which coordinates federal acid deposition research. In addition, we use mathematical models, ambient monitoring information, and other data to determine the effectiveness of control strategies.

Technology Development and Assessment

Developing and assessing innovations in environmental protection is another important aspect of EPA's clean air program. Through its Clean Automotive Technology program, EPA will continue to develop advanced clean and fuel-efficient automotive technology. We will collaborate with industry partners to transfer the unique EPA-patented, highly-efficient hybrid engine and power-train components, originally developed for passenger cars, to meet the more demanding size, performance, durability, and towing requirements of sport utility and urban delivery vehicles, without compromising performance, safety, or reductions in emissions.

EPA is committed to common-sense, cost-effective solutions that result in cleaner air. To control air toxics reasonably and effectively, EPA will continue to evaluate control technologies to ensure that they are protective, cost-effective, and commercially viable.

Effectively using partnerships is a key aspect of our approach to sound science. Under a joint effort on air quality forecasting, for example, EPA and the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) are combining their expertise in air quality, atmospheric measurements, and modeling to develop a consistent, national numerical air quality model for short-term air quality forecasts for ozone and PM. We are contributing our national collection, analysis, and distribution of ambient air quality (our AIRNow program) and emissions data; air quality modeling; and detailed research analysis of air quality impacts on human health. NOAA brings expertise in operational meteorological modeling, air quality research, and product development and distribution. In addition to partnerships with other U.S. agencies, EPA also works with partners in the international science community to better understand flows of pollutants into and out of the United States and to assess potential mitigation strategies.

Research

The Air Research Program is driven by information needs to set and implement the National Ambient Air Quality Standards (NAAQS), with additional impetus provided by the need to ensure that EPA, states, tribes, and localities are adequately reducing residual risks associated with exposure to hazardous air pollutants (air toxics). This program will produce measurable benefits in the form of:

- reduced uncertainty in the science that supports standard-setting and air quality management decisions; and
- reduced uncertainty in the linkages between health impacts and air pollutant sources in order to fully appraise their relevance.

The Program relies on research conducted at EPA Laboratories, through extramural grants (including five Particulate Matter Research Centers), and by co-funded partnerships (e.g. with NIEHS and HEI). EPA has established two strategic targets to achieve our research sub-objective. The means and strategies to achieve these targets fall into the following three main categories designed to move the program toward achieving the benefits stated above:

1. Data and tools to support implementation of the NAAQS. Planned research will increase the capabilities of EPA, states, and tribes to design effective strategies for meeting the NAAQS. This includes new and updated data and new methods and models to characterize and estimate source emissions. Enhanced air quality models will incorporate more accurate meteorological effects and increased ability to forecast air quality changes, improving the ability to alert the public about episodes of adverse air quality. Advances in receptor-based models will more accurately identify which source categories contribute to ambient concentrations, providing the

basis for targeted control strategies. Work will also investigate technologies to address multiple pollutants from key sources contributing to non-attainment or air toxics problems.

2. Improving our understanding of the health effects associated with exposure to ambient PM. Together with HEI and other research partners EPA is undertaking a systematic evaluation of PM attributes that will expand our understanding of how they are related to a range of health outcomes across a range of endpoints (e.g. pulmonary, cardiovascular, immunological, neurological, reproductive and developmental).

3. Research to advance understanding of the links between sources and effects advances the state of air pollution science to enable health effects to be linked more strongly to specific source types and PM attributes, the major theme of the 5-year PM centers program.

Human Capital

One human capital challenge is the existing shortage of qualified on-board staff to implement new requirements such as the Clean Air Interstate Rule and the Energy Policy Act of 2005. For example, to implement CAIR, EPA has determined that additional staff is needed in the areas of emissions measurement, engineering technology, environmental assessment, and computer database development and administration. Similarly, the Energy Policy Act of 2005 requires the development of a national renewable fuel standard (RFS), followed by the promulgation of regulations to implement the RFS. Developing these regulations will require staff with expertise in renewable fuels, vehicle testing, refinery modeling, transportation modeling and life-cycle analysis, energy security impacts, and economic analyses.

In other areas, EPA has been able to recruit and retain top talent with the needed scientific and technical backgrounds. For example, the EPA National Vehicle and Fuel Emissions Laboratory and the CAT program have both been able to attract high quality engineers and scientists. Cooperative agreements are in place with several top engineering colleges to help with recruiting.

Performance Measurement

EPA has made great strides in improving measures of Clean Air and Global Climate Change achievements so that they focus on environmental results. The annual performance goals (APGs) and measures under the Clean Air and Global Climate Change programs are closely aligned with the long-term strategic targets. EPA monitors the progress toward strategic objectives and targets through a series of annual performance goals. The APGs focus on environmental outcomes and action-oriented outputs achieved by the integrated efforts of EPA, its state and tribal partners, and the regulated community. Several APGs, established in the Agency's Annual Plan and Budget and reported on in EPA's annual Performance and Accountability Report, directly track and measure the strategic targets. For instance, the APGs for reductions

in the population-weighted ambient concentration of ozone and PM 2.5 programs set annual targets related to the strategic targets. As another example, there are annual measures that directly track strategic targets for the number of people taking all essential actions to reduce exposure to indoor environmental asthma and number of schools implementing an effective indoor air quality management plan.

For the research sub-objective, EPA will track annual progress toward expected long-term results by means of multiple, objective-based measures of customer satisfaction, product impact and quality, and efficiency.

Influence of Environmental Indicators and PART Measures on the Strategic Plan

EPA has aligned its strategic and annual measures under Goal 1 with the environmental indicators to be included in the forthcoming *Report on the Environment*. Environmental indicators reflected in the *Strategic Plan* include trends of national ambient concentrations and emissions of criteria air pollutants (and their precursors) such as ozone and fine particulate matter), mercury point-source emissions, ambient levels of stratospheric chlorine (which can deplete the ozone layer), and greenhouse gas emissions.

EPA has included in this *Strategic Plan* all the Clean Air and Global Climate Change long-term, outcome-oriented measures developed through the federal Program Assessment Rating Tool (PART) assessments as strategic targets. These targets include the population-weighted ambient concentration targets for ozone and PM_{2.5}, and the toxicity-weighted risk reduction goals for air toxics. Improved strategic targets were also developed for the radiation program during the PART assessment process.

Future Improvements to Performance Measurement

While considering revisions and improvements for developing this *Strategic Plan*, the Agency also examined some of the longer-term opportunities to make improvements in the expression of our outcome measures for future plans. With respect to Goal 1, EPA is continuing to work on the development of long-term measures that capture the environmental benefits of the air and climate change programs. One example is the Agency's work to directly measure the benefits of reduced ultraviolet exposure on human health.

CLOSING THE FEEDBACK LOOP: RESULTS OF PERFORMANCE ASSESSMENTS AND PROGRAM EVALUATIONS

Ambient Air Quality Program

In the PART evaluation of the Acid Rain program, OMB recommended that EPA work to: (1) overcome statutory limitations that set maximum emission reduction targets and limit the scope of emissions trading and program benefits, and (2) develop efficiency measures based on the full cost of the program. The first recommendation is

addressed by promulgation of the Clean Air Interstate Rule, which is projected to reduce SO₂ and NO_x emissions beyond Title IV and uses a cap-and-trade approach modeled after the Acid Rain program. EPA is addressing the second recommendation by developing data and methods to support efficiency measures that incorporate industry as well as EPA costs.

The National Academy of Sciences (NAS) evaluated the nation's air quality management system^{xvi} and concluded that while emitted pollutants have been substantially reduced over the past 30 years, further progress is hindered by scientific and technical limitations in the current system. To address some of these issues, EPA is: (1) developing air quality-ecosystem indicators for the future tracking of trends in human exposure and ecological condition, (2) exploring opportunities to co-locate ambient air monitoring and atmospheric deposition monitoring with long-term ecological research study sites, and (3) improving methods for monitoring atmospheric inputs, such as ambient mercury concentrations and mercury deposition, to ecosystems. EPA also is working to develop and expand the use of high order health and ecological indicators, and on characterizing the movement of air pollutants through ecosystems over time.

Indoor Air

In the indoor air arena, OMB's PART assessment has led the program to better quantify the relationship between funding levels and results, improve transparency by making state radon grantee performance data easily accessible to the public, and improve the program's efficiency measures to more clearly demonstrate the cost effectiveness of the program.

Mobile Source – Clean Air Technology (CAT) Program

As a result of its 2005 PART evaluation, the CAT program is working to develop two efficiency measures: one for comparing the CAT program to similar efforts at other agencies, and another to relate a technology's fuel economy improvements to greenhouse gas reductions.

Research

In 2005, the Board of Scientific Counselors (BOSC), a public advisory committee chartered under the Federal Advisory Committee Act) evaluated the Particulate Matter and Ozone Research Program and made specific recommendations for improvements.^{xvii} Specifically, the BOSC recommended wording for long-term measures as well as recommended periodic assessment of customer satisfaction. Recommendations were incorporated into the 2005 PART evaluation of the NAAQS Research Program. EPA has identified actions and milestones to meet this need. The long-term measures are reflected in the discussion of measurable benefits for research under the Means and Strategies section. These measures will be incorporated in an upcoming revision of EPA multi-year plan for air research. The multi-year plan complements the *Strategic*

Plan by providing a more specific air research plan and will address the recommendations of the BOSC, PART, and NRC reviews.

A committee of air pollution experts formed under the National Academy of Sciences National Research Council (NRC) completed a series of reports in 2004 and made three specific recommendations concerning the management of scientific research:

- EPA should work toward a higher level of sustained integration and interaction among the scientific disciplines and among the full range of public and private research funding organizations.
- Research is needed to develop stronger tools to compile and synthesize the large amounts of new information being developed in this research program.
- Sustained and substantially enhanced management of this program by EPA, accompanied by a continuing mechanism for independent review and oversight of the program, will be the only way to ensure that this investment is being soundly made.

Emerging Issues and External Factors

The current, fundamental imbalance between energy supply and energy demand, and the impacts of that imbalance throughout the economy, is debatably the most significant environmentally-related issue that has emerged since the issuance of EPA's 2003–2008 *Strategic Plan*. The convergence of concerns around energy supply, economic prosperity, national security, and the environment present unprecedented opportunities for technological innovation in the marketplace. EPA will be impacted as the nation moves forward to address these key energy challenges: using energy more efficiently, increasing domestic energy supplies, modernizing the energy infrastructure; and, ensuring that public health and the environment are protected.

To Learn More:

<http://www.epa.gov/ocfo/futures/perspectives.htm>

Higher and/or more volatile energy prices will create pressures affecting air quality programs and goals. EPA's role in supporting the development of renewable transportation fuels such as ethanol will increase, and the Agency will need to ensure smooth implementation of renewable fuels programs—including those required under the Energy Policy Act of 2005. As these trends in energy prices increase the pace of turnover of capital stock in the energy sector, there will be greater interest in new and more efficient technologies—many of which could have a positive impact on air quality—and the Agency will need to work with industry to encourage the development of these technologies in all sectors (e.g., transportation, electricity production and end-use). For example, demand for domestic coal resources will likely increase, and EPA

will need to work with the Department of Energy, coal producers, and others to ensure that advanced new coal technologies such as integrated gasification combined cycle (or coal gasification with carbon capture and sequestration, more broadly) that have extremely low air emissions will continue to develop and that we can encourage their diffusion throughout the marketplace. Finally, we also will need to continue to look for opportunities to streamline energy permitting so that we can both achieve our clean air goals, and expeditiously build the energy infrastructure our country needs.

Another challenge comes from growing levels of emissions in other countries that threaten to affect progress within the United States and impact our ability to achieve our public health and environmental standards. The impacts of international and intercontinental transport are already being observed, and as energy use and development increases rapidly in regions such as Asia, there is the potential for critical impacts in the United States. Efforts to decrease emissions in developing countries will not replace the need to continue to reduce air pollution emissions within the United States. Instead, international efforts are needed to complement our local and regional control efforts, to protect public health and our domestic investments. Thus, to achieve our own domestic policy goals, we will have to better understand the impact of emissions sources in other countries on environmental quality and public health in the United States and, when appropriate, work cooperatively with other countries to decrease these emissions.

Recent scientific studies indicate that the stratospheric ozone layer is likely to take longer to heal than previously anticipated.^{xviii} More people will be exposed to excess UV radiation over a longer time period, and the number of people impacted by this exposure will increase. This means that timely, comprehensive action by all nations, including the United States, is more important than ever in order to achieve restoration of the ozone layer.

There are a number of external factors that could affect achievement of our strategic goals. State, local, and tribal implementation of air programs is necessary for achieving many of the clean air performance targets, but reduced budgets and resource constraints could impede their ability to carry out environmental programs. Lawsuits and court action might require the Agency to adjust schedules and could delay achievement of critical milestones. Achievement of clean air objectives can also be affected by economic conditions and development patterns in the United States and the world, and by choices made for energy and transportation policies.

Weather conditions and meteorological patterns have very important effects on air quality. For example, high temperatures and bright sunlight can increase the formation of ozone. Wind can carry air pollution from one area to another, while conditions of little or no wind can cause air pollutants to remain in an area and build up to unhealthy levels. These effects must be considered when developing and implementing plans and strategies to achieve and maintain clean air.

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^{xviii} New York Times, December 7, 2005, Scientists Say Recovery of the Ozone Layer may take Longer Than Expected, Kenneth Chang. Available online at: [Hhttp://www.nytimes.com/2005/12/07/science/07ozone.html?ex=1291611600&en=6e8ca9c8549a6f6b&ei=5090&partner=rssuserland&emc=rssH](http://www.nytimes.com/2005/12/07/science/07ozone.html?ex=1291611600&en=6e8ca9c8549a6f6b&ei=5090&partner=rssuserland&emc=rss). Date of Access: April 26, 2006.

GOAL 2 - CLEAN AND SAFE WATER

Ensure drinking water is safe. Restore and maintain oceans, watersheds, and their aquatic ecosystems to protect human health, support economic and recreational activities, and provide healthy habitat for fish, plants, and wildlife.

Since the enactment of the Clean Water and Safe Drinking Water Acts over 3 decades ago, government, citizens, and the private sector have worked together to make dramatic progress in improving the quality of surface water and drinking water.

Thirty years ago, many of the nation's drinking water systems provided water to the tap with very limited treatment. Drinking water was too often the cause of acute illnesses linked to microbiological contaminants or of longer-term health problems resulting from exposure to low levels of toxic and other contaminants. Today, drinking water systems monitor the quality of the water they provide and treat water to ensure compliance with standards covering a wide range of contaminants. In addition, efforts to protect waters that are sources of drinking water are helping to keep drinking water safe.

Thirty years ago, about two-thirds of the surface waters assessed by states were not attaining basic water quality goals and were considered polluted.¹ Some of the nation's rivers were open sewers posing health risks, and many water bodies were so polluted that swimming, fishing, and recreation were impossible. Today, the number of polluted waters has been dramatically reduced, and many clean waters are getting even healthier. A massive investment of federal, state, and local funds has resulted in a new generation of sewage treatment. More than 50 industrial sectors now comply with nationally consistent discharge regulations. In addition, sustained efforts to implement "best management practices" have helped reduce runoff of pollutants from diffuse, or "nonpoint," sources.

Cleaner, safer water has renewed recreational, ecological, and economic interests in communities across the nation. The recreation, tourism, and travel industry is one of the largest employers in the country, and a significant portion of recreational spending comes from swimming, boating, sport fishing, and hunting.² In addition, each year, more than 180 million people visit beaches for recreation.³

The dramatic restoration of some of the nation's most polluted waters has paid large dividends in enhanced recreation, healthier fisheries, and stronger local economies. Many of the nation's best-known water pollution problem areas are showing the results of years of restoration efforts. The Cuyahoga River, which once caught fire, is now busy with boats and harbor businesses. Oregon's Willamette River has been restored to provide swimming, fishing, and water sports. In Boston, the Charles River, once badly polluted, is increasingly recognized as a place for boating and related recreation.

Despite numerous improvements in the quality of water, serious water pollution and drinking water problems remain in certain areas. Population growth continues to generate higher levels of water pollution and places greater demand on drinking water systems. Continued progress toward clean waters and safer drinking water will require that the country maintain its commitment to the core programs that have proven so effective in the past and implement partnership approaches to improve water quality and protect human health.

To Learn More: www.epa.gov/water/

OBJECTIVE 2.1: PROTECT HUMAN HEALTH. Protect human health by reducing exposure to contaminants in drinking water (including protecting source waters), in fish and shellfish, and in recreational waters.

Sub-objective 2.1.1: Water Safe to Drink. By 2011, 91 percent of the population served by community water systems will receive drinking water that meets all applicable health-based drinking water standards through effective treatment and source water protection. (2005 Baseline: 89 percent)

Strategic Targets:

- By 2011, 90 percent of community water systems will provide drinking water that meets all applicable health-based drinking water standards throughout the year. (2005 Baseline: 89 percent)
- By 2011, 86 percent of the population in Indian country served by community water systems will receive drinking water that meets all applicable health-based drinking water standards throughout the year. (2005 Baseline: 86 percent)
- By 2011, minimized risk to public health through source water protection will be achieved for 50 percent of community water systems and for an associated 62 percent of the population served by community water systems (i.e., “minimized risk” achieved by substantial implementation, as determined by the state, of actions in a source water protection strategy). (2005 Baseline: 20 percent of community water systems; 28 percent of population)
- By 2015, in coordination with other federal agencies, reduce by 50 percent the number of homes on tribal lands lacking access to safe drinking water. (2003 Baseline: Indian Health Service data indicate that 12 percent of homes on tribal lands lack access to safe drinking water [i.e., 38,637 homes lack access].)

Sub-objective 2.1.2: Fish and Shellfish Safe to Eat. By 2011, reduce public health risk and allow increased consumption of fish and shellfish, as measured by the strategic targets described as follows.

Strategic Targets:

- By 2011, reduce the percentage of women of childbearing age having mercury levels in blood above the level of concern from 5.7 percent to 4.6 percent. (2002 Baseline: 5.7 percent of women of childbearing age have mercury blood levels above levels of concern identified by the National Health and Nutrition Examination Survey [NHANES].)
- By 2011, maintain or improve the percentage of state-monitored shellfish-growing acres impacted by anthropogenic sources that are approved or conditionally approved for use. (2003 Baseline: 65 to 85 percent [estimated] of 16.3 million acres of state-monitored shellfish-growing acres impacted by anthropogenic sources are approved or conditionally approved for use; EPA estimates that 2 to 20 percent of the total 1990 baseline of 17,157,000 acres of classified estuarine shellfish waters impacts are impacted by non-anthropogenic sources.)

Sub-objective 2.1.3: Water Safe for Swimming. By 2011, the number of waterborne disease outbreaks attributable to swimming in or other recreational contact with coastal and Great Lakes waters will be maintained at two, measured as a 5-year average. (2005 Baseline: an annual average of two recreational contact waterborne disease outbreaks reported per year by the Centers for Disease Control over the years 1998 to 2002; adjusted to remove outbreaks associated with waters other than coastal and Great Lakes waters and other than natural surface waters [i.e., pools or water parks].)

Strategic Target:

- By 2011, maintain the percentage of days of the beach season that coastal and Great Lakes beaches monitored by state beach safety programs that are open and safe for swimming at 96 percent. (2004 Baseline: beaches open 96 percent of the 584,150 days of the beach season [i.e., beach season days = 3,574 beaches multiplied by variable number of days of beach season at each beach].)

Means and Strategies for Achieving Objective 2.1

Water Safe to Drink

Safe drinking water is critical to protecting human health. More than 280 million Americans rely on the safety of tap water provided by water systems that comply with national drinking water standards.⁴ EPA's strategy for ensuring safe drinking water over the next several years includes six key elements:

- Developing or revising drinking water standards.
- Supporting states, tribes, and water systems in implementing programs to improve compliance with drinking water standards.
- Promoting sustainable management of drinking water infrastructure.
- Preventing contamination of surface water and ground water that is a source of drinking water.
- Strengthening security at drinking water systems.
- Increasing access to safe drinking water on tribal lands.

Drinking Water Standards

The Safe Drinking Water Act (SDWA) directs EPA to establish national standards for contaminants in drinking water provided to consumers by water systems. Under the Safe Drinking Water Act, EPA sets national standards that reduce public health risks based on rigorous technical and economic analysis and sound science, including contaminant occurrence data, health effects studies, and research on treatment technology efficacy.

Over the past 30 years, EPA has established standards for some 91 contaminants. Most recently, the Agency issued enhanced standards for the microbial pathogen *cryptosporidium* and disinfection byproducts (December 2005). EPA plans to establish additional standards that address microbial contaminants for water systems that use ground water.

Over the next several years, EPA will conduct the second 6-year National Primary Drinking Water Rule Review. Where there is adequate information, EPA will determine whether revision of an existing standard is warranted. Through 2011, EPA will continue to assess the need for new drinking water standards. Based on recommendations from the National Research Council, the National Drinking Water Advisory Council, and other stakeholders, the Agency will evaluate health effects data and risks of exposure to contaminants; gather information on technologies that prevent, detect, and remove contaminants; and evaluate compliance costs.

Compliance with Drinking Water Standards

EPA will work closely with states, tribes, and owners and operators of municipal water systems to move toward the goal of 91 percent of the population served by community water systems providing water meeting health-based standards by 2011. For water systems that meet drinking water standards, EPA will emphasize actions to maintain compliance. EPA will also emphasize the need to return water systems to compliance when they fail to meet standards and prepare water systems to comply with new regulations, such as the recent rules for *cryptosporidium* and disinfection byproducts.

EPA and states, 49 of which have primary enforcement authority for health-based standards under the Safe Drinking Water Act, are partners in ensuring water system compliance. States carry out an array of activities such as onsite sanitary surveys of water systems and working with small systems to improve their technical, managerial, and financial capacity. EPA carries out key actions to help improve compliance rates:

- Provide guidance, training, and technical assistance.
- Ensure proper certification of water system operators.
- Promote consumer awareness of the safety of drinking water.
- Maintain the rate of system sanitary surveys and onsite reviews.
- Cooperate with the Office of Enforcement and Compliance Assurance to identify noncompliance and take appropriate action.

Small community water systems are more likely to have difficulty complying with drinking water standards. Many of these systems serve people with low incomes and are located in rural areas. In addition, water systems serving tribal areas, Pacific Island Territories, Alaska Native villages, and communities along the Mexico border face special challenges in providing safe water.

Improving Tribal Drinking Water System Compliance

The rate of compliance with drinking water standards by water systems on tribal lands (86 percent in 2005) lags behind nationwide compliance rates (89 percent in 2005). In addition to their often-small size and rural locations, tribal water systems face other significant challenges, including limited resources for source water protection. EPA is taking key steps to maintain or improve tribal water system compliance:

- Develop quick reference guides that tribes can use to assist in complying with drinking water regulations.
- Promote watershed protection on tribal lands and implementation of source water protection plans.
- Continue to directly implement the Public Water System Supervision and Underground Injection Control programs on tribal lands.
- Participate in an interagency effort encouraging use of available funds to improve tribal access to safe drinking water.

To support these communities, EPA will provide training and assistance addressing the use of cost-effective treatment technologies, proper waste disposal, and compliance with standards for high-priority contaminants, including arsenic in drinking water and microbes, disinfectants, and disinfection byproducts. EPA will also continue efforts to partner with states to address the underlying need to strengthen the technical, managerial, and financial capacity of small systems.

The Safe Drinking Water Information System serves as the primary source of information on compliance with all Safe Drinking Water Act requirements. EPA will continue to work to ensure that all applicable drinking water regulatory requirements are incorporated into this data system to help states and authorized tribes manage their drinking water programs. EPA will also continue to work with states, tribes, and others to improve data completeness, accuracy, timeliness, and consistency.

Sustainable Drinking Water Infrastructure

Providing drinking water that meets public health standards often requires an investment in the construction or maintenance of infrastructure. The Drinking Water State Revolving Fund (DWSRF) provides water systems with low-interest loans to make infrastructure improvements.

Even with financial assistance from the DWSRF, the Agency's September 2002 report on the infrastructure "gap" identifies a multi-billion-dollar gap in capital infrastructure financing over the next 20 years.⁵ EPA will continue to provide infrastructure grants to capitalize state DWSRFs to support needed infrastructure. EPA will also work with states to ensure that DWSRF funds are effectively managed, and with water system owners and operators to encourage them to adopt sustainable management systems.

Sources of Drinking Water

There is growing recognition that protecting the quality of sources of drinking water, including surface waters and ground water, can reduce violations of drinking water standards. EPA will support protection of drinking water sources through training and technical assistance to states, tribes, and communities that are taking voluntary measures to prevent or reduce contamination of source water. The Agency will foster coordination of contamination prevention strategies across jurisdictions and monitor progress in the adopting of strategies by water systems. The Agency will encourage and collaborate with external stakeholders to promote and enhance source water protection efforts.

In a related effort, EPA will protect ground water that is a source of drinking water by ensuring safe underground injection of waste materials. EPA will:

- Continue working with states and tribes to educate and assist underground injection control well operators.
- Work with industry and stakeholders to collect and evaluate data on potential ground water contamination from Class V (shallow) wells, including agricultural and stormwater drainage wells and large-capacity septic systems.
- Explore best management practices for protecting underground sources of drinking water.
- Work to address emerging underground injection issues including carbon sequestration and disposal of drinking water treatment residuals.

Finally, EPA will work with states and tribes to use Clean Water Act authorities to prevent contamination of waters that serve as public water supplies and are at high risk. The Agency will continue to actively encourage other federal programs to focus protection efforts in source water areas.

Water Infrastructure Security

The President has given EPA primary responsibility for facilitating the protection of the water sector, including drinking water systems. The Bioterrorism Act of 2002 required community water systems serving more than 3,300 people to develop vulnerability assessments and to certify emergency response plans.

With the compliance deadlines for these requirements having passed and most of this work now complete, the focus of EPA's water security program has shifted from identification of vulnerabilities to reduction of risks associated with these vulnerabilities. The program will provide the tools and assistance that the sector needs to prevent, detect, respond to, and recover from intentional acts and natural disasters. For example, EPA will aggressively promote the 14 features of an active and effective water security program as developed by the National Drinking Water Advisory Council, in addition to initiating efforts to measure progress within the sector with respect to risk reduction.

EPA will also encourage mutual aid agreements within states and regions. EPA will continue to provide training and exercises to improve the preparedness of the nation's water utilities.

EPA also will undertake two significant initiatives: (1) the Water Sentinel program, which will deploy and test a contamination warning system; and (2) the Water Alliance for Threat Reduction, which will provide direct water security training to drinking water utilities serving more than 100,000 people.

Collectively, these efforts will represent a robust approach for addressing the threats, vulnerabilities, and consequences facing the water sector.

Tribal Access to Safe Drinking Water

The 2002 World Summit on Sustainable Development in Johannesburg adopted the goal of reducing the number of people lacking access to safe drinking water and basic sanitation by 50 percent by 2015.⁶

In the United States, EPA will focus on providing infrastructure in tribal areas, with the 2015 goal of increasing the percentage of tribal homes with access to safe drinking water and basic sanitation by 50 percent from 2003 levels by 2015. EPA will contribute to this work through its support for development of drinking water facilities in Indian country and Alaska Native villages, using set-aside funds from the drinking water State Revolving Funds and Clean Water State Revolving Funds as well as targeted grants.

Other federal agencies, such as the Department of Health and Human Services, the Department of the Interior, and the Department of Agriculture, also play key roles in addressing this problem. EPA is working with these agencies to develop a coordinated strategy for improving access to water and sanitation.

In addition, Mexico Border infrastructure projects, and projects to improve water infrastructure in the Pacific Islands, described under Goal 4 (Healthy Communities and Ecosystems), will also increase access to safe drinking water and basic sanitation.

To Learn More: www.epa.gov/safewater/

Fish and Shellfish Safe to Eat

Some toxic contaminants that enter water bodies can move up the food chain and build up to levels that make fish unsafe to eat. States and tribes report they have issued fish consumption advisories for some 24 percent of river miles and 35 percent of lake acres.⁷

Shellfish also can accumulate disease-causing microorganisms and toxic algae. In 2003, shellfishing was prohibited in 9 percent of the acres that support shellfishing.⁸ EPA is working with states, tribes, and other federal agencies to improve water and sediment quality so all fish and shellfish are safe to eat and to protect the public from consuming fish and shellfish that pose unacceptable health risks.

Make More Fish Safe to Eat

Most fish consumption advisories today are issued because of unhealthy levels of mercury in fish. Although small amounts of mercury are discharged to waters, most

mercury in fish originates from combustion sources, such as coal-fired power plants and incinerators, which release it into the air. The mercury is then deposited by rainfall onto land and water, where it is methylated by bacteria and moves up the aquatic food web through fish to people.

EPA is working to reduce releases of mercury to the air through controls on combustion sources. For example, EPA expects that by 2011, federal market-based and other air regulatory programs will reduce electric-generating unit emissions of mercury by 10 tons from their 2000 level of 48 tons (see Goal 1 of this *Strategic Plan*).

Improving water and sediment quality is another key element of the strategy for making more fish safe to eat. Implementation of Clean Water Act programs will improve water quality by reducing discharges from stormwater systems, combined sewer overflows, and concentrated animal feeding operations, and by reducing runoff from nonpoint sources.

These water quality programs rely on sound scientific information concerning individual contaminants in fish. In 2001, EPA issued a criteria document under the Clean Water Act identifying maximum acceptable levels of methylmercury in fish tissue and will help states and tribes adopt the criterion into water quality standards. EPA expects that states and authorized tribes will begin adopting the new mercury fish tissue criterion in 2008.

EPA's methodology for calculating "human health criteria" for contaminants found in surface waters reflects research on the human health effects of contaminants and their potential in water to be concentrated in the food chain and to pose a greater risk to people who consume fish. EPA has partly recalculated the criteria for 83 pollutants and will be revising these criteria and additional criteria more completely over the next several years.

EPA is also working to restore the quality of aquatic sediment in critical water bodies, with special emphasis on the Great Lakes. In addition, EPA will use Superfund program authorities to restore the quality of sediment. To reduce the potential for future sediment contamination, EPA is working to reduce the use of polychlorinated biphenyls (PCBs), a major sediment contaminant, in electrical equipment. (See Goal 4 of this *Strategic Plan*.)

Another key element of EPA's strategy for making more fish safe to eat is expanding the amount and type of information about fish safety and making this information available to the public. EPA provides guidance to states and tribes on monitoring and issuance of fish consumption advisories. A total of 46 states and five tribes now follow these guidelines, and EPA is working to help all states and additional tribes assess fish safety.

A key public information tool is the Internet-based National Listing of Fish Consumption Advisories.⁹ This Web site allows states and tribes to enter their advisories and provides the public with information about the location of advisories, the fish that are affected, and the number of meals or amount of fish that a person can safely eat.

To Learn More:
www.epa.gov/waterscience/fish/

Make More Shellfish Safe to Eat

The safety of shellfish is managed through a partnership of the U.S. Food and Drug Administration (FDA), the Interstate Shellfish Sanitation Commission (ISSC), and coastal states. States monitor shellfishing waters and can restrict harvesting if shellfish are unsafe.

Because an effective system for monitoring the condition of shellfishing waters and limiting public exposure to unsafe shellfish is in place, shellfish harvesting is restricted in many acres of otherwise productive shellfishing waters. Restrictions can be the result of poor water quality due to anthropogenic activity (e.g. discharges from sewage treatment plants), but can also be due to naturally occurring algal blooms or for administrative reasons.

EPA is working through its surface water program to address anthropogenic sources that result in closures. EPA also continues to work with states, the FDA, the ISSC, and the National Oceanic and Atmospheric Administration (NOAA) to encourage them to improve conditions that result in an increase in the percentage of shellfishing acres open for harvesting.

The ISSC, working with states and federal agencies, has developed an information system that uses state monitoring data to pinpoint areas where shellfishing has been restricted. This information system, now in operation in 13 of 22 shellfishing states, enables EPA and the states to identify possible sources of pollutants restricting the use of shellfishing waters. This information can also be used to strengthen water pollution control activities, including development of watershed plans, implementation of National Estuary Program plans, issuance or reissuance of permits to point sources, enforcement of existing permits, and implementation of controls over polluted runoff.

To Learn More:
www.epa.gov/waterscience/shellfish/

Water Safe For Swimming

Recreational waters, especially beaches in coastal areas and the Great Lakes, provide outstanding recreational opportunities for many Americans. Swimming in some recreational waters, however, can pose an increased risk of illness as a result of exposure to microbial pathogens.

Beach closures to protect the public from harmful levels of pathogens can have significant economic impacts. In some cases, these pathogens can be traced to sewage treatment plants, malfunctioning septic systems, and discharges from stormwater systems and animal feeding operations.

EPA is implementing a three-part strategy to protect public health and the quality of the nation's recreational waters. The Agency will work to protect recreational water generally, control combined sewer overflows (CSOs), and protect public health by working with local beach managers to ensure proper notification of the conditions at public beaches along the coasts and Great Lakes.

Protect Recreational Waters

The first element of the strategy is broadly focused on all recreational waters. EPA is working with states to ensure that state-adopted criteria for pathogens and bacteria in waters designated for recreational use are current and scientifically sound. In a related effort, EPA has developed new analytic methods for monitoring pathogen levels at beaches and other recreational waters.

To protect and restore these waters, EPA works with state, tribal, and local governments to implement the core programs of the Clean Water Act. For example, developing and implementing total maximum daily loads (TMDLs) will generally benefit recreational waters that are impaired. The continuing implementation of the discharge permit program, urban stormwater controls, and nonpoint pollution control programs will also reduce pollution to recreational waters.

Proper management of onsite/ decentralized sewage treatment systems is critical to control of pathogens and ensuring that waters are safe for swimming. EPA will encourage state, tribal, and local governments to adopt voluntary guidelines for the sound management of these systems and to use Clean Water Revolving Loan Funds to finance systems where appropriate.

Control Combined Sewer Overflows

Full implementation of controls for overflows from CSOs is another key step in protecting recreational waters. These overflows release untreated sewage containing high levels of pathogens. CSOs, which occur in about 770 communities around the

country, can have a significant impact on the quality of recreational waters. EPA, states, and local governments are making steady progress toward reducing overflows under the “CSO Policy.”¹⁰

To Learn More: www.epa.gov/npdes/cso

Most communities with CSOs have now implemented basic control measures and 48 percent of permittees have adopted schedules for implementing Long Term Control Plans for CSOs. EPA is working to complete the development of Long Term Control Plans by 2011 and is monitoring the progress toward full implementation of the controls called for in these plans.

Protect Coastal and Great Lakes Beaches

The third element of the strategy to protect and restore recreational waters is focused on public beaches along coastal areas and the Great Lakes. Under the Beaches Environmental Assessment and Coastal Health (BEACH) Act, EPA provides grants to state, tribal, and local governments for programs to monitor beach water quality and notify the public when bacterial contamination poses a risk to swimmers.

Of the approximately 6,000 beaches nationwide, states have determined that some 2,756 are “significant” or “Tier I” beaches based on expected use and other criteria. EPA expects that 100 percent of these “significant” public beaches will be managed under the BEACH Act each year. EPA has set a goal that these significant beaches will be open 96 percent of the days of the beach season.

Finally, EPA will continue to expand public access to Internet-based beach information on its Web site. Governments receiving BEACH Act grants will provide information on water quality, beach monitoring and advisory programs, and beach closures. This will provide beach-goers with the information they need to make informed choices.

To Learn More: www.epa.gov/beaches/

OBJECTIVE 2.2: PROTECT WATER QUALITY. Protect the quality of rivers, lakes, and streams on a watershed basis and protect coastal and ocean waters.

Sub-objective 2.2.1: Improve Water Quality on a Watershed Basis. By 2012, use pollution prevention and restoration approaches to protect the quality of rivers, lakes, and streams on a watershed basis.

Strategic Targets:

- By 2012, attain water quality standards for all pollutants and impairments in more than 2,250 water bodies identified in 2002 as not attaining standards (cumulative). (2002 Baseline: 37,978 water bodies identified by states and tribes as not meeting water quality standards. Water bodies where mercury is among multiple pollutants causing impairment may be counted toward this target when all pollutants but mercury attain standards, but must be identified as still needing restoration for mercury; 1,703 of the 37,978 impaired water bodies are impaired by multiple pollutants including mercury.)
- By 2012, remove at least 5,200 of the specific causes of water body impairment identified by states in 2002. (2002 Baseline: estimate of 64,250 specific causes of water body impairment identified by states and tribes.)
- By 2012, improve water quality conditions in 213 impaired watersheds nationwide using the watershed approach (cumulative). (2002 Baseline: zero watersheds improved of an estimated 40,000/50,000 impaired watersheds with one or more water bodies impaired. The watershed boundaries for this measure are those established at the “12-digit” scale by the U.S. Geological Survey (USGS). Watersheds at this scale average between 16 and 36 square miles in size. “Improved” means that one or more of the impairment causes identified in 2002 are removed for at least 40 percent of the impaired water bodies or impaired miles/acres; or there is significant watershed-wide improvement, as demonstrated by valid scientific information, in one or more water quality parameters or related indicators associated with the impairments.)
- By 2012, the condition of the nation’s wadeable streams does not degrade (i.e., there is no statistically significant increase in the percent of streams rated “poor” and no statistically significant decrease in the streams rated “good”). (2006 Baseline: Wadeable Stream Survey identifies 28 percent of streams in good condition; 25 percent in fair condition; 42 percent in poor condition.)
- By 2012, improve water quality in Indian country at not fewer than 10 percent of baseline monitoring stations in tribal waters (i.e., show improvement in one or more of seven key parameters: dissolved oxygen, pH, water temperature, total nitrogen, total phosphorus, pathogen indicators, and turbidity). (2006 Baseline: 35 tribes provide water quality data to EPA; number of monitoring stations to be determined by August 2006.)
- By 2015, in coordination with other federal partners, reduce by 50 percent the number of homes on tribal lands lacking access to basic sanitation. (2003

Baseline: Indian Health Service data indicate that 8.4 percent of homes on tribal lands lack access to basic sanitation [i.e., 26,777 homes of an estimated 319,070 homes lacking access].)

Sub-objective 2.2.2: Improve Coastal and Ocean Water. By 2011, prevent water pollution and protect coastal and ocean systems to improve national coastal aquatic ecosystem health by at least 0.2 points on the “good/fair/poor” scale of the National Coastal Condition Report. (2004 Baseline: national rating of “fair/poor,” or 2.3, where the rating is based on a 4-point system ranging from 1.0 to 5.0 in which 1 is poor and 5 is good using the National Coastal Condition Report indicators for water and sediment, coastal habitat, benthic index, and fish contamination).

Strategic Targets:

- By 2011, at least maintain aquatic ecosystem health on the “good/fair/poor” scale of the National Coastal Condition Report in the Northeast Region. (2004 Baseline: Northeast rating of 1.8)
- By 2011, at least maintain aquatic ecosystem health on the “good/fair/poor” scale of the National Coastal Condition Report in the Southeast Region. (2004 Baseline: Southeast rating of 3.8)
- By 2011, at least maintain aquatic ecosystem health on the “good/fair/poor” scale of the National Coastal Condition Report in the West Coast Region. (2004 Baseline: West Coast rating of 2.0)
- By 2011, at least maintain aquatic ecosystem health on the “good/fair/poor” scale of the National Coastal Condition Report in the Puerto Rico Region. (2004 Baseline: Puerto Rico rating of 1.7)
- By 2011, 95 percent of active dredged material ocean dumping sites will have achieved environmentally acceptable conditions (as reflected in each site’s management plan). (2005 Baseline: 94 percent)

Means and Strategies for Achieving Objective 2.2

Improve Water Quality On A Watershed Basis

To improve water quality on a watershed basis, EPA will focus its work with states, interstate agencies, tribes, local governments, and others on three key areas:

- Maintain strong core clean water programs with greater emphasis on watershed protection.

- Strengthen efforts to identify impaired waters and restore these waters on a watershed basis.
- Invest in water infrastructure and strengthen management practices to improve the sustainability of water systems.

Maintain Strong Core Programs

To build on the progress toward clean water of the past 30 years, EPA will work with states and tribes to operate four key elements of the Clean Water Act:

- Scientifically sound water quality standards.
- Effective water monitoring.
- Strong programs for control of nonpoint sources of pollution.
- Strong discharge permit programs.

Water Quality Criteria and Standards

State and tribal water quality standards provide the environmental baselines for water quality programs. EPA provides scientific information concerning contaminants in the form of “water quality criteria” and supports state and tribal adoption of water quality standards that protect water for such uses as swimming, public water supply, and fish and wildlife.

EPA’s investment in the science needed to support state water quality standards is focused on several key areas:

- Improving the science relating to nutrient criteria.
- Developing the science for a new generation of pathogen criteria for ambient water.
- Determining how to address PPCPs (pharmaceuticals and personal care products) found in the aquatic environment.
- Developing criteria methodology for water body sedimentation.
- Developing analytic methods needed to support criteria.

In working with states and tribes to improve standards, EPA will:

- Assist states as they move from defining to adopting numeric nutrient criteria.
- Encourage the utilization of use attainability.
- Issue guidance for implementing new water quality criteria in state and tribal programs.
- Work with states to adopt appropriate pathogen criteria for recreational waters.
- Expand the number and range of biological criteria.

Finally, EPA will work with states and tribes to ensure the effective operation and administration of the standards program. For example, all states and authorized tribes are expected to review and revise their standards every 3 years if necessary. In addition, EPA must promptly review and approve or disapprove changes to standards.

To Learn More:

www.epa.gov/waterscience/standards/

Water Quality Monitoring

Over the next 5 years, EPA will assist states and tribes in significantly improving information concerning the condition of the nation's rivers, lakes, streams, and wetlands. Top priorities for this work are:

- Continuing the long-term cooperative EPA/state surveys of the condition of waters, with surveys of lakes and rivers following the recent survey of wadeable streams.
- Implementing water-monitoring strategies adopted by states and tribes on established schedules.
- Expanding use of the Assessment Database and integrated reporting of water quality conditions, including identification of impaired waters.
- Expanding use of STORET, the national water quality data warehouse.

This monitoring work will be coordinated with assessments of fish tissue contamination, the condition of water at beaches, the condition of coastal waters, and the condition of ground water.

To Learn More:

www.epa.gov/owow/monitoring/

Nonpoint Source Pollution Control

Nonpoint pollution degrades water quality in many of the water bodies throughout the country. State nonpoint control programs under section 319 of the Clean Water Act are critical to reducing nonpoint pollution.

EPA will work with states to maintain core programs for reducing nonpoint pollution through implementation of best management practices, including education and technical assistance. A critical step in this effort is for EPA to forge strategic partnerships with a broad range of agricultural interests at all levels. EPA will work with the U.S. Department of Agriculture (USDA) to ensure that federal resources, including

grants under section 319 of the Clean Water Act and funds available through the programs managed by USDA, are managed in a coordinated manner.

As part of this effort, EPA will work with states on developing and implementing watershed-based plans, focused on watersheds with impaired water quality caused by nonpoint sources. These plans are a mechanism to coordinate monitoring and planning on a watershed basis and will build a foundation for effective implementation actions using federal and other funding.

To Learn More: www.epa.gov/owow/nps/

Discharge Permit Program

The National Pollutant Discharge Elimination System (NPDES) requires point sources discharging to the nation's waters to have permits for those discharges and requires pretreatment programs to control discharges from industrial facilities to sewage treatment plants.

EPA has five key objectives for the program:

- Continue to strengthen management of the permit program.
- Advance program innovations including watershed permitting and water quality trading.
- Implement wet-weather point source controls.
- Maintain effective pretreatment of discharges to sewage treatment plants.
- Develop new or revised national regulations addressing key industrial sources of pollution.

EPA worked with states over the past several years to develop a *Permitting for Environmental Results Strategy* to address concerns about the backlog in issuing permits and the health of state NPDES programs. The *Strategy* was designed to assess program integrity, foster efficient permitting operations, and increase data quality, including modernizing the Permits Compliance System. Over the next several years, EPA will monitor the implementation of several hundred follow-up actions that resulted from the assessments to assure a strong NPDES program.

Implementing Core Programs on a Watershed Basis

EPA and states are working to deliver core Clean Water Act programs on a watershed basis. Some examples include:

- Nonpoint pollution control projects focused on watersheds needing restoration.
- Watershed-scale discharge permits.
- Water quality trading.
- Watershed scale assessment of infrastructure needs.
- Demonstration of watershed scale program integration through targeted watershed assistance grants.

In addition, EPA and states are fostering the collaborative efforts of diverse partners to protect the health of watersheds by building local institutions to provide stewardship of water resources on a sustained basis.

To assist states with improving the operational efficiency of permit programs, EPA will continue to develop and deploy electronic tools such as the electronic Discharge Monitoring Report, electronic permitting, and electronic Notices of Intent to be covered by a general permit, as well as delivery of a new performance tracking system called the Integrated Compliance Information System-NPDES.

EPA will continue to support states in expanding the use of innovative permit tools to improve water quality on a watershed scale. The momentum is building for watershed-based permitting and pollutant trading and over the next 5 years EPA expects to begin to see the results of early efforts. To date, approximately 98 dischargers have carried out trades under NPDES permits. As more permits incorporate trading options, trading is expected to increase.

Wet weather discharges are a significant cause of water pollution and are a top priority for the permit program. State and local governments have issued permits to control storm water from industrial sites, construction sites and municipal separate storm sewers. EPA will work to ensure that these permits are reissued promptly when they expire and will monitor the extent to which those entities needing a permit are covered by a permit.

EPA is revising rules for discharges from Concentrated Animal Feeding Operations (CAFOs) to reflect court findings. EPA expects that, after the revised rules take effect in 2007, permits will be issued promptly, and CAFOs will begin developing and implementing nutrient management plans. Projected pollution reductions from this effort include 166 million pounds of nutrients and 2 billion pounds of sediments over 5 years.

Permit Compliance

EPA will continue working with states to address and resolve significant noncompliance with NPDES permits in a timely manner, including placing emphasis on occurrences of significant noncompliance where effluent exceedances may contribute to impaired waters. EPA will continue to work with states and sewage treatment plants to improve compliance with permit conditions.

EPA will continue to implement and strengthen the pretreatment program by providing tools to assist states and localities in their activities. EPA and states will monitor the percentage of significant industrial facilities that have control mechanisms in place to implement pretreatment requirements prior to discharging to publicly owned treatment works.

Most industrial facilities discharging directly to water bodies or to sewage treatment plants have permit limits or pretreatment controls based on national regulations developed for the class of industrial activity. Regulations are now in place for more than 50 industrial classes.

Over the next 5 years, EPA will consider new wastewater regulations for airport deicing and drinking water treatment residuals, and will consider revising regulations for some chemical manufacturers. EPA will publish Effluent Guidelines Plans every other year that summarize the Agency's findings about the sources, volume, and toxicity of industrial discharges and the need for new or revised regulations.

To Learn More: cfpub.epa.gov/npdes/ and www.epa.gov/waterscience/guide/plan/

Restore Impaired Waters on a Watershed Basis

EPA is working with states, interstate agencies, and tribes to expand and strengthen efforts to restore impaired waters with the goal of restoring, by 2012, at least 2,250 of the 37,978 waters identified by states as impaired in 2002.

Key elements of the strategy to restore impaired waters include:

- Improve data relating to the location and nature of impairments.
- Organize TMDLs on a water body and a watershed basis.
- Maintain aggressive efforts to complete TMDL development.

- Expedite implementation of pollution control actions called for in TMDLs and other plans, giving special attention to “high priority” discharge permits.
- Implement watershed scale restoration in more than 200 “12- digit” scale watersheds.

In a related effort, EPA is working to restore and protect large-scale ecosystems around the country. This work is described in Goal 4 of this *Strategic Plan*.

States identify impaired waters (i.e., waters where one or more of the uses designated in water quality standards is not being attained) in reports to EPA. Over the next several years, EPA will continue to work with states to coordinate identification of impaired waters with overall water quality assessments and to improve data concerning the location of impaired waters and the causes of impairments. As these data improve, EPA and states will be able to identify watersheds where impaired waters are clustered together and better understand likely impairment causes and remedies.

This improved data will also help states refine schedules for the development of TMDLs so that the TMDLs needed to restore a group of impaired waters can be developed in a coordinated manner. EPA is encouraging states to develop TMDLs for these waters on a watershed basis because watershed-based TMDLs are less expensive to develop and create the opportunity for coordinated implementation of response programs and innovations such as water quality trading and watershed-based permitting. Trading is a valuable tool that allows sources of pollutants to share responsibility for controlling their discharges within a watershed and to reduce pollutants at the lowest cost.

Understanding that restoration of impaired waters can often best be accomplished through the coordinated development of TMDLs and implementation of restoration actions on a watershed scale, EPA will work with states to develop watershed restoration plans focusing on small, “12-digit” watersheds defined by USGS. These plans will demonstrate how to coordinate the planning and implementation of pollution control actions to accomplish improvements in water quality. EPA will work with states to initiate a significant number of watershed restoration plans, with the goal of generating documented water quality improvement in more than 200 watersheds by 2012.

EPA will also continue working with states to develop TMDLs consistent with state TMDL development schedules and court-ordered deadlines. States and EPA have made significant progress in the development and approval of TMDLs and expect to maintain the current pace of approximately 3,500 TMDLs completed and approved per year.

The significant investment in development of TMDLs since 2000 has resulted in the cumulative completion of over 19,000 TMDLs across the country. As more TMDLs

are developed to support those already in place, an increasing number of impaired water bodies and watersheds will be ready for implementation of pollution control and restoration efforts.

To Learn More: www.epa.gov/tmdl/

Meeting the water body restoration goal will require that EPA and states carefully define and schedule restoration actions resulting from TMDLs. In some cases, a single permit revision or enforcement action may bring about restoration. In other cases, water body or watershed scale restoration plans linking point source controls, nonpoint source management practices, and financing support will be needed.

Improving Tribal Water Quality

EPA has set a goal of improving water quality at monitoring stations on tribal lands. A key step in this effort is the development of tribal water quality standards and monitoring strategies.

EPA will also work with tribes to develop nonpoint pollution programs under section 319, expand and strengthen water permit programs, and develop tribal wetlands programs.

EPA will assist tribes in developing watershed plans for protecting water quality and will involve tribes in the development of TMDLs related to tribal waters.

Wastewater infrastructure issues on tribal lands will be addressed using funds set-aside from Clean Water State Revolving Funds and Alaska Native Village Sanitation Grants. Increasing access to basic sanitation and safe drinking water on tribal lands is addressed in Section 2.1.1 of this *Strategic Plan*.

In support of this effort, EPA will refine the selection and issuance of “high-priority” permits – those expired permits that states determine have significant environmental impacts – to ensure they address factors such as location on impaired waters, incorporation of new TMDLs and water quality standards, and potential to contribute to watershed restoration. EPA will continue to ensure that these critical permits are issued promptly while also maintaining a high level of overall permit currency to maintain program integrity.

Support Sustainable Wastewater Infrastructure

One of the most critical challenges facing the nation is how to sustain water and wastewater infrastructure systems. Existing systems are aging, with some components older than 100 years, and a growing and shifting population requires continued

investment for new and existing infrastructure. Recognizing the substantial remaining need for wastewater infrastructure, EPA expects to continue to provide annual capitalization to CWSRFs in future years. This continued federal investment in state revolving funds, along with other traditional sources of financing (including increased local revenues) will result in significant progress toward addressing the nation's wastewater treatment needs.

EPA's *Gap Analysis Report* (2002) estimated that if capital spending and investments in operations and maintenance for wastewater infrastructure remained at current levels, the potential gap in funding between 2000 and 2019 would be about \$270 billion. In addition, investment in research and development has declined and many utilities have not focused attention on managing for long-term sustainability.

The nation must embrace a fundamental change in the way it manages, views, values, and invests in water infrastructure. This can only occur if all parties embrace a collaborative approach focused on finding effective, efficient, and fair solutions. As one partner in a much larger effort, EPA's main role will be to facilitate the efforts by others to help ensure sustainable water infrastructure.

EPA has developed a *Sustainable Infrastructure* organized around four main themes, or "pillars":

- **Sustainable Management Practices:** In collaboration with leading utilities and associations, EPA will promote greater adoption of sustainable utility management practices. EPA will sign agreements with leading national organizations describing a number of key steps, including finalization of a national strategy in early 2007.
- **Water Efficiency:** EPA will develop a voluntary, partnership program to enhance the market for water-efficient products, modeled after the highly successful ENERGY STAR program, to provide consumers with information regarding the water use and performance of a variety of water-using equipment and products.
- **Full Cost Pricing:** EPA will identify the range of approaches used to set rate structures based on full cost pricing, collect "lessons learned" from utilities implementing those structures, and use that data to provide a range of options on full-cost pricing to meet the disparate needs of communities.
- **A Watershed Approach:** EPA will work with utilities, watershed organizations, and others to provide tools and information that will facilitate a watershed approach for making key infrastructure decisions.

EPA is developing a new Internet-based Clean Watersheds Needs Survey (CWNS) data system to allow local communities and states to more easily enter and update information on their pollution prevention and treatment project needs. In support of sustainable infrastructure management, the CWNS data will be easily accessible for purposes such as project prioritization and Internet mapping analyses.

EPA will also undertake a major research and development initiative to identify unmet water infrastructure needs that can be addressed through innovation.

Clean Water State Revolving Funds (CWSRFs) are another tool to help support sustainable infrastructure management. CWSRFs provide low-interest loans to help finance wastewater treatment facilities and other clean water projects. These projects are critical to continuing the gains in public health and water quality of the past 30 years.

As of early 2006, the federal government had invested over \$23 billion in CWSRFs.¹¹ The revolving nature of the funds and substantial additions from states have magnified that investment so that \$55 billion has been available for loans.¹²

Over the next 5 years, EPA will work with CWSRFs to meet several key objectives:

- Fund projects designed as part of an integrated watershed approach, including repairing or upgrading onsite treatment systems.
- Link projects to environmental results through the use of scientifically sound data.
- Maintain the CWSRF's excellent fiduciary condition.

A portion of CWSRF funding is a set-aside each year for investment in water infrastructure improvements on tribal lands, included expanding access to basic sanitation.

To Learn More:

www.epa.gov/owm/cwfinancing/

Improve Coastal And Ocean Waters

Coastal and ocean waters are environmentally and economically valuable to the nation. Assessments of coastal regions of the country through the National Coastal Condition Report indicate that coastal waters are improving overall for a composite score of 2.0 in 2001 to 2.3 in 2004. Of the five major coastal regions (i.e., the four addressed here and the Gulf of Mexico region addressed in Goal 4 of this *Strategic Plan*), four regions showed improvement from 2001 to 2004, with only the Northeast Coast holding constant at 1.8. (The Puerto Rico Region was not assessed in 2001.)

Key programs focused on and critical to improving coastal waters are:

- Assessing coastal conditions
- Reducing vessel discharges
- Controlling coastal nonpoint pollution
- Managing dredged material
- Managing non-indigenous invasive species
- Supporting international marine pollution control

In addition, coordinating these efforts with those of other federal agencies, states, tribes, and public and private parties is essential. Improving coastal waters will depend on successful implementation of pollution controls in inland watersheds .

Progress in protecting and restoring coastal waters is also directly tied to geographically focused projects, such as the key estuaries addressed by the National Estuary Program, as well as programs to protect coastal ecosystems including the Chesapeake Bay, Gulf of Mexico, Long Island Sound, South Florida ecosystem, Puget Sound, and Columbia River Basin. These programs are described under Goal 4 of this *Strategic Plan*.

Assess Coastal Conditions

Progress in meeting the strategic goals for coastal waters will be tracked through the National Coastal Condition Report, created in 2002 as a cooperative project of EPA, NOAA, USDA, and the Department of Interior (DOI). The report describes the ecological and environmental condition of U.S. coastal waters according to five key indicators. EPA and other federal agencies will review changing conditions and periodically issue updated assessments of the health of coastal waters.

In support of this work, EPA is developing indices for measuring the health of coral reefs and monitoring compliance with environmental requirements at ocean dumping sites.

To Learn More:

www.epa.gov/owow/oceans/nccr/

Reduce Vessel Discharges

To improve the health of the nation's ocean and coastal waters, EPA will focus on addressing discharges of pollution from vessels. Key work includes:

- Assessing the need for and developing discharge standards for cruise ships operating in Alaskan waters.

- Cooperating with the Department of Defense to develop discharge standards for certain armed forces vessels.
- Assessing the effectiveness of the program to reduce sewage discharges from vessels.

Implement Coastal Nonpoint Source Pollution Programs

Rapid population growth in coastal areas can result in significant increases in pollution from nonpoint sources. For the past 15 years, EPA and NOAA have been working with coastal and Great Lakes states to improve and expand programs to reduce nonpoint source pollution in the “coastal zone” identified by states.

Most states have used federal grant funds to develop coastal nonpoint programs and EPA and NOAA are working with the remaining states to complete the program by providing continued support and assistance. These nonpoint control programs, focused on the critical coastal zone areas, play an important role in accomplishing the environmental improvements sought for coastal waters.

Manage Dredged Material

Several hundred million cubic yards of sediment are dredged from waterways, ports, and harbors every year to maintain the nation's navigation system for commercial, national defense, and recreational purposes. All of this sediment must be disposed of safely. EPA and the U.S. Army Corps of Engineers (the Corps) share responsibility for regulating how and where the disposal of sediment occurs.

EPA and the Corps will focus additional resources on improving disposal of dredged material, including evaluating disposal sites, designating and monitoring the sites, and reviewing and concurring on the disposal permits issued by COE.

EPA is also working with its state partners and other federal agencies, including COE, the Fish and Wildlife Service, and the U.S. Coast Guard, to ensure that dredged material management plans, which include provisions for the beneficial reuse of dredged material, are developed and implemented in major ports and harbors.

EPA has adopted a goal of having 95 percent of active dredged material ocean dumping sites meeting environmentally acceptable conditions, as reflected in the site management plan. EPA will use the new capability provided by the Ocean Survey Vessel *Bold* to monitor compliance with environmental requirements at these ocean sites and to conduct other ocean studies.

Manage Invasive Species

One of the greatest threats to U.S. waters and ecosystems is the uncontrolled spread of invasive species, such as zebra mussels. Invasive species commonly enter U.S. waters through the discharge of ballast water from ships. Although the majority of these organisms never become established in a new ecosystem, an increasing number of them are harming the environment and local economies and posing risks to human health.

EPA is assisting the U.S. Coast Guard in its efforts to develop ballast water discharge standards and is addressing this issue at the international level.

Support International Marine Pollution Control

EPA works closely with the U.S. Coast Guard, NOAA, and the Department of State to address environmental threats to U.S. waters that require international cooperation.

Recognizing the effect of international shipping on the quality of the U.S. waters, EPA is heavily involved in the negotiation of international standards at the International Maritime Organization. These standards are the principal mechanism EPA is using to address invasive aquatic species, tributyltin and other harmful antifoulants, and marine debris. Work is currently underway to develop guidelines under a global treaty (not yet in force) designed to prevent further introductions of invasive aquatic species through ballast water.

EPA is also engaged in cooperative efforts to reduce other sources of pollution affecting the Gulf of Mexico, Great Lakes, Arctic Ocean, Straits of Florida, and the Wider Caribbean Basin.

To Learn More:
www.epa.gov/owow/oceans/

OBJECTIVE 2.3: ENHANCE RESEARCH TO SUPPORT CLEAN AND SAFE WATER. By 2011, conduct leading-edge, sound scientific research to support the protection of human health through the reduction of human exposure to contaminants in drinking water, fish and shellfish, and recreational waters and to support the protection of aquatic ecosystems—specifically, the quality of rivers, lakes, and streams, and coastal and ocean waters.

Means and Strategies for Achieving Objective 2.3

EPA conducts dedicated research programs to support both the drinking water and water quality program. Additional research related to human health and ecological issues conducted in support of the Healthy Communities and Ecosystems Goal of this *Strategic Plan* also supports drinking water and clean water programs.

Progress toward research goals is assessed through a suite of metrics that is tailored to measuring the impacts of the outcomes of the respective research programs. Among the measurable factors are: independent expert review panel ratings on the extent to which clients utilize EPA research products; composite scores on a client survey designed to gather data on product utility and perceptions of use; and the results of bibliometric and/or client document analyses demonstrating the actual use of EPA research products. These factors are applied to measure success in providing the results identified in the research programs that follow.

Drinking Water Research Program

The Drinking Water Research Program (DWRP) supports the needs of the Office of Water, regions, states, tribes, municipalities and utilities, producing research products that DWRP clients use to inform their critical decisions associated with implementing the Safe Drinking Water Act (SDWA). The SDWA Amendments of 1996 direct EPA to conduct research to strengthen the scientific foundation for standards that limit public exposure to drinking water contaminants. This program will produce measurable benefits in the form of enhanced decisions for the six-year review of drinking water standards and contaminant candidate listing decisions.

DWRP science and engineering research will be executed by strategic use of the skills and facilities available in the Office of Research and Development (ORD) laboratories, by expertise at universities through ORD's STAR Grants program, and by cross-agency collaborations such as those established with the Centers for Disease Control and Prevention, the National Institute for Environmental Health Sciences, and USGS.

DWRP will coordinate its research portfolio with extramural organizations conducting complimentary research including the American Water Works Association Research Foundation, the Water Environment Research Foundation, and the Global Water Research Coalition. The program will continue to emphasize the use and development of genomic and proteomic-based techniques and methods.

The Office of Water performs risk assessments in support of regulatory determinations for candidate drinking water contaminants and other risk management activities, including perfecting methods to assess exposure, conducting health effects studies on contaminant mode of action and dose-response, developing analytical methods to monitor contaminants, and determining treatment, performance, and cost parameters.

Regions, states, tribes, municipalities and utilities often need technical advice to put new and revised drinking water regulations into action. The DWRP will develop

drinking water treatment strategies, compliance monitoring methods, and tools for source water protection to assist these clients with meeting regulations.

The Safe Drinking Water Act requires review of existing regulations on a six-year cycle. The DWRP will assist the Office of Water in these reviews by conducting research to update the science and engineering information used in the rule including, for example, studying newly identified modes of toxicity, improving monitoring methods, improved treatment approaches, and increasing understanding of the impact of distribution systems on water quality.

Water Quality Research Program

The Water Quality Research Program (WQRP) provides timely, leading-edge water quality research products and information to the Office of Water, EPA regions and states for use in support of regulatory and non-regulatory activities that, when implemented, result in environmental and/or human health benefits. This program will produce measurable benefits in the form of:

- stronger criteria for the protection of human health and ecosystems as related to designated uses for aquatic systems;
- increased use of diagnostics and forecasting techniques for the protection of human health and ecosystems as related to designated uses for aquatic systems; and
- selection, placement, and management of sustainable watershed technologies to 1) restore impaired aquatic systems, 2) protect unimpaired systems, 3) provide human health risk and treatment process information on the beneficial use of biosolids, and 4) forecast the ecologic, economic, and human health benefits of alternative approaches to attaining water quality standards.

Research under these goals is intended to lead to the promulgation of protective standards; the identification of contaminant contributions to impaired waters; and the utilization of tools needed to restore and protect the nation's waters with due consideration of point and nonpoint sources of contamination and including the treatment and beneficial use of biosolids. Thus, the research directly contributes to the Agency's water related environmental outcomes.

In establishing research priorities, the water quality research program relies on the inputs of the Office of Water (Office of Science and Technology; Office of Wetlands, Oceans, and Watersheds; and the Office of Wastewater Management). In turn, the research priorities identified by these clients are inclusive of the research needs of the EPA regions and states that have provided input to the development of the EPA *Strategic Plan*.

HUMAN CAPITAL

Over the past 20 years, EPA has delegated to state governments much of its authority to protect surface water and drinking water. As a result, EPA's role has shifted from directly implementing water programs to providing guidance and assistance to, and coordinating financial and information resources for, partners and stakeholders. EPA continues to be responsible for coordinating national water policy and evaluating water programs, as well as for direct program implementation of certain programs for some states and tribes.

EPA's changing role in protecting water quality means that the Agency's workforce must be increasingly competent in areas such as communication, policy development, and management of contracts and assistance agreements in addition to engineering and life sciences. The Office of Water has initiated the establishment of a *Workforce Council* that will review the implementation of workforce initiatives and will advise senior managers on priorities for improving quality of work life.

EPA's Office of Water is assessing the optimal skill mix needed to fulfill mission-critical assignments, as well as the distribution of tasks among those positions and expected trends in staff retirements. The Office of Water has formed a *Recruitment Council*, composed of staff and managers, to plan and coordinate participation in job fairs, train employees on the recruitment process, and improve recruitment information sharing. In addition, water program offices have established or are working to establish ongoing ties to historically black colleges as well as other colleges and universities, in order to create opportunities for ensuring a diverse workforce into the future.

Recognizing that today's staff members are tomorrow's leaders, the National Water Program has initiated several long-term efforts to provide training and career guidance to employees. The *Water Careers* program in the Office of Water provides employees with a variety of opportunities for training and development related to creating Individual Development Plans, mentoring and coaching, and leadership. About 100 water program staff members have participated in this leadership development program, instituted in 2002. The Office of Water also provides expert training in water program topics to both EPA employees and state water program employees. Three key training programs are the Drinking Water Academy, the Water Quality Standards Academy, and the NPDES Permit Writer's Course.

PERFORMANCE MEASUREMENT

In Goal 2, most of the strategic targets (or measurable objectives and sub-objectives) are measurable and reportable on an annual basis. These annual performance goals and measures are established in the Agency's Annual Plan and Budget and reportable results are documented in EPA's annual Performance and Accountability Report.

For the research sub-objective, EPA will track annual progress toward expected long-term results by means of multiple, objective-based measures of customer satisfaction, product impact and quality, and efficiency.

Influences of Environmental Indicators on the Strategic Plan

The Agency is working to improve the expression of long-term, outcome-oriented commitments. In this Clean and Safe Water Goal, EPA has developed new strategic targets drawing from sources such as program evaluations and the environmental indicators that will be included in the forthcoming *Report on the Environment* (ROE). The first measure addresses the chemical, biological and physical condition of wadeable streams. The second measure expresses the mercury blood-levels of women of child-bearing age, a reflection of the health risk from consuming contaminated fish. Through the ROE, the Agency will routinize the updating and improvement of scientifically-sound environmental indicators. The latest version of the ROE as well as information associated with the new ROE can be found at <http://www.epa.gov/indicators/index.htm> .

Future Improvements to Performance Measurement

In addition to the revisions and improvements incorporated when developing this *Strategic Plan*, the Agency made a preliminary assessment of longer-term opportunities for such improvements. Based on this assessment, EPA will work to expand and sustain a scientifically-sound, statistically-valid monitoring regimen to characterize the condition of the nation's waters, to advance measurement of water quality conditions on tribal lands and to improve measures related to environmental justice.

Environmental Justice Measures

The National Water Program is participating on the Agency-wide effort to develop and strengthen measures to ensure that the environmental and public health benefits of programs are equitably shared among all citizens. Within this Clean and Safe Water Goal, EPA has developed measures of compliance with drinking water standards by tribal water systems as well as access to safe drinking water and basic sanitation on tribal lands.

In the future, the National Water Program expects to be able to use Agency definitions of geographic areas meeting criteria related to "environmental justice" and develop measures of progress with respect to drinking water safety and restoration of impaired waters in these areas. EPA will strive to deliver program resources so that progress toward clean and safe water in these areas is as good or as better than progress reported nationwide.

CLOSING THE FEEDBACK LOOP: PERFORMANCE ASSESSMENTS AND PROGRAM EVALUATIONS

The National Water Program is committed to affirmative assessment of performance and adaptive management to strengthen performance and enhance results. Over the next 5 years, the National Water Program will implement a program performance process including the following key steps:

- Define 5-year environmental goals and program strategies in this *Strategic Plan*.
- Define annual increments of progress under program measures.
- Assess performance of individual water programs.
- Annually summarize all program evaluations in a single assessment report and revise and strengthen management practices.

Role of Annual Program Guidance

The National Water Program publishes annual program guidance that expresses the goals and objective of the *Strategic Plan* in annual, operational terms. The annual guidance includes annual targets for environmental measures from the *Strategic Plan* but also includes measures of program performance. The annual guidance also includes more detailed directions for program management to reflect priorities of that year and the results of performance assessments. A key function of the annual guidance is to strengthen the link between program grants to states, tribes, and others to the environmental goals in the *Strategic Plan*.

The “targets” described in the annual guidance are developed into more formal “commitments” in grant workplans as a result of negotiations among regions, states, and tribes during the spring and summer prior to the start of the fiscal year. These annual commitments define, in an operational sense, the “strategy” for the National Water Program for coming fiscal year. Selected measures and commitments are included in the organizational assessments used to assess the performance of individual EPA managers.

Assessments of Programs and Regions

The National Water Program assesses the performance of individual programs and EPA regions on a continuing basis. Some of these assessments are internal and others are conducted by outside organizations.

Each year, the Office of Water visits three to four EPA regional offices and Great Water body offices to conduct dialogues on program management and performance. These visits include assessment of performance in the region against the measures in the *Strategic Plan*; regional water issues identified in the Regional Plan; and the annual state/tribal program commitments. These assessments help identify program

innovations or “best practices” developed by the region, states, tribes, watershed organizations, and others, and these practices can be described in water program performance reports and more widely adopted throughout the country.

In addition to looking at the performance of the National Water Program at the national level and performance in each EPA region, individual water programs are evaluated periodically by EPA and by outside organizations such as the EPA Office of Inspector General, the Government Accountability Office, the Office of Management and Budget, and the National Academy of Sciences.

For the past several years, EPA has worked with states to assess implementation of the NPDES permit program. This “Permitting for Environmental Results” process included review of core program authorities, and identification of improvements in program management needed in each state. EPA is now working with states to implement almost 300 specific follow-up actions designed to strengthen program implementation.

EPA used program evaluations developed over the past several years in formulating this *Strategic Plan*. For example, an evaluation of the Agency’s work with states and tribes to implement clean water programs on a watershed basis by the EPA Inspector General resulted in important changes to the measure of progress related to watersheds in the *Strategic Plan*. The Inspector General identified issues in the methodology for the watershed measure in the previous *Strategic Plan* and recommended that EPA both improve the design of the measure and revise supporting measures of program activity.

EPA responded to these recommendations by developing a new measure for the *Strategic Plan* related to watersheds (i.e. new measure addressing improvement in water quality in “12 digit” watersheds) and expanding and revising watershed related program activity measures in the annual National Water Program *Guidance*. The new watershed measure in the *Strategic Plan* addresses smaller geographic areas than the measure in the previous *Strategic Plan* and is more flexible in that it recognizes improvement in water quality as well as full restoration of impaired waters.

Another evaluation study that influenced the development of this *Strategic Plan* addressed the implementation of programs to protect sources of drinking water. Responding to the assessment by the Inspector General, EPA national program managers worked with regional managers and states and tribes to revise and simplify measures related to source water protection. As a result of this effort, EPA was able to define a target for the implementation of source water protection programs by 2011 that is both ambitious and realistic.

PART Reviews

Some of the water programs reviewed under the Program Assessment and Rating Tool (PART) include, along with their rating of program effectiveness:

- Public Water Supply Supervision – Adequate
- Underground Injection Control – Adequate
- Surface Water Protection – Moderately Effective
- Oceans and Coastal Protection – Adequate

The EPA Board of Scientific Counselors (BOSC) and the Office of Management and Budget (OMB) evaluated the Drinking Water Research Program in 2005. The BOSC found that the program is relevant and critically important to EPA's mission in protecting human health and the environment and is focused on high quality research of national importance.

OMB found that the program has developed annual and long-term measures of performance, coordinates its work with other agencies, employs good oversight of competitively awarded grants, and requires grantees to work toward program goals. Input from these evaluations was instrumental in revision of long-term drinking water research plans.

The Office of Water participates in development of EPA's Performance and Accountability Report at the end of the year and progress on many of the outcome measures identified in this *Strategic Plan* is described in this report.

In addition, the National Water Program prepares a performance report at the mid-point in each fiscal year and the end of each fiscal year based on data describing progress under both environmental and program measures. These water program annual reports include conclusions and recommended actions to improve performance by responding to specific instances of poor performance, disseminating "best practices," and informing the development of future annual guidance and strategic plans. Examples of performance improvements identified through this process include the need to expand clean water and drinking water program integration, the need to reduce data reporting lags in the drinking water program, and the need to expedite reviews of tribal water quality standards.

Finally, the Office of Water will maintain program performance records and, to the extent possible, use this information to identify trends in program performance.

To Learn More:
www.epa.gov/water/waterplan/

EMERGING ISSUES AND EXTERNAL FACTORS

In the fall of 2005, the Office of Water held a national meeting to identify and explore emerging issues of significance to clean and safe water. EPA will continue to gather information about these issues described below, and use insights gained from this work in both strategic and operational planning.

Decaying Water Infrastructure: A significant percent of municipal wastewater infrastructure, built in the 1970s and 1980s with EPA funding, is now reaching the end of its design life and will need to be replaced. Drinking water distribution systems are also failing at increasing rates. EPA's commitment to advancing sustainable infrastructure using the "four pillars" of sound water infrastructure management, discussed previously, is intended to address this issue.

Water Scarcity: Demand for water for municipal and other uses is growing steadily. Meeting this demand while protecting ecological values of aquatic resources will be a significant challenge.

Water Security: The security of drinking water and wastewater systems is now recognized as a top priority but much remains to be done to define needed security practices and implement these measures across the country. EPA has made a significant investment of resources in supporting this work.

Nanotechnology: The predicted explosion in the use of nanotechnology offers the potential for innovative water treatment methods as well as the risks of harm to aquatic systems from the release of nano-scale devices and products.

Remote Sensing Technology: The dramatic progress in miniaturizing sensors and gathering environmental data from remote locations will open new avenues to monitoring the condition of waters.

Sea Level Rise: Projected increases in sea levels pose significant risks for the health and productivity of coastal waters and threaten habitat, fisheries, and wetlands.

Pharmaceuticals in Wastewater: Increases in the variety and amount of pharmaceutical products reaching aquatic systems through disposal to wastewater systems poses risks to ecological systems and to humans. EPA is expanding efforts to investigate these issues.

Renewable Energy: As energy demand increases and the costs of energy from conventional sources climbs, demand for renewable energy will grow. Recent studies have demonstrated the potential for sewage treatment plants and animal feeding operations to generate significant amounts of renewable energy from treatment process by-products.

To Learn More:
<http://www.epa.gov/ocfo/futures/perspectives.htm>

EPA's strategies for achieving clean and safe water depend on substantial contributions and investments by many public and private entities.

States are primary partners in implementing both clean water and safe drinking water programs. Many states, however, are facing budget problems and even deficits. EPA recognizes that state budget shortfalls are an external factor that may limit progress toward clean and safe water goals.

Consistent with the federal government's unique trust responsibility to federally recognized tribes, EPA implements programs in Indian country, helps build tribal capacity to administer clean and safe water programs, and works with authorized tribes as co-regulators. Tribal resource needs are great. Unlike states, many tribes are still developing programs to administer clean and safe water programs. Inadequate progress in developing these programs will limit progress toward clean water goals.

Local governments play a critical role in implementing clean and safe water programs. Municipalities and other local entities have proven to be strong partners with states and the federal government in the financing of wastewater treatment and drinking water systems, and continued partnership in financing these systems is essential to meeting water goals.

Despite sometimes-significant resource limits, municipalities are also now taking on additional responsibilities for addressing storm water and CSOs. In the case of the drinking water program, effective local management of drinking water systems, including protection of source waters, is essential to maintaining high rates of compliance with drinking water standards. More than 90 percent of the nation's 52,000 community water systems are smaller systems (serving 10,000 or fewer people) that often struggle to provide safe drinking water.¹² Continued consultation with local governments is critical to achieving clean and safe water.

Several key elements of the National Water Program, including nonpoint source control, source water protection, and watershed management, require broad partnerships among many federal, state, and local agencies and the private sector. Over the next several years, building partnerships with the agricultural community (such as USDA, state agricultural agencies, and local conservation districts) is a top priority for meeting clean water goals. EPA will also continue to provide water quality data and technical assistance that can help USDA target its runoff control programs.

EPA relies on many other agencies to provide monitoring data to measure progress toward its goal of clean and safe water. States lead the effort in water quality

monitoring. Other agencies provide critical information as well, such as USGS, which maintains water-monitoring stations throughout the nation, and NOAA, which provides information on coastal waters.

EPA also relies on the Corps to co-administer the Section 404 program of the Clean Water Act. In fact, the Corps acts as the lead federal agency for permitting the discharge of dredged or fill material and, as part of its civil works projects, addressing dredged material management issues in U.S. waters.

In addition to the domestic activities that support the 2002 World Summit goal, EPA will continue working with the Agency for International Development, the Department of State, and other interested stakeholders to improve access to safe drinking water and sanitation worldwide.

Finally, all of the EPA's coastal and oceans activities are carried out in partnership with other federal agencies and, in some cases, international, state, local, and private entities as well. EPA relies on its work with the Department of Defense, the U.S. Coast Guard, Alaska and other states, and a number of cruise ship and environmental and nongovernmental organizations regarding regulatory and non-regulatory approaches to managing wastewater discharges from vessels.

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GOAL 3 - LAND PRESERVATION AND RESTORATION

Preserve and restore the land by using innovative waste management practices and cleaning up contaminated properties to reduce risks posed by releases of harmful substances.

Uncontrolled, hazardous and nonhazardous wastes on the land can migrate to the air, ground water, and surface water, contaminating drinking water supplies, causing acute illnesses or chronic diseases, and threatening healthy ecosystems in urban, rural, and suburban areas. Hazardous substances can kill living organisms in lakes and rivers, destroy vegetation in contaminated areas, cause major reproductive complications in wildlife, and otherwise limit the ability of an ecosystem to survive.

EPA will work to preserve and restore the land using the most effective waste management and cleanup methods available. We use a hierarchy of approaches to protect the land: reducing waste at its source; recycling waste; managing waste effectively by preventing spills and releases of toxic materials; and, cleaning up contaminated properties. The Agency is especially concerned about threats to our most sensitive populations, such as children, the elderly, and individuals with chronic diseases.

The Resource Conservation and Recovery Act (RCRA)¹ and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund)² provide the legal authority for most of EPA's work toward this goal. The Agency and its partners use Superfund authority to clean up uncontrolled or abandoned hazardous waste sites and return the land to productive use. Under RCRA, EPA works in partnership with states and tribes to address risks associated with leaking underground storage tanks (USTs) and with the generation and management of hazardous and nonhazardous wastes. The EPA waste management program recognizes tribal governments as the primary parties for setting standards, making environmental policy decisions, and managing programs for reservations, consistent with federal standards and regulations. Accordingly, EPA regional offices work directly with tribal governments as the recognized independent authorities for reservation affairs and not as political subdivisions of states.

EPA also uses authorities provided under the Clean Air Act,³ Clean Water Act,⁴ and Oil Pollution Act of 1990⁵ to protect against spills and releases of hazardous materials. Controlling the many risks posed by accidental and intentional releases of harmful substances presents a significant challenge to protecting the land. EPA uses an approach that integrates prevention, preparedness, and response activities to minimize these risks. Spill-prevention activities keep harmful substances from being released to the environment. Improving EPA's readiness to respond to emergencies through training, development of clear authorities, and provision of proper equipment

will ensure that we are adequately prepared to minimize contamination and harm to the environment when spills do occur.

OBJECTIVE 3.1: PRESERVE LAND. By 2011, reduce adverse effects to land by reducing waste generation, increasing recycling, and ensuring proper management of waste and petroleum products at facilities in ways that prevent releases.

Sub-objective 3.1.1: Reduce Waste Generation and Increase Recycling. By 2011, reduce materials use through product and process redesign, and increase materials and energy recovery from wastes otherwise requiring disposal.

Strategic Targets:

- By 2011, decrease the total amount of municipal solid waste disposed at landfills and combustion facilities by 11 million tons from the amount disposed in 2003 (under determination).
- By 2011, increase recycling of the total annual municipal solid waste produced to 40 percent from 30.6 percent in 2003.
- By 2011, increase reuse and recycling of construction and demolition debris by 6 percent from a baseline of 59 percent in 2003.
- By 2011, increase the use of coal combustion ash to 50 percent from 32 percent in 2001.
- By 2011, increase by 81 the number of tribes covered by an adequate and recently-approved integrated waste management plan.
- By 2011, close, clean up, or upgrade 54 open dumps in Indian country and on other tribal lands.

Sub-objective 3.1.2: Manage Hazardous Wastes and Petroleum Products Properly. By 2011, reduce releases to the environment by managing hazardous wastes and petroleum products properly.

Strategic Targets:

- By 2011, prevent releases at 500 RCRA hazardous waste management facilities by implementing initial approved controls or updated controls. (In FY2006, EPA estimates that 820 facilities require these controls; the baseline is zero. The universe of facilities will be reassessed by FY 2009.)

- By 2011, increase the percentage of UST facilities that are in significant operational compliance with both release detection and release prevention requirements by five percent more than the 66 percent in 2006, out of a total estimated universe of approximately 245,000 facilities.
- Each year through 2011, minimize the number of confirmed releases at UST facilities to 10,000 or fewer from a universe of approximately 650,000 UST tanks.

Means and Strategies For Achieving Objective 3.1

EPA's strategy for reducing waste generation and increasing recycling, promoting the development of tribal integrated waste management plans, and closing, cleaning up or upgrading open dumps is based on: (1) establishing and expanding partnerships with businesses, industries, states, communities, consumers, tribes and federal agencies; (2) stimulating development of infrastructure, new technologies, and environmentally responsible behaviors by product manufacturers, users, and disposers ("product stewardship"); and (3) helping businesses, government, tribes, institutions, and consumers by providing education, outreach, training, and technical assistance. To implement this strategy, EPA will apply the talents and technical expertise of its workforce to create synergistic relationships with its stakeholders to achieve common goals.

Working Toward a Vision for 2020

These updated strategic goals for materials management put us on a path to achieve our vision for the RCRA program in the year 2020. In 2002, in a document entitled, "Beyond RCRA: Waste and Materials Management in the Year 2020." (<http://www.epa.gov/epaoswer/osw/vision.htm>) we noted the future we envision is one "...in which materials that were once considered wastes suitable only for landfilling are now continually reused and recycled, and 'industrial ecology' has become the mantra of corporate executives across the nation. Landfills are becoming obsolete..."

While EPA did not go so far as to say that we would achieve a full cradle-to-cradle industrial system by 2020, we envisioned that "...a future waste reduction program could achieve more than it would otherwise by setting its aspirations high, and explicitly focusing on reducing waste as much as possible, even approaching zero." Our recycling goals for 2011 would clearly need to increase dramatically to reach a zero waste future by 2020. However, even if our aspirational goals prove to be overly aggressive, they will have helped push us toward a more sustainable future.

Establishing and Expanding Partnerships

EPA will work to establish and expand its partnerships with industry, states, and other entities to reduce waste and to develop and deliver tools that can help businesses, manufacturers, and consumers. Nationally recognized programs, such as WasteWise (<http://www.epa.gov/epaoswer/non-hw/reduce/wstewise/htm>), and our Coal Combustion Products Partnership (C2P2; <http://www.epa.gov/epaoswer/osw/conservation/c2p2/index.htm>), which employ partnerships to encourage waste prevention and recycling, will serve as models for new alliances among government agencies, industries, and businesses that capitalize on voluntary efforts to reduce waste and increase recycling.

EPA will also continue to support its tribal partners to improve practices for managing solid waste on Indian lands. EPA has direct implementation responsibility for RCRA hazardous waste and UST programs in Indian country. Recognizing the unique challenges encountered on tribal lands, EPA will work with tribes on a government-to-government basis that affirms its federal trust responsibility to the 572 federally recognized tribal governments and acknowledges the importance of conserving natural resources for cultural uses. Actions to upgrade tribal solid waste management infrastructure will continue, including the development of integrated waste management plans, codes, ordinances, recycling programs, and other alternatives to open dumping. These efforts will help to prevent open dumping in Indian country, further the cleanup of existing dumps, and reduce the risks that such dumps pose to human health and the environment.

During 2006 – 2011, EPA will initiate a national effort to forge partnerships with senior managers from other federal agencies to identify and resolve commonly

A Vision of the Future

(from Beyond RCRA: Waste and Materials Management in the Year 2020)

Generating and managing post-consumer household wastes have undergone a transformation. Concern for environmental sustainability has become ingrained as a societal value as individuals have become much more aware of the environmental consequences of their consumptive choices. These changes in consumer values have prompted shifts in manufacturing techniques and choices, so that manufacturing processes are based on managing resources efficiently, closing the loop of material flows, and designing for the environment. Products contain fewer toxic materials and are designed to last longer. Much less—and less toxic—waste is generated during manufacturing. Manufacturers now take responsibility for their products throughout the product life cycle, and product stewardship—involving all members of the product chain—is a standard operating procedure. Household recycling, as well as advances in packaging, product design, and other market-based measures, has reduced household waste generation rates to a small fraction of what they were in the late twentieth century. Virtually all organic wastes, construction and demolition wastes, and other materials formerly managed as part of the municipal solid waste stream are now diverted to beneficial reuse, dramatically reducing the amount of landfill space needed.

acknowledged waste problems in Indian country and other tribal lands. This effort will build on the work of the National Interagency Workgroup, whose members cooperatively contribute to fund annually the Solid Waste Assistance Grant Program for tribes.

Stimulating Infrastructure Development, Product Stewardship, and New Technologies

Another key strategy for reducing waste is fostering development of infrastructure that will make it easier for industry, businesses, and consumers to reduce the waste they generate, acquire and use recycled materials, and purchase products containing recycled materials. EPA will continue to promote development of new and expanded markets for recycled materials and new and better recycling technologies. Within municipal solid waste, we will focus our efforts on specific commodity streams with the potential for large increases in recycling with a particular emphasis on paper, organics, containers, packaging, and electronics. Several initiatives already underway demonstrate the potential of such efforts. EPA has established product stewardship partnerships with manufacturers, retailers, and governmental and nongovernmental organizations to reduce the impacts that electronics and carpets can have on the environment throughout their useful lives. Carpets and electronics offered strong opportunities for collaboration because key industries and states identified the environmental benefits associated with waste reduction in these sectors. Through our new GreenScapes (<http://www.epa.gov/greenscapes/>) partnership, we are promoting major increases in end-markets for compost while also working to teach homeowners how to save time, money, and natural resources by reducing and recycling their yard wastes.

We will also work to increase recycling at important tribal venues. Significant potential exists for waste reduction, increased recycling of beverage containers, and composting of organics (both yard and food wastes) at large public venues such as tribally-owned and operated casinos, shopping centers, and amphitheaters where concerts and other large events are held. Such "Recycling on the Go⁶" projects at these venues have the potential to result in more recyclable and compostable materials being diverted from landfills, contributing to the national recycling goal. Such projects will also create opportunities for partnerships and relationship building among EPA, tribes, and local governments.

To increase recycling of industrial byproduct materials, we will concentrate on three large-quantity material streams: coal combustion products, foundry sands, and construction and demolition debris. EPA is engaging with the construction and demolition industries to identify ways to increase the recycling of construction and demolition debris. Through the Green Highways Initiative (<http://www.greenhighways.org/>), EPA collaborates with governments at all levels, businesses, and industries to achieve the following goals: promote use of industrial

materials in the transportation infrastructure; promote reduction, reuse, and recycling of municipal solid waste; and educate our partners about options for “green procurement.”

EPA will also promote development of new and better recycling technologies and will explore ways to obtain energy or products from waste. For example, through bioreactor technology, which provides accelerated stabilization of municipal solid waste, the collection of landfill gases containing methane offers promise as a future source of energy. The Agency will continue to support initiatives that revamp technologies to reduce or eliminate the use of virgin materials, recover energy to produce power, and improve waste management.

Providing Education, Outreach, Training, and Technical Assistance

As a result of the Agency’s continuing outreach activities with non-profit organizations, major retailers, electronics manufacturers, and other industries, more products and venues are displaying conservation, waste prevention, and recycling messages. These educational messages increase awareness of the issues associated with waste disposal and encourage consumers, young people, and underserved communities to make smarter, more responsible environmental choices.

Collaborating with industries and with government agencies at all levels, EPA will continue to foster the increased recycling of industrial byproducts that would otherwise require disposal. Outreach, training, and assistance efforts will focus on construction and demolition debris and coal combustion products to attain our numerical goals. Our Coal Combustion Products Partnership will serve as a primary outreach vehicle to encourage the use of coal combustion products. EPA’s Construction Initiative (<http://www.epa.gov/epaoswer/osw/conservation/priorities/bene-use.htm>) will foster recycling of industrial materials, including construction and demolition debris, in major transportation and building construction projects. We will continue working with the foundry industry to encourage recycling of spent foundry sands and to develop a numerical goal to quantify these efforts.

The Agency and its partners will design activities that encourage students and teachers to start innovative recycling programs and will develop unique tools and projects which promote waste reduction, recycling, and neighborhood revitalization in Hispanic and African-American communities and on Indian lands. The EPA supports the development of tribal waste management programs by funding training on and publishing resource documents for tribal employees for the development of tribal waste management plans, community education and outreach, and other cleanup activities to mitigate the results of improper waste disposal.

Establishing and Expanding International Initiatives

“Global Environment” is a core priority in the Agency’s Action Plan. Recycling (e.g., paper, plastics, electronics) and waste management are becoming increasingly global enterprises, and EPA waste management programs will continue to devise efficient and rational solutions, working on voluntary and regulatory initiatives in conjunction with partner countries and international agencies, to protect the global environment.

EPA actively promotes the safe handling of waste imports and exports through participation in the Commission for Environmental Cooperation’s Hazardous Waste Task Force in implementing environmentally sound management principles for hazardous waste among North American Free Trade Agreement countries. This work will lead to significantly improved tracking of transboundary hazardous waste shipments and result in improved compliance, enhanced border security, and reduced administrative burden and costs to both the private sector and government agencies in both the U.S. and abroad. EPA also is partnering with Mexico to implement the U.S.-Mexico Border 2012 Plan (<http://www.epa.gov/usmexicoborder/intro.htm>), which includes reduction of land contamination through the Waste Policy Forum. EPA and Mexican authorities are working together in this forum to clean up and prevent tire piles and remediate contaminated sites along the border (2.1 million tires have been cleaned up through April 2006).

EPA is engaged with the Working Group on Waste Prevention and Recycling of the Organization for Economic Cooperation and Development (OECD) in efforts to minimize waste generation, remove barriers to recycling, and streamline exports and imports of hazardous waste recyclables.⁷ EPA has a leading role in a global public-private partnership under the Basel Convention to enhance the design, collection, reuse, and recycling of mobile phones. EPA is participating in negotiations expected to continue until 2009, under the auspices of the International Maritime Organization’s environmental committee, to develop a new international convention for the safe and environmentally sound dismantling and recycling of ships.

Managing Hazardous Wastes And Petroleum Products

Recognizing that some hazardous wastes cannot yet be completely eliminated or recycled, the RCRA program reduces the risks of exposure to hazardous wastes by maintaining a “cradle-to-grave” approach to waste management.

Preventing Hazardous Releases from RCRA Facilities

EPA’s strategy for addressing hazardous wastes that must be treated, stored or disposed is based on achieving greater efficiencies at waste management facilities through more focused permitting processes and improving permitting conditions where

appropriate. We will work with our state, tribal, and local government partners to ensure that hazardous waste management facilities have approved controls in place and continue to strive for safe waste management.

Through the end of FY 2008, EPA will continue to work with authorized states—specifically, those with a large number of facilities lacking initial approved controls—to achieve the goal of having 95 percent of approximately 2,460 facilities with permits or other approved controls. We want to resolve any issues that might be preventing key categories of these facilities from obtaining permits or putting other approved controls in place and transfer successful strategies from other states. At the same time, we will update controls for preventing releases at 150 facilities. By 2009, we will finalize the universe of facilities that still require initial approved controls and those that need updated permits (currently estimated to be 820), and use that number as the universe for determining future accomplishments.

Preventing Releases from Underground Storage Tank Systems

EPA recognizes that the size and diversity of the regulated community puts state authorities in the best position to regulate USTs and to set priorities. RCRA Subtitle I allows state UST programs approved by EPA to operate in lieu of the federal program.⁸ Even states that have not received formal state program approval from EPA are in most cases the primary implementing agencies—with the exception of Indian country—and are receiving annual grants from EPA.

The Underground Storage Compliance Act⁹ (or USTCA) of the Energy Policy Act requires major changes to federal and state UST programs and focuses on preventing releases to keep our nation's land and water safe. Among other things, it expands eligible uses of the Leaking Underground Storage Tank (LUST) Trust Fund, extends the LUST Trust Fund tax through 2011, and includes provisions regarding inspections, operator training, delivery prohibition, secondary containment and financial responsibility, and cleanup of releases that contain oxygenated fuel additives. Some of these provisions require implementation by August 2006; others will require implementation in subsequent years. To implement the new law, EPA and states will work closely with tribes, other federal agencies, tank owners and operators, and other stakeholders to bring about the mandated changes affecting UST facilities.

In any given year, it is possible that factors such as greater field presence and discovery of older releases during site closures will increase the number of confirmed releases reported, potentially exceeding the Agency's annual strategic targets. Despite such apparent increases in releases, human health and the environment are being better protected than if the releases went undetected or unreported. While the vast majority of the approximately 650,000 active USTs have the regulatorily-required equipment, significant work remains to ensure that UST owners and operators maintain

and operate their systems properly.¹⁰ EPA will also continue to support state programs, strengthen partnerships among stakeholders, and provide technical assistance, compliance assistance, and training to promote and enforce compliance by UST facilities. The Agency and states will use innovative compliance approaches, along with outreach and education tools, to bring more tanks into compliance.

OBJECTIVE 3.2: RESTORE LAND. By 2011, control the risks to human health and the environment by mitigating the impact of accidental or intentional releases and by cleaning up and restoring contaminated sites or properties to appropriate levels.

Sub-objective 3.2.1: Prepare for and Respond to Accidental and Intentional Releases. By 2011, reduce and control the risks posed by accidental and intentional releases of harmful substances by improving our nation's capability to prevent, prepare for, and respond more effectively to these emergencies.

Strategic Targets:

- By 2011, achieve and maintain at least 95 percent of maximum score on readiness evaluation criteria in each region.
- Between 2006 and 2011, complete 975 Superfund-lead hazardous substance removal actions. In FY2005, 175 of these actions were completed.
- Between 2006 and 2011, oversee and complete 650 voluntary removal actions. In FY2005, 137 of these actions were completed.
- By 2011, reduce by 25 percent the gallons of oil spilled by facilities subject to Facility Response Plan regulations relative to the 601,000 gallons of oil spilled in 2003.
- By 2011, increase the compliance rate to 90 percent of all facilities subject to Facility Response Plan regulations from 50 percent in 2004.

Sub-objective 3.2.2: Clean Up and Revitalize Contaminated Land. By 2011, control the risks to human health and the environment at contaminated properties or sites through cleanup, stabilization, or other action, and make land available for reuse.

Strategic Targets:

- By 2011, make final assessment decisions at 40,455 of 44,700 potentially hazardous waste sites submitted to EPA for remedial evaluations to help resolve community concerns on whether these sites require long-term

cleanup to protect public health and the environment, and to help determine if they can be cleared for possible redevelopment.

- By 2011, control all identified unacceptable human exposures from site contamination to health-based levels, or below, for current land and/or groundwater use conditions at 84 percent (1,294) of 1,543 Superfund human exposure sites (as of FY 2005). This baseline includes 172 Superfund federal facility sites. By 2011, increase the percentage of high NCAPS (National Corrective Action Prioritization System)-ranked RCRA facilities with human exposures to toxins controlled to 95 percent (universe of all facilities that need RCRA Corrective Action—including high-ranked facilities—to be finalized by the end of 2007).
- By 2011, control the migration of contaminated groundwater through engineered remedies or natural processes at 74 percent (1,016) of 1,381 Superfund groundwater sites (as of FY 2005). This baseline includes 166 Superfund federal facility sites. By 2011, increase the percentage of RCRA Corrective Action facilities with migration of contaminated groundwater under control to 50 percent of all facilities requiring RCRA Corrective Action (universe to be finalized by the end of 2007).
- By 2011, reduce the backlog of LUST cleanups that do not meet state risk-based standards for human exposure and groundwater migration from 26 percent down to 21 percent. For Superfund, complete construction of remedies at approximately 76 percent (1,171) of 1,547 Superfund sites (as of FY 2005). This baseline includes 172 Superfund federal facility sites. (Note: construction completion is a milestone which indicates that all significant construction activity has been completed, even though additional remediation may be needed for all cleanup goals to be met.)
- By 2011, ensure that XX percent (xx number) of XX final and deleted construction complete NPL sites are ready for reuse (i.e., EPA has determined that all cleanup goals have been met for media that may affect current and reasonably anticipated future land uses and that controls are in place so there are no unacceptable risks to human health). (NOTE: In order to develop realistic targets for this measure, EPA is developing the baseline of the final and deleted construction complete NPL sites that currently meet these criteria.)

Sub-objective 3.2.3: Maximize Potentially Responsible Party Participation at Superfund Sites. Through 2011, conserve federal resources by ensuring that potentially responsible parties conduct or pay for Superfund cleanups whenever possible.

Strategic Targets:

- Each year through 2011, reach a settlement or take an enforcement action before the start of a remedial action at 95 percent of Superfund sites having viable, liable responsible parties other than the federal government.
- Each year through 2011, address all unaddressed costs in Statute of Limitations cases for Superfund sites with unaddressed total past Superfund costs equal to or greater than \$200,000.

Means and Strategies for Achieving Objective 3.2

EPA leads the federal government's effort to reduce the risks posed by releases of harmful substances and by contaminated land, and return land to beneficial use. The most effective approach to controlling these risks incorporates developing and implementing prevention measures, improving response capabilities, maximizing the effectiveness of response and cleanup actions, and promoting a vision of protective, sustainable, and productive uses of formerly contaminated properties.

EPA works with organizations at every level of government and the private sector to maximize its ability to control risks from accidental and intentional releases of harmful substances, contaminated lands, and hazardous waste sites. Human health and environmental protection is the responsibility of all affected individuals, and it is important to engage communities, organizations, businesses, and governments in collaborative efforts toward returning lands to beneficial use. In this way, we can increase public understanding of environmental issues, help ensure the long-term sustainability of our cleanup efforts, and become environmental stewards for land that is returned to beneficial use.

PREPAREDNESS AND RESPONSE

EPA plays a major role in reducing the risks that accidental and intentional releases of harmful substances and oil pose to human health and the environment. Under the National Response System (NRS), EPA evaluates and responds to thousands of releases annually. The NRS is a multi-agency preparedness and response mechanism that includes the following key components: the National Response Center; the National Response Team (NRT), composed of 16 federal agencies; 13 Regional Response Teams; and federal on-scene coordinators (OSCs). These organizations and entities work with state and local officials to develop and maintain contingency plans that enable the nation to respond effectively to hazardous substance and oil emergencies. When an incident occurs, these groups coordinate with the OSC-in-charge to ensure that all necessary resources, such as personnel and equipment, are available and that containment, cleanup, and disposal activities proceed

quickly, efficiently, and effectively. EPA's primary role in the NRS is to serve as the federal OSC for spills and releases in the inland zone.

Preparing for Emergencies

Preparedness on a national level is essential to ensure that emergency responders are able to deal with multiple, large-scale emergencies, including those that may involve chemicals, oil, biological agents, or weapons of mass destruction. Over the next several years, EPA will continue to enhance its core emergency response program to respond quickly and effectively to chemical, oil, biological, and radiological releases, and large-scale national emergencies. Our efforts will focus on continuation of specialized training on the Incident Command System, development of additional health and safety materials and participation in exercises with federal, state and local government agencies, including the Regional Response Teams, and response readiness across multiple regions.

In addition to enhancing our readiness capabilities, EPA will work to improve coordination and communication mechanisms. For example, as part of the National Incident Coordination Team, EPA will continue to improve its mechanisms for coordinating responses to national emergencies. Under the Continuity of Operations/Continuity of Government program, we will upgrade and test plans, facilities, training, and equipment to ensure that essential government business can continue during a catastrophic emergency. Our NRT capabilities will also expand to ensure coordination with the Department of Homeland Security, Federal Emergency Management Agency (FEMA), Federal Bureau of Investigation (FBI), other federal agencies, and state and local governments during large-scale responses.

Responding to Hazardous Substance Releases and Oil Spills

Each year, EPA personnel assess, respond to, mitigate, and clean up thousands of releases—whether accidental, deliberate, or naturally occurring. These incidents range from small spills at chemical or oil facilities to larger accidental releases in train and highway accidents, and from natural disasters such as hurricanes Katrina and Rita, and earthquakes to national emergencies such as terrorist events.

EPA will work to improve its capability to respond effectively to incidents that involve harmful chemical, oil, biological, and radiological substances. The Agency will improve its response readiness levels, review response data provided in the “after-action” reports following the response to a release, and examine “lessons learned” reports to identify which activities work and which need to be improved. Over the next 2 years, EPA will work to expand the current core emergency response program to include prevention and preparedness, thereby covering all aspects of emergency management. The removal response measures have been revised from start of the

action to completion of the cleanup to better reflect the accomplishment of the outcome.

Preventing and Preparing for Oil Spills

An important component of EPA's land strategy is preventing oil spills and being prepared for spills that do occur so that the oil does not reach our nation's waters. Under the Oil Pollution Act,¹¹ the Agency requires certain facilities (defined in 40 CFR 112.2) to develop Facility Response Plans and to practice implementing the plans by conducting drills and exercises to be prepared in the event of a spill. Compliance with these requirements reduces the number of oil spills that reach navigable waters and prevents detrimental effects on human health and the environment should a spill occur. Over the next 5 years, EPA will work to ensure at least 90 percent compliance with these regulations by industry. Compliance at the end of FY 2005 was 77 percent.

Cleaning Up And Revitalizing Contaminated Sites

The primary goal of EPA's cleanup programs is to protect America's citizens from the risks posed by contaminated land; restore the nation's contaminated land; and enable America's communities to safely return these properties to beneficial economic, ecological, and societal uses. In implementing its cleanup programs, EPA will ensure that all people are treated fairly, given equal opportunity to participate meaningfully in making the cleanup decisions about these contaminated lands, and that no one portion of the population bears a disproportionate health burden.

EPA continues to foster a One Cleanup Program, which is a long term initiative designed to encourage programs at all levels of government to work together to ensure that appropriate cleanup tools are used; that resources, activities, and results are coordinated with partners and stakeholders and communicated to the public effectively; and that cleanups are protective and contribute to community revitalization, including areas with environmental justice concerns. While the approach reflects EPA's efforts to coordinate across all of its cleanup programs, the Agency maintains the flexibility needed to accommodate differences in program authorities and approaches.

"Revitalization"

The term "revitalization" in its broadest sense means to impart new life, energy, or activity to something. In the context of contaminated or potentially contaminated properties, revitalization refers to actions taken to promote protective, productive, and sustainable use, continued use, or reuse of property. These revitalization actions can help to impart new life to properties, resulting in enhancements to America's communities and ecosystems.

Common Elements of Environmental Cleanups

Common elements of EPA's cleanup programs include initial assessment, stabilization (when needed), site investigation, selection of appropriate remedies, implementation and completion of remedies, and promoting protective uses/reuses.

EPA performs these activities in cooperation with partners who share authority for the sites, and works with federal, state, tribal, and local government partners to identify facilities and sites requiring attention and to implement these elements.

Assessing Sites

All cleanup programs assess preliminary site information to determine whether or not contaminated sites or facilities pose a significant risk to human health and the environment and require cleanup actions. Site assessments can also assist in the determination of whether or not sites can be cleared for possible redevelopment. Attainment of final site assessment decisions is a strategic target for EPA's Superfund program.

Stabilizing Sites

"Stabilization" refers to the initial actions taken to control actual or potential exposure, based on current land and water use. Where necessary, these actions are taken immediately to protect populations located within a reasonable distance from the site from existing or imminent exposure to harmful contaminants.

EPA's Superfund and RCRA Corrective Action programs use two environmental indicators—controlling human exposures and controlling groundwater migration—to help communicate to the public progress that is being made toward protecting human health and the environment due to stabilization and other cleanup activities.

Controlling Human Exposures and Groundwater Migration

Controlling unacceptable human exposures to contamination and preventing the continued spread of contaminated groundwater are key indicators of cleanup progress. When EPA determines that human exposure is under control at a site, it means that there is no exposure to contaminants at unsafe levels under **current** site conditions.

When a determination is made that groundwater migration is under control at a site, it means that contamination levels fall within the levels specified as safe by EPA, or if they do not, that the contaminated groundwater is not continuing to spread above unacceptable levels or negatively affecting surface water into which groundwater may be flowing.

Investigating Sites and Selecting Site Remedies

EPA and its partners conduct detailed environmental investigations to identify the type and extent of contamination, as well as actual or potential exposures to humans and environmental receptors. The data collected from these activities are used to make critical determinations regarding risks to human health and the environment and eventual remedy selections. To better address areas that may suffer disproportionate impacts, EPA will encourage the broader use of improved sample collection techniques, analytical (e.g., on-site chemical analysis) tools and indicators. Approaches will include

those previously developed by EPA's Office of Environmental Justice to identify areas with potential environmental justice concerns.

Remedies are selected based on many criteria, including the environmental media of concern (e.g., soil, air, groundwater, etc.), cleanup objectives based on protection associated with reasonably expected uses of the site (e.g., industrial, commercial, residential, ecological, recreational), compliance with applicable laws, implementation issues, and acceptability to state and tribal governments and the affected communities. Cost and efficiency of the overall cleanup process are also important. When remedies involve leaving contamination in place, EPA will continue to ensure that such remedies include institutional controls like notices and easements designed to prevent inappropriate uses of the land or water and/or associated unacceptable exposures.

Completing the Site Cleanup

Implementing remedies and completing the site cleanup involve constructing remedy components that are designed to provide long-term protection and include performing any remaining cleanup actions that do not require physical construction (e.g., monitoring). Completing construction of all remedies at a site or facility is an important milestone and is a strategic target for several of EPA's cleanup programs. The RCRA program has developed a long-term goal of implementing and completing construction of final remedies at 95 percent of all facilities that need RCRA corrective action by 2020 [Beyond RCRA (<http://www.epa.gov/epaoswer/osw/vision.htm>)], and we will be developing interim annual targets to achieve this goal in 2008.

During remedy construction and following construction completion, the Superfund program conducts reviews every 5 years to ensure that the remedy is functioning as intended and that it remains protective. With the large number of sites moving into the post-construction completion stage, EPA will implement a strategy to manage post-construction completion activities (PCC Strategy, <http://www.epa.gov/superfund/action/postconstruction/>) over the next 5 years. The purpose of this strategy is to ensure the long-term effectiveness of response actions in protecting human health and the environment at a site. The PCC Strategy sets the following five goals: (1) ensure that remedies remain protective and cost effective; (2) ensure that required institutional controls are implemented and effective; (3) ensure adequate financing and capability to conduct PCC activities; (4) support appropriate reuse of site while assuring remedy reliability; and (5) improve site records management to ensure remedy reliability.

A key milestone for all cleanup programs is the point at which all cleanup goals for a particular remedy or an entire site/facility are achieved. Depending on the site-specific goals, this can mean that no contamination is left above levels of concern and

that the land has no restrictions to its use, based on environmental contamination. When contamination is left in place, cleanup goals are based on restricted uses of the property. In these situations, long-term protectiveness is contingent on the continued operation and maintenance of appropriate institutional and, if necessary, engineering controls such as monitoring. For the Superfund program, sites can be deleted from the National Priorities List after all remedies at a site have met their cleanup goals.

Promoting Protective Uses/Reuses of Previously Contaminated Land

EPA's cleanup programs have set a national goal of returning formerly contaminated sites to long-term, sustainable, and productive use. This goal creates greater impetus for selecting and implementing remedies that, in addition to providing clear environmental and human health outcomes, also support reasonably anticipated future land use options and provide greater economic and social benefits.

Revitalization (<http://www.epa.gov/oswer/landrevitalization/>) is fostered in several ways: (1) developing policies and systems for the safe long-term use of remediated land; (2) identifying and removing unintended barriers that hinder a community's beneficial reuse of contaminated properties; (3) working with the private marketplace to make formerly contaminated properties commercially attractive; and (4) developing revitalization measures and indicators for all EPA cleanup programs.

Maximizing Potentially Responsible Party Participation at Superfund Sites

Enforcement authorities play a critical role in all Agency cleanup programs. However, they have an additional and unique role under the Superfund program. They are used to leverage private party resources to conduct a majority of the cleanup actions and to reimburse the federal government for the federally financed cleanups. EPA will continue to pursue the following two strategies for limiting the use of federal funds.

"Enforcement First"

Under the Superfund program's "Enforcement First" strategy, EPA takes enforcement actions at sites where viable, liable potentially responsible parties (PRPs) exist, so that the PRPs either pay for or perform the cleanup at the site. This strategy allows EPA to focus limited federal resources on sites where PRPs either do not exist or they lack the funds or capabilities needed to conduct the cleanup. In order to ensure that these parties are able to meet their cleanup obligations, EPA developed a national strategy to assess companies' compliance with federal financial assurance requirements and will implement it over the next several years. EPA will continue to leverage private party dollars so that federal money is used only when absolutely necessary to clean up hazardous waste sites.

Recovering Costs

Cost recovery is another way to leverage private party resources through enforcement. Under Superfund, EPA has the authority to compel private parties to pay back federal money spent to conduct cleanup activities. [(42 USC 9601-9675, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Sec. 107.)] EPA will continue its efforts to address 100 percent of the unaddressed past costs for Statute of Limitations cases at sites with unaddressed total past Superfund costs equal to or greater than \$200,000 and to report the value of costs recovered.

OBJECTIVE 3.3: ENHANCE SCIENCE AND RESEARCH. Through 2011, provide and apply sound science for protecting and restoring land by conducting leading-edge research, which through collaboration, leads to preferred environmental outcomes.

Sub-objective 3.3.1: Provide Science to Preserve Resources and Remediate Land. Through 2011, provide sound science and constantly integrate partner inputs for smarter technical solutions and protection strategies that enhance our ability to remediate contaminated land for beneficial use, conserve resources and materials management, and preserve land quality.

Strategic Targets:

- Through 2011, lead the incorporation of sound science as determined by peer review into guidance and decisions on land preservation, remediation, and response.
- Through 2011, facilitate the deployment of new technological approaches at sites, develop state-of-science-reports, and provide training on emerging applied science issues.

Sub-objective 3.3.2: Conduct Research to Preserve Resources and Support Land Remediation Activities. Through 2011, conduct sound, leading-edge scientific research to provide a foundation for preserving resources, supporting land quality, and remediating contaminated land. Research will result in documented methods, models, assessments, and risk management options for program and regional offices, facilitating their accurate evaluation of effects on human health and the environment, understanding of exposure pathways, and implementation of effective risk-management options. Disseminate the research affecting Indian country in partnership with the tribes.

Means and Strategies For Achieving Objective 3.3

Science to Preserve and Remediate Land

EPA will continue to improve its capability to assess environmental conditions and determine the relative risks that contaminated land poses to health and the environment. The Agency will ensure that the environmental data it collects are of known, documented, and acceptable quality by implementing necessary field and lab procedures, practices, and controls. We will continue integrating technological advances to enhance our site investigation capabilities, implement cost-effective remedies, and improve the operation and maintenance of existing remedies. In addition, we will continue to coordinate with other agencies to identify and communicate program research priorities.

Multimedia risk assessment methodologies for solid waste are built upon prior collaborative work within the Agency to develop the Multimedia, Multipathway, and Multi-receptor Risk Assessment (3MRA) modeling system in support of the Hazardous Waste Identification Rule (HWIR). 3MRA development will focus on addressing key recommendations by the Science Advisory Board and will address uncertainty analysis, sensitivity analysis, and parameter estimation in model-supported, risk-based decision making. Resource conservation research will be conducted to provide a preliminary risk screening for electronics waste based on current understanding of hazardous constituents. At the same time, additional work will be conducted to better understand the hazardous constituents and how they might pose risks during various recycling operations, disposal, or component reuse.

The 3MRA model will also evaluate relative risks on a national basis of various waste disposal options for use in regulatory decision making. In addition to modeling, material evaluation by speciation and leach testing is needed to understand what hazardous constituents might be released in various disposal and use scenarios. EPA has targeted specific materials for volume reduction to minimize generation of hazardous waste and other materials for beneficial use to demonstrate one facet of resource conservation. Research is planned to support these efforts with case studies.

While the emphasis on cradle-to-cradle materials management has increased, we realize that significant volumes of municipal, commercial, and industrial waste will continue to be produced for the foreseeable future. Materials management research will evaluate landfill caps, improving containment technologies. Ongoing research on operation of landfills as bioreactors will continue. The research is addressing operation and monitoring parameters, as well as evaluating risks such as increased fugitive emissions. Results to date have been incorporated in training and technology transfer materials used by state permitting officials.

Research to Clean Up and Revitalize Contaminated Land

EPA's land research program supports our objective of reducing or controlling potential risks to human health and the environment at contaminated waste sites by providing the science to accelerate scientifically defensible and cost-effective decisions for cleanup at complex sites, in accordance with the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA). This program will produce measurable benefits in the form of:

- better management of material streams, conserve resources and appropriately manage waste; and
- more effective mitigation, management and long-term stewardship of contaminated sites.

Research will focus on contaminated sediments, ground water contamination, site characterization, and technical support to specific sites. Reducing uncertainties in the assessment of contaminated sediments and developing and evaluating remedial options will be the focus of this research theme. Research activities on sediments will develop the framework for modeling remedial alternatives and an improved understanding of causal relationships between sediment contamination and chemical residues/exposure to aquatic organisms. The Agency is investigating several alternative sediment remedies with the potential to be more cost-effective than conventional dredging or capping remedies. An emphasis is being placed on bioremediation of organics, electrochemical degradation, and conventional and reactive landfill caps. In coordination with the U.S. Army Corps of Engineers, and in association with the Strategic Environmental Research and Development Program (SERDP), we will complete a number of research projects to evaluate the field performance of dredging and capping, to improve understanding of the best management practices.

EPA's ground water research will continue to develop applications for permeable reactive barriers and address fate and transport and treatment methods for contaminants. Ground water remediation of inorganic plumes and ground water-surface water assessment strategies will be stressed. Research on dense nonaqueous phase liquids (DNAPL) source remediation is focused on three critical issues: 1) Demonstration, evaluation and optimization of DNAPL remediation technologies; 2) Assessment and prediction of the benefits of partial DNAPL depletion and 3) Development and assessment of integrated DNAPL source remediation approaches. Our technical support centers will continue to provide site specific assistance on technical issues.

Research in support of EPA's leaking underground storage tanks program will provide fate and transport studies and the effectiveness of remedial alternatives. Emergency response activities for oil spills are supported by research on fate and

transport and risk management strategies for petroleum and non-petroleum oil spills.

Progress toward research goals is assessed through a suite of metrics that is tailored to measuring the impacts of the respective research programs. Among the measurable factors are: independent expert review panel ratings on the extent to which clients utilize EPA research products; composite scores on a client survey designed to gather data on product utility and perceptions of use; and the results of bibliometric and/or client document analyses demonstrating the actual use of EPA research products. These factors are applied to measure success in providing the results identified in the research program.

HUMAN CAPITAL

EPA's emergency prevention, preparedness, response, and cleanup staff are vital to the work of this Goal. The Agency will continue to enhance the interdisciplinary skills of technical personnel in the field, ensuring their readiness and protecting their health and safety when they are responding to releases of dangerous materials and cleaning up contaminated lands. This will be accomplished through annual on-scene coordinator readiness training conferences, continuation of specialized training on the Incident Command System, development of additional health and safety materials, and participation in exercises with federal, state, and local government agencies. Additionally, acquisition and maintenance of appropriate response equipment, experience with daily cleanup operations, and pre-deployment of responders for national special security events will contribute to the enhancement of workforce skill levels.

PERFORMANCE MEASUREMENT

As a first step in developing measures for revitalization described below, the Superfund program has set a target for a "site ready for reuse" measure to demonstrate cleanup progress. This measure tracks NPL sites as follows: where construction of the remedy is complete; where cleanup goals in the Record of Decision have been achieved such that there are no unacceptable risks associated with current and reasonably anticipated future uses; and where all institutional controls required in the Record of Decision have been implemented.

In this Goal, all of the strategic targets will be directly measured on an annual basis as annual performance goals and measures in the Agency's Annual Plan and Budget. At the end of each year, EPA's Performance and Accountability Report will address whether the annual commitments were met. In this way, progress toward the longer-term commitments will be measured annually over the 2006-2011 time horizons.

For the research sub-objective, EPA will track annual progress toward expected

long-term results by means of multiple, objective-based measures of customer satisfaction, product impact and quality, and efficiency.

Influences of Environmental Indicators and PART Measures on the Strategic Plan

Goal 3 currently contains one metric relating to waste generation as a strategic target that also appears in EPA's forthcoming 2007 *Report on the Environment* (ROE). Long-term outcome measures for the Agency's cleanup programs also serve as environmental indicators in that report. While we recognize the importance of these indicators, EPA also recognizes their limitations with respect to capturing broader descriptions of the state of contaminated land in the United States. The latest version of the ROE and information associated with it can be found at <http://www.epa.gov/indicators/index.htm>.

Most of the strategic targets for the waste management, underground storage tank, and Superfund programs are based on the long-term, outcome-oriented measures developed by EPA for use in OMB's Program Assessment and Rating Tool (PART) assessment.

As a result of the self-evaluation conducted during the FY 2005 OMB PART process, the Superfund program: (1) enhanced a key outcome measure to better communicate progress towards long-term human health; (2) added a new measure to reflect the lasting impacts of land cleanup and restoration; improved our processes for reporting on annual and long-term performance data to ensure accountability; (3) implemented a new program review process and undertook its first benchmarking study to seek improved performance, effectiveness and efficiencies, and protection. The OMB PART for the Oil Removal Program led to the development of new measures and related targets as well as a commitment to develop a second long-term outcome measure and at least one annual outcome measure.

Future Improvements to Performance Measurement

In support of EPA's national goal of returning formerly contaminated sites to sustainable and productive use, the Agency is developing new revitalization measures for all cleanup programs. These measures will capture the total number and acres of sites for which EPA has some level of accountability, the number of sites and acres EPA has determined to be ready for reuse (or protective of exiting uses), and whether and how the sites are being used (e.g., industrial, commercial, residential, etc.).

As the Agency puts the recording, updating, reviewing, and improvement of scientifically-sound environmental indicators on a routine footing through the *Report on the Environment*, we expect increasing opportunities to benefit from these indicators in future strategic plans. This will enable the Agency to increasingly articulate all of our

significant long-term objectives in terms of measurable improvements in the condition of land.

When considering revisions and improvements for developing this *Strategic Plan* we also conducted a preliminary assessment of longer-term opportunities to improve our articulation of strategic, outcome-oriented commitments for future Plans. Under this Goal, we identified four priorities for developing improved measures: extent of contaminated land; extent of land restored to potential use; extent of previously contaminated land in productive use; and, the impacts of waste-management efforts on human and environmental condition.

CLOSING THE FEEDBACK LOOP: RESULTS OF PERFORMANCE ASSESSMENTS AND PROGRAM EVALUATIONS

In undertaking the PART process, the Superfund Program made the following policy and process changes: a commitment to develop stronger strategic planning procedures to ensure continuous improvement in the program, including regular procedures that will track and document key decisions and work products; a commitment to evaluate the data quality of key data sources used by the program to improve the accuracy and reliability of performance information; and a commitment to develop a forum for sharing and implementing best practices among regional offices that will improve the program's overall performance and efficiency.

The EPA Science Advisory Board (SAB) conducted an advisory review of the Contaminated Sites and RCRA Multi-Year Plans in July 2004. The following quote is from the SAB letter to the Administrator on the findings of the panel: "In general, the Panel finds that the Contaminated Sites and RCRA Multi-Year Plans are programmatically and scientifically sound. We note in particular the remarkable coordination of the program's research with that of the relevant program offices and other institutions and are encouraged by the judicious use of leveraging opportunities to significantly stretch limited resources to meet more of the Agency's needs." Changes in the research program in response to the SAB recommendations were: combining the two multi-year plans into one document, reducing the number of long term goals to two, and clearer linkage of research activities to program activities in objectives 3.1 and 3.2.

The SAB also reviewed the Multimedia, Multipathway, and Multireceptor Risk Assessment (3MRA) modeling system and delivered a report documenting the findings of that review in November 2004. EPA is addressing their recommendations to maintain the value, utility, and credibility of 3MRA. These include the continued development of the 3MRA modeling system validation protocols, modeling system evaluation, and additional uncertainty analysis.

EMERGING ISSUES AND EXTERNAL FACTORS

There are a number of emerging technologies with potentially important implications for waste management strategies and programs. One that could have significant implications for energy supply is Waste to Energy (WTE) where waste materials that are unlikely to be recycled have potential as feedstocks for energy production. As a small but growing source of energy being monitored by EPA, they could also replace other sources of energy that are in short supply. With rising energy costs, WTE may continue to grow as a technology with future energy-saving potential.

Additionally, significant research is being carried out on the application of nanotechnologies to the remediation of hazardous waste sites. The benefits from the use of nanomaterials for remediation could include more rapid or cost-effective cleanups relative to current conventional approaches. More information on this topic can be found in the external peer review draft of EPA's White Paper on Nanotechnology <http://www.epa.gov/osa/nanotech.htm>.

Since the Superfund program was intended to provide permanent solutions at sites to the maximum extent practicable, complications arise when new scientific information suggests that the cleanup decisions have been based upon now outdated risk assessments. Nevertheless, the program will incorporate new emerging science into our decision making as appropriate and consistent with the intent to provide permanent solutions.

EPA's ability to respond as the federal On Scene Coordinator for releases of harmful substances in the inland zone is affected by several external factors. The National Response system ensures that EPA will respond when necessary, but relies heavily on the ability of responsible parties and state, local, and tribal agencies to respond to most emergencies. The need for EPA to respond is a function of the quantity and severity of spills that occur, as well as the capacity of state, local, and tribal agencies to address spills.

EPA's ability to respond to homeland security incidents is affected by circumstances surrounding each event. For instance, if travel or communication is severely impeded, EPA's response may be delayed and its efficiency reduced. In the case of a single large-scale incident, our removal activity resources will most likely be concentrated on that response, thus reducing our ability to address other emergency releases. In severe cases, EPA's current emergency response workforce and resources may not be sufficient to address a many simultaneous large-scale incidents.

A number of external factors could substantially affect the Agency's ability to achieve its objectives for cleanup and prevention. These factors include Agency reliance on private-party response and state and tribal partnerships, development of

new environmental technologies, work by other federal agencies, and statutory barriers. State programs are primarily responsible for implementing the RCRA Hazardous Waste and UST programs. Our ability to achieve the goals for these programs depends on the strength and funding levels of state programs. Similarly, our success in meeting compliance standards depends on extensive training and a strong state presence. To increase UST compliance, EPA will build upon its commitment to provide states and tribes with technical support and training.

Achievement of our waste reduction and recycling objectives will depend on the participation of federal agencies, states, tribes, local governments, industries, and the general public, in partnerships that aim to reduce waste generation and increase recycling. EPA provides national leadership in the areas of waste reduction and recycling to facilitate public and private partnerships that can provide the impetus for government, businesses, and citizens to join in the campaign to reduce the amount of waste generated and ultimately sent for disposal. However, both domestic and foreign economic stresses can adversely affect markets for recovered materials.

Similarly, EPA relies on its partnerships with other federal agencies and tribal governments to ensure that open dumps in Indian country are upgraded, cleaned-up, or closed and that tribes have access to information on modern waste management planning. Achieving EPA tribal waste management objectives will depend on the successful participation by federal agencies and tribes.

NOTES

1.42 *U.S. Code* 6901-6992k

2.42 *U.S. Code* 9601-9675

3.42 *U.S. Code* 7401-7671q

4.33 *U.S. Code* 1251-1387

5.33 *U.S. Code* 2701-2761

6 U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Resource Conservation Challenge/ Recycling on the Go web site:
[Hhttp://www.epa.gov/osw/conserve/onthego/H](http://www.epa.gov/osw/conserve/onthego/)

⁷ (Core Performance Elements of the Guidelines for Environmentally Sound Management of Wastes, April 24, 2003, Environment Policy Committee, OECD)

8..42 *U.S. Code* 6901-6992k

⁹ Title XV, Subtitle B of the Energy Policy Act of 2005 (Public Law 109-58) amends RCRA Subtitle I.

10. Memorandum from Cliff Rothenstein, Director, EPA Office of Underground Storage Tanks to Underground Storage Tank Division Directors in EPA regions 1-10. December 15, 2005. *FY 2005 End-of-Year Activity Report*.

11. 33 U.S. Code 2701-2761

GOAL 4 - HEALTHY COMMUNITIES AND ECOSYSTEMS

Protect, sustain, or restore the health of people, communities, and ecosystems using integrated and comprehensive approaches and partnerships.

Communities and ecosystems are extremely complex systems of enormous variety. To protect, sustain, or restore the health of communities and ecosystems, EPA brings together a variety of programs, tools, approaches, and resources; creates strong partnerships with federal, state, tribal, and local government agencies; and enlists the support of many stakeholders.

- 4.1 Chemical and Pesticide Risks
- 4.2 Communities
- 4.3 Ecosystems
- 4.4 Science and Research

EPA manages environmental risks to watersheds, communities, homes, and workplaces to protect human health and the environmental integrity of ecosystems. The Agency employs a mix of regulatory programs and partnership approaches to achieve results in ways that are efficient, innovative, and sustainable. Ideally, EPA can implement a strategy of preventing pollution at the source; however, where programs to prevent pollution or ecosystem damage are not viable, EPA promotes waste minimization, avoidance of impact on habitat, safe disposal, and remediation. In managing risk, EPA directs its efforts toward the greatest threats in our communities, homes, and workplaces, including threats to sensitive populations, such as children, the elderly, and Native Americans, and to communities with potential disproportionately high and adverse environmental and/or public health effects.

A key component of protecting the health of people, communities, and ecosystems is identifying, assessing, and reducing the risks presented by the thousands of chemicals on which our society and economy have come to depend. Chemical and biological pesticides help meet national and global demands for food, provide effective pest control for homes, schools, gardens, highways, utility lines, hospitals, drinking water treatment facilities, and control animal vectors of disease. Industrial and commercial chemicals are in products throughout our homes and workplaces.

Building a community's capability to make decisions that affect the environment is at the heart of EPA's community-centered work. EPA's efforts to share information and build community capacity offer the tools communities need to consider the many aspects of planned development or redevelopment. EPA encourages community development by providing funds to inventory, assess, and clean up the hundreds of thousands of properties that have been abandoned or unused due to previous industrial, commercial, or other use. In the U.S.-Mexico border, addressing local pollution and infrastructure are priorities for Mexico and the United States under the Border 2012 Agreement. Ensuring safe drinking water for all Americans is another

important priority. Addressing these challenges requires combining innovative and community-based approaches with national guidelines and inter-agency coordination to achieve results.

Some populations, such as children, the elderly, and Native Americans face significant and unique health threats from a range of environmental exposures. Pound for pound, children breathe more air, drink more water, and eat more food than adults, and their behavior patterns may increase their exposure to potential toxics. Because their systems are still developing, children may be more vulnerable to environmental risks, including air pollution that may exacerbate asthma, lead-based paint in older homes, microbes in drinking water that may be resistant to treatment, and persistent chemicals that may cause cancer or induce reproductive or developmental changes. Even older Americans in good health may be at increased risk from exposure to environmental pollutants. As people age, their bodies are less able to detoxify and eliminate toxins. Native Americans represent another segment of the population with a different risk profile. Their traditional sources for food and ways of life may lead to higher levels of exposure to certain toxics. EPA continues its focus on these sensitive populations by increasing the Agency's understanding of these issues, building infrastructure and capacity, and providing information and tools needed to assess and prevent adverse impacts.

The key to sustaining and enhancing both domestic and international environmental progress is the collaborative efforts of national, tribal, state, and local governments, of international organizations, the private sector, and concerned citizens. Working collaboratively with other government agencies, EPA cooperates with other nations and international organizations to identify, develop, and implement policy options to address environmental problems of mutual concern. By assisting developing countries in managing their natural resources and protecting the health of their citizens, EPA leverages financial and human resources to the greater environmental good. EPA also works to include environmental protection provisions and commitments to enforce environmental laws and regulations effectively in all international trade agreements negotiated by the United States.

EPA's ecosystem protection programs encompass a wide range of approaches that address specific at-risk regional areas and larger categories of threatened systems, such as estuaries and wetlands. Locally generated pollution, combined with pollution carried by rivers and streams and through air deposition, can accumulate in these ecosystems and degrade them over time. Large water bodies, such as the Gulf of Mexico, the Great Lakes, and the Chesapeake Bay, have been exposed to substantial pollution over many years. Coastal estuaries and wetlands are also vulnerable. As the populations in coastal regions grow, the challenges to preserve and protect these important ecosystems increase. Working with stakeholders, EPA has established special programs to protect and restore these unique resources.

Science guides EPA's identification and treatment of emerging issues and advances our understanding of long-standing human health and environmental challenges. EPA's

research is typically crosscutting, multidisciplinary, and at the cutting edge of environmental science; reflects the dynamic nature of science; and brings scientific rigor to the characterization of uncertainty and risk. The Agency's research provides decision makers with a more complete picture of the potential risks and benefits of alternative approaches to environmental protection. EPA's research program includes "core research" that builds the scientific knowledge base in human health and ecology, in addition to informing environmental decision making. To further our ability to measure, assess, and describe environmental conditions, EPA's research is vital for advancing programs like the National Land Cover Database and the Environmental Monitoring and Assessment Program, as well as EPA's *Report on the Environment*.¹ EPA's research also informs stewardship approaches and sustainability solutions that can prevent pollution by building environmental protection into both national economic and individual consumer decisions.

OBJECTIVE 4.1: CHEMICAL AND PESTICIDE RISKS. By 2011, prevent and reduce pesticide and industrial chemical risks to humans, communities, and ecosystems.

Sub-objective 4.1.1: Reduce Chemical Risks. By 2011, prevent and reduce chemical risks to humans, communities, and ecosystems.

Strategic Targets:

- By 2011, eliminate or effectively manage risks associated with 100 percent of High Production Volume (HPV) chemicals for which unreasonable risks have been identified through EPA risk assessments.²
- Through 2011, ensure that new chemicals introduced into commerce do not pose unreasonable risks to workers, consumers, or the environment.³
- By 2011, achieve a 31 percent cumulative reduction of chronic human health risk from environmental releases of industrial chemicals in commerce since 2001.⁴
- By 2010, eliminate childhood lead poisoning cases as a public health concern by reducing to zero the number of cases of children (aged 1-5 years) with elevated blood lead levels (>10ug/dl).⁵
- By 2010, reduce to 28 percent the percent difference in the geometric mean blood lead level in low-income children 1-5 years old as compared to the geometric mean for non-low income children 1-5 years old.⁶
- By 2011, through work with international partners, eliminate the use of lead in gasoline in the remaining 35 countries that still use lead as an additive, affecting over 700 million people. (Baseline: As of January 2006, 35 countries still need to phase lead out of gasoline. Information source: United Nations Environment Program and the Partnership for Clean Fuels and

Vehicles maintain a global database on fuel quality, which is updated periodically.⁷⁾

- By 2011, through work with international partners, over 3 billion people will have access to low-sulfur fuel in 10 countries, including China, India, Mexico and Brazil. (Baseline: As of January 2006, none of the developing countries has access to low-sulfur fuel, according to the United Nations Environment Program and the Partnership for Clean Fuels and Vehicles.)

Sub-objective 4.1.2: Reduce Chemical Risks at Facilities and in Communities.

By 2011, protect human health, communities, and the environment from chemical releases through facility risk-reduction efforts and building community preparedness and response capabilities.

Strategic Targets:

- By 2011, continue to maintain the Risk Management Plan (RMP) prevention program and further reduce by 5 percent the number of accidents at RMP facilities. (The baseline is an annual average of 340 accidents, based on RMP program data through 2003.)
- By 2011, reduce by 5 percent the consequences of accidents at RMP facilities, as measured by injuries, fatalities, and property damage. (The baseline is an annual average of 358 injuries, 13 fatalities, \$143,487,189 property damage at RMP from 1995-2003.)
- By 2011, vulnerability zones surrounding RMP facilities will be reduced by 5 percent from the 2004 baseline, which will result in the reduction of risk for over 4 million people in the community. (The 2004 baseline is 33,504 miles of total cumulative radius of all vulnerability zones).
- By 2011, improve by 10 percent from the 2007 baseline the capabilities of Local Emergency Planning Committees (LEPCs) to prevent, prepare for, and respond to chemical emergencies (as measured by a survey of those LEPCs), thereby reducing the risk to communities from the potentially devastating effects of chemical accidents.

Sub-objective 4.1.3: Protect Human Health from Pesticide Risk. Through 2011, protect human health by implementing our statutes and taking regulatory actions to ensure pesticides continue to be safe and available when used in accordance with the label.

Strategic Targets:

- By 2011, reduce the concentration of pesticides detected in the general population by 50 percent. Baselines are determined from 1990–1992 Centers

for Disease Control-National Health and Nutrition Examination Survey (NHANES) data.⁸

- Through 2011, protect those occupationally exposed to pesticides by improving upon or maintaining a rate of 3.5 incidents per 100,000 potential risk events. Baseline: There were 1385 occupational pesticide incidents in 2003 out of 39,850,000 potential pesticide risk events/year.⁹
- By 2011, improve the health of those who work in or around pesticides by reaching a 50 percent targeted reduction in moderate to severe incidents for six acutely toxic agricultural pesticides with the highest incident rate: chlorpyrifos, diazinon, malathion, pyrethrins, 2,4-dichlorophenoxy acetic acid (2,4-D), and carbofuran. Baselines will be determined from the Poison Control Center (PCC) Toxics Exposure Surveillance System (TESS) database for 1999-2003.¹⁰

Sub-objective 4.1.4: Protect the Environment from Pesticide Risk. Through 2011, protect the environment by implementing our statutes and taking regulatory actions to ensure pesticides continue to be safe and available when used in accordance with the label.

Strategic Targets:

- By 2011, reduce the percentage of urban watersheds sampled by the US Geological Survey's National Water Quality Assessment (USGS NAWQA) program that exceed the National Pesticide Program aquatic life benchmarks for three key pesticides of concern (diazinon, chlorpyrifos, malathion). The 1992 – 2001 baselines as a percentage of urban watersheds sampled that exceeded benchmarks are Diazinon: 40 percent; Chlorpyrifos: 37 percent; and Malathion: 30 percent.¹¹
- By 2011, reduce the number of agricultural watersheds sampled by the USGS NAWQA program that exceed EPA aquatic life benchmarks for 2 key pesticides (azinphos-methyl and chlorpyrifos). Based on 1992–2001 data, 18 percent percent of agricultural watersheds sampled exceeded benchmarks for Azinphos-methyl and Chlorpyrifos.
- By 2011, cumulative percentage of Section 3 actions (registrations of new active ingredients and re-registration of existing pesticides) taken by EPA which have fully addressed Endangered Species Act obligations, will reach 60 percent.

Sub-objective 4.1.5: Realize the Benefits from Pesticide Use. Through 2011, ensure the public health and economic benefits of pesticide availability and use are achieved.

Strategic Targets:

- By 2011, avoid \$1.5 billion of crop loss by ensuring that effective pesticides are available to address emergency pest infestations.
- By 2011, annually avoid \$900M in termite structural damage by ensuring that safe and effective pesticides are registered/re-registered and available for termite treatment.

Means and Strategies For Achieving Objective 4.1

In cooperation with our state and tribal partners and with the support of industry, environmental groups, and other stakeholders, EPA will use environmental stewardship strategies to reduce significantly chemical and pesticide risks to individuals, communities, and ecosystems.

Reducing Risks From Chemicals

EPA's strategy to prevent and reduce risks posed by chemicals and microorganisms consists of two primary approaches: (1) preventing the introduction into U.S. commerce of chemicals and organisms that pose unreasonable risks; and (2) effectively screening the stock of chemicals already in commerce for potential risk. EPA develops and implements action plans to reduce the use of and exposure to chemicals demonstrated to harm humans and the environment. EPA works with states and tribes, other federal agencies, the private sector, and international entities and increasingly employs stewardship strategies to protect public health and the environment from chemical risks.

The primary mechanism for preventing the introduction into U.S. commerce of chemicals and organisms that pose unreasonable risks is the Toxic Substances Control Act's (TSCA's) requirement that EPA review all new industrial chemicals and organisms prior to their production or import and be notified of significant new uses for certain chemicals that have already been reviewed.¹² Under TSCA, EPA screens, assesses, and reduces risks posed by the 66,600 chemicals that were in use prior to the TSCA's enactment in 1977. Thousands of these chemicals still are in use today, and nearly 3,000 of them are High Production Volume (HPV) chemicals, produced or imported into the United States in quantities exceeding 1 million pounds per year. Under the HPV Challenge Program, more than 400 companies and 100 consortia have voluntarily provided critical hazard screening data on almost 1,400 HPV chemicals that EPA is making publicly available through a comprehensive searchable database.¹³ EPA also participates in the Organization for Economic Co-operation and Development (OECD) Screening Information Data Set program,¹⁴ the international equivalent of the HPV Challenge Program. EPA uses these data to screen chemicals for potential hazards and risks, and to set priorities for further assessments and actions to eliminate or manage unreasonable risk.

EPA's New Chemical Program prevents the introduction of chemicals and organisms into economic production that might pose unreasonable risk. EPA's premanufacture notice (PMN) reviews typically assess 1,300 to 1,500 new chemicals or organisms every year, a rate expected to continue through 2011. Under the New Chemical Program, EPA has developed a number of advanced screening tools to estimate the fate, concentrations, and potential health and environmental hazards of chemicals released to the environment.¹⁵ These advanced tools are also critical to another component of this approach—EPA's work to encourage development of safer or "greener" new chemicals at the earliest stages of product, process, and service design. The Sustainable Futures initiative¹⁶ provides chemical manufacturers with the same screening tools EPA uses to evaluate potential risks to workers and the public and possible impacts to the environment. EPA expects to increase the New Chemical Program's efficiency as more companies voluntarily pre-screen their chemicals and reduce the number of problematic new chemical notices submitted to EPA. EPA's tools and models continue to undergo rigorous external peer review and are updated and expanded as needed, based on review recommendations.

Addressing Lead And Other High-Risk Chemicals

EPA targets risk-reduction efforts at specific chemicals and addresses essential environmental justice concerns. Foremost among these is the federal government's commitment to eliminate the incidence of childhood lead poisoning. Since the 1990s, EPA has focused on reducing children's exposure to lead in paint and dust through a regulatory framework, federal interagency collaboration, and education of parents and the medical community about prevention. Because of these efforts, children's blood lead levels in the United States have declined dramatically, and the federal government anticipates that it will achieve its goal of eliminating the incidence of childhood lead poisoning in 2010. In working towards that goal, EPA is developing a comprehensive program to address lead hazards created by renovation, repair, and painting activities in homes with lead-based paint. Continued vigilance is required to ensure that no resurgence in childhood lead poisoning occurs after 2010. The Agency is also working to eliminate the disparity in blood lead levels between low income and non-low income target populations, and to address other environmental justice concerns. EPA will accomplish this by targeting program resources towards this country's most vulnerable populations.

Particulate matter (PM) from vehicles is a growing public health problem in many countries, particularly in urban areas in the developing world. Reducing sulfur in fuel will significantly decrease emissions of particulate matter from vehicles. Over the next 5 years, through the public-private global Partnership for Clean Fuels and Vehicles, EPA will reduce emissions from vehicles in key countries by eliminating lead from gasoline worldwide and reducing sulfur from gasoline and diesel fuels. The Partnership, launched by EPA at the World Summit on Sustainable Development in Johannesburg, South Africa (WSSD), includes representatives from the oil and automobile industries, non-governmental organizations, governments, and international organizations such as the United Nations Environmental Program.¹⁷ The Partnership also leverages expertise

from other U.S. government agencies to provide technical assistance on projects in several parts of the world, including expertise from the U.S. Agency for International Development, the U.S. Department of State, and the Centers for Disease Control.

EPA is also evaluating and implementing risk management actions on chemicals of emerging concern. Perfluorooctanoic acid (PFOA), a persistent chemical causing systemic and developmental toxicity in animal studies, has been found in human blood and has a half-life in humans measured in years.¹⁸ EPA invited the eight major companies with operations in the United States that generate or use PFOA in their products to participate in a global environmental stewardship program to reduce emissions and product content levels of PFOA, PFOA precursors, and related chemicals. All eight of the companies committed to reduce facility emissions and product content of PFOA and related chemicals by 95 percent no later than 2010, and to work toward eliminating emissions and product content of these chemicals by 2015. Companies will report their progress for both their U.S. and global operations. In addition, the United States shares with Germany the lead on preparing a draft international PFOA assessment for the Organization for Economic Cooperation and Development. EPA will seek to expand the stewardship program into a truly international effort through cooperative activities with foreign governments.

Mercury is a domestic and global pollutant and potent neurotoxin that places adults, children, and developing fetuses at risk for a variety of health problems, including developmental delays. The U.S. has been a catalyst for increasing international collaboration, building countries' capacities, and promoting data sharing to better characterize and reduce global mercury use and releases. EPA expects to achieve measurable reduction in the chlor-alkali sector, commercial and manufactured products sector, and the sectors for artisanal and small scale gold mining and coal combustion, together responsible for up to 80 percent of global anthropogenic mercury emissions. This reduction will be accomplished through demonstration projects in key countries, training, public awareness programs, and information sharing.

EPA employs a multimedia, cross-Agency strategy to focus on other high-risk chemicals and classes of chemicals. For example, we are working to prevent new persistent, bioaccumulative, toxic (PBT) chemicals from entering commerce and to reduce the risks associated with PBTs that are currently in use or have been used in the past, including mercury and polychlorinated biphenyls (PCBs). EPA ensures that PCB waste is properly stored and disposed, and that PCB-contaminated sites are correctly cleaned up by advising the regulated community on PCB remediation, reviewing and acting on PCB disposal applications, and overseeing PCB permitted storage and disposal facilities. EPA supports the U.S. Navy, the Department of Transportation's Maritime Administration (MARAD), and other federal agencies that dispose of obsolete ships containing PCBs. In addition, the Agency works with the Department of Defense to approve the incineration of PCBs in nerve agent rockets and the safe disposal of PCB wastes outside of the United States.

Tribal environmental and public health issues are continuing EPA priorities for the chemical program. EPA focuses on the needs of tribal communities by addressing chemical risks using risk assessment methods that take into account the different risk profiles of some tribal lifestyles by building infrastructure and capacity, by providing information and tools to assess and prevent adverse impacts on these sensitive populations, and by implementing lead, asbestos, and PCB programs within tribal communities.

Reducing Risks From Accidental Chemical Releases From Facilities

To reduce or eliminate risks associated with accidental chemical releases from facilities, EPA must first identify and understand the potential risks. Since 2003, EPA completed approximately 1,800 audits of Risk Management Plan (RMP) facilities and processed over 12,000 RMPs. During 2007, EPA will review and analyze data collected in 1999 and 2004 under the Agency's Risk Management Plan (RMP) program.¹⁹ Through 2011, EPA will continue analyzing RMP and the Emergency Planning and Community Right-to-Know (CERCLA) data²⁰ to identify geographic locations and facility types with the greatest potential for chemical accidents and releases areas, and identify where susceptible and sensitive populations may be at higher risk from chemical releases. EPA will use this information to develop voluntary initiatives and activities aimed at high-risk facilities and geographic areas.

In the event of a chemical emergency, protecting first responders and other on-site personnel is critical. EPA's federal, state, and local partners accomplish the majority of this work. EPA provides emergency personnel with information they need to take necessary precautions and treat individuals who may be on the scene. EPA, in collaboration with other federal, private, and academic organizations, is increasing the pace for developing Acute Exposure Guideline Levels (AEGs), i.e., limits for short-term exposures representing three tiers of health effect endpoints (i.e., discomfort, disability, and death) for five different exposure durations.²¹ States, communities, fire departments, health agencies, and local governments use the information provided by EPA in their local emergency response planning and mitigation efforts to understand how these chemical risks could affect them, how to reduce those risks, and how to address and mitigate risks should a chemical release occur.

Reducing Exposure To Pesticides

The mission of EPA's Pesticide Program is to protect human health and the environment by ensuring that pesticides are safe and available.²² Pesticides protect our food supply from a range of pests including fungi, insects, weeds, and microorganisms. They reduce risks of vector-borne diseases, sanitize hospital equipment, and disinfect household items and surfaces. Consequently, people may be exposed to pesticides from the foods that they eat, in and around homes and parks, and in occupational settings. Because many pesticides are potentially hazardous, EPA serves an important role by screening new pesticides before they reach the market, and as an effective steward of pesticides already on the market.

EPA's statutory authority to regulate pesticides derives from three primary statutes: the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Federal Food, Drug, and Cosmetic Act (FFDCA), and the Food Quality Act of 1996 (FQPA) that amended both FIFRA and FFDCA. Under these laws, EPA has responsibility for protecting consumers, pesticide users, or workers who may be exposed to pesticides, and children and other sensitive populations, and for protecting the ecosystems, including non-target plants and species, with a special emphasis on EPA's responsibilities under the Endangered Species Act. EPA is also required to balance the risks and benefits of a pesticide's use when making regulatory decisions and establishing tolerances or maximum allowable pesticide residues on food and feed, and to consider cumulative and aggregate risks and greater protections for children. EPA seeks to maximize the potential for pesticide use to positively affect quality of life, control vector-borne disease, and ensure availability and affordability of agricultural goods.

EPA's Pesticide Registration Program serves to screen pesticide products before their entry into the market.²³ EPA reviews significant data prior to registering a pesticide and, when needed, implements use restrictions and directions that ensure when a pesticide is used according to label directions it will not result in unreasonable risk. This pre-market review includes consideration of human health and environmental concerns and the pesticide's potential benefits. Under the Reregistration Program, EPA reviews existing registrations to ensure they meet current scientific standards and concerns identified after the original registration.²⁴ A provision under FQPA replaced the FIFRA requirement for reregistration with a requirement for periodic review of pesticide registrations to ensure existing registrations meet the most current standards.²⁵ The Agency uses data on the concentrations of pesticides detected in the general public, collected by the Center for Disease Control in a bi-annual National Health and Nutrition Examination Survey (NHANES), to assess EPA's effectiveness in protecting human health from pesticides.²⁶

EPA began promoting the registration of reduced risk pesticides in 1995. EPA gives priority in its registration program for pesticides that have low impact on human health, low toxicity to non-target organisms (birds, fish, and plants), low potential for groundwater contamination, lower use rates, low pest resistance potential, and those that are compatible with Integrated Pest Management.²⁷ Several countries and international organizations have instituted programs to facilitate registration of reduced risk pesticides. EPA will maintain its leadership role and work with the international scientific community and individual OECD member countries to ensure the registration of twelve new reduced risk pesticides and to establish related tolerances (maximum residue limits) in Organization for Economic Cooperation and Development (OECD) countries. As a greater amount of food is imported from other countries, international use of reduced risk pesticides contributes to reduced risks for Americans.

The regulation of pesticides also requires a strong field program to ensure that decisions made during the licensing and re-licensing processes are implemented in

pesticide use. Working closely with states, tribes, and other federal agencies, EPA's pesticide field program addresses worker safety, certification, and training for more hazardous pesticides, as well as protection of endangered species. In agriculture alone, an estimated 1.8 million workers could be exposed to pesticides, and there are millions of individuals involved in occupations that use pesticides, such as lawn care, healthcare, food preparation, and landscape maintenance.²⁸ In addition to promoting and licensing safer products, EPA reduces the number and severity of pesticide exposure incidents through regulations under the Worker Protection Standard, pesticide applicator certification and training, risk assessment and risk management, and effective communication and outreach. Close cooperative relationships between EPA, states, tribes, and other regulatory partners allows information on local pesticide use patterns, geological conditions, location of endangered species, and tribal cultural practices to inform the risk assessment process and to guide EPA to practical and effective decisions.

Reducing Risks To Ecosystems

Pesticides can have negative effects on water resources, soil, and wildlife. While a significant portion of the risk assessments conducted for new and existing pesticides relate to human health, EPA also conducts ecological risk assessments to address potential impacts to plants, animals, and ecosystems. Under FIFRA, EPA must determine that a pesticide is not likely to harm the environment in the same way that it must determine potential risk for human health. EPA may impose risk mitigation measures such as use restrictions, denial of uses, or requirements to monitor environmental conditions such as effects on water sources.

Reductions in the concentrations of pesticides in water sources are a major indicator of the efficacy of EPA's risk assessment, management, mitigation, and communication activities. To reduce potential environmental impact of four pesticides of concern (diazinon, chlorpyrifos, malathion, and azinphos-methyl), EPA will use sampling data from urban and agricultural watersheds collected under the U.S. Geological Survey (USGS) National Water Quality Assessment (NAWQA) program.²⁹ For each of the pesticides, EPA will monitor the impacts of previous regulatory decisions and consider additional action necessary to achieve greater environmental improvements. EPA will work with USGS to develop sampling plans, and intermediate (2008–2010) goals will be refined when the USGS plan is finalized in late FY 2007. In addition to currently tracked insecticides, EPA will request that USGS add additional insecticides to sampling protocols and establish baselines for newer products that are replacing organophosphates such as synthetic pyrethroids.

Under the Endangered Species Act (ESA), EPA is required to ensure that pesticide regulatory decisions will not adversely modify critical habitat or jeopardize the continued existence of listed species. With approximately 600 active ingredients in over 19,000 products—each which may have multiple uses—and approximately 1,200 listed species each with diverse habits and habitat requirements, this is a great challenge. EPA is working with the U.S Fish and Wildlife Service and National Marine Fisheries Service to

establish an effective process for EPA to carry out its ESA obligations. Together, we are developing “counterpart regulations” that provide EPA authority to make certain determinations without further consultation. Realizing that former licensing and registration processes did not fully examine endangered species impacts, EPA has made assessing risks to endangered species a priority and is revising its processes to make endangered species considerations a routine part of Agency reviews.³⁰ EPA is training staff to ensure they are able to make determinations under the counterpart regulations. EPA, states, and tribes also make vital contributions by providing valid and relevant information on local pesticide use and practices, and recommendations on the feasibility of potential mitigation methods.

Realizing Economic Benefits Of Pesticides

Controlling the production and income losses from pests is important for agricultural production systems where pest damage can be an economic detriment. U.S. agricultural producers have relied on registered pesticides for decades to produce an abundant and safe food supply and to avoid economic losses from pests. One of the primary benefits of EPA’s licensing and re-licensing programs is access to effective pesticides that eliminate or limit losses. FIFRA also authorizes conditional use of a pesticide for a geographically specific emergency. Historically, the crop loss avoided through the timely review of emergency exemption requests is estimated at \$1.5 billion per year. EPA continues to support these benefits to American agriculture and American consumers by carefully reviewing all requests for emergency exemptions in a timely manner.

Due to the availability of effective termiticides, it is estimated that \$900 million of termite damage is avoided each year. Although some effective termiticides have been removed from the market because of safety concerns, EPA works with industry to help register safe alternatives to maintain a high level of protection with safe products that meet or exceed all current safety standards.

OBJECTIVE 4.2: COMMUNITIES. Sustain, clean up, and restore communities and the ecological systems that support them.

Sub-objective 4.2.1: Sustain Community Health. By 2011, reduce the air, water, and land impacts of new growth and development through use of smart growth strategies in 30 communities that will achieve significant measurable environmental and/or public health improvements. The baseline will be established in 2006.

Sub-objective 4.2.2: Restore Community Health through Collaborative Problem-Solving. Make significant environmental improvements in communities with potential disproportionately high and adverse environmental and/or public health effects (“areas with potential environmental justice concerns”) and foster the ability of communities to address local environmental concerns with other stakeholders through collaborative problem solving.³¹

Strategic Targets:

- By 2011, 30 communities with potential environmental justice concerns will achieve significant measurable environmental or public health improvement through collaborative problem-solving strategies. (Baseline: In 2006, 30 communities with potential environmental justice concerns are in the process of using collaborative problem-solving strategies in efforts to achieve environmental or public health improvement. Community-specific baselines will be developed by 2008 for assessing improvement.)
- By 2011, as compared to the general population, significantly decrease the amount of pollution that may disproportionately affect the environmental health of communities with potential environmental justice concerns. This reduction will include, as appropriate, pollutant sources associated with the following national environmental justice priorities: asthma, air toxics, lead, contaminated fish and shellfish, drinking water; brownfields, and contaminated sites.

Sub-objective 4.2.3: Assess and Clean Up Brownfields. Working with state, tribal, and local partners, promote the assessment, cleanup, and sustainable reuse of brownfields properties.

Strategic Targets:

- By 2011, conduct environmental assessments at 13,900 properties. (FY 2005 baseline is 7,900.)
- By 2011, make 1,125 acres (cumulative) of brownfields ready for reuse. (Baseline will be established in FY 2006.)
- By 2011, leverage \$12.9 billion (cumulative) in assessment, cleanup, and redevelopment funding at brownfields properties (FY 2005 baseline is \$7.5B³².)

Sub-objective 4.2.4: Sustain and Restore the United States - Mexico Border Environmental Health. By 2012, sustain and restore the environmental health along the United States-Mexico border through implementation of the "Border 2012" plan.

Strategic Targets:

- By 2012, achieve a majority of currently exceeded water quality standards in impaired reaches or segments of significant shared and trans-boundary surface waters. (2002 Baseline: 42 water quality impairments/sources were identified for 24 segments of significant shared and trans-boundary surface waters.)

- By 2012, provide safe drinking water to 25 percent of homes in the Mexican border area that lacked access to safe drinking water in 2003. (2003 Baseline: 98,515 homes lacked access to safe drinking water.)³³
- By 2012, provide adequate wastewater sanitation to 25 percent of homes in the Mexican border area that lacked access to wastewater sanitation in 2003. (2003 Baseline: 690,723 homes lacked access to wastewater sanitation.)³⁴
- By 2012, cleanup five waste sites (two abandoned waste tires sites and three abandoned hazardous waste sites) in the United States-Mexico border region.

Sub-objective 4.2.5: Sustain and Restore Pacific Island Territories. By 2011, sustain and restore the environmental health of the U.S. Pacific Island Territories of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI).

Strategic Targets:

- By 2011, 95 percent of the population in each of the U.S. Pacific Island Territories served by community drinking water systems will receive drinking water that meets all applicable health-based drinking water standards throughout the year. (2005 Baseline: 95 percent of the population in American Samoa, 10 percent in CNMI, and 80 percent of Guam served by community water systems received drinking water that meets all applicable health-based drinking water standards throughout the year).
- By 2011, the sewage treatment plants in the U.S. Pacific Island Territories will comply 90 percent of the time with permit limits for biochemical oxygen demand (BOD) and total suspended solids (TSS). (2005 Baseline: the sewage treatment plants in the Pacific Island Territories complied 59 percent of the time with the BOD and TSS permit limits).
- By 2011, beaches in each of the U.S. Pacific Island Territories monitored under the Beach Safety Program will be open and safe for swimming 96 percent of days of the beach season. (2005 Baseline: beaches were open and safe 64percent of the 365-day beach season in American Samoa, 97 percent in CNMI and 76 percent in Guam).

Sub-objective 4.2.6: Reduce Persistent Organic Pollutants (POPs) Exposure.

By 2011, reduce the mean maternal serum blood levels of POPs contaminants in indigenous populations in the Arctic.³⁵

Strategic Targets:

- By 2011, reduce mean maternal blood levels of polychlorinated biphenyls (PCBs) (measured as Aroclor 1260) in indigenous populations in the Arctic to 5.6 µg/l.

- By 2011, reduce mean maternal blood levels of chlordane (measured as the metabolites oxychlordane and trans-nonachlor) in indigenous populations in the Arctic to 1.1 µg/l.

Means And Strategies For Achieving Objective 4.2

Communities are the places where we live and work, supported and enriched by natural ecosystems and their valuable assets. EPA is committed to sustaining and restoring community health and the ecological systems that support it. EPA's work in communities across the United States is critical to ensure clean and safe water for drinking, swimming, and fishing, healthy air, and safe management of waste and its by-products. Much of EPA's community work also addresses environmental justice and tribal concerns and advances stewardship and sustainability. EPA's national media-specific programs carry out important aspects of work in communities; however, to effectively address the great range of conditions among communities requires cross-media coordination and innovative strategies. As we expand our knowledge of environmental conditions, stressors, and solutions, community-based strategies for environmental protection will become more common and widely implemented. Thus, developing and implementing effective community-based strategies are the great challenge and promise of environmental protection in the coming century.

Sustaining Healthy Communities

Achieving healthy communities and ecosystems requires protecting and sustaining natural resources that are at risk. EPA uses four approaches to facilitate community-based protection of local natural resources.

- Inform local decision-making. EPA continues to improve methods for information exchange and for giving communities greater access to environmental information.
- Build local capacity. EPA develops and distributes tools that integrate media-specific information, supports multimedia planning, and develops training for local agencies and community groups on how to use environmental assessment and planning data and how to work collaboratively and cooperatively with a range of stakeholders. EPA also identifies and provides opportunities for greater public participation in environmental decision making.
- Provide technical and financial assistance directly to communities. This assistance helps neighborhood groups adopt integrated comprehensive approaches to environmental problems in their neighborhoods, coordinate environmental management, and promote strategic partnerships with EPA. For example, EPA's Community Action for a Renewed Environment (CARE) program provides competitive grants directly to communities to create local collaborative partnerships to reduce releases and minimize exposure to toxic pollutants.

Through programs like CARE, by 2011, EPA expects more than 100 community partnerships will use meaningful public involvement to address disproportionate environmental impacts and/or prioritized risks through comprehensive, integrated planning, and environmental management and partnership programs. These communities will provide quantitative data on human, public, or community health to EPA. Through continuing efforts to negotiate international free trade agreements, our assistance to communities also extends to specific international trading partners. In this context, EPA conducts environmental reviews and provides technical assistance to promote ecologically compatible development abroad.

- Ensure that national policies and programs support, rather than hinder, the comprehensive, and integrated management of local resources. EPA also reviews new policies and regulations to ensure that federal programs are more compatible with local efforts and that they promote overall environmental improvement. EPA continues to collaborate with other federal agencies to create incentives for and remove barriers to smart growth and integrated environmental management.

Restoring Healthy Communities: Environmental Justice

EPA maintains an ongoing commitment to ensure environmental justice for all people, regardless of race, color, national origin, or income in accordance with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." In recognizing that minority and/or low-income communities frequently may be exposed disproportionately to environmental hazards and risks, EPA works to protect these and other affected communities. Ensuring environmental justice means not only protecting human health and the environment for everyone, but also ensuring that all people are treated fairly and are given the opportunity to participate meaningfully in the development, implementation, and enforcement of environmental laws, regulations, and policies.

To achieve the goals of environmental justice, EPA is establishing, as appropriate, measurable environmental justice commitments for eight national environmental priorities and other critical areas of focus. Priority areas include: reducing asthma attacks; reducing exposure to air toxics; increasing compliance with regulations; reducing incidence of elevated blood lead levels; ensuring that fish and shellfish are safe to eat; ensuring that water is safe to drink; revitalization of brownfields and contaminated sites; and, using collaborative problem-solving to address environmental and/or public health concerns. EPA is also increasing the integration of environmental justice considerations in all aspects of its mission through staff training and improved access to guidance documents, online tools, and other resources; the dissemination of information about successful strategies; and enhancing the ability of staff to work effectively with community-based organizations and other stakeholders. EPA promotes collaborative problem-solving strategies by providing capacity-building through grants and cooperative agreements, online tools, training, and technical assistance. EPA also

coordinates stakeholders to help leverage resources and to address multi-media, cumulative risk, and/or other community concerns. In addition, the Agency uses dispute resolution, facilitation, listening sessions, and other consensus building techniques and convenes multi-stakeholder groups to address environmental and/or public health issues. These efforts help communities and other stakeholders develop partnerships that produce practical solutions to local human health and environmental issues.

Assessing And Cleaning Up Brownfields

Brownfields are real properties whose expansion, redevelopment, or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties increases local tax bases, facilitates job growth, utilizes existing infrastructure, takes development pressures off undeveloped land, and improves and protects the environment. EPA's Brownfields Program works in cooperation with communities, states, tribes, and various other stakeholder groups, and provides funding and technical assistance to address both public health and environmental concerns and to advance a community's revitalization vision.

EPA offers competitive grants for brownfields assessment, cleanup, job training, and revolving loan fund grants. EPA has awarded 780 of these grants since the enactment of the Brownfields Law. Assessing brownfields helps communities understand the risks these properties pose and provides the information needed to undertake cleanup and reuse. Nearly one third of the properties that communities assess do not require environmental cleanup. EPA's cleanup grants provide funding for environmental cleanup activities of many properties that are contaminated. EPA's revolving loan fund grants capitalize a revolving loan fund to carry out cleanup activities at brownfield sites. In addition, EPA's brownfields job training grants fund eligible governmental and non-profit organizations for recruitment, training, and job placement in the environmental field for residents affected by brownfields, helping to ensure that the economic benefits derived from brownfield reuse remain in the affected community.

Competitive grant ranking criteria include community need, sustainability, community involvement, preservation of greenspace, and reduction of threats to human health and the environment. The "Brownfields Law" also requires EPA to consider "the extent to which the grant would address or facilitate the identification and reduction of threats to the health or welfare of minority or low-income communities, or other sensitive populations," further emphasizing the brownfields program's commitment to environmental justice and addressing community concerns in the reuse of brownfields.³⁶ The program is developing a methodology to better assess the relationship between EPA-funded brownfields projects and sensitive, socio-economically disadvantaged communities. This information will allow the program to evaluate the assistance provided to date and to develop strategies that better integrate environmental justice considerations.

EPA provides funds to state and tribal governments to establish and enhance response programs that oversee the majority of brownfields assessments and cleanup. These programs may provide technical oversight and assistance to property owners; create inventories of brownfields sites; develop policies, regulations, and ordinances; and conduct site assessment and cleanup of brownfields sites. EPA funding is often critical to the operation of these response programs, especially for tribal governments for whom funding might not otherwise be available.

EPA also provides outreach and technical assistance to stakeholders confronting and revitalizing brownfields. EPA performs targeted brownfields assessments at individual sites where stakeholders are seeking federal assistance to identify the extent of contamination. Through the Brownfields and Land Revitalization Technology Support Center,³⁷ EPA helps streamline site investigations and the cleanup process, identify technology options, evaluate contractor capabilities and recommendations, and explain complex technologies to communities. EPA provides technical tools to help stakeholders complete brownfields transactions, such as Triad³⁸ and SMARTe.³⁹ The Triad approach to site assessment improves environmental decision making through systematic planning, dynamic work strategies, and real-time measurement technologies. SMARTe is a tool that communities can use to assess both market and non-market costs and benefits of redevelopment options, clarify private and public financing options, and evaluate and communicate environmental risks. EPA cosponsors a national brownfields conference with educational sessions, workshops, and roundtables where the brownfields reuse community shares ideas, lessons learned, and best practices.

The Brownfields Program is conducting a program review of the operations at EPA headquarters and at the Agency's 10 regional offices. The review will compile feedback on program objectives and operations, ensure accountability of internal and external stakeholders, evaluate decision-making processes, and identify and share best practices. The review, which is aimed at enhancing the overall quality of the program, will be completed in FY 2008.

Reducing Transboundary Threats Along The United States-Mexico Border

In an increasingly interconnected world, domestic environmental quality and public health often require action along borders and in other parts of the world. Since 1970, the United States-Mexico border region has experienced rapid population growth. Today, there are approximately 13 million inhabitants in the border region, nearly equally divided between Mexico and the United States. The U.S.-Mexico Border 2012 Program, a joint effort between the governments of the United States and Mexico, works with the 10 border states and border communities to reduce transboundary threats to improve the region's environmental and ecosystem health.⁴⁰

As part of EPA's continuing commitment to environmental justice, the Agency is working with some disadvantaged border communities to improve water quality in both the United States and Mexico. For decades, raw sewage has flowed unabated through

and from border cities, posing a significant public health and environmental threat to both U.S. and Mexican communities. Inadequate water and sewage treatment cause border residents to suffer disproportionately from hepatitis A and other waterborne diseases. To reduce health risks to residents, EPA assists communities in the U.S.-Mexico border region to increase the number of homes with access to safe drinking water and basic sanitation. As this infrastructure comes on line, discharges of raw sewage will be reduced and surface water quality will improve. Restoration of surface water quality on 24 impaired shared and trans-boundary waters is an EPA priority.

EPA will also focus on the environmental and human health risks posed by land contamination from abandoned tires and hazardous waste. Piles of waste tires pose a risk to health and the environment because they serve as breeding grounds for mosquitoes and are prone to fires, which are difficult to extinguish. Addressing the challenge of contaminated hazardous waste sites will also minimize the threat of acute heavy metal poisoning and long-term central nervous system damage to local residents.

To Learn More:

www.epa.gov/owm/mab/mexican/

Restoring Island Communities

The U.S. island territories of American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), and Guam face severe environmental infrastructure problems, leaving residents more at risk from environmental problems than many of their mainland counterparts. In some cases, island residents are not able to turn on their faucets and get clean, safe water. Similarly, these islands are frequently plagued with poor wastewater conveyance and treatment systems that contaminate drinking water wells and surface waters, posing an immediate danger to residents. Island beaches have important recreational, economic, and cultural significance. Beaches provide a year-round draw for tourists and residents alike and also allow local fisherman to continue traditional practices. Currently, pollution from many different sources results in frequent and widespread island beach advisories.

EPA uses a combination of tools to improve conditions in the islands. The Agency targets infrastructure and non-point source grants at the greatest deficiencies. With aggressive enforcement and technical assistance, EPA works to improve the capacity of island utilities to protect public health and safeguard the environment. In close cooperation with island and federal partners, EPA continues to work toward the development of a Territories Bond Bank. The Bond Bank will provide islands with access to more affordable financing, greatly enhancing their ability to fund critical capital improvement projects.

Protecting Arctic Indigenous Communities

Long-range and transboundary atmospheric transport and deposition of persistent organic pollutants (POPs) are a continuing threat to human health and ecosystems. These pollutants can travel great distances from their sources, remain intact for long periods, enter the ecosystem, and bioaccumulate through the food chain. Consequently, POPs are a continuing threat to human health and the ecosystems in North America, especially the Arctic. Arctic indigenous populations, including those in Alaska, have higher exposures to POPs than other populations due to their traditional food consumption. Reducing international sources of POPs can lead to reductions of their levels in the Arctic environment, including animal food sources. The United States is a strong supporter of the Stockholm Convention on Persistent Organic Pollutants, a global treaty to reduce POPs that EPA helps implement.⁴¹

The Arctic Monitoring and Assessment Program, that documents exposure of indigenous populations to toxics in remote areas, indicates the primary sources of POPs are from international, long-range transport, and that some of the largest sources of pollutants to the Arctic include Russia and China.⁴² EPA works with Russia and other Arctic Council members toward reducing these pollutants, including efforts to collect and safely store obsolete pesticide stockpiles. Based on EPA-led Arctic Council projects, EPA estimates that about 24,000 tons of POPs pesticides will be removed from unsafe storage and destroyed by 2008⁴³ and about 12,000 tons of PCB oil will be destroyed by 2009.⁴⁴ EPA also works with partners to raise awareness about persistent pollutants, build capacity to prevent pollution, and share beneficial technologies to protect arctic indigenous communities.

OBJECTIVE 4.3: RESTORE AND PROTECT CRITICAL ECOSYSTEMS. Protect, sustain, and restore the health of critical natural habitats and ecosystems.

Critical Ecosystems

- Wetlands
- Estuaries
- Great Lakes
- Chesapeake Bay
- Gulf of Mexico
- Long Island Sound
- South Florida Ecosystem
- Puget Sound Basin
- Columbia River Basin

Sub-objective 4.3.1: Increase Wetlands. By 2011, working with partners, achieve a net increase in wetlands acres with additional focus on assessment of wetland condition.

Strategic Targets:

- By 2011, working with partners, achieve a net increase of 100,000 acres of wetlands per year with additional focus on biological and functional measures and assessment of wetland condition. (2004 Baseline: 32,000 acres annual net wetland gain based on new U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory Status and Trends Report, 1998-2004.)
- By 2011, in partnership with the U.S. Army Corps of Engineers (the Corps), states, and tribes, achieve “no net loss” of wetlands each year under the Clean Water Act Section 404 regulatory program, beginning in 2007. (Baseline: new baseline to be determined in 2008)

Sub-objective 4.3.2: Facilitate the Ecosystem-Scale Restoration of Estuaries of National Significance.

By 2011, working with partners, protect or restore an additional (i.e., measuring from 2007 forward) 250,000 acres of habitat within the study areas for the 28 estuaries that are part of the National Estuary Program. (2005 Baseline: 449,242 acres of habitat protected or restored; cumulative from 2002.)

Sub-objective 4.3.3: Improve the Health of the Great Lakes. By 2011, prevent water pollution and protect aquatic systems so that the overall ecosystem health of the Great Lakes is at least 23 points on a 40-point scale. (2005 Baseline: Great Lakes rating of 21.5 on the 40-point scale where the rating uses select Great Lakes State of the Lakes Ecosystem indicators based on a 1 to 5 rating system for each indicator, where 1 is poor and 5 is good.⁴⁵)

Strategic Targets:

- Through 2011, maintain or improve an average annual 5 percent decline for the long-term trend in average concentrations of PCBs in whole lake trout and walleye samples. (Baseline: decline from 1990 levels.⁴⁶)
- Through 2011, maintain or improve an average 7 percent annual decline for the long-term trend in average concentrations of toxic chemicals (PCBs) in the air in the Great Lakes basin. (Baseline: Decline from 1992 levels measured through Integrated Atmospheric Deposition Network (IADN) data.⁴⁷)
- By 2010, restore and delist a cumulative total of at least 8 Areas of Concern within the Great Lakes basin (2005 Baseline: 0 areas of concern de-listed as of 2005 of the 31 total areas of concern.)
- By 2011, remediate a cumulative total of 7 million cubic yards of contaminated sediment in the Great Lakes. (2005 Baseline: 3.7 million cubic yards of contaminated sediments from the Great Lakes have been remediated from 1997 through 2004 of the 75 million yards estimated to need remediation.)

Sub-objective 4.3.4: Improve The Health of the Chesapeake Bay Ecosystem.

By 2011, prevent water pollution and protect aquatic systems so that the overall aquatic system health of the Chesapeake Bay is improved.

Strategic Targets:

- By 2011, achieve 45 percent (83,250 acres) of the long-term restoration goal of 185,000 acres of submerged aquatic vegetation. (2005 Baseline: 39 percent (72,935 acres) of submerged aquatic vegetation goal achieved.)
- By 2011, achieve 40 percent (29.92 cubic km) of the long-term restoration goal of 100 percent attainment of the dissolved oxygen water quality standards in all tidal waters of the Bay. (2005 Baseline: 34 percent (25.40 cubic km) of dissolved oxygen goal achieved.)
- By 2011, achieve 59 percent (95.88 million pounds) of the long-term goal to reduce annual nitrogen loads 162 million pounds from 1985 levels.
- By 2011, achieve 74 percent (10.63 million pounds) of the long-term goal to reduce annual phosphorus loads 14.3 million pounds from 1985 levels.
- By 2011, achieve 74 percent (1.25 million tons) of the long-term goal to reduce annual land-based sediment loads 1.68 million tons from 1985 levels.

Sub-objective 4.3.5: Improve the Health of the Gulf of Mexico. By 2011, the overall health of coastal waters of the Gulf of Mexico will be improved from 2.4 to 2.6 on the “good/fair/poor” scale of the National Coastal Condition Report. (2004 Baseline: Gulf Coast rating of fair or 2.4 where the rating is based on a 4-point system where 1 is poor and 5 is good.)

Strategic Targets:

- By 2011, restore water and habitat quality to meet water quality standards in 71 impaired segments (cumulative) in 13 priority coastal areas (i.e., 20 percent of the 354 impaired segments identified in 13 priority coastal areas). (2005 Baseline: 28 segments restored)
- By 2011, restore, enhance, or protect 20,000 acres of important coastal and marine habitats. (2005 baseline: 16,000 acres restored, enhanced, or protected; Gulf of Mexico coastal wetland habitats include 3,769,370 acres.)
- By 2015, reduce releases of nutrients throughout the Mississippi River Basin to reduce the size of the hypoxic zone in the Gulf of Mexico to less than 5,000 km², as measured by the 5-year running average of the size of the zone. (Baseline: 1996-2000 running average size = 14,128 km².)

Sub-objective 4.3.6: Restore and Protect Long Island Sound. By 2011, working through the Long Island Sound Study Management Conference partnership, prevent water pollution, improve water quality, protect aquatic systems, and restore the habitat of Long Island Sound.

Strategic Targets:

- By 2014, reduce point source nitrogen discharges to Long Island Sound by 58.5 percent as measured by the Long Island Sound Nitrogen Total Maximum Daily Load. (Annual reduction target: 8,303 lbs/day. TMDL baseline: 212,899 lbs/day; 2014 target: 88,353 lbs/day.)
- By 2011, reduce the size of hypoxic area in Long Island Sound (i.e., the average maximum July-September <3mg/l DO) by 25 percent; reduce average duration of maximum hypoxic event by 25 percent. (2005 baseline derived from 19-year averages as of December 2005. Size: 203 sq/mi. Duration: 58 days.)
- By 2011, restore or protect an additional 300 acres of coastal habitat, including tidal wetlands, dunes, riparian buffers, and freshwater wetlands from the 2005 baseline. (2005 baseline: 562 acres restored and 150 acres protected.)
- By 2011, reopen an additional 50 miles of river and stream corridor to anadromous fish passage from the 2005 baseline through removal of dams and barriers or installation of by-pass structures such as fishways. (2005 baseline: 81 miles.)

Sub-objective 4.3.7: Restore and Protect the South Florida Ecosystem. Protect and maintain the South Florida Ecosystem, including the Everglades and coral reef ecosystems.

Strategic Targets:

- Annually, beginning in 2008, work with the U. S. Army Corps of Engineers and other partners to achieve “no net loss” of wetlands in South Florida under Section 404 of the Clean Water Act. (2005 baseline to be determined in 2006.)
- By 2012, working with all stakeholders (federal, state, regional, and local), achieve “no net loss” of stony coral cover (mean percent stony coral cover) in the Florida Keys National Marine Sanctuary (FKNMS) and in the coastal waters of Dade, Broward, and Palm Beach Counties, Florida. (Baseline to be determined using information collected and analyzed in FY 2005 by the long-term coral reef monitoring projects.)
- By 2011, maintain the overall health and functionality of sea grass beds in the FKNMS each year beginning in 2008, as measured by the long-term sea grass

monitoring project that addresses composition and abundance, productivity, and nutrient availability. (Baseline index of sea grass health to be determined using information collected and analyzed in FY 2005.)

- By 2011, maintain the overall water quality of the near shore and coastal waters of the FKNMS each year, beginning in 2008. (Baseline concentrations for inorganic nitrogen [nitrate, nitrite, and ammonium], soluble reactive phosphorus, water clarity [turbidity and light attenuation], and chlorophyll a to be determined using information collected and analyzed in FY 2005 as measured by the long-term water quality monitoring project.)
- By 2011, maintain the water quality of the Everglades ecosystem each year, beginning in 2008, as measured through water quality monitoring of total phosphorus. (Baseline is 1995 water quality.)

Sub-objective 4.3.8: Restore and Protect the Puget Sound Basin. By 2011, improve water quality, air quality, and minimize the adverse impacts of rapid development in the Puget Sound Basin.

Strategic Targets:

- By 2011, improve water quality and lift harvest restrictions in 1,000 acres of shellfish bed growing areas impacted by degraded or declining water quality. (Baseline: As of January 2006, approximately 30,000 shellfish bed growing areas had harvest restrictions due to water quality impairments in Puget Sound.)
- By 2011, 200 acres of prioritized contaminated sediments are remediated. (Baseline: as of January 2006, approximately 5,000 acres of remaining contaminated sediments required some level of remediation.)
- By 2011, 3,500 acres of tidally- and seasonally-influenced estuarine wetlands are restored. (Baseline: total intertidal and near shore habitat acres identified in the 2006 Puget Sound Near Shore Restoration Site Inventory Database.)
- By 2011, through coordinated diesel emission mitigation efforts, reduce total diesel emissions in the Puget Sound airshed by 8 percent. (Baseline will be determined in 2006.)

Sub-objective 4.3.9: Restore and Protect the Columbia River Basin. By 2011, prevent water pollution, and improve and protect water quality and ecosystems in the Columbia River Basin to reduce risks to human health and the environment.

Strategic Targets:

- By 2011, protect, enhance or restore 13,000 acres of wetland habitat and 3,000 acres of upland habitat. (Baseline: 1999 Lower Columbia River Comprehensive Conservation Management Plan.⁴⁸)
- By 2011, clean up 150 acres of known highly contaminated sediments. (Baseline: 400 acres of known highly contaminated sediments in the main-stem of the Columbia River and Lower Willamette River as of 2006.)
- By 2011, demonstrate a 10 percent reduction in mean concentration of contaminants of concern found in water and fish tissue. (Chemical-specific baseline will be available in 2006 from the following sources: Pesticide Stewardship Partnership (PSP) Studies for Oregon as of 2006⁴⁹; Total Maximum Daily Load (TMDL) studies for Washington⁵⁰; 2002 EPA Columbia River Basin Fish Contaminant Survey⁵¹; Lower Columbia River Estuary Partnership 2006 Monitoring Study⁵²; and Washington Ecology's March 2005 Report: Concentrations of 303(d) Listed Pesticides, PCBs, PAHs, Measured with Passive Samplers Deployed in the Lower Columbia River.⁵³)

Means and Strategies For Achieving Objective 4.3

EPA works to protect, sustain, and restore the health of natural habitats and ecosystems by identifying and evaluating problem areas, developing tools, and improving community capacity to address problems. Our activities target wetlands, estuaries, and high-priority areas such as the Great Lakes, Chesapeake Bay, Gulf of Mexico, Long Island Sound, South Florida ecosystem, Puget Sound Basin, and the Columbia River. Place-based ecosystem protection efforts focus attention on critical watersheds to develop and implement water quality control practices and other ecosystem management tools that can be transferred to other place-based efforts nationwide.

Increasing Wetlands

Since the 1700's, the United States has lost more than 115 million acres of wetlands to development, agriculture, and other uses.⁵⁴ Today, the nation may be entering a period of annual net gain of wetlands acres for some wetland classes. When wetlands function properly, they can provide water quality protection, fish and wildlife habitat, natural floodwater storage, and reduction in the erosive potential of surface water. Still, many wetlands in the United States are in less than pristine condition and many created wetlands, while beneficial, fail to replace the diverse plant and animal communities of wetlands lost. Excessive sedimentation, nutrient over-enrichment, pesticides, invasive species, habitat loss, and fragmentation are degrading wetlands.⁵⁵

The 2006 National Wetlands Inventory Status and Trends Report shows the overall gains in wetland acres exceeded overall losses from 1998 through 2004. However, this

gain is primarily attributable to an increase in unvegetated freshwater ponds, some of which (such as aquaculture ponds) may not function as wetlands and others which have varying functional value. The report also notes that freshwater vegetated wetlands declined by 0.5 percent, a smaller rate of loss than in preceding years, and estuarine vegetated wetlands declined by 0.7 percent, an increased rate of loss from the preceding years. The Status and Trends Report, however, does not assess the quality or condition of wetlands. EPA will work with the U.S. Fish and Wildlife Service and other federal agencies to refine the methodology used in preparing future reports to more effectively assess the status and trends of both the quantity and quality of the nation's wetlands.

EPA cooperates with federal partners, state and tribal governments, and others to achieve the President's goal, set in 2004, to restore, improve, and protect 3 million acres of wetlands by 2009. Progress under the President's Initiative is reported annually starting in 2005, in *"Conserving America's Wetlands: Implementing the President's Goal."* EPA also works with the U.S. Army Corps of Engineers (the Corps) in several key areas to ensure "no net loss" of wetlands under Section 404 of the Clean Water Act. A key area of cooperation is the application of the 404(b)(1) guidelines that require that discharges of dredged or fill material into waters of the United States be avoided and minimized to the extent practicable, and that unavoidable impacts be fully compensated. EPA and the Corps are cooperatively developing a consistent set of science-based standards for all types of compensatory mitigation⁵⁶ or mitigation that compensates for wetland destruction. EPA also works with the Corps to enhance data collection and tracking of Section 404 permitted projects and associated compensatory mitigation and provides this information to federal, state, and tribal partners and the public.

EPA leads federal agency implementation of the 2002 National Wetlands Mitigation Action Plan, which includes 17 action items to improve the effectiveness of wetland mitigation and restoration.⁵⁷ EPA continues to enhance its wetlands monitoring by building state and tribal capacity to measure wetland function and condition. Broad-based, integrated monitoring and assessment programs improves wetlands decision-making, helps target restoration activities, and facilitates our ability to address significant stressors. EPA provides technical and financial support through wetland program development grants to build state and tribal wetland programs in the areas of regulation, monitoring, restoration, water quality standards, mitigation compliance, and partnership-building. Other programs, such as the Five Star Restoration Challenge Grant Program,⁵⁸ regional geographic initiatives (RGI),⁵⁹ targeted watershed grants (TWG),⁶⁰ and nonpoint source grants,⁶¹ provide funding, technical support, and information to help communities build strong partnerships to implement riparian, coastal, and wetland restoration projects. EPA also is fully integrating wetlands protection into other clean water and other Agency programs, such as Brownfields.

To Learn More:

www.epa.gov/owow/wetlands/

Restoring Estuaries

Estuaries are among the most biologically productive ecosystems on earth, providing numerous ecological, economic, cultural, and aesthetic benefits and services. They are also among the most threatened ecosystems, largely as a result of rapidly increasing growth and development.⁶² Estuaries tend to accumulate sediments, nutrients, and other pollutants from adjacent and upstream land-based sources. This can have a profound effect on water quality, habitats, living resources, and human health. In addition, overuse of natural resources and conflicts among recreational and commercial users have resulted in a host of problems.

EPA's National Estuary Program (NEP) provides inclusive, community-based planning and action in 28 nationally significant estuaries selected by Congress and the states' governors. EPA supports and monitors the continuing efforts of all 28 NEP estuaries to implement approved comprehensive conservation and management plans, which identify over 2,000 priority actions needed to protect the estuaries and restore estuarine resources. In addition, EPA supports broad priorities identified by the NEPs, including: developing approaches to identify and rank priority habitats; providing tools to integrate local and regional plans for growth with stormwater management; supporting development of total maximum daily loads (TMDLs) for coastal waters; developing and implementing nutrient management strategies, including development of nutrient water quality criteria; addressing problems of invasive species; and, reducing wet weather runoff from urban and agricultural areas.

ESTUARIES IN THE NATIONAL ESTUARY PROGRAM

Albemarle-Pamlico Sounds, NC	Massachusetts Bay, MA
Barataria-Terrebonne, LA	Mobile Bay, AL
Barnegat Bay, NJ	Morro Bay, CA
Buzzards Bay, MA	Narragansett Bay, RI
Casco Bay, ME	New Hampshire Estuaries, NH
Charlotte Harbor, FL	New York/New Jersey Harbor, NY/NJ
Coastal Bend Bays and Estuaries, TX.	Peconic Bay, NY
Lower Columbia River, OR/WA	Puget Sound, WA
Delaware Estuary, DE/NJ	San Francisco Bay, CA.
Delaware Inland Bays, DE	San Juan Bay, PR
Galveston Bay, TX	Santa Monica Bay, CA
Indian River Lagoon, FL	Sarasota Bay, FL
Long Island Sound, NY/CT	Tampa Bay, FL
Maryland Coastal Bays, MD	Tillamook Bay, OR

To Learn More: www.epa.gov/owow/estuaries

The health of the nation's estuarine ecosystems also depends on the maintenance of high-quality habitat. Diminished and degraded habitats are less able to support

healthy populations of wildlife and marine organisms and perform the economic and ecological functions on which coastal populations depend for their livelihood. EPA facilitates the ecosystem-wide protection and restoration of natural areas in cooperation with other federal resource agencies through interagency partnerships, such as the Estuary Habitat Restoration Council and Coastal America.

Great Lakes

The Great Lakes are the largest system of surface freshwater on earth, containing 20 percent of the world's surface freshwater and about 84 percent of North America's surface freshwater. The watershed includes 2 nations, 8 American states, a Canadian province, more than 40 tribes, and more than one-tenth of the U.S. population.

While certain persistent toxic substances (PTS) have been reduced significantly in the Great Lakes Basin Ecosystem over the past 30 years, they continue to be present at levels that pose threats to human and wildlife health, warrant fish consumption advisories in all five lakes, and disrupt a way of life for many in the basin. The Great Lakes Legacy Act targets additional resources to clean up contaminated sediments, one of the significant sources of PTS. The Great Lakes Regional Collaboration Strategy uses the concepts of the Great Lakes Binational Toxics Strategy⁶³ as its starting point for reduction and elimination of PTS. The Great Lakes Binational Toxics Strategy is a groundbreaking international toxics reduction effort that applies voluntary and regulatory tools focused on pollution prevention to a targeted set of substances, including mercury, PCBs, dioxins/furans, and certain canceled pesticides. Both the Legacy Act and the Great Lakes Binational Toxics Strategy support work EPA is doing with the states to promote delisting of all Areas of Concern by 2025.

In a 2004 Executive Order, the President established two major Great Lakes efforts: A "Great Lakes Interagency Task Force"⁶⁴ and a Great Lakes "Regional Collaboration of National Significance" (GLRC).⁶⁵ The Task Force brings together ten Cabinet secretaries and federal agency heads to coordinate restoration of the Great Lakes, focusing on outcomes like cleaner water and sustainable fisheries, and targeting measurable results. More than 1,500 people representing federal, state, local and tribal governments; nongovernmental entities; and private citizens participated on eight issue-specific GLRC teams to develop a GLRC Strategy, completed in 2005.⁶⁶ Strategy Teams focused on aquatic invasive species, habitat/species, coastal health, sediments, nonpoint sources, toxic pollutants, indicators and information, and sustainable development, and recommended many actions to take over the next 5 years. The federal government committed to implement 48 near-term activities that address issues in all 8 of the priority areas identified in the Strategy, as illustrated below:

- Implement the Great Lakes Legacy Act to remediate contaminated sediments in Great Lakes Areas of Concern.
- Establish a communication network among federal agencies to coordinate responses to newly identified aquatic invasive species, primarily in response to requests for assistance from state or local authorities.

- Develop a system to track and report on the GLRC wetlands goal to enhance and protect 200,000 acres of wetlands in the Great Lakes basin.
- Develop a standardized sanitary survey form for state and local governments use.
- Improve policy guidance on managing peak flows at sanitary sewer plants to reduce overflows.
- Conduct surveillance for emerging chemicals of concern.
- Work with the U.S. Army Corps of Engineers to expedite the processing and review of permits for projects to restore wetlands and other aquatic habitat in the Great Lakes Basin.

To Learn More:

www.epa.gov/greatlakes/

Chesapeake Bay

EPA's Chesapeake Bay work is based on a unique regional partnership formed to direct and conduct restoration of the Bay and its tidal tributaries. Partners include Maryland, Virginia, Pennsylvania, Delaware, New York, and West Virginia; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; EPA, which represents the federal government; and participating citizen advisory groups. Chesapeake 2000, a comprehensive and far-reaching agreement, guides restoration and protection efforts through 2010, and focuses on improving water quality as the most critical element in the overall protection and restoration of the bay and its tributaries.⁶⁷ The challenge for EPA and its partners is to reduce pollution and restore aquatic habitat to the extent that the Bay's waters can be removed from the Clean Water Act's "impaired waters" list.

EPA and its partners work to improve two key measures of bay water quality: the restoration of submerged aquatic vegetation (SAV) and the attainment of dissolved oxygen (DO) standards in the Bay's tidal waters. The Chesapeake Bay Program's long-term goal for SAV restoration in the Bay is 185,000 acres and the long-term goal for DO restoration in the Bay is 100 percent attainment of standards in all tidal waters of the Bay. To achieve these long-term goals, Bay watershed models estimate that annual nitrogen loadings must be reduced by 162 million pounds, phosphorus reduced by 14.3 million pounds, and sediment reduced by 1.68 million tons per year from 1985 levels.⁶⁸ As of 2005, 39 percent (72,935 acres) of the SAV and 34% (25.40 cubic km) of the DO long-term restoration goal was achieved, and 41% (67.42 million pounds) of the nitrogen, 58 percent (8.39 million pounds) of the phosphorus, and 54 percent (0.91 million tons) of the sediment long-term reduction goal was achieved.⁶⁹

As of 2005, 61 percent (30.41 million pounds) of the nitrogen and 80 percent (4.93 million pounds) of the phosphorus long-term reduction goals were achieved. The 2011 targets are 88 percent (43.91 million lbs) of the nitrogen and 91 percent (5.61 million

pound) of the phosphorus reduction goals for wastewater dischargers. The long-term goals for nutrient reduction from significant wastewater dischargers in the Bay watershed are to achieve a 50 million pound per year reduction in nitrogen and a 6 million pound per year reduction in phosphorus loads from 1985 levels. The current pace of nutrient and sediment load reductions is not sufficient and needs to be accelerated to restore water quality by the Chesapeake 2000 goal of 2010. EPA and its partners will review progress each year and make adjustments to increase annual targets if appropriate.

EPA works with other Bay Program partners to make the most cost-effective use of available regulatory, incentive, and voluntary tools and to find new economies and innovations to pick up the pace dramatically. A key strategy to reduce nutrient discharges is the implementation of advanced wastewater treatment. Another key strategy to reduce nitrogen, phosphorus, and sediment loadings is the restoration and protection of riparian forests that prevent sediment and nutrient pollution from entering waterways from the land. The long-term goal for forest buffer planting in the watershed is 10,000 miles. As of FY 2005, 3,791 miles had been planted, achieving 38% of the goal. The 2011 target for forest buffer planting is 8,400 miles or 84% goal achievement. Implementing agricultural best management practices to reduce nutrients and sediment is also key to achieving Bay goals, and requires close cooperation with U.S. Department of Agriculture. Water quality restoration complements other critical initiatives to protect and restore critical Bay watershed habitat and improve fisheries management, undertaken by partner federal agencies, such as the National Oceanic and Atmospheric Administration, U.S. Department of the Interior, U.S. Department of Agriculture, and the U.S. Army Corps of Engineers, and by Maryland, Virginia, Pennsylvania, Delaware, New York, and West Virginia.

To Learn More:

www.epa.gov/region3/chesapeake/

Gulf of Mexico

The Gulf of Mexico's estuaries and near coastal waters support critical fisheries and wildlife habitats that significantly contribute to the national and Gulf state economies. The sustainability of the Gulf's marine resources is under increasing pressure from population growth, land development, coastal and commercial activities. Hurricanes Katrina and Rita wrought widespread environmental harm in 2005.

The EPA Gulf of Mexico Program⁷⁰ assists the Gulf states and stakeholders develop a regional, ecosystem-based framework for restoring and protecting the Gulf. EPA supports a collaborative, multi-organizational partnership with business, industry, agriculture, state and local government, citizens, environmental organizations, fishery interests, and federal agencies. In addition, the five Gulf states formed a Gulf of Mexico Alliance⁷¹ to increase regional collaboration to enhance the environmental and economic health of the Gulf of Mexico. Thirteen federal agencies have organized a regional partnership⁷² to provide support to the Gulf of Mexico Alliance.

In 2006, the Gulf of Mexico Alliance⁷³ developed the Governors' Action Plan for Healthy and Resilient Coasts⁷⁴ that identifies five key priority coastal and ocean issues that are regionally significant and can be effectively addressed through cooperation at the local, state, and federal levels: (1) water quality for healthy beaches and shellfish beds; (2) wetland and coastal conservation and restoration; (3) identification and characterization of gulf habitats for management decision making; (4) reductions in nutrient loadings; and, (4) strategic environmental education across the five-state region.

Although nutrients, such as nitrogen and phosphorus, are essential for healthy marine and freshwater environments, an overabundance can trigger excessive algal growth. In the near-shore Gulf of Mexico, excessive algal growth results in a decrease in dissolved oxygen in the bottom water, and a corresponding loss of aquatic habitat. This "hypoxic zone" is the largest area of hypoxia in U.S. waters that is associated with human activities.

REDUCING THE GULF HYPOXIC ZONE

To reduce the size of the hypoxic zone in the Gulf of Mexico, EPA supports:

- State-based implementation of nutrient-focused hypoxia reduction measures through multi-year budget strategies;
- Collaborative monitoring and assessment framework to measure and calibrate the performance of nitrogen reduction efforts;
- Updating of information on flow, nutrient concentrations, and loadings at the mouths of each major sub-basin in partnership with USGS and sub-basin committees;
- Modeling of the hypoxic zone;
- Cooperative implementation of industry-led nonpoint source nutrient reduction strategies through effective sub-basin team partnerships; and
- Science and management re-assessment of the nutrient load reductions achieved and the response of the hypoxic zone; water quality throughout the Basin; and economic and social effects of Gulf of Mexico hypoxia.

Causes of the Gulf of Mexico hypoxic zone include: excessive nutrients delivered to Gulf waters from the Mississippi-Atchafalaya River drainage basin; physical changes, such as channelization, loss of natural wetlands and riparian buffers, and wetland conversions throughout the basin; and stratification in the waters of the northern Gulf caused by the interaction of fresh river water and the saltwater of the Gulf. EPA is working with other partners on a national hypoxia task force to carry out key actions outlined in the Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico, with the goal of reducing the size of the hypoxic zone from about 14,000 square km to less than 5,000 square km by 2015.⁷⁵

To Learn More:

www.epa.gov/gmpo/

Long Island Sound

EPA works in partnership with the States of New York and Connecticut and other federal, state, and local Long Island Sound Management Conference partners to implement a comprehensive conservation and management plan (CCMP) to restore the Sound. Since levels of dissolved oxygen are critical to the health of aquatic life and viable public use of the Sound, the CCMP focuses on controlling nitrogen discharges to meet applicable water quality standards. EPA and state partners are implementing an agreement to control the maximum daily load of nitrogen entering the Sound. The agreement provides for a 58.5 percent reduction in nitrogen loads to the Sound over a 15-year period ending in 2014. This bi-state nitrogen reduction agreement uses flexible and innovative approaches, notably “bubble” management zones and exchange ratios that allow sewage treatment plant operators to “trade” nitrogen reduction obligations with each other. This approach will allow the plant operators to save an estimated \$800 million by allocating reductions to those plants where they can be achieved most economically while meeting water quality improvement goals.

EPA and the Management Conference partners are also working to restore degraded habitats; reopen rivers and streams to anadromous fish passage; improve riparian buffers; restore submerged aquatic vegetation in key embayments; reduce the impact of toxic substances, pathogens, and floatable debris on the ecology; and promote environmental education, management, and stewardship throughout the watershed. The bi-state Long Island Sound 2003 Agreement and its successor documents guide and measure the implementation of progress in concert with core Clean Water Act programs to manage nonpoint sources of pollution, protect watersheds, regulate point sources of pollution, and address nitrogen deposition from the airshed.

To Learn More:

www.epa.gov/region01/eco/lis/

South Florida Ecosystem

The natural resources of the South Florida ecosystem include 3 national parks, more than 10 national wildlife refuges, a national preserve, and a national marine sanctuary. The South Florida ecosystem is the principal nursery area for the largest commercial and sport fisheries in Florida, home of the largest wilderness area east of Mississippi River, the location of the only living coral barrier reef adjacent to the United States, the most significant breeding ground for wading birds in North America, a major producer of sugarcane, home to two Native American nations, and a major tourist region.

Rapidly expanding human population is a threat to the ecosystem's health. The South Florida region is home to about 8 million people; and is more populous than 39 individual states. Over 2 million more people are expected to settle in the area over the next 10 to 20 years. Fifty percent of the region's wetlands have been lost to suburban and agricultural development and the altered hydrology and water management throughout the region have had a major impact on the ecosystem.

To address the issues surrounding the south Florida ecosystem, EPA is working in partnership with several local, regional, state, and federal agencies. The goal is to ensure the long-term sustainability of the region's varied natural resources while providing for the coexistence of extensive agricultural operations and a continually expanding human population. EPA's South Florida geographic initiative (SFGI) is designed to protect and restore communities and ecosystems impacted by environmental problems. Under the SFGI, EPA works with stakeholders to develop and implement community-based approaches to mitigate diffuse sources of pollution and cumulative risk.

EPA leads special projects and planning activities in the South Florida area, including the Everglades and the Florida Keys coral reef ecosystem. SFGI staff are involved in activities related to the Section 404 wetlands protection program, the comprehensive Everglades Restoration Program (CERP), the water quality protection program for the Florida Keys National Marine Sanctuary, the Southeast Florida Coral Reef Initiative as directed by the U.S. Coral Reef Task Force, the Brownfields program, and other waste division programs. EPA continues to implement the South Florida Assessment Project, an ecosystem assessment of the Everglades.

To Learn More:

<http://www.epa.gov/region4/water/southflorida/>

Puget Sound

EPA works closely with other federal, state, tribal, and local agencies through Puget Sound action partnerships to help protect this ecosystem and associated wide-ranging human health issues. The Puget Sound contains the Pacific Northwest's largest population and commerce center, including a major transboundary estuary and airshed, a vital system of international ports and multi-modal transportation networks, and a concentration of national defense installations. The Puget Sound includes roughly 20 major rivers and 2,500 miles of sheltered inland waters that provide habitat to 26 kinds of marine mammals, 200 species of fish, and 100 species of sea birds. This ecosystem has commercial salmon landings that average 19.2 million pounds a year, and includes 578,000 average annual sport fishing trips for salmon and steelhead.

Protecting and restoring water quality in shellfish growing areas is a high priority. While the Puget Sound currently leads U.S. waterways in shellfish production, averaging over \$100 million in annual sales, 30,000 acres of shellfish beds have been closed to harvest since 1980. These closures affect both local economies and also cultural and subsistence uses of these traditional resources. Excess nutrients create “hypoxic zones” that further impair shellfish and finfish populations and require the reduction of nutrient loadings into the Sound.

Recent monitoring assessments indicate that marine species in the Puget Sound have high levels of toxic contamination. Almost 5,700 acres of submerged lands (about 9 square miles) are currently classified as contaminated with toxics. Another 24,000 acres are classified as at least partially contaminated with toxics. In addition to these legacy contamination problems, additional pollutants are released. Approximately 1 million pounds of toxics are released into the water and 5 million pounds into the air each year, with many pollutants finding their way into Puget Sound. An important element of the strategy for protecting Puget Sound is to maintain the rate of progress in addressing contaminated estuary bottom sediments, while at the same time developing more effective source control strategies to reduce the release of additional toxics into the environment.

Over half of the shallow water habitats in Puget Sound have been lost, with higher loss rates in key urban estuaries. Intertidal salt marsh habitat has declined by 75 percent since the 1800s. In addition, development has modified one-third of Puget Sound’s shoreline, and the population is expected to increase by 1.4 million over the next 20 years. State and local governments are working to update the Puget Sound comprehensive conservation and management plan (CCMP) and to conduct both growth management and species recovery planning.

To Learn More:
www.epa.gov/pugetsound

Columbia River Basin

At 1,214 miles in length, boasting a 260,000 square mile drainage basin, the Columbia River spans portions of Oregon, Washington, Idaho, Wyoming, Nevada, Utah, Montana, and a substantial portion of British Columbia. The Columbia River Basin is comprised of ecosystems that are home to a diverse array of biologically significant plants and animals. The Basin is also a dynamic economic engine driving many industries vital to the Pacific Northwest, including sport and commercial fisheries, agriculture, transportation, recreation, and, with 55 hydropower dams, electrical power generation.

Columbia River salmon and steelhead runs—once the largest on earth—are now a fraction of their original size. EPA studies and state monitoring programs have found significant levels of toxins in fish and the waters they inhabit, including dichloro-

diphenyl-trichloroethane (DDT), PCBs, and dieldrin.⁷⁶ EPA and its partners adopted a three-dimensional approach to the problem of toxins in the Columbia River system, emphasizing remediation, prevention, and protection efforts. Oregon, Washington, Idaho, Columbia Basin tribal governments, the Lower Columbia River Estuary Partnership, local governments, citizen groups, industry, and other federal agencies are actively engaged in efforts to remove contaminated sediments, bring back native anadromous fish, restore water quality, and preserve, protect, and restore habitat, as illustrated below:

- Working locally with agriculture producers to reduce pesticide use through the Pesticide Stewardship Partnership.
- Providing an anonymous opportunity to collect banned toxics and pesticides.
- Implementing total maximum daily loads through sediment reductions and riparian restoration.
- Cleaning up the Portland Harbor Superfund site and PCB contamination in the Columbia River at Bradford Island.
- Restoring wetlands and habitats at Mirror Lake and Ridgefield through the Lower Columbia River Estuary Partnership with Targeted Watershed Program funding.

EPA, state and tribal partners, and the Lower Columbia River Estuary Partnership have launched a Columbia River toxics strategy to identify and clean up contaminated sediments, restore critical wetlands, and reduce toxics in water, land, and fish.⁷⁷ Under this strategy, EPA, states, and tribes are systematically expanding key actions in the Columbia River Basin based on available resources, such as fish, water, and sediment monitoring; pesticide stewardship partnerships; targeted pesticide/toxic collections; precision agriculture; and related activities. The National Estuary Program also plays a key role in addressing toxics and restoration of critical wetlands in the Lower Columbia River estuary. Key actions and milestones to demonstrate a reduction of toxins in fish and/or water by 2011 include:

- Identifying contaminants of concern.
- Identifying other databases that can serve as baseline data.
- Establishing new monitoring efforts to fill data gaps for understanding toxics in water, fish, and sediment.
- Identifying and implementing best management actions and other measures to prevent or reduce the presence of the contaminants of concern in the Columbia River.

To Learn More:

www.epa.gov/Region10/

OBJECTIVE 4.4: ENHANCE SCIENCE AND RESEARCH. Through 2011, identify and synthesize the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions related to the health of people,

communities, and ecosystems. Focus research on pesticides and chemical toxicology; global change; and comprehensive, cross-cutting studies of human, community, and ecosystem health.

Means and Strategies For Achieving Objective 4.4

Since research must be ahead of the curve, significant lead times are typically necessary to conduct the research required to support program implementation. Consequently, research is required to be forward-looking. Areas in which the EPA Office of Research and Development (ORD) will devote particular attention in the years ahead include development of computational toxicology, bioinformatics and related technology, environmental and human health monitoring and indicator development (including the incorporation of an emerging Global Earth Observation System of Systems (GEOSS)), and the improved utility of research results through incorporation of uncertainty analysis.

Research arising out of the human health research program led to the establishment of the computational toxicology program in 2003, exemplifying the value of applying cutting-edge scientific innovations in order to protect the environment better and more efficiently. This research harnesses computational biology to assess the risk chemicals pose to human health and the environment and has enabled EPA to screen the hundreds of thousands of commercially available chemicals for toxicity. Another new dimension is the nascent nanotechnology research program launched in 2005; it focuses on decision support and the safe use of nanomaterials in commercial and environmental applications.

Progress toward research goals is assessed through a suite of metrics that is tailored to measuring the impacts of the respective research programs. Among the measurable factors are: independent expert review panel ratings on the extent to which clients utilize EPA research products; composite scores on a client survey designed to gather data on product utility and perceptions of use; and the results of bibliometric and/or client document analyses demonstrating the actual use of EPA research products. These factors are applied to measure success in providing the results identified in the research programs that follow.

HUMAN HEALTH RESEARCH

The Human Health Research Plan (HHRP) provides risk assessors/managers with a greater capacity to reduce reliance on default assumptions in human health risk assessment. The HHRP assesses uncertainties in risk assessment articulated across several legislative acts (i.e., FQPA, SDWA, CAA) and addresses research priorities articulated by multiple Program Offices (i.e., OPPTS, OPP, OW, OAR, OCHP), risk assessors (i.e., IRIS, NAAQS) and regional offices. This program will produce measurable benefits in the form of:

- reduced uncertainty in risk assessment using ORD's mechanistic (mode of

- action) information;
- reduced uncertainty in risk assessment via the use of ORD's products characterizing and protecting susceptible subpopulations, and characterizing aggregate and cumulative risk from multiple environmental stressors; and
- tools to evaluate the effectiveness of public health outcomes.

Research to develop approaches for the prioritization and screening of chemicals utilizes emerging genomic and proteomic methods to study potential sites where toxicants could affect biological systems. This information is used with other methods to determine how tissue levels in those biological systems cause adverse effects. Emerging technologies and models are then used to identify potential biological indicators that can be used to screen or prioritize chemicals based on the study of several classes of environmental agents.

Methods and models developed over a period of 3-4 years to study single chemicals and pathways of exposure will then be used during the next 2-3 years to identify bioindicators of exposure to evaluate multiple chemical/multiple exposures. This work addresses concerns related to environmental justice and accountability related to assessment of regulatory decision-making.

Methods, models, and data from the work described above are applied during the next 2-3 years to the problem of understanding the basis for differential response to chemicals as a function of life stage. A portion of this work focuses on assessing differential exposure and response in children, while another portion focuses on older populations. Additional work emphasizes the potential long-term health effects following developmental exposure to environmental agents. Fundamental research on environmental influences on neurodevelopment, asthma, and disease is obtained through extramural sources jointly funded by EPA and NIEHS. Other lines of research will contribute to developing principles to evaluate the effectiveness of risk management decisions at the local and regional level. This work is accomplished in collaboration with CDC and other federal agencies, as well as with the regions.

ECOLOGICAL RESEARCH

The ecosystems research program will produce measurable benefits in the form of:

- more states and tribes using a common monitoring design and appropriate indicators to determine the status and trends of ecological resources and the effectiveness of national programs and policies;
- all states, tribes and relevant EPA offices having improved ability to diagnose causes of, and forecast, the ecological impacts of various actions using EPA research tools and methods, resulting in measurable positive environmental outcomes; and
- states, tribes and relevant EPA offices have improved their ability to protect and restore ecological condition and services using EPA research tools and methods, resulting in measurable positive environmental outcomes.

Analytical tools derived from ecological structure and function relationships will help to evaluate land development and urban sprawl. New research on measures, especially measures of ecosystem services at different scales, will improve EPA's understanding of the impact of stressors on natural systems, and how to most efficiently control and reduce harmful affects. Improved understanding of services provided by ecosystems and ecological health will illuminate conditions affecting place-based health. Research in this area requires greater coordination between environmental and human health research and public health, as well as a stronger role for local partnerships. Better understanding of ecological condition indicators and ecosystem services will improve EPA's ability to provide assessment tools to place-based decision makers. This research program assesses uncertainties in ecological risk assessment articulated in several legislative acts (i.e., CWA, CAA, TSCA, FIFRA, CERCLA, RCRA) and is relevant to the research priorities of multiple Program Offices (i.e., OW, OAR, OPPTS, OPP, OEI) and regional offices.

GLOBAL CLIMATE CHANGE RESEARCH

The Global Change Research Program has its primary emphasis on assessing the potential consequences of global change on air quality, water quality, ecosystems, and human health in the United States. This program will produce measurable benefits in the form of :

- increased use of scientific information about the place-based impacts of global change;
- increased use of scientific information and models to evaluate and implement adaptation policies that protect air quality from the impacts of global change; and
- greater ability for EPA programs that protect human health, water quality, and aquatic ecosystems to accommodate the need for adaptation caused by global change.

The program employs a place-based framework to provide the means for integration. The Program uses study results to investigate adaptation options to improve society's ability to effectively respond to the risks and opportunities presented by global change.

This work is consistent with and closely coordinated with the 2003 Strategic Plan of the U.S. Climate Change Science Program (CCSP), addressing two of its five principal goals, namely to: understand the sensitivity and adaptability of different natural and managed ecosystems and human systems to climate and related global changes (CCSP Goal 4) and; explore the uses and identify the limits of evolving knowledge to manage risks and opportunities related to climate variability and change (CCSP Goal 5).

EPA's Global Program, along with the entire CCSP, is placing markedly increased emphasis on the goal of improving decision-making and adaptive management. "Decision support" reflects the broad purpose of making scientific knowledge more readily available and more useful to decision makers, with the ultimate goal of improving

environmental and societal outcomes. To accomplish this, the Program is developing a dynamic “decision inventory” to identify different classes of climate-sensitive decisions in different regions of the country, and to evaluate the returns from providing better scientific information to inform those decisions.

ENDOCRINE DISRUPTORS SCIENCE AND RESEARCH

Over the last several years, concern has grown about exposure to endocrine-disrupting, or hormonally active, chemicals. Evidence suggests that exposure to chemicals that mimic hormones (endocrine disruptors, or EDCs) may cause adverse health effects in wildlife and may affect human health as well. OPPTS, other Program Offices, and the Regions apply research products to help reduce uncertainty in our knowledge of endocrine disruptors, determine chemicals’ potential for endocrine disruption, and identify the nature of adverse effects. This program will produce measurable benefits in the form of:

- reduced uncertainty regarding the effects, exposure, assessment, and management of endocrine disruptors;
- determination of the extent of the impact of endocrine disruptors on humans, wildlife, and the environment; and
- greater use of endocrine disruptor screening and testing assays developed from Agency research.

The Agency needs valid tests to assess new chemicals’ and pesticides’ potential for endocrine disruption. The validation of screens and tests necessary before large-scale reviews can take place will be completed; and the Endocrine Disruptor Methods Validation Advisory Committee (EDMVAC) will continue to provide EPA with scientific and technical advice. We are working to minimize the use of animals for these tests.

Research to understand the effects of endocrine disruptors has shifted from animal exposure testing to computational toxicological research. This is a relatively new field and the extent to which it will yield fruitful results is not fully known. Consequently, endocrine disruptor research will reflect the degree of success achieved in the field of computational toxicology. Progress in the ability to sequence the human genome has led to a rapid development of laboratory methods to assess gene expression on a genome-wide basis, and contributing to the tools available for endocrine disruptor research. Continued expansion of this field may also facilitate research into the effects of endocrine disruptors.

HUMAN HEALTH RISK ASSESSMENT RESEARCH

The Human Health Risk Assessment (RA) program serves the programs and regions throughout EPA by incorporating and integrating the use of scientific information as a foundation for regulatory decision-making. This program will produce measurable benefits in the form of:

- state-of-the-science health hazard assessment information provided on priority substances in Agency, state and local risk assessors’ decisions;

- the incorporation of contemporary scientific advances into their assessments, enhancing their quality and objectivity; and
- AQCDs for ambient air pollutants (as mandated in the Clean Air Act) are revised to reflect the best available scientific information on identifiable effects on public health and the environment from exposure to the pollutant, and this information is incorporated in the review and promulgation of the National Ambient Air Quality Standards (NAAQSs).

The Integrated Risk Information System (IRIS) and Air Quality Criteria Document (AQCD) assessments, and other assessments, are directly responsive to program needs and are primary considerations in Agency actions to protect human health and the environment. Recognizing their importance, the strategic objective of the RA program is to increase the output of these products while enhancing their quality through incorporating the latest advances in risk assessment science. These activities are coordinated across EPA research and program offices through formal means including the IRIS consensus review and Risk Assessment Forum processes.

COMPUTATIONAL TOXICOLOGY RESEARCH

Computational toxicology is the integration of modern computing and information technologies with molecular biology and chemistry to improve the prioritization of data requirements and risk assessment of chemicals. This program will produce measurable benefits in the form of:

- increased use of improved methods and tools to link sources to outcomes;
- increased use of advanced hazard characterization tools to prioritize and screen chemicals for toxicological evaluation; and
- increased use of the latest science for enhanced dose-response assessment and quantitative risk assessment.

The methods, models, and data generated by the Agency's National Center for Computational Toxicology (NCCT) will respond to the need for better, faster, cheaper approaches to testing chemicals and emerging technologies such as bio- and nanotechnology. Associated research will address the need to assess cumulative impacts on humans from multiple exposures, as well as facilitating approaches to identify and characterize diseases in people resulting from changing environmental factors and other factors, such as other disease states and pharmacological exposure. The research includes both intramural and extramural resources. . With these tools, scientists can produce a more-detailed understanding of the hazards and risks of a much larger number of chemicals. ToxCast, a forecasting tool, will provide a number of EPA program offices with the ability to prioritize, screen, and assess the potential hazards of chemicals in far more rapid and time relevant manner than current methods.

Two important research products moving into more common use that enable this scanning to be done efficiently and at greatly reduced expense are customized DNA arrays and tools for modeling and virtual prototyping. EPA has taken a leadership position in this new field of environmental protection, and will apply new capabilities

from this research to other research applications in the coming years.

MERCURY RESEARCH

The Agency's Mercury Research Program will produce measurable benefits in the form of:

- reduced release of mercury into the environment; and
- better understanding of the transport and fate of mercury from release to adverse effects.

The program is focusing on several key uncertainties, specifically: (1) how much methyl mercury in fish consumed by the U.S. population is contributed by U.S. emissions relative to other sources of mercury; (2) how much mercury emissions from coal-fired utility boilers and other combustion systems can be reduced; (3) the magnitude of contributions of mercury releases from non-combustion sources; (4) the risks associated with methyl mercury exposure to wildlife species and other significant ecological receptors; (5) critical changes in human health associated with exposure to environmental sources of mercury in the most susceptible human sub-population; and (6) the most effective means for informing susceptible populations of the health risks.

In order to evaluate the effectiveness of the new Clean Air Mercury Rule (CAMR), research work focuses on efforts to increase the accuracy, precision, and effectiveness of continuous emission monitors. This work is coordinated across several programs and globally, e.g., with the UNEP Fate and Transport Partnership.

Another high priority for the Mercury Program will be to provide information to EPA, states, and utilities on alternative control technologies. Research is also required to focus on identifying potential mercury deposition "hot spots" that may already exist, and may occur in the future with market trading of mercury emissions.

HOMELAND SECURITY RESEARCH

Threat and consequence assessment (TCA) research focuses on the rapid evaluation of chemical, biological, and radiological risks associated with a terrorist threat or attack. This program will produce measurable benefits in the form of:

- faster evaluations of chemical, biological, and radiological risks associated with a terrorist threat or attack;
- better-protected national water infrastructure, by way of research products to identify vulnerabilities, detect contamination, warn the public, and respond effectively in the event of a biological, chemical, or radiological attack; and
- better emergency and follow-up response, by way of research products for locating, collecting, and analyzing environmental samples; protecting decontamination personnel, the general public, and the environment; and the decontamination and disposal of materials inside and outside of contaminated buildings.

Researchers are developing and refining advisory levels for various contaminants of concern, improving risk assessment methods and communication tools, and providing support to emergency and follow-up responders. Research results are provided (in cooperation with the Office of Solid Waste and Emergency Response and other federal agencies) to the emergency and remedial response community, elected and appointed officials, and the general public to help them be more informed should an intentional attack occur in the United States.

Water infrastructure protection (WIP) research focuses on the protection and safety of the nation's water supply, treatment operations, and drinking water distribution systems, and to a lesser degree, on wastewater collection, treatment operations, and treated water discharge. Research results are provided (in cooperation with EPA's Office of Water) to water utilities and their support organizations, public health officials, and the emergency and follow-up response community. Work also involves the laboratory and field testing and evaluation of technologies to detect, contain, treat, and recover from intentional attacks on drinking water and wastewater facilities.

Decontamination and consequence management (DCM) research focuses on rapid and cost-effective remediation and restoration of buildings and broad outdoor areas. Research results are provided (in cooperation with EPA's Office of Solid Waste and Emergency Response and other federal agencies) to the emergency and follow-up response community, elected and appointed officials, and the general public. Work also involves the laboratory and field testing and evaluation of technologies to decontaminate and dispose of materials and areas affected by intentional attacks.

SAFE PESTICIDES AND PRODUCTS RESEARCH

The Safe Pesticides/Safe Products (SP2) Research Program will produce measurable benefits in the form of:

- new predictive tools for prioritization and enhanced interpretation of exposure, hazard identification and dose-response information;
- the scientific foundation for probabilistic risk assessment methods to protect natural populations of birds, fish and other wildlife;
- the scientific foundation for guidance to reduce risks of human environments within communities, homes, workplaces; and
- strategic scientific information and advice concerning novel or newly discovered hazards.

Among the research underway or planned is the development and application of the latest molecular and computational approaches to produce the next series of chemical prioritization tools and toxicity testing approaches. Research in this subject is increasingly linked to advances in computational toxicological research. This is a relatively new field and the extent to which it will yield fruitful results is not fully known. Progress in the ability to sequence the human genome has led to a rapid development of laboratory methods to assess gene expression on a genome-wide basis, and contributing to the tools available for SP2 research.

The scientific foundation for conducting probabilistic risk assessments for wildlife populations is advanced by developing methods for extrapolation among wildlife species and exposure scenarios of concern (e.g., endangered species focus). Research will also work to improve the evaluation of potential ecological effects of biotechnology products, the development of risk management approaches; and development of methods to assess for the potential allergenicity of genetically engineered plants.

HUMAN CAPITAL

The foundation for achieving the goal of healthy communities and ecosystems begins with an EPA workforce that has a well-balanced combination of skills, experience, and expertise. The skilled occupations needed to carry out the work inherent in this goal range from toxicologists with expertise in chemical testing, registration and monitoring, biologists to evaluate the exposure impact of chemical releases on wetlands, specialized chemical engineers to reduce hazardous risk at chemical facilities, and modelers to evaluate risks of chemicals to populations and fragile ecosystems. EPA also identified a gap in the number of economists, epidemiologists, human exposure modelers, and hydrologists needed to fill mission-critical scientist/researcher positions.

PERFORMANCE MEASUREMENT

Many strategic targets to protect, sustain, or restore the health of people, communities, and ecosystems are directly measured on an annual basis as annual performance goals and measures in the Agency's Annual Plan and Budget. Other strategic targets rely on measures or indicators of changes in the environment or human health, such as habitat and water quality conditions, and blood lead levels. Collection and analyses of these data are often expensive and time-consuming. In addition, changes in environmental and health conditions that result from EPA programs frequently take several years to observe and measure. It is therefore not always practicable or useful to collect these data every year. Consequently, while these environmental and health outcome measures and data are excellent indicators of EPA's long-term performance, the Agency also uses other shorter-term measures and data to manage programs.

Influences of Environmental Indicators and PART Measures on the Strategic Plan

EPA has incorporated one new strategic target that embodies metrics presented as environmental indicators in the forthcoming Report on the Environment,⁷⁸ involving human body-burden of pesticides. EPA has also incorporated all of the long-term, outcome-oriented measures currently used in twelve PART evaluations of various pesticides, toxics, brownfields, geographic and research programs as strategic targets in this *Strategic Plan*.

Future Improvements to Performance Measurement

As the Agency puts the recording, updating, reviewing, and improvement of scientifically-sound environmental indicators on a routine footing through the *Report on the Environment*, we expect increasing opportunities to incorporate this information into future strategic plans. This will enable the Agency to increasingly articulate all of our significant long-term objectives in terms of measurable improvements in the condition of land.

When considering revisions and improvements for developing this *Strategic Plan*, we also conducted a preliminary assessment of longer-term opportunities to improve our articulation of strategic, outcome-oriented commitments for future Plans. Collaborative research plans for the pesticides and toxics programs focus on program-support research to produce new and better representation of the dimensions and magnitudes of risks to human health and ecosystems from toxic substances and pesticides. The Agency also identified development of a Chesapeake Bay Water Quality Index for more comprehensive representation of the Bay's aquatic health as a priority.

CLOSING THE FEEDBACK LOOP: RESULTS OF PERFORMANCE ASSESSMENTS AND PROGRAM EVALUATIONS

The programs that support the Agency's healthy communities and ecosystems goals are assessed using three key approaches:

- Internal EPA program evaluations, including those by the EPA Inspector General and by the EPA Board of Scientific Counselors.
- Office of Management and Budget Program Assessment and Rating Tool (PART) reviews.
- External assessments by organizations such as the Government Accountability Office and the National Academy of Sciences.

Internal Program Evaluations

Internal program evaluations are conducted by both individual program offices, by the EPA Inspector General, and by the EPA Board of Scientific Counselors (BOSC). The BOSC Human Health Subcommittee evaluated the Agency's Human Health Research Program's four long-term goals related to the use of information in risk assessment, aggregate and cumulative risk, susceptible subpopulations, and public health outcomes. As a result of BOSC recommendations, the program increased communication and collaboration between research areas, developed specific peer review goals, and articulated a decision-making process. The BOSC's recommendation informed the Human Health Research program's long term goals and the means and strategies to them.

Program offices also develop program-specific evaluations. For example, in a cooperative effort between regional and headquarters office, the Brownfields Program is

reviewing the operations of the ten regional offices and the headquarters office. The review will compile feedback on program objectives and operations, assure accountability of internal and external stakeholders, enhancing the overall quality of the program, evaluate decision making processes, and identify exchanging best practices. The review will be completed in FY 2008.

The EPA Inspector General has conducted extensive program reviews of programs supporting the healthy communities and ecosystems goal over the past several years. Examples of this work include:

- Assessment of the integration of environmental justice into EPA operations, including recommendations for reaffirming the commitment to environmental justice and strengthening planning efforts.
- Review of EPA implementation of the Food Safety Act, including recommendations for changes to consideration of subpopulations, responding to petitions, and increasing consistency of public participation.
- Assessments of the implementation of the Brownfields program, including resource management and improvements to grant application and selection processes.

Program Assessment Rating Tool (PART)

EPA works closely with the Office of Management to assess the effectiveness of key environmental programs using the Program Assessment Rating Tool (PART). Programs are rated as “effective,” “moderately effective,” “adequate,” and “ineffective”. Many of the programs supporting Goal 4 have been assessed under the PART process. Summaries of all completed PART studies are available in the Internet at www.whitehouse.gov/omb/expectmore/ and examples of several of the programs evaluated through PART process, and the program rating, are provided below:

- New Chemicals Program – moderately effective.
- Existing Chemicals Program – adequate.
- Pesticide Registration – adequate.
- Brownfields Revitalization – adequate.
- U.S. Mexico Border Water Infrastructure – adequate.
- The Ecological Research Program - Ineffective (The program is conducting follow-up actions to address this issue).
- Human Health Research – adequate.
- Endocrine Disrupting Chemicals Research – adequate.

External Evaluations

EPA participates with outside organizations, such as the Government Accountability Office (GAO) and the National Academy of Sciences, in the evaluation of program effectiveness and development of recommendations for improved program management and policies. The GAO has conducted numerous evaluations of programs

supporting the healthy communities and ecosystems goal; a complete list is available at <http://www.gao.gov/docsearch/rebandtest.html>. Some examples include:

- Chemical Regulation: Options Exist to Improve EPA's Ability to Assess Health Risks and Manage its Chemical Review Process (June 2005).
- Brownfield Redevelopment: Stakeholders Cite Additional Measures that Could Complement EPA's Efforts to Clean up and Redevelop Properties (April, 2005).
- Wetlands: Corps of Engineers Needs to Better Supports its Decisions for Not Asserting Jurisdiction (September 2005).
- Great Lakes: Organizational Leadership and Restoration Goals Need to be Better Defined for Monitoring Restoration Progress (September 2004).
- Chesapeake Bay: Improved Strategies Are Needed to Better Assess, Report, and Manage Restoration Progress (October 2005).
- Columbia River Basin: A Multi-layered Collections of Directives and Plans Guides Federal fish and Wildlife Activities (June 2004).

The National Academy of Sciences develops reports and recommendations on a range of environmental issues, including issues related to the Healthy Communities and Ecosystems Goal. For example, in 2006, NAS released a report titled Rebuilding the Unity of Health and the Environment in Rural America. In 2004, NAS released a report titled "Valuing Ecosystem Services: Toward Better Environmental Decision-making." Additionally, the Agency's Risk Assessment Forum has also convened external reviews to evaluate programs when appropriate. The Endocrine Disrupting Chemical Research program was evaluated in this manner.

The ORD Board of Scientific Counselors (BOSC) has initiated a cycle of review for the ORD research programs. An average of three programs will be evaluated annually for relevance, utility, and value to EPA. The BOSC has reviewed and made recommendations for improvements to three of the Goal 4 research plans between 2005 and 2006.

- Human Health
- Ecosystems
- Global Climate Change
- Endocrine Disrupting Chemicals

EXTERNAL FACTORS AND EMERGING ISSUES

Promoting safe and healthy communities requires up-to-date knowledge of the rapid technology change in today's economy. The growing importance of some technologies, in particular, nano- and biotechnologies, will require foresight to craft skillful and flexible responses. In addition, rapid growth and technological change has the potential to impact human health and the environment. In the energy sector, EPA is committed to additional consideration of how best to address both potential positive and negative implications of these rapid technology changes.

Nanoscale materials represent an emerging challenge to the EPA's new chemicals program. These materials are chemical substances containing structures on the scale of approximately 1 to 100 nanometers, or 1 to 100 billionths of a meter. Because of their small size, they may have different molecular properties than chemical substances on a larger scale and may present unique issues with respect to health and environmental risks. Some nanotechnology products already are commercialized; the first public inventory of these products can be viewed at <http://www.nanotechproject.org/inventories>. EPA is currently reviewing the premanufacture notices for several new chemical substances in the nanoscale size range.

EPA's nascent nanotechnology research program is focusing on decision support and guiding the safe use of nanomaterials in commercial and environmental applications. Between 2007 and 2011, EPA research will address four broad areas:

- Development of risk assessment approaches to evaluate nanomaterials.
- Assessment of risks to human health and ecosystems, particularly nanomaterials used in intentionally dispersive applications.
- Life cycle assessments of nanomaterial impacts throughout product lifecycles and life cycle approaches to inform the use of nanotechnology in ways that prevent pollution and allow more sustainable use of resources.
- Identification and development of research technologies that use nanomaterials to detect, monitor, and remediate environmental releases of traditional pollutants as well as nanoparticles.

Another part of the Agency's response to nanotechnology is a new, environmental stewardship program that will complement the Toxic Substances Control Act's regulatory tools. The program will gather existing data and information assembled from manufacturers and processors of new nanoscale materials or materials currently in U.S. commerce. This partnership with the chemical industry and other stakeholders will inform risk assessment and risk reduction activities. EPA will use this information and strategic testing to determine whether commercial activities involving nanoscale materials present potential risks and respond with appropriate efforts to protect human health and the environment. EPA may also be able to provide tools to companies that will help them anticipate environmental risks and direct their investments toward safer products and production procedures.

With so many new technologies and the continual development of new chemicals, EPA works to respond with the best technology available. EPA is anticipating the use of DNA micro-arrays in environmental chemical testing. DNA micro-arrays are a type of technology that profiles the genomes of plant and animal species and uses sequences like probes to recognize substances. The Agency recognizes that these technologies have the potential to change and enhance chemical testing in multiple environmental areas. EPA's research is making significant progress in the use of DNA micro-arrays (gene chips) and related developments, particularly in computational toxicology. As

these technologies develop, the Agency will examine their potential applications and relevance to protecting the environment and human health.

Another emerging technology, distributed sensor networks, has the potential to enhance EPA's environmental monitoring. It is possible to envision a network of physical, chemical, and biological sensors that will feed into a central environmental data management and analysis system, such as EPA's Global Earth Observation System of Systems (GEOSS). Distributed sensor networks can increase the frequency and speed of data collection and transmission, improve the quality of data, enhance data integration, and facilitate access to and sharing of data. Other potential implications include the opportunity to provide better environmental health information that allows us to measure progress at multiple temporal and spatial scales. This technology could increase the frequency of EPA's Report on the Environment and advance our foresight capabilities. Distributed sensor networks could enhance multi-media, interdisciplinary and cross-program collaboration at EPA, and provide data that accurately portrays environmental conditions on a real-time basis.

Renewable energy and fuel sources such as biofuels could have many implications for EPA. The potential environmental impacts of new renewable and non-renewable forms of energy production, and the distribution and storage infrastructure will need to be examined. Biofuel production has the potential to affect human health and the environment through pesticide use and habitat loss. The potential multi-media emissions generated from the use and production of biofuels production also will need to be characterized.

Global change, habitat loss and destruction due to sprawl and exploitation of natural resources, invasive species, nonpoint source pollution, and the accumulation and interaction of these effects present emerging ecological challenges for the Agency. EPA's ability to achieve its strategic objectives depends on many factors over which the Agency has little or no influence. Partnerships, international collaboration, global harmonization, industry, economic influences (including increased trade and foreign investment), industrial accidents, natural disasters, litigation, and new legislation have significant influence on the Agency's ability to achieve its goals. Changes in the focus, new level of effort, or status of any of these components could play a critical role in the success of the Agency's programs.

To Learn More:

<http://www.epa.gov/ocfo/futures/perspectives.htm>

¹ For additional information on EPA's National Land Cover Database, see: [Hhttp://www.epa.gov/nerlesd1/land-sci/H](http://www.epa.gov/nerlesd1/land-sci/H), [Hhttp://www.mrlc.gov/H](http://www.mrlc.gov/H), and [Hhttp://edcsns17.cr.usgs.gov/glcc/H](http://edcsns17.cr.usgs.gov/glcc/H); on the Environmental Monitoring and

Assessment Program, [Hhttp://www.epa.gov/emap/H](http://www.epa.gov/emap/H) and on EPA's Report on the Environment, [Hhttp://www.epa.gov/indicators/index.htm](http://www.epa.gov/indicators/index.htm)H (accessed 15 May 2006).

² Baseline: EPA screening of data obtained through the HPV Challenge Program is commencing in 2006; actions to obtain additional information needed to assess risks will commence subsequently as chemicals are identified as priority concerns through the screening process. Measurement Mechanism: EPA risk management action tracking tools, including RAPIDS (not publicly available) and HPVIS. See U.S. Environmental Protection Agency High Production Volume Information System (HPVIS) internet site: [Hhttp://epa.gov/hpvis/H](http://epa.gov/hpvis/H). Washington, DC: Office of Prevention, Pesticides & Toxic Substances (accessed 19 May 2006). Once HPV challenge chemicals have been through the EPA multi-tier risk assessments process, any found to present unreasonable risks under the Toxics Substance Control Act is tracked for action, such as Significant New Use Rules (SNURs) that bind all manufacturers and processors to terms and conditions that prevent unreasonable risks, other regulatory action, guidance, referral to other Agency statutes, etc.

³ Baseline: 100 percent in FY 2004 and FY 2005. Measurement Mechanism: Number of TSCA 8(e) Chemical Hazard Notifications associated with Pre-manufacture notice (PMN)-reviewed chemicals verified to identify the occurrence of unreasonable risks. Starting in FY 2005, the EPA expanded its assessment of incoming TSCA 8(e) reports, required to be submitted whenever companies learn of "substantial risks", to determine whether EPA properly identified those potential hazards/risks in previously reviewed PMNs. The results of this new assessment process enables the program to identify potential flaws in its PMN review protocols and act quickly to make associated improvements.

⁴ Baseline: 2001 starting point is 0. Actual cumulative reduction reported from 2001 – 2003 is 6.6% (5.7% for 2001 – 2002; 0.9% for 2002 – 2003. Target assumes annual 3.0% reductions for remaining years through 2011. Measurement Mechanism: EPA's Risk Screening Environmental Indicators (RSEI) model. See: U.S. Environmental Protection Agency Risk-Screening Environmental Indicators (RSEI) internet site: [Hhttp://www.epa.gov/opptintr/rsei/H](http://www.epa.gov/opptintr/rsei/H). Washington, DC: Office of Prevention, Pesticides & Toxic Substances (accessed 19 May 2006).

⁵ Baseline: 310,000 cases in 1999-2002. Data source: Centers for Disease Control and Prevention. 2005. Blood Lead Levels -United States, 1999-2002, MMWR:54, pages 513-516. Available on the internet: [Hwww.cdc.gov/mmwr/PDF/wk/mm5420.pdf](http://www.cdc.gov/mmwr/PDF/wk/mm5420.pdf)H (accessed 19 May 2006).

⁶ Baseline: 37.0% in 1991-1994. Data source: Centers for Disease Control and Prevention, 1994 Update: Blood Lead Levels--United States, 1991-1994, MMWR,43(30): 545-548: [Hwww.cdc.gov/mmwr/preview/mmwrhtml/00032080.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/00032080.htm)H (accessed May 22, 2006).98

⁷ See United Nations, Partnership for Clean Fuels and Vehicles internet site: [Hhttp://webapps01.un.org/dsd/partnerships/public/partnerships/178.html#top](http://webapps01.un.org/dsd/partnerships/public/partnerships/178.html#top)H. Division for Sustainable Development (accessed 19 May 2006).

⁸ This Strategic Target is based on the levels of several key pesticides found in people as measured by the Center for Disease Control's bi-annual (1990 – 1992) National Health and Nutrition Examination Survey (NHANES). Center for Disease Control had collected these data for sufficient time to establish a meaningful baseline. The target provides an indicator of the body burden in the general population resulting from pesticide exposure. See [Hhttp://www.cdc.gov/nchs/nhanes.htm](http://www.cdc.gov/nchs/nhanes.htm)H.

⁹ The term "risk events" is based on the assumption that every pesticide application has the potential to create a pesticide incident with adverse health effects. The number of pesticide applications was derived by taking the universe of occupationally exposed individuals and estimating the number of pesticide applications per individual per year. Data sources: EPA's annual count of certified applicators; U.S. Department of Labor, Findings from the National Agricultural Workers Survey (NAWS) 2001 - 2002. A Demographic and Employment Profile of United States Farm Workers, Research Report No. 9. March 2005, Office of the Assistant Secretary for Policy, Office of Programmatic Policy: Washington, DC: [Hhttp://www.doleta.gov/agworker/naaws.cfm](http://www.doleta.gov/agworker/naaws.cfm)H, and; American Association

of Poison Control Centers' Toxic Exposure Surveillance System: [Hhttp://www.aapcc.org/poison1.htm](http://www.aapcc.org/poison1.htm)H (accessed 10 May 2006).

¹⁰ American Association of Poison Control Centers' Toxic Exposure Surveillance System: <http://www.aapcc.org/poison1.htm> (accessed 10 May 2006).

¹¹ USGS National Water-Quality Assessment (NAWQA) program, as reported in USGS's 2006 report, Pesticides in the Nation's Streams and Ground Water.

¹² Toxic Substances Control Act Section 5: Manufacturing and Processing Notices, *Public Law* 94-469, October 11, 1976.

¹³ U.S. Environmental Protection Agency, High Production Volume Information System (HPVIS) internet site: [Hhttp://www.epa.gov/hpvis/index.html](http://www.epa.gov/hpvis/index.html)H. Washington, DC: Office of Prevention, Pesticides & Toxic Substances (updated 17 April 2006; accessed 30 May 2006).

¹⁴ See Organisation for Economic Co-operation and Development, Co-operation on the Investigation of Existing Chemicals, Description of OECD Work on Investigation of High Production Volume Chemicals internet site: [Hhttp://www.oecd.org/document/21/0,2340,en_2649_34379_1939669_1_1_1_1,00.html](http://www.oecd.org/document/21/0,2340,en_2649_34379_1939669_1_1_1_1,00.html)H, and Global HPV Portal and existing databases internet site: [Hhttp://www.oecd.org/document/9/0,2340,en_2649_34379_35211849_1_1_1_1,00.html](http://www.oecd.org/document/9/0,2340,en_2649_34379_35211849_1_1_1_1,00.html)H. Also see United Nations Environmental Program, Chemical Screening Information Data Set (SIDS) for High Volume Chemicals internet site: [Hhttp://www.chem.unep.ch/irptc/sids/OECDsids/sidspub.html](http://www.chem.unep.ch/irptc/sids/OECDsids/sidspub.html)H (accessed 30 May 2006).

¹⁵ Advanced tools developed under the NCP include QSAR - Quantitative Structure Activity Relationships. There is no defined base data set required before PMN, and the TSCA does not require prior testing of new chemicals. Consequently, less than half of the PMNs submitted include toxicological data. In these cases, EPA scientists assess the chemical's structural similarity to chemicals for which data are available - called structure-activity relationship (SAR)- to help predict toxicity. A useful discussion of SAR is found in an OECD monograph, US EPA/EC Joint Project on the Evaluation of (Quantitative) Structure Activity Relationships, Environment Monograph No. 88, Organisation for Economic Co-Operation and Development, Paris, 1994, available on the internet at [Hhttp://www.epa.gov/opptintr/newchems/pubs/ene4147.pdf](http://www.epa.gov/opptintr/newchems/pubs/ene4147.pdf)H (accessed 19 May 2006).

The Ecological Structure Activity Relationships (ECOSAR) is a personal computer software program used to estimate the aquatic toxicity of chemicals. The program predicts the toxicity of industrial chemicals to aquatic organisms such as fish, invertebrates and algae using (Q)SARs. ECOSAR estimates a chemical's acute (short-term) toxicity and, when available, chronic (long-term or delayed) toxicity. ECOSAR is available on the internet at US Environmental Protection Agency, Pollution Prevention (P2) Framework, Hazard Models internet site: [Hhttp://www.epa.gov/oppt/p2framework/docs/hazard.htm#Sub2](http://www.epa.gov/oppt/p2framework/docs/hazard.htm#Sub2)H. Washington, DC: Office of Pollution Prevention and Toxics (accessed 19 May 2006).

⁷ Office of Pollution Prevention and Toxics, Sustainable Futures. 67 Federal Register 76282. December 11, 2002, Washington, DC: U.S. Environmental Protection Agency: [Hhttp://www.epa.gov/oppt/newchems/pubs/sustainablefutures.htm](http://www.epa.gov/oppt/newchems/pubs/sustainablefutures.htm)H (accessed 5 May 2006).

¹⁷ See Partnership for Clean Fuels and Vehicles internet site: [Hwww.unep.org/PCFV](http://www.unep.org/PCFV)H. Nairobi, Kenya: United Nations Environmental Program (updated 25 April 2005, accessed 18 May 2006).

¹⁸ For relevant studies, see citations in U.S. Environmental Protection Agency (2005). Draft risk assessment of the potential human health effects associated with exposure to perfluorooctanoic acid and its salts. Washington, DC, Office of Pollution Prevention and Toxics, Risk Assessment Division. Available at: <http://www.epa.gov/opptintr/pfoa/pfoarisk.pdf> (accessed 17 May 2006).

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- ¹⁹ See Office of Emergency Management RMP Program Overview internet site: [Hhttp://yosemite.epa.gov/oswer/ceppoweb.nsf/content/RMPOverview.htm](http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/RMPOverview.htm)H. Washington, DC: U.S. Environmental Protection Agency (updated 11 October 2002; accessed 25 May 2006).
- ²⁰ See Office of Emergency Management EPCRA Overview internet site: [Hhttp://yosemite.epa.gov/oswer/ceppoweb.nsf/content/epcraOverview.htm](http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/epcraOverview.htm)H. Washington, DC: U.S. Environmental Protection Agency (accessed 17 May 17, 2006).
- ²¹ See Acute Exposure Guideline Levels (AEGLs) Program internet site: [Hhttp://www.epa.gov/opptintr/aegl/](http://www.epa.gov/opptintr/aegl/)H. Washington, DC: U.S. Environmental Protection Agency (updated 3 March 2006, accessed 25 May 2006).
- ²² See Office of Pesticide Programs, Pesticides internet site: [Hhttp://www.epa.gov/pesticides/](http://www.epa.gov/pesticides/)H. Washington, DC: U.S. Environmental Protection Agency (accessed 17 May 17, 2006).
- ²³ See U.S. Environmental Protection Agency, Pesticides: Topical & Chemical Fact Sheets, Pesticide Registration Program internet site: [Hhttp://www.epa.gov/pesticides/factsheets/registration.htm](http://www.epa.gov/pesticides/factsheets/registration.htm)H (updated 2 may 2006; accessed 19 May 2006).
- ²⁴ See U.S. Environmental Protection Agency, Pesticide Tolerance Reassessment & Reregistration internet site: [Hwww.epa.gov/pesticides/reregistration](http://www.epa.gov/pesticides/reregistration)H (updated and accessed 24 May 2006).
- ²⁵ Federal Insecticide, Fungicide, and Rodenticide Act, as amended. January 23, 2004. Section 3(g), Registration Review (7 U.S.C. 136a). Available at [Hwww.epa.gov/opp00001/regulating/fifra.pdf](http://www.epa.gov/opp00001/regulating/fifra.pdf)H (accessed 24 may 2006).
- ²⁶ Department of Health and Human Services. 2005. 3rd National Report on Human Exposure to Environmental (NCEH Pub. No. 05-0570Chemicals). Atlanta, Georgia: Centers for Disease Control and Prevention. Available at: [Hhttp://www.cdc.gov/exposurereport/](http://www.cdc.gov/exposurereport/)H (accessed 24 May 2006)
- ²⁷ See U.S. Environmental Protection Agency, Pesticides: Health and Safety, Reducing Pesticide Risk internet site: [Hhttp://www.epa.gov/pesticides/health/reducing.htm](http://www.epa.gov/pesticides/health/reducing.htm)H (accessed 10 May 2006).
- ²⁸ U.S. Department of Labor, Findings from the National Agricultural Workers Survey (NAWS) 2001 - 2002. A Demographic and Employment Profile of United States Farm Workers, Research Report No. 9. March 2005, Office of the Assistant Secretary for Policy, Office of Programmatic Policy: Washington, DC: [Hhttp://www.doleta.gov/agworker/naws.cfm](http://www.doleta.gov/agworker/naws.cfm)H (accessed 10 May 2006).
- ²⁹ See U.S. Geological Survey, National Water Quality Assessment Program internet site: [Hhttp://water.usgs.gov/nawqa/](http://water.usgs.gov/nawqa/)H (accessed 19 May 2006).
- ³⁰ U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration 2004. Joint Counterpart Endangered Species Act Section 7 Consultation Regulations, 50 CFR Part 402. Available on the internet: [Hhttp://endangered.fws.gov/consultations/pesticides/Final_Rule.pdf](http://endangered.fws.gov/consultations/pesticides/Final_Rule.pdf)H (accessed 19 May 2006).
- ³¹ The term “significant” is used in a manner analogous to its use under the National Environmental Policy Act, involving considerations of both “context” and “intensity.” See 40 CFR 1508.27. Under this definition, “...in the [context] of a site-specific action, significance would usually depend upon the affects in the locale.... Both short- and long-term effects are relevant.” With respect to intensity, issues such as the magnitude of the impact (positive and negative) will be considered.
- ³² Source for data is Assessment Cleanup and Redevelopment Exchange System (ACRES).
- ³³ Census estimate of homes lacking access minus homes provided with access between 2000 and 2003.
- ³⁴ 2000 Census estimate of homes lacking access to adequate wastewater sanitation minus homes provided with access between 2000 and 2003.

³⁵ Baseline for both strategic targets: The 2006 calculated baseline mean maternal serum level for PCBs was 6.28 ug/l and for total chlordane was 1.26 ug/l. This initial baseline was calculated based on Arctic Monitoring and Assessment Program data (AMAP, 2003), that includes human health data points from indigenous maternal populations across the Arctic, including Alaska, Canada, Norway, and the Russian Federation. Measurement Mechanism: Assessment of data from AMAP, an existing international scientific working group, which advises governments of the eight Arctic countries on issues related to pollution in the Arctic. AMAP data is presented in periodic scientifically-based assessments (available at [Hwww.amap.no](http://www.amap.no)), which are a result of cooperative efforts involving a large number of scientists and other stakeholders, who follow agreed quality assurance and control protocols consistent with such practices common in the United States.

³⁶ Small Business Liability Relief and Brownfields Revitalization Act (Public Law 107-118 (H.R. 2869), 115 stat. 2356). Available on the Internet at” [Hhttp://www.epa.gov/swerosps/bf/sblrbra.htm#status](http://www.epa.gov/swerosps/bf/sblrbra.htm#status)H (accessed 11 May 2006).

³⁷ See Brownfields and Land Revitalization Technology Support Center internet site: [Hhttp://www.brownfieldstsc.org](http://www.brownfieldstsc.org)/H. U.S. Environmental Protection Agency Office of Superfund Remediation and Technology Innovation, U.S. Army Corps of Engineers, and Argonne National Laboratory (updated and accessed 18 May 2006).

³⁸ See Triad Resource Center internet site: [Hhttp://www.triadcentral.org](http://www.triadcentral.org)/H (accessed 18 May 2006). Triad is an innovative approach to decision-making for hazardous waste site characterization and remediation. The Triad approach proactively exploits new characterization and treatment tools. The Triad Resource Center provides the information hazardous waste site managers and cleanup practitioners need to implement the Triad effectively. The U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Army, U.S. Navy, Argonne National Laboratory, State of New Jersey Department of Environmental Protection, and the Interstate Technology Regulatory Council support Triad.

³⁹ See SMARTe (Sustainable Management Approaches and Revitalization Tools) internet site: [Hhttp://www.smarte.org/smart/home/index.xml](http://www.smarte.org/smart/home/index.xml)H (accessed 17 May 2006). SMARTe, is an open-source, web-based, decision support system for developing and evaluating future reuse scenarios for potentially contaminated land. SMARTe contains guidance and analysis tools for all aspects of the revitalization process including planning, environmental, economic, and social concerns. The US Environmental Protection Agency Office of Research and Development and Office of Brownfields Cleanup and Redevelopment, the German Federal Ministry of Education and Research, and the Interstate Technology Regulatory Council support its development.

⁴⁰ U.S. Environmental Protection Agency, U.S.-Mexico Border Program, Border 2012 Program Web Site: [Hhttp://www.epa.gov/usmexicoborder](http://www.epa.gov/usmexicoborder)/H (accessed 9 May 2006)

⁴¹ Stockholm Convention on Persistent Organic Pollutants. Signed by USA on May 23, 2001. Entered into force on 17 May 2004. See [Hhttp://www.pops.int](http://www.pops.int)/H See also [Hhttp://www.epa.gov/oppfead1/international/pops.htm](http://www.epa.gov/oppfead1/international/pops.htm)H

⁴² Arctic Monitoring and Assessment Program, 2003. AMAP Assessment 2002: Human Health in the Arctic. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. ([Hhttp://www.amap.no/Assessment/ScientificBackground.htm](http://www.amap.no/Assessment/ScientificBackground.htm)H).

⁴³ See Arctic Council, [Hwww.arctic-council.org](http://www.arctic-council.org)H under “Activities” (ACAP/Obsolete Pesticides Project) (accessed 17 May 2006).

⁴⁴ See Arctic Council, [Hwww.arctic-council.org](http://www.arctic-council.org)H under “Activities” (ACAP/PCB Project) (accessed 17 May 2006).

⁴⁵ Data for the index components are tracked internally by USEPA’s Great Lakes National Program Office and reported through the State of the Lakes Ecosystem Conference (SOLEC) process. The document, “State of the Great Lakes 2005 -A Technical Report,” presents detailed indicator reports prepared by primary authors, including listings of data sources.

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- ⁴⁶ See U.S. Environmental Protection Agency, Great Lakes Monitoring, Contaminants in Top Predator Fish internet site: [Hhttp://www.epa.gov/glnpo/glindicators/fishtoxics/topfishb.html](http://www.epa.gov/glnpo/glindicators/fishtoxics/topfishb.html)H (accessed 17 May 2006).
- ⁴⁷ Data will be available at U.S. Environmental Protection Agency, Great Lake Monitoring, Atmospheric Deposition of Toxic Pollutants internet site: [Hhttp://www.epa.gov/glnpo/glindicators/air/airb.html](http://www.epa.gov/glnpo/glindicators/air/airb.html)H (accessed 17 May 2006).
- ⁴⁸ Lower Columbia River Estuary Program. June 1999. Comprehensive Conservation and Management Plan. Portland, OR: Estuary Partnership Office. Available on Lower Columbia River Estuary Partnership internet site: [Hhttp://www.lcrep.org/mgmt_complete_plan.htm](http://www.lcrep.org/mgmt_complete_plan.htm)H (accessed 18 May 2006).
- ⁴⁹ Hood River Watershed, DEQ 2006, Mill Creek Watershed, DEQ 2006, Walla Walla Watershed, DEQ 2006 (pending), Pudding River Watershed, DEQ 2006 (pending), and Clackamas River, Watershed DEQ 2006 (pending). These reports which are found in hard copy will be put on the EPA Columbia River website (as a part of the baseline information) which is currently under development.
- ⁵⁰ Water Cleanup Plans (TMDLs) by Watershed/Ecology Region, [Hhttp://www.ecy.wa.gov/programs/wq/tmdl/watershed/index.html](http://www.ecy.wa.gov/programs/wq/tmdl/watershed/index.html)H (updated April 2005); Yakima River Pesticide TMDL, Okanogan River DDT and PCB TMDL, Wenatchee River, Mission Creek, and Lake Chelan PCB and Pesticide TMDL, Walla Walla Pesticide and PCB TMDL, and Palouse River Pesticide and PCB TMDL.
- ⁵¹ U.S. Environmental Protection Agency (2002). Columbia River Basin Fish Contaminant Survey:1996-1998 (EPA, 910-R-02-006). Seattle, Washington, USEPA Region 10, Risk Evaluation Unit.
[Hhttp://yosemite.epa.gov/R10/OEA.NSF/af6d4571f3e2b1698825650f0071180a/c3a9164ed269353788256c09005d36b7?OpenDocument](http://yosemite.epa.gov/R10/OEA.NSF/af6d4571f3e2b1698825650f0071180a/c3a9164ed269353788256c09005d36b7?OpenDocument)H (accessed 17 May 2006).
- ⁵² Fixed Station and Seasonal Monitoring Of Conventional and Toxic Contaminants on the Lower Columbia River Estuary Partnership (LCREP) Internet site: [Hhttp://www.lcrep.org/eco_water_qual.htm#fixed](http://www.lcrep.org/eco_water_qual.htm#fixed)H (accessed 17 May 2006).
- ⁵³ Johnson, A. and D. Norton (March 2005). Concentrations of 303(d) Listed Pesticides, PCBs, and PAHs Measured with Passive Samplers Deployed in the Lower Columbia River, Ecology Publication No. 05-03-006. Olympia WA., Washington State Department of Ecology. Available on the Internet: [Hhttp://www.ecy.wa.gov/pubs/0503006.pdf](http://www.ecy.wa.gov/pubs/0503006.pdf)H (accessed 17 May 2006).
- ⁵⁴ Dahl, T.E. 1990. *Wetlands Losses in the United States, 1780s to 1980s*. Washington, DC: U.S. Department of the Interior, U.S. Fish and Wildlife Service. Available on the Internet::
[Hwww.npwrc.usgs.gov/resource/othrdata/wetloss/wetloss.htm](http://www.npwrc.usgs.gov/resource/othrdata/wetloss/wetloss.htm)H (accessed 17 May 2006).
- ⁵⁵ Dahl, T.E. 2006. *Status and Trends of Wetlands in the Conterminous United States, 1998 to 2004*. Washington, DC: U.S. Department of the Interior, U.S. Fish and Wildlife Service.
- ⁵⁶ Compensatory Mitigation Rulemaking web page: [Hhttp://www.epa.gov/wetlandsmitigation](http://www.epa.gov/wetlandsmitigation)H (accessed 9 May 2006)
- ⁵⁷ U.S. Environmental Protection Agency, Army Corps of Engineers, and Departments of Agriculture, Commerce, Interior, and Transportation. December 24, 2002. National Wetlands Mitigation Action Plan. Available on the internet: [Hhttp://www.mitigationactionplan.gov/index.html](http://www.mitigationactionplan.gov/index.html)H (updated 6 September 2005; accessed 30 May 2006).
- ⁵⁸ See U.S. Environmental Protection Agency, Five Star Restoration Program internet site: [Hhttp://www.epa.gov/owow/wetlands/restore/5star/](http://www.epa.gov/owow/wetlands/restore/5star/)H. Washington, DC: Office Wetlands, Oceans, and Watersheds (updated 1 May 2006, accessed 30 May 2006).

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- ⁵⁹ See U.S. Environmental Protection Agency, Regional Geographic Initiatives internet site: [Hhttp://www.epa.gov/regional/rgi.htm](http://www.epa.gov/regional/rgi.htm)H. Washington DC: Office of Regional Operations (updated 25 April 2006, accessed 30 May 2006).
- ⁶⁰ See U.S. Environmental Protection Agency, Targeted Watershed Grants Program internet site: [Hhttp://www.epa.gov/owow/watershed/initiative/](http://www.epa.gov/owow/watershed/initiative/)H. Washington, DC: Office Wetlands, Oceans, and Watersheds (updated and accessed 30 May 2006).
- ⁶¹ See U.S. Environmental Protection Agency, Polluted Runoff (Nonpoint Source Pollution), Clean Water Act Section 319 internet site: [Hhttp://www.epa.gov/OWOW/NPS/cwact.html](http://www.epa.gov/OWOW/NPS/cwact.html)H. Washington, DC: Office Wetlands, Oceans, and Watersheds (updated 22 February 2006, accessed 30 May 2006).
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- ⁶³ See U.S. Environmental Protection Agency, Great Lakes Pollution Prevention and Toxics Reduction, Great Lakes Binational Toxics Strategy internet site: [Hhttp://www.epa.gov/glnpo/bns/index.html](http://www.epa.gov/glnpo/bns/index.html)H (accessed 19 May 2006).
- ⁶⁴ See U.S. Environmental Protection Agency, Great Lakes, Regional Collaboration: Interagency Task Force internet sites: [Hhttp://www.epa.gov/grtlakes/collaboration/taskforce/index.html](http://www.epa.gov/grtlakes/collaboration/taskforce/index.html)H (accessed 18 May 2006).
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- ⁶⁶ See Great Lakes Regional Collaboration internet site: [Hhttp://www.gllrc.us/](http://www.gllrc.us/)H (updated 7 July 2005; accessed 17 May 2006). See also Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes, December 2005, Chicago, IL, Great Lakes Regional Collaboration. Available on the internet at: [Hhttp://www.gllrc.us/strategy.html](http://www.gllrc.us/strategy.html)H (accessed 17 May 2006).
- ⁶⁷ U.S. Environmental Protection Agency, Chesapeake Bay Program. June 2000. *Chesapeake 2000 Agreement*. Annapolis, Maryland. Available online at: [Hhttp://chesapeakebay.net/pubs/chesapeake2000agreement.pdf](http://chesapeakebay.net/pubs/chesapeake2000agreement.pdf)H (accessed 9 May 2006)
- ⁶⁸ See Koroncai, R., et al. December 2003. Setting and Allocating the Chesapeake Bay Basin Nutrient and Sediment Loads: The Collaborative Process, Technical Tools, and Innovative Approaches. Annapolis, Maryland: U.S. Environmental Protection Agency, Region III, Chesapeake Bay Program Office: [Hhttp://www.chesapeakebay.net/caploads.htm](http://www.chesapeakebay.net/caploads.htm)H (accessed 30 May 2006).
- ⁶⁹ To view data on submerged aquatic vegetation, see: [Hhttp://www.chesapeakebay.net/pubs/statustrends/88-data-2002.xls](http://www.chesapeakebay.net/pubs/statustrends/88-data-2002.xls)H; dissolved oxygen: [Hhttp://www.chesapeakebay.net/pubs/statustrends/204-data-2005.xls](http://www.chesapeakebay.net/pubs/statustrends/204-data-2005.xls)H; on nitrogen, phosphorus and sediment reductions, see [Hhttp://www.chesapeakebay.net/pubs/statustrends/186-data-2003.xls](http://www.chesapeakebay.net/pubs/statustrends/186-data-2003.xls)H. For additional information on data and methods for submerged aquatic vegetation, see: [Hhttp://www.chesapeakebay.net/pubs/2006reports/Indicator_Survey_SAV.doc](http://www.chesapeakebay.net/pubs/2006reports/Indicator_Survey_SAV.doc)H; for dissolved oxygen: [Hhttp://www.chesapeakebay.net/pubs/2006reports/Indicator_Survey_Dissolved_OxygenRevised031406.doc](http://www.chesapeakebay.net/pubs/2006reports/Indicator_Survey_Dissolved_OxygenRevised031406.doc)H; and for nitrogen, phosphorus, and sediment reductions: [Hhttp://www.chesapeakebay.net/pubs/2006reports/IndicatorSurvey_Reducing_Pollution_032406.doc](http://www.chesapeakebay.net/pubs/2006reports/IndicatorSurvey_Reducing_Pollution_032406.doc)H (accessed 30 May 2006).

⁷⁰ See U.S. Environmental Protection Agency, Gulf of Mexico Program internet site: [Hhttp://www.epa.gov/gmpo](http://www.epa.gov/gmpo)H (accessed 17 May 2006).

⁷¹ See The Gulf of Mexico Alliance internet site [Hhttp://www.gulfofmexicoalliance.org](http://www.gulfofmexicoalliance.org)H (accessed 17 May 2006).

⁷² See Federal Workgroup, the U.S. Ocean Action Plan's Gulf of Mexico Regional Partnership internet site: [Hhttp://www2.nos.noaa.gov/gomex](http://www2.nos.noaa.gov/gomex)H (accessed 17 May 2006).

⁷³ See The Gulf of Mexico Alliance internet site: [Hhttp://www.dep.state.fl.us/gulf/](http://www.dep.state.fl.us/gulf/)H. Tallahassee, Florida: Florida Department of Environmental Protection (accessed 30 May 2006).

⁷⁴ Gulf of Mexico Alliance. 2006. Governors' Action Plan for Healthy and Resilient Coasts March: 2006-March 2009. Available on the internet: [Hhttp://www.dep.state.fl.us/gulf/files/files/GulfActionPlan_Final.pdf](http://www.dep.state.fl.us/gulf/files/files/GulfActionPlan_Final.pdf)H (accessed 17 May 2006).

⁷⁵ Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. 2001. Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico. Washington, DC.available on the internet at: [Hhttp://www.epa.gov/msbasin/taskforce/pdf/actionplan.pdf](http://www.epa.gov/msbasin/taskforce/pdf/actionplan.pdf)H. See also Mississippi River Basin and Gulf of Mexico Hypoxia Hypoxia Task Force internet site: [Hhttp://www.epa.gov/msbasin/taskforce/index.htm](http://www.epa.gov/msbasin/taskforce/index.htm)H (accessed 17 May 2006)

⁷⁶ See U.S. Environmental Protection Agency (2002). Columbia River Basin Fish Contaminant Survey:1996-1998 (EPA, 910-R-02-006). Seattle, Washington, USEPA Region 10, Risk Evaluation Unit. Available on the internet: [Hhttp://yosemite.epa.gov/R10/OEA.NSF/af6d4571f3e2b1698825650f0071180a/c3a9164ed269353788256c09005d36b7?OpenDocument](http://yosemite.epa.gov/R10/OEA.NSF/af6d4571f3e2b1698825650f0071180a/c3a9164ed269353788256c09005d36b7?OpenDocument)H (accessed 17 May 2006); Fixed Station and Seasonal Monitoring Of Conventional and Toxic Contaminants on the Lower Columbia River Estuary Partnership (LCREP) Internet site: [Hhttp://www.lcrep.org/eco_water_qual.htm#fixed](http://www.lcrep.org/eco_water_qual.htm#fixed)H (accessed 17 May 2006); and Johnson, A. and D. Norton (March 2005). Concentrations of 303(d) Listed Pesticides, PCBs, and PAHs Measured with Passive Samplers Deployed in the Lower Columbia River, Ecology Publication No. 05-03-006. Olympia WA., Washington State Department of Ecology. Available on the Internet: [Hhttp://www.ecy.wa.gov/pubs/0503006.pdf](http://www.ecy.wa.gov/pubs/0503006.pdf)H (accessed 17 May 2006).

⁷⁷ The Columbia River Toxics Strategy is a commitment by EPA, Oregon, Washington, and Idaho, in coordination with Columbia Basin tribes, to reduce toxics in water and in fish that people eat.

⁷⁸ See U.S. Environmental Protection Agency, EPA Report on the Environment internet site: [Hhttp://www.epa.gov/indicators/index.htm](http://www.epa.gov/indicators/index.htm)H (accessed 19 May 2006).

GOAL 5 - Compliance and Environmental Stewardship

Improve environmental performance through ensuring compliance with environmental requirements by enforcing environmental statutes, preventing pollution, and promoting environmental stewardship. Protect human health and the environment by encouraging innovation and providing incentives for governments, businesses, and the public that promote environmental stewardship and long-term sustainable outcomes.

Under this goal, EPA will work to ensure that government, business, and the public meet federal environmental requirements and will empower and assist them to do more. EPA programs designed to ensure compliance (through assistance, enforcement, and other tools) with federal environmental laws and regulations, to increase voluntary and self-directed actions to minimize or eliminate pollution before it is generated (pollution prevention), and to promote environmental stewardship behavior all contribute to the achievement of this goal. The Agency also promotes greater compliance by other countries such as key international trading partners with their own domestic and international environmental commitments, since greater compliance will lead to lower levels of pollution that can cross borders and impact the United States.

EPA uses the term “environmental stewardship” to describe behavior that includes but also exceeds the requisite compliance with existing regulatory requirements. Stewards of the environment recycle wastes to the greatest extent possible, minimize or eliminate pollution at its sources, and use energy and natural resources efficiently to reduce impacts on the environment. Under this goal, EPA will strive to use science and research more strategically and effectively to inform Agency policy decisions and to guide compliance, pollution prevention, and environmental stewardship efforts. In order for EPA to meet its domestic environmental challenges, the Agency will work with key international stakeholders through complementary and coordinated actions to promote and increase environmental stewardship globally.

OBJECTIVE 5.1: ACHIEVE ENVIRONMENTAL PROTECTION THROUGH IMPROVED COMPLIANCE.

By 2011, maximize compliance to protect human health and the environment through enforcement and other compliance assurance activities by achieving a 5 percent increase in the pounds of pollution reduced, treated, or eliminated by regulated entities, including those in Indian country. (Baseline to be determined in 2006)

Sub-objective 5.1.1: Compliance Assistance. By 2011, prevent noncompliance or reduce environmental risks, with an emphasis on achieving results in areas with potential environmental justice concerns, through EPA compliance assistance by maintaining or improving on the following percentages for direct assistance provided to regulated entities, including those in Indian country: 85 percent of the regulated entities improve their understanding of environmental requirements; 50 percent of the regulated entities improve environmental management practices; and 12 percent of the regulated entities reduce, treat, or eliminate pollution. (Baseline to be determined in 2006)

Sub-objective 5.1.2: Compliance Incentives. By 2011, identify and correct noncompliance and reduce environmental risks, with an emphasis on achieving results in areas with potential environmental justice concerns, through a 5 percentage point increase in the number of facilities that use EPA incentive policies to conduct environmental audits or other actions that reduce, treat, or eliminate pollution or improve environmental management practices at their facilities, including those in Indian country. (Baseline to be determined in 2006)

Sub-objective 5.1.3: Monitoring and Enforcement. By 2011, identify, correct, and deter noncompliance and reduce environmental risks, with an emphasis on achieving results in areas with potential environmental justice concerns, through monitoring and enforcement of regulated entities' compliance, including those in Indian country, by achieving: a 5 percent increase in the number of facilities taking complying actions¹ during EPA inspections and evaluations after deficiencies have been identified; a 5 percentage point increase in the percent of enforcement actions requiring that pollutants be reduced, treated, or eliminated; and a 5 percentage point increase in the percent of enforcement actions requiring improvement of environmental management practices. (Baseline to be determined in 2006)

Means and Strategies for Achieving Objective 5.1

EPA works cooperatively with state, tribal, and local agencies to secure and maintain compliance with the nation's environmental laws and regulations. To reduce noncompliance and the environmental risks that can result, EPA and its partners provide compliance assistance to promote understanding of environmental regulations; offer incentives that encourage facilities voluntarily to identify, disclose, and correct violations; monitor compliance through inspections, evaluations, and investigations; and conduct civil and criminal enforcement actions to correct violations and deter future noncompliance.

EPA will continue working with state, tribal, and local environmental compliance assurance programs to ensure that regulated entities are in compliance. Specifically, EPA will (1) work with states and tribes to ensure a consistent level of effort in state and tribal enforcement and compliance assurance programs; (2) expand the role of its partners in identifying national priorities for the federal enforcement and compliance assurance programs; (3) better integrate strategic planning efforts at the state, tribal, regional, and national levels; (4) share information about patterns of noncompliance or emerging risks which need to be addressed; (5) explore development of common performance measures for state and tribal enforcement and compliance assurance programs; and, (6) continue to ensure compliance in Indian country, including improving data collection and reporting, and building compliance assurance and enforcement capacity of tribes. EPA also will work with some of these same partners, and federal entities such as the U.S. Departments of State, Justice and Interior, to encourage and, as appropriate, support efforts by other countries to develop and ensure greater

compliance with their own domestic environmental programs. The four elements of EPA's compliance assurance program—assistance, incentives, monitoring, and enforcement—are described in more detail below.

Compliance Assistance

To assist regulated entities in complying with environmental laws and regulations, EPA will continue to provide direct assistance to regulated entities through activities such as training, workshops, on-site visits, and telephone contacts. Our 14 virtual Compliance Assistance Centers (<http://www.epa.gov/compliance/assistance/centers/index.html>) directly provide assistance and access to resources such as pollution prevention information for the regulated community. EPA also provides indirect assistance to regulated entities by developing tailored compliance assistance tools and making them readily available to the regulated community through its websites, free publications, and distributions of materials through trade associations and other groups. The Agency's National Environmental Compliance Assistance Clearinghouse provides a forum for sharing information on best practices, outcome measurement, and new compliance assistance materials among federal, state, tribal, and local governments, academia, trade associations, and other organizations that provide compliance assistance to regulated entities. When providing compliance assistance, EPA also encourages the promotion of environmental stewardship behavior by establishing partnership programs designed to minimize or eliminate pollution prior to its generation.

The Agency is developing compliance assistance activities and measures through the Environmental Assistance Network in order to improve environmental performance on a sector-specific basis such as in the health care and construction sectors. The Network brings together Agency offices to collaborate and identify opportunities for building common metrics and measurement approaches for a particular sector that will address environmental assistance, pollution prevention, and environmental stewardship.

Compliance Incentives

Compliance incentive policies help foster an environmental stewardship ethic within the regulated community by offering an incentive to address environmental issues proactively. EPA offers several incentives to encourage regulated entities, private and governmental, to assess their overall compliance with environmental requirements and voluntarily disclose, promptly correct, and prevent the recurrence of non-compliance problems. The Agency will continue to make the Audit Policy (Self-Policing Policy) and other compliance incentives available to the regulated community, including reduced penalties for violations and extended time for correction. EPA also encourages owners of multiple facilities to enter into corporate-wide auditing agreements because such agreements offer the opportunity for these regulated entities to review their operations more comprehensively while providing certainty about their environmental liability. Corporate-wide auditing agreements, particularly those following mergers and

acquisitions, offer the potential for significant environmental benefits because environmental compliance issues are addressed simultaneously across the company.

EPA will continue to work with stakeholders to improve opportunities for entities to self-disclose and correct violations. The Small Business Compliance Policy has recently been modified to encourage greater participation by small businesses, allowing businesses with fewer than 100 employees to benefit from a reduction in penalties for federal violations they discover, disclose, and correct. As part of outreach supporting the Small Business Compliance Policy, EPA will work with small business compliance assistance providers to develop tools small businesses can use to understand applicable environmental requirements and take advantage of the flexibility offered by the policy. EPA also will continue to encourage states to adopt, and communities to use, the policy.

Compliance Monitoring and Enforcement

Federal environmental regulations establish a baseline for consistent compliance levels nationwide. States and tribes that have been delegated responsibilities for specific programs may make these baseline standards more stringent and enforce against the more stringent standards. EPA uses strategic targeting to conduct monitoring and enforcement activities—inspections, evaluations, civil and criminal investigations, administrative actions, and civil and criminal judicial enforcement—to identify the most egregious violators and return them to compliance as quickly as possible. EPA's goal is to address the most significant risks to human health and the environment and to address disproportionate burdens on certain populations. EPA's national enforcement and compliance assurance program will continue to focus on two major components: (1) a limited number of national priorities that focus on significant environmental risks and patterns of noncompliance; and, (2) core program activities that implement the requirements of all environmental laws and programs. Through a collaborative process with states and tribes, EPA analyzes data and trends to identify areas appropriate for priority attention.

OBJECTIVE 5.2: IMPROVE ENVIRONMENTAL PERFORMANCE THROUGH POLLUTION PREVENTION AND THE ADOPTION OF OTHER STEWARDSHIP PRACTICES THAT LEAD TO SUSTAINABLE OUTCOMES.

By 2011, enhance public health and environmental protection and increase conservation of natural resources by promoting pollution prevention and the adoption of other stewardship practices by companies, communities, governmental organizations, and individuals.

Sub-objective 5.2.1: Prevent Pollution and Promote Environmental Stewardship by Business, Government and the Public.

By 2011, reduce pollution, conserve natural resources, and improve other environmental stewardship practices through implementation of EPA's pollution prevention programs.

Strategic Targets:

- By 2011, reduce 7.3 billion pounds of hazardous materials cumulatively from the 2000 baseline amount of 44 million pounds.
- By 2011, reduce, conserve, or offset 774.0 trillion British Thermal Units (BTUs) cumulatively from the 2002 baseline amount of 0 BTUs.
- By 2011, reduce water use by 52.0 billion gallons cumulatively from the 2000 baseline amount of 220 million pounds.
- By 2011, save \$1.1 billion through pollution prevention improvements in business, institutional, and governmental costs cumulatively from the 2002 baseline amount of \$0.0.
- By 2011, reduce 4 million pounds of priority chemicals from waste streams as measured by National Partnership for Environmental Priorities (NPEP) contributions, Supplemental Environmental Projects (SEPs), and other tools used by EPA to achieve priority chemical reductions.

Sub-objective 5.2.2: Promote Improved Environmental Performance through Business and Community Innovation. Through 2011, achieve measurably improved environmental performance to achieve sustainable outcomes through sector-based approaches, performance-based programs, and assistance to small business.

Strategic Targets:

- By fiscal year 2011, the reported results of Performance Track member facilities collectively will show the following normalized annual reductions: 5.1 billion gallons in water use; 13,000 tons of hazardous materials use; 230,000 megatons of carbon dioxide equivalent (MTCOE) of greenhouse gases; 300 tons of toxic discharges to water; and 5,500 tons of combined NOx, SOx, VOC, and PM emissions. (Performance Track member facilities make commitments to, and report yearly progress on, performance improvements in up to four environmental areas. In FY 2005, Performance Track members achieved normalized annual reductions of 3.4 billion gallons in water use; 8,794 tons of hazardous materials use; 151,129 MTCO₂E of greenhouse gases; 186 tons of toxic discharges to water; and 3,533 tons of combined NOx, SOx, VOC, and PM emissions.)
- By 2011, the participating manufacturing and service sectors in the Sector Strategies Program will achieve an aggregate 10 percent reduction in environmental releases to air, water, and land, working from a 2004 baseline and normalized to reflect economic growth. (Baseline and normalization factors to be developed in 2006.)

Sub-Objective 5.2.3: Promote Environmental Policy Innovation. Through 2011, achieve measurably improved environmental results, promote stewardship behavior, and advance sustainable outcomes by testing, evaluating, and applying alternative approaches to environmental protection in states, companies, and communities. This work also will seek to improve the organizational cost effectiveness and efficiency for regulatory agencies as well as regulated entities.

Strategic Target:

- By 2011, innovation projects under the State Innovation Grant Program and other piloting mechanisms will achieve, on average, a 7.5 percent or greater improvement in environmental results (such as reductions in air or water discharges, improvements in ambient water or air quality, or improvements in compliance rates), or a 5 percent or greater improvement in cost effectiveness and efficiency. (Each project's achievement will be measured by the results established in selected grantee proposals. Baselines for ambient conditions or pollutant discharges or costs of compliance will be developed at the beginning of each project, and improvements for each project will be measured after full implementation of the innovative practice.)

Means and Strategies for Achieving Objective 5.2

EPA is committed to developing and promoting innovative strategies that achieve better environmental results, reduce costs, and promote environmental stewardship. In collaboration with its state and tribal partners, the Agency will continue to focus its efforts on innovations that will assist small businesses and communities in improving both their environmental and economic performance. EPA relies on partnerships to achieve pollution prevention goals under the Pollution Prevention Act of 1990 that encourages prevention and source reduction as the preferred method of preventing pollutants from release to the environment. In addition, EPA and key stakeholders and partners will work to enhance international awareness and use of pollution prevention measures and environmental stewardship approaches, in particular by focusing on key trading partner countries that also represent major emitters of critical transboundary pollutants.

EPA's Innovations Strategy relies on continued outreach to states, tribes, and businesses to help identify innovative approaches that merit testing, evaluation, and implementation. To provide leadership on the cutting edge of environmental policy, EPA works continually to identify, test, and implement innovative strategies that are effective and efficient. Some innovations relate to policies and programs, such as permitting or the regulation of small sources. Other innovations change the way the Agency does business. For example, EPA utilizes Agency staff expertise in working with state, community, and business leaders to strengthen partnerships that encourage greater reliance on collaboration and meaningful public involvement. EPA advances innovation through a combination of policy analysis, piloting, grants, assessments, information-sharing, and regulatory or policy development. To identify and test new

approaches, the Agency partners extensively with states, tribes, businesses, and others. To bring innovations to full-scale implementation, EPA initiates regulatory change such as more flexible permitting approaches, or promotes adoption of new strategies by states.

Improving Environmental Performance

EPA will advance environmental protection through innovative and collaborative approaches with business and governmental entities that produce measurable environmental results. For example, EPA's National Environmental Performance Track Program is a public-private partnership that encourages continuous environmental improvement through the use of environmental management systems, local community involvement, and measurable environmental results. The objectives of the Performance Track program are to motivate high-performing facilities to measurably reduce their environmental footprint beyond legal requirements and to change the way government regulates these facilities. Performance Track members make commitments among 38 different environmental performance categories. Facilities are urged to target their most significant aspects, yielding environmental accomplishments in their most important areas. Facilities also leverage their commitments to influence improved environmental performance up and down their supply chain. Performance Track establishes new relationships between government and business which is based on recognition, mentoring, sharing knowledge, incentives (including lower inspection priorities), and a sustained pattern of superior performance.

EPA will continue to promote improved environmental performance by high-impact sectors of the U.S. economy with the Sector Strategies Program. At present, the program works with 12 major manufacturing and service sectors, representing 780,000 facilities and over 20 percent of manufacturing gross domestic product (GDP) and environmental releases. Although the program's overall activities are intended to promote environmental stewardship while minimizing regulatory burden, individual sector projects address EPA's specific air, water, land, and ecosystem objectives as well. The program also supports the Administrator's goal to "accelerate the pace of environmental protection" by addressing the 'driver & barrier' factors that affect environmental management decisions throughout each sector. In addition to fostering collaboration and innovation, the program maintains an emphasis on results and accountability by tracking sector-wide trends in pollutant emissions and resource conservation in the *Sector Strategies Performance Report*, which is available to the public at www.epa.gov/sectors/performance.html.

EPA will continue to promote the widespread use of environmental management systems (EMS) both domestically and internationally. EMSs provide organizations of all types with a structured system and approach for managing environmental and regulatory responsibilities to improve overall environmental performance, including areas not subject to regulation such as product design, resource conservation, energy efficiency, and other sustainable practices. Through various partnership programs and its EMS website, the Agency provides information and technical assistance for

organizations implementing EMSs. EPA will also fund research on the effectiveness of EMSs in the private and public sector. Leading by example, EPA has implemented EMSs at 34 of its own facilities to improve environmental management and reduce environmental impact.

EPA also remains committed to identifying and testing new approaches to improving environmental performance by partnering with states, tribes, and industry through the State Innovation Grant Program. EPA will use this grant program to fund projects that promote innovative approaches to permitting and other approaches that improve corporate environmental performance. One example of an innovative program receiving State Innovation Grants is the Environmental Results Program (ERP), an approach first developed by the State of Massachusetts to regulate small sources such as drycleaners and printers more cost-effectively. By requiring each business owner to certify annually compliance with all applicable requirements, providing for random state inspections to provide a statistically reliable picture of performance across the industry, and requiring businesses to submit a plan for returning to compliance if a violation is found, the ERP results in significant performance improvements in sectors that previously had been largely overlooked. Moreover, the resources needed to monitor an entire sector are very small compared to traditional means. State Innovation Grants have been instrumental in expanding the use of this policy innovation. Between 15 and 20 states are now using or exploring the use of ERP to effectively address environmental concerns related to small businesses including sectors such as auto body shops, auto salvage yards, small hazardous waste generators, and gas stations. In another project supported by this grant program, Arizona developed an automated permit application system that reduced the number of permit writers devoted to stormwater permitting statewide from 34 to two, allowing a reallocation of resources to compliance assistance in higher priority areas.

EPA measures and tracks results for the State Innovation Grant program by requiring grantees to include performance measures in project planning, to report regularly on implementation of their projects, and to file a final report on results achieved. Additionally, by 2011, EPA is planning to conduct an evaluation of the State Innovation Grant Program.

Cost Saving Technologies that Prevent Pollution

EPA's Green Chemistry Program² supports research and fosters development and implementation of innovative chemical technologies to prevent pollution in a scientifically sound, cost-effective manner. The Green Suppliers Network is a national EPA program that works with the Department of Commerce's Manufacturing Extension Program and state technical assistance programs to improve the environmental and economic performance of manufacturing suppliers by providing critical information necessary to inform corporate decision making on cost saving opportunities and technologies that eliminate waste and increase energy efficiency. The Presidential Green Chemistry Challenge Award program recognizes superior achievement in the design of chemical products and encourages chemical designers to prevent pollution,

conserve water, and reduce energy use in achieving measurable results. The program has been at the forefront of the global Green Chemistry movement, and through voluntary partnerships with academia, industry, and other government agencies, supports fundamental research in environmentally benign chemistry and provides a variety of educational and international activities.

EPA's Design for the Environment³ (DfE) Industry Partnership Program promotes integration of cleaner, cheaper, and smarter pollution prevention solutions into everyday business practices. DfE encourages the adoption of less polluting practices through technology assessments and outreach that includes a comprehensive comparison of cost, performance, and hazards of baseline and alternative technologies. The program will continue to work with industry sectors to measure results in reducing risks to human health and the environment, improve performance, and save costs associated with existing and alternative pollution prevention technologies or processes.

Waste Minimization

To reduce priority chemicals in wastes going to landfills, EPA focuses on key waste streams and waste generators through a variety of mechanisms, including the National Partnership for Environmental Priorities (NPEP), a part of the Agency's Resource Conservation Challenge (RCC). Through this program, EPA encourages state and local governments, manufacturers, and other nongovernmental organizations to form partnerships to reduce the generation of waste containing any of the 31 priority chemicals. Companies that become NPEP partners are publicly recognized for their contribution to the national reduction goal. As of April 2006, NPEP has enrolled 84 partners, which together have committed to achieve reductions of over 6 million pounds of priority chemical reductions.

EPA will advance environmental protection and protection of children's health through innovative and collaborative approaches with government entities and businesses that produce measurable environmental results. EPA's Schools Chemical Cleanout Campaign aims to decrease the number of injuries and K-12 school days lost due to poor chemical management and chemical spills, which is likely to improve the learning environment in K-12 schools across the nation. EPA will continue to work with other federal agencies, and their state, tribal and local equivalents to facilitate chemical cleanout and prevention of future chemical management problems by providing technical assistance and grant funding.

Preventing Environmental Impacts through NEPA Review

The Agency will prevent significant environmental impacts associated with large federal projects subject to National Environmental Policy Act (NEPA) review⁴. Section 309 of the Clean Air Act requires EPA to review and make public its comments on the environmental impacts of other federal agencies. EPA performs this role in consultation with the White House Council on Environmental Quality. EPA also provides technical assistance to other federal agencies on developing environmental impact statements;

assists them in developing projects to avoid environmental impacts; supports streamlined environmental review processes; participates in rotational assignment programs; participates in interagency work groups; and, provides training and guidance. EPA's own activities that are subject to NEPA requirements include wastewater and drinking water treatment plant construction and facilities constructed under other EPA grants and EPA-issued new-source water discharge permits.

Pollution Prevention Work with Tribal Partners

Tribal environmental and public health issues remain a priority as part of EPA's efforts to apply environmental justice principles in its programs. EPA will focus on the expansion of green technologies on tribal lands, especially for tribal communities' buildings that were constructed decades ago. Currently, EPA is working with the U.S. Department of Housing and Urban Development (HUD) to provide information about green building training for tribes, incorporate green building guidance into tribal housing grants, post green building materials on appropriate websites, and implement advisory group recommendations.

OBJECTIVE 5.3: IMPROVE HUMAN HEALTH AND THE ENVIRONMENT IN INDIAN COUNTRY. Protect human health and the environment on tribal lands by assisting federally-recognized tribes to: build environmental management capacity; assess environmental conditions and measure results; and implement environmental programs in Indian country.

Strategic Targets:

- By 2011, increase the percent of tribes with an environmental program to 67 percent.⁵ (FY 2005 Baseline: 54 percent of 572 tribes.)
- By 2011, increase the percent of tribes implementing federal environmental programs in Indian country to 9 percent. (FY 2005 Baseline: 5 percent of 572 tribes.)
- By 2011, increase the percent of tribes conducting EPA-approved environmental monitoring and assessment activities in Indian country to 26 percent. (FY 2005 Baseline: 20 percent of 572 tribes.)

Means and Strategies for Achieving Objective 5.3

Under federal environmental statutes, the Agency has responsibility for protecting human health and the environment in Indian country. EPA has worked to establish the internal infrastructure and organize its activities in order to meet this responsibility.

Since adopting the EPA Indian Policy in 1984 (which has been reaffirmed by each succeeding Administration), EPA has worked with tribes on a government-to-

government basis that affirms the federal trust responsibility between EPA and each federally recognized tribe. EPA's American Indian Environmental Office leads the Agency-wide effort to ensure environmental protection in Indian country. In 2006, there are 572 federally-recognized tribes as well as intertribal consortia⁶ in 9 EPA Regions. The land base in Indian Country totals over 70 million acres and varies from reservations of less than 10 acres to those of more than 14 million acres.

EPA's strategy for achieving its objectives in Indian country has three major components. First, the Agency will continue to distribute Indian General Assistance Program (GAP) capacity-building grants with the goal of establishing an environmental presence in all 572 federally recognized tribes in the United States. GAP grants help cover the costs of planning, developing, and establishing environmental protection programs and creating this environmental presence for a tribe. In 2005, EPA provided \$62 million in GAP resources which allowed 480 tribes and intertribal consortia to develop an integrated environmental program.

Second, EPA will develop the information technology infrastructure needed to measure environmental conditions in Indian country and related lands and measure the environmental results that accrue from the implementation of environmental programs on those lands. The Agency will provide the data and information necessary for tribes and EPA to meet environmental priorities. The Tribal Program Enterprise Architecture (TPEA) complements the General Assistance Program (GAP) with an information technology infrastructure that organizes environmental data on a tribal basis. The TPEA provides a clear, up-to-date picture of environmental conditions in Indian country on a local level. These data can assist tribes in identifying priorities for assuming regulatory and program management responsibility, primarily through the "Treatment in a manner similar to a State" (TAS) process available under several environmental statutes or through development of a tribal program under tribal law, without seeking EPA approval. We will continue to establish direct links with other federal agencies (including the U.S. Geological Survey, Bureau of Reclamation, and Indian Health Service) to create an integrated, comprehensive, multi-agency Tribal Enterprise Architecture. This interactive system will allow tribes and EPA regional offices to supply information on environmental conditions that supplements data collected by EPA's national tribal systems. As data gaps are identified, EPA will work with our tribal partners to obtain data that will assist environmental managers to more accurately address high risks within Indian Country.

Third, EPA's American Indian Environmental Office will continue to coordinate closely with Agency programs to guide and track the timely and appropriate implementation of those programs directly on Indian lands. In its continuing outreach to tribes, EPA has developed specific tribal strategies in water, air, land, pollution prevention and toxics, and enforcement and compliance. Consultation, collaboration, and direct partnerships with tribes remain a priority for the Agency and are integral to EPA's strategic planning. The Tribal Caucus, which has provided input to the Agency on tribal issues for several years, will serve as the focal point for work under this objective and will help facilitate continued development of EPA-tribal partnerships. The Agency will also engage other EPA-sponsored tribal groups, such as the Tribal Committee of

the Forum on State and Tribal Toxics Action, the Tribal Pesticides Program Council, the Tribal Science Council, the National Tribal Air Association, and the Tribal Water Council (under development).

OBJECTIVE 5.4: ENHANCE SOCIETY'S CAPACITY FOR SUSTAINABILITY THROUGH SCIENCE AND RESEARCH.

Conduct leading-edge, sound scientific research on pollution prevention, new technology development, socioeconomic, sustainable systems, and decision-making tools. By 2011, the products of this research will be independently recognized as providing critical and key evidence in informing Agency policies and decisions and solving problems for the Agency and its partners and stakeholders

Sub-objective 5.4.1: Strengthening Science. The research and educational community, the regulated community and decision and policy makers use Agency research products and services to enhance the scientific and technology base and catalyze innovation of alternative processes, tools, technologies and systems for advanced environmental protection; implement more efficient and sustainable practices, materials and technologies in improved environmental performance; implement improved and scientifically sound management decisions and policies and practices for sustainable resource management.

Sub-objective 5.4.2: Conducting Research. Through 2011, conduct leading-edge, sound scientific research on pollution prevention, new technology development, socioeconomic, sustainable systems, and decision-making tools. The products of this research will provide critical and key evidence in informing Agency policies and decisions affecting the Agency programs in Goal 5, as well EPA partners and stakeholders.

Means and Strategies for Achieving Objective 5.4

Progress toward research goals is assessed through a suite of metrics that is tailored to measuring the impacts of the outcomes of the respective research programs. Among the measurable factors are: independent expert review panel ratings on the extent to which clients utilize EPA research products; composite scores on a client survey designed to gather data on product utility and perceptions of use; and the results of bibliometric and/or client document analyses demonstrating the actual use of EPA research products. These factors are applied to measure success in providing the results identified in the research programs that follow.

Science and Technology for Sustainability

Through intramural and extramural resources, the Science and Technology for Sustainability (STS) research program aims to develop models, tools, and technologies that will give decision makers more options and enable them to make decisions that lead to sustainable outcomes. The concept of stewardship recognizes that our nation's natural resources are the common property of all parts of society. Effective stewards of

the environment will work to enhance environmental protection and achieve sustainable outcomes. This program will produce measurable benefits in the form of:

- an enhanced scientific and technology base to catalyze innovation for advanced environmental protection;
- more efficient and sustainable practices, materials, and technologies with improved environmental performance; and
- improved and scientifically sound management decisions and policies and practices for sustainable resource management.

More fundamental research to enhance basic sustainability knowledge and catalyze environmental stewardship includes Life Cycle Assessment and Material Flow Analysis methodological development; theoretical modeling of sustainable systems; development of new science-based sustainability metrics and indicators; and the People, Prosperity, and the Planet Student Design Competition program.

The regulated community receives support as they seek to implement more efficient, sustainable, and protective practices, materials, and technologies that result in improved environmental stewardship, using the underlying methodologies described above. Additional research, often with industrial partners, is focused on new industrial methods, alternative chemicals and industrial practices, including decision support tools for bench chemists to evaluate the environmental dimensions of new chemicals and production pathways. The Environmental Technology Verification (ETV) Program has been expanded to include a sustainability-focused effort, the Environmentally Sustainable Technologies Evaluation Program. Quality-controlled test protocols are being developed to help verify the capabilities of new technologies.

A Sustainable Environmental Systems research program was established that draws on economics, ecology, law, and engineering in seeking systems-based solutions to regional environmental problems. Two new applied and educational extramural programs have been introduced--the People, Prosperity, and the Planet Student Design Competition for Sustainability, and the Collaborative Science and Technology Network for Sustainability.

Economics and Decision Sciences

The Economics and Decision Sciences (EDS) program within ORD is an extramural program, based primarily on needs identified in the Environmental Economics Research Strategy (EERS). EDS research helps identify innovative, cost-effective policy approaches to address environmental challenges and provides necessary methods and data for economics analysis of policy effectiveness, leading to better decision-making. The EDS program is coordinated closely with economists doing related work in ORD and with our research partners in EPA's National Center for Environmental Economics, who conduct most of the Agency's internal economics

research. Because of the breadth of the need for better economic analyses, the EDS program has clients in virtually every EPA headquarters office, as well as many Regions. Other federal, state, and local government officials, as well as private organizations, also use the results of EDS research.

This program will produce measurable benefits in the form of:

- reduced uncertainties and potential biases associated with benefit transfer methods with estimated values from original studies for ecological and human health benefits analysis;
- improved understanding of decision-making with respect to compliance behavior and environmental performance in response to interventions, including government enforcement, information disclosure, voluntary initiatives, and similar programs; and
- identification of regulated entities' responses to market mechanisms and incentives, and investigation of how market-based programs can be designed to improve environmental quality at the lowest cost.

The EERS envisions a dual strategy for achieving improved benefit valuation—development of benefit transfer methods and development of original benefit estimates followed by switching to original valuation estimates.

With its emphasis on analyzing and developing programs to change the behavior of individuals and organizations, this research will inform EPA's stewardship initiatives, identifying the most effective means of providing information that leads to desired changes in behavior.

Research will also focus on the use of trading programs for new pollutants, media, and geographical areas. This research area will include investigation of the environmental justice implications of trading programs because of the concern about “hotspots” in trading programs.

HUMAN CAPITAL

EPA relies on a core set of competencies to assist the regulated community in complying with environmental laws and regulations; a comprehensive knowledge of applicable requirements; sector-specific information about business and industrial processes; an understanding of best practices; and, an ability to assess a specific situation and readily determine how best to advise those regulated entities seeking help and guidance. The Agency is also seeking to enhance the abilities of its personnel to interact and assist those it regulates. For example, the Agency expects to focus its efforts on attracting applicants who are also skilled facilitators and communicators and on encouraging rotational opportunities at the state and local levels for current employees to broaden their perspectives and thereby enhance collaborative

relationships between Agency staff and the regulated community. The changing and increasingly complex array of environmental challenges presents a rich opportunity for our work with state partners and others in the regulated community to address problems of both a local and regional nature. We recognize that a broad spectrum of regulatory and stewardship approaches will be necessary. A highly-skilled, well-informed EPA workforce with a large capacity for collaborative, results-oriented work and the organizational systems to support it will be the key to our future success.

EPA employees engaged in developing or implementing compliance incentives also possess a body of core competencies that helps them in fashioning incentives or guiding the regulated community in proactively addressing environmental problems. EPA attorney/advisors, engineers, and environmental protection specialists, among others, all contribute in reviewing submitted materials, assessing compliance, and crafting the Agency's response, including fines or penalties. EPA personnel involved in compliance monitoring and enforcement similarly have their own core set of competencies as they endeavor to carry out their respective responsibilities which include inspections, civil and criminal investigations, and administrative and judicial enforcement.

PERFORMANCE MEASUREMENT

The compliance program established annual performance goals and measures to facilitate tracking progress toward the compliance objective. For each compliance program sub-objective, there is a matching annual performance goal, which in turn, is supported by a set of performance measures. This parallel structure enables annual progress toward *Strategic Plan* goals to be easily tracked.

Influence of PART Measures on the Strategic Plan

EPA's strategy for maximizing protection of human health and the environment through improved compliance focuses on compliance assurance activities that will lead to reductions of pollutants entering the environment, pollutants being treated, or pollutants eliminated from the environment. EPA's compliance objective tracks the pounds of pollution estimated to be reduced, treated, or eliminated, which is also a performance measure included in the Program Assessment Rating Tool (PART) assessment for the compliance program. The four major compliance assurance tools -- assistance, incentives, monitoring, and enforcement -- are used in an integrated fashion to address noncompliance problems and contribute to the achievement of their respective compliance sub-objectives and the compliance objective. In addition, EPA has incorporated the PART long-term, outcome-oriented measures for the Agency's tribal General Assistance Program (GAP) grants into the *Strategic Plan*.

Future Improvements to Performance Measurement

EPA is working to supplement the pollutant reduction outcome measure for its compliance program with information that characterizes the hazard and potential

exposure of the public to the pollutants. The compliance program is using air pollution models to estimate the human health benefits of reductions in air pollutants. As a result, in FY 2005, the compliance assurance program reported that the ten biggest air pollution cases produced annual human health benefits valued at over \$4.6 billion dollars, due to annual pollutant reductions of more than 620 million pounds. The compliance program continues to work with the air program to further expand the types of information on human health benefits that can be reported for air pollution cases, and is exploring opportunities to report similar information for cases involving other media.

In order to more accurately characterize the state of compliance for particular sectors and regulations, the compliance program began piloting the use of statistically-valid compliance rates in 2000. Though development of pilot rates has proven to be resource intensive, the program is continuing to work to identify more efficient ways to develop statistically-valid compliance rates so their use can be expanded. While continuing to explore opportunities to expand the use of statistically-valid compliance rates generally, the program is focusing on developing compliance rates for national priority areas.

EPA's compliance program is also working to develop a set of nationally consistent environmental justice indicators (i.e., health, environmental, compliance, and demographics) to identify and place an emphasis on activities in potential disproportionately and adversely affected areas ("areas with potential environmental justice concerns"). This effort is designed to better protect all communities, including minority and/or low-income communities. It will help the Agency report on the impact that the compliance program has had in areas with potential environmental justice concerns and on the minority and/or low-income populations living in these areas. Experience gained from use of these indicators will be used to develop specific environmental justice measures, and to develop environmental justice targets for compliance assurance activities.

EPA is committed to continual assessment of performance, and the development of the most meaningful performance measures. The pollution prevention programs have collaborated with states and tribes in developing improved performance measures. Through the PART process, the pollution prevention programs continue their extensive review of performance measures to make them more outcome oriented.

CLOSING THE FEEDBACK LOOP: RESULTS OF PERFORMANCE ASSESSMENTS AND PROGRAM EVALUATIONS

EPA met its original priority chemical reduction goal in 2003 (2 years earlier than anticipated) and has continued to achieve additional reductions while re-setting the goal for the 2006–2011 *Strategic Plan*. The successes of the early years of the program are not proving easily sustainable, as the "low hanging fruit" of waste minimization opportunities appears to have been reaped. Future reductions will be more difficult and require a revised targeting approach. EPA is working with states to develop a sector

targeting approach that will allow for more direct technology transfer between facilities involved in similar industrial processes.

The Harvard Regulatory Policy Program evaluated several aspects of the Performance Track program including the differences among facilities applying for the program, the characteristics of facilities motivating them to apply, and the differences in environmental performance between members and non-members. The evaluation has reinforced the importance of EPA recognition as an incentive for environmental improvements. The Performance Track program will take steps toward increasing recognition and branding associated with the program. It has also led the Agency to refocus recruiting efforts at the corporate level while identifying firms that are taking positions of environmental leadership. The study also stressed the importance of low transaction costs as a way of encouraging participation in innovative programs. The study has confirmed, based on several indicators of environmental performance, that EPA has been successful in identifying the better-performing firms in the selection process for Performance Track.

The Enforcement and Compliance program has undergone three PART assessments since FY 2003: civil enforcement (2003), criminal enforcement (2004), and pesticides grants (2005). The nature and scope of the recommendations made by OMB as a result of each PART assessment have been focused on individual program areas and have been limited to certain aspects of OECA's program management. For example, OECA continues to work to improve and refine outcome measurement and to strategically expand the use of statistically-valid compliance rates. These activities are directly related to PART follow-up actions.

Emerging Issues and External Factors

The rapid technology change of today's economy presents unique opportunities and challenges. By 2011, significant scientific advances can be expected in the areas of nanotechnology, genomic research, computational toxicology, computer sciences, and the cognitive and behavioral sciences. The development and application of emerging nanotechnologies, biotechnologies, and sensor technologies could significantly enhance EPA's ability to protect human health and the environment. Progress in these frontier areas will also directly affect future direction of EPA's research programs. EPA's Science and Technology for the Sustainability framework emphasizes these research areas to support a forward-looking, integrated, and preventive approach to environmental protection.

Advances in measurement technology could have significant impacts on EPA programs. As more sensitive technology to detect and measure emissions is installed in facilities, emissions reporting could become more accurate and emission rates could be found to be either higher or lower than previously reported

Distributed sensor network technologies, remote sensing, and hyper spectral imaging are developing rapidly and have the potential to support compliance monitoring

by increasing the frequency and speed of data collection and transmission, improving data quality, enabling data integration, and facilitating data access and data sharing. Sensors could facilitate the acquisition and use of empirical data and facilitate the tracking and analysis of the flow of materials and elements throughout the industrial cycle.

Emerging applications of nanotechnology could present new opportunities for pollution prevention and environmental stewardship (see <http://www.epa.gov/osa/nanotech.htm>). Nanotechnology applications have potential for reductions in energy demand, development of cleaner energy and improvements in manufacturing process efficiency leading to reduced material use and waste generation. Pollution prevention programs can provide a forum for industry and academia to exchange information on the environmental effects and benefits of innovative nanomaterials, and enable more environmentally responsible manufacturing processes and product design. A growing number of institutional players are picking up the call for policymakers to study nanotechnology and develop policy responses.

At the same time, these emerging technologies may present novel risks. Anticipating these risks and developing tools for their identification will be important as these technologies are developed and enter the marketplace.

¹ Complying actions are actions taken by a facility to address deficiencies, which are potential violations, identified during on-site inspections and evaluations. Examples of a complying action include correcting record keeping deficiencies, requesting a permit application, improving pollutant identification (labeling, manifesting, etc.), improving management practices (storage, training, etc.) or reducing pollution through use reduction, industrial process change, or emissions or discharge change.

² U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. Green Chemistry Web Site, [Hhttp://www.epa.gov/greenchemistry.H](http://www.epa.gov/greenchemistry.H) Washington, DC. Accessed September 9, 2006.

³ U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics. Design for the Environment Web Site: [Hhttp://www.epa.gov/dfe.H](http://www.epa.gov/dfe.H) Washington, DC. Accessed September 9, 2006.

⁴ U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance. National Environmental Policy Act Web Site: [HHhttp://www.epa.gov/compliance/basics/nepa.html#requirementH.H](http://www.epa.gov/compliance/basics/nepa.html#requirementH.H) Washington, DC. Accessed September 9, 2006.

⁵ A tribe is counted as having an environmental program for the purposes of this measure if the tribal government has taken at least one of the following actions, in combination with having "an organizational structure which includes EPA-funded environmental office or coordinator that has been staffed in the most recent year":

- A) Complete a Tier III TEA, as evidenced by a document signed by the tribal government and EPA.
- B) Establish environmental laws, codes, regulations, ordinances, resolutions, policies, or other compulsory environmental compliance program, as evidenced by a document signed by the tribal government.
- C) Complete solid and/or hazardous waste implementation activities.
- D) Complete an inter-governmental environmental agreement (e.g. state-tribe MOA, federal-tribe MOA, etc).

EPA is seeking comment on other areas that would be considered evidence of the implementation of an environmental program. Proposed additional actions may include:

- E) Approve a tribal environmental plan which includes an assessment of the reservation environment, establishes a plan of action to address environmental concerns, and sets goals for public health and environmental outcomes. This plan must be approved by the tribal government;
- F) Tribal environmental programs funded entirely by tribal governments, for which EPA provided substantial technical assistance to the tribe in program development.

⁶ Intertribal consortia are groups of federally-recognized Tribes that meet the criteria for EPA purposes, that join to work together.

RESULTS AND ACCOUNTABILITY

EPA is committed not only to being a good steward of the environment, but being a good steward of the public's tax dollars as well. To meet this commitment, the Agency must operate as efficiently and effectively as possible in delivering results to the American people. The President's Management Agenda (PMA), first issued in August 2001, proposed three basic principles for management reform: government should be citizen-centered, results-oriented, and market-based.¹ The President's Management Agenda originally set forth five government-wide initiatives to address these principles: (1) strategic management of human capital; (2) competitive sourcing; (3) expanded electronic government; (4) improved financial performance; and (5) budget and performance integration. EPA participates in two additional initiatives: elimination of improper payments, and research and development investment criteria. This cross-goal strategy for results and accountability will address the initiatives that now comprise the PMA (with the exception of research and development investment criteria, which will be discussed in the Best Available Science Cross-Goal Strategy). Before turning to the PMA initiatives, this section will address two other key efforts to improve the effectiveness and efficiency of Agency programs: assessing the state of the environment and measuring progress, and making information more accessible.

Assessing the State of the Environment and Measuring Progress

High-quality data are essential for the Agency to describe to the American public the results we are trying to achieve, measure accomplishments, and hold managers accountable for achieving results. EPA is committed to developing and using a suite of scientifically sound environmental indicators to track trends in environmental conditions and environmentally influenced human health. Specifically, the Agency seeks to develop a set of measures that can help us track relevant environmental conditions over time and eventually track conditions at various geographic scales.

Environmental indicator information is critical to the Agency's strategic planning, helping us establish meaningful goals and objectives, develop strategies, review our performance, and adjust policies and approaches as necessary. Information on trends in environmental conditions and human health also assists us in understanding key environmental concerns; emerging issues; and the impact of federal, state, local, tribal, and private efforts to improve environmental quality.

This information is compiled in EPA's *Report on the Environment (ROE)*, where it provides a snapshot of current environmental conditions and a baseline against which we can measure and track environmental trends. In 2003, we presented this information in our first *Draft Report on the Environment*. This endeavor will continue through the development of our next *Report on the Environment*, scheduled for release in 2007.

The Agency's work on environmental indicators—through the *Report on the Environment*—is critical to our more comprehensive effort to identify priorities, focus

resources on areas of greatest concern, manage our work effectively to achieve measurable results, and report regularly on our progress to the American public. The latest set of indicators was specifically used to inform the development of this *Strategic Plan's* architecture of goals, objectives, sub-objectives, and associated strategic targets, which articulate the measurable environmental results we are trying to achieve. We also used information from the indicators effort to identify critical data needs for future strategic planning efforts.

Making Information More Accessible

EPA's work to protect human health and the environment entails thousands of decisions every year, and each of those decisions is based on information. EPA and its partners, states, tribes, local governments, and the private sector need accurate, timely, and useful information for environmental decision making. EPA uses specific strategies to make sure the information is ready and available when it is needed.

EPA's information systems ensure that environmental information is available, secure, analyzed, and validated. Among our many achievements, EPA has created a computer network connecting all employees and contractors with all 50 states and approximately 10 tribes to readily share environmental information. To save EPA money and make it easier for employees to share their work with others, we also standardized the computer systems used throughout the Agency. In addition, EPA has implemented standards so data can be collected once and then used by many parties, without costly reformatting or duplicative collection. Other streamlining efforts have included centralizing the Internet servers, so EPA presents itself to the world as a single organization rather than as a collection of offices, centralizing the use of electronic document storage while eliminating a variety of existing incompatible systems, and centralizing information security to ensure that appropriate safeguards are applied to all of EPA's information resources.

EPA is working to identify the ongoing information technology and information management challenges we face. EPA's goal is to address those challenges in ways that maximize the value to both the Agency and its partners while minimizing overall costs. EPA is focusing its information technology and information management efforts in four major areas:

- 1) **Analytical Capacity:** EPA is converting raw environmental data into information that can be used easily by decision makers. A key example is our geospatial work to convert millions of pieces of data into maps that visually illustrate how data relate to each other and the world in which we live.
- 2) **Governance:** EPA is taking the steps necessary to ensure that data are of appropriate quality and design when collected so that many can use them and is minimizing system overlaps to avoid conflicts and reduce costs.

- 3) **Excellence in Information Service Delivery:** EPA is keeping pace with technology to streamline management and data processes, and linking data partners to make information more accessible to all.
- 4) **Innovation in Information Management:** EPA is using electronic government (e-Gov) efforts to convert paper-based administrative or regulatory processes into electronic systems to improve transparency and accessibility and reduce paper waste.

In short, EPA's information strategy is to make sure that both Agency employees and our many external partners can get the information they need—when they need it—to make sound environmental decisions.

Integrating Budget and Performance Information

EPA was one of the first federal agencies to link its strategic and annual planning structure with its budget structure. The Budget and Performance Integration (BPI) initiative of the President's Management Agenda at EPA builds on this initial momentum to align the management of financial and human resources with the effective delivery of environmental results. BPI is a key component of EPA's quest for better performance, more informed decision making, increased accountability for results, and more transparent, comprehensive reporting of environmental results to the public.

EPA strives for consistent, effective performance across all programmatic areas to meet our environmental goals. EPA program managers and staff develop meaningful long-term program performance measures that link to the Agency's *Strategic Plan* and establish reasonable expectations for future environmental outcomes. EPA program managers also craft annual performance and efficiency measures, all of which must meet the Office of Management and Budget's (OMB's) Program Assessment Rating Tool (PART) requirements. PART is a diagnostic tool that focuses on program purpose and design, strategic planning, program management, and program results and accountability. Based on this defined set of program performance and efficiency measures, the Agency collects and analyzes performance information to assess program performance over time and evaluate the effectiveness of approaches for addressing environmental problems. The Agency can then adjust program implementation based on the results of these evaluations.

Through this mechanism, the Agency determines the most efficient and effective means to deliver environmental results. PART and other performance analyses inform our decision-making processes and help both EPA employees and our environmental partners to be more accountable for the delivery of environmental results. In this way, EPA's efforts to strengthen budget and performance integration help facilitate overall transparency and cultivate credibility in conveying environmental results to the public.

Successful achievement of EPA's mission requires the commitment and cooperation of both EPA's employees and its environmental partners. To foster

increased accountability among all environmental partners, the Agency is incorporating, as appropriate, programmatic performance measures into Agency contracts, grants, and memoranda of understanding. Additionally, EPA is incorporating programmatic performance measures into EPA managers' performance agreements to demonstrate the connection between employees' contributions and the delivery of environmental results. Linking EPA's mission, goals, and expected environmental outcomes to employee and partner performance will help increase understanding and commitment to achieving improved environmental outcomes.

Improving Financial Performance and Eliminating Improper Payments

EPA is recognized as a leader in the federal government for improving financial management. Our record of accomplishments includes consecutive clean audit opinions on annual financial statements since FY 2001, effective internal controls to prevent erroneous payments, and resolution of all outstanding material weaknesses under the Federal Manager's Financial Integrity Act.ⁱⁱ Equally important to EPA's financial performance is the Agency's financial management system, which provides integrated, timely, and reliable financial and performance data to program managers, who use it to support day-to-day decision making.

EPA has undertaken a multi-office data integration effort based on the use of financial information to improve program efficiency and ensure sound financial management. Given the magnitude and complexity of EPA's mission, the Agency is focusing on financial information related to one business process at a time. In FY 2005, grants management was chosen as the first area for review. EPA has made progress to link grants management and financial data, producing better information that shows the relationship between projects funded by grants and EPA's environmental objectives. EPA recently selected emergency management as the next area for review. In future efforts, the Agency will undertake similar analyses of other key risk areas, such as debt management and contracts management.

Another important aspect of financial performance is the elimination of improper payments, which involves identifying, preventing, and eliminating erroneous payments and documents that the government is using tax dollars for their intended purpose. Although EPA's improper payments are minimal, the Agency proposed to reduce the error rate for improper payments even further. EPA's error rate in the Drinking Water and Clean Water State Revolving Funds, two of the Agency's largest sources of grant funding, was 0.51 percent, or \$10.3 million, in FY 2004, and we reduced it to 0.16 percent, or \$3.1 million, by the end of FY 2005. EPA continues to strive to uphold high standards of integrity for financial performance.

Effectively Meeting Human Capital Needs of the Future

Protecting human health and the environment requires a diverse, highly skilled, and motivated workforce that seeks creative solutions to environmental problems and is committed to achieving excellence. The Agency's Human Capital Strategy focuses on ensuring that our workforce is high-performing, results-oriented, aligned with strategic goals and objectives, and accountable for delivering environmental results. Human capital planning includes identifying the skills required to do the future work of the Agency, attracting and retaining diverse talent, providing continuous organizational learning, developing leadership professionals, and ensuring adequate succession planning.

The Agency relies not only upon the capabilities of its workforce, but also on our external partners to achieve demonstrable results. EPA is relying increasingly on partnerships and collaborative endeavors to ensure mission accomplishment. Strategic human capital planning at EPA takes into consideration relationships with partners such as other federal agencies, state and local governments, tribes, grantees, contractors, and other stakeholders to ensure that available expertise is brought to bear in achieving Agency goals.

Over the next 5 years, EPA faces greater human capital challenges due to the anticipated dramatic increase in "baby boomer" retirements across both the public and private sectors. The Agency will explore a variety of means to attract and retain the right people in the right jobs over both the short term and long term, including elevation of the Agency's profile as an employer of choice, use of retention incentives, and increased emphasis on intern and career development programs.

Increasing Efficiency through Competitive Sourcing

Competitive sourcing is another key element of the Agency's effort to maximize delivery of environmental results and ensure accountability. Competitive sourcing is the process of using competition to determine whether federal employees or the private sector can more efficiently and effectively perform work that is not inherently governmental in nature. Through this competitive process, EPA determines the optimal mix of federal employees and contractor personnel to maximize results for the investment while also ensuring the highest quality of service.

EPA's competitive sourcing program aligns Agency business needs with its Human Capital Strategy and uses Agency planning processes to inform decisions that identify activities for competition and reinvestment. Competitive sourcing drives innovation and efficiency in selected areas, thereby allowing the resulting savings to be reinvested in high-priority activities. EPA is improving the cost-effectiveness of environmental programs by determining who can most efficiently and effectively perform work—Agency employees or private sector contractors.

EPA has already used competitive sourcing to gain efficiencies in the delivery of its financial and certain information technology services; as a result, savings of over \$10 million are expected to be available for reinvestment during the next 5 years. Additional information technology services and administrative support services are planned for competitive sourcing competitions over the next 3 years, and are anticipated to result in 15-25 percent savings for the Agency.

Increasing Efficiency through E-Gov Opportunities

Through its Electronic Government (E-Gov) initiatives, EPA is pursuing a number of opportunities to leverage electronic tools and capabilities to improve overall performance and accountability. Whether it is improving electronic processing and streamlining flows of the Toxics Release Inventory (TRI) data or developing a new generation of geospatial tools with which decision makers can analyze environmental data, EPA's E-Gov efforts enable data to be more current and accessible to Agency managers and stakeholders. For example, the expanded use of EPA's Central Data Exchange facilitates sharing of environmental data among our state and tribal partners and promotes greater citizen involvement in the federal rulemaking process through an easy-to-use public comment vehicle.

EPA is actively participating in 18 of the 25 E-Gov initiatives included in the President's Management Agenda. On behalf of the federal government, EPA is spearheading one particular E-Gov initiative, known as E-Rulemaking, by coordinating the efforts of nine other agencies as the "managing partner." E-Rulemaking encompasses the complete rulemaking process, from regulation development to public participation with continual access. The core of this initiative is to redesign the rulemaking process to achieve highly accessible, Web-based implementation. Using the Internet, interested parties can observe and participate in the rulemaking process. Formerly a paper-based process, E-Rulemaking now offers one-stop access and user services such as text and document search capabilities and electronic submission of public comments. With the EPA system as a template, the project will improve existing "E-DOCKET" systems and will supplant duplicative systems at multiple federal agencies.

EPA's leadership in E-Gov is accelerating the Agency's efforts to achieve real environmental results by simplifying and unifying common work processes across federal agencies and within EPA. E-Gov initiatives provide individual customers with one-stop access to services and transactions, reduce duplicative information collection, and enable on-line data and information transparency and timeliness. EPA will continue to build on these successes by applying new principles and methods to achieve better results, improve customer service, and provide greater savings to the American people.

i.U.S. Office of Management and Budget. 2002. *The President's Management Agenda: FY 2002*. Washington, DC: U.S. Government Printing Office. Available online at: <http://www.whitehouse.gov/omb/budget/fy2002/mgmt.pdf>; Executive Office of the President, OMB Web Site. Date of Access: September 15, 2003.

ii. Available online at: <http://www.epa.gov/ocfo/integrity/integrity.htm>.

INNOVATION AND COLLABORATION

EPA's ability to make progress over the next several years will depend greatly on our ability and commitment to find more effective tools and approaches to meet the complexity of today's environmental challenges. We face broad-based problems, such as polluted runoff, global climate change, and loss of habitat and biodiversity, which are often the result of many diffuse causes and cannot be solved fully with conventional regulatory controls. We also see rapid technological and scientific advances that can bring breakthrough solutions as well as unknown or unexpected environmental and public health risks.

As EPA looks ahead, the complexity of the challenges we face and the reality of a tightening federal budget underscore the importance of the two major components of this cross-goal strategy--finding innovative solutions and collaborating with others. Our task in the coming years is to work even more effectively with organizations engaged on environmental issues, leveraging limited resources and coordinating complementary authorities and capabilities. We also must engage with other government agencies, businesses, communities, and individuals who might not ordinarily focus on environmental matters, yet have distinctive expertise, perspectives, and resources to bring to bear on environmental problem-solving.

To make the greatest progress, we will promote an ethic of environmental stewardship that engages all parts of society in taking responsibility for environmental quality and achieving sustainable results. In 2005, Administrator Johnson endorsed a forward-looking strategy to harness the growing interest in environmental stewardship by businesses, companies, communities, and individuals. This strategy is based on the premise that government cannot meet environmental challenges alone. Rather we need all parts of society to understand how environmental protection aligns with broader social and economic interests and to engage with us in actively creating a sustainable future.

Innovating to Improve Environmental Results

The first major component of this cross-goal strategy—innovation—is a key element to environmental progress. Innovation involves developing new ideas, testing their effectiveness, and then determining useful applications. It also involves examination of how proven approaches can be made even more effective or adapted to address other needs.

EPA's innovation strategy has four elements which will help drive progress under EPA's *Strategic Plan*, as described below.

Promoting State and Tribal Innovation: Because states and tribes are on the frontlines of environmental protection, they are in the best position to recognize problems and to craft innovative solutions. EPA is therefore committed to supporting innovation in state and tribal programs.

EPA's support for state innovation programs takes many forms, including state participation in EPA's Innovation Action Council. Through this senior-level policy forum, states and EPA develop a joint innovation work plan that focuses attention on priority issues. Examples include finding innovative approaches to program management challenges, such as the development of total maximum daily loads for impaired water bodies and state use of alternative approaches to hazardous waste management under the Resource Conservation and Recovery Act.

Another vehicle for supporting state innovation is the State Innovation Grant program. Since 2003, this competitive funding program has provided targeted assistance to help states explore innovative approaches in three areas that are of mutual interest to states and EPA—environmental permitting, environmental management systems, and performance-based leadership programs. For example, these funds have been instrumental in helping states adapt an innovative approach to permitting first developed in Massachusetts. Today, 15 states are developing or applying the Environmental Results Program, as it is known, to improve environmental performance in small business sectors, such as dry cleaning and printing.

Similarly, the Agency's Innovative Funding Workgroup, supported through the Agency's Indian Program Policy Council, is developing options for the strategic and innovative use of funding, resources, and other opportunities to support tribes to more directly effect environmental change. The workgroup seeks to gain a common understanding of the various mechanisms that are or could be used by EPA and other agencies to enhance coordination and environmental protection in Indian country.

Focusing on Priority Problems: While innovation is essential for environmental progress generally, EPA's innovation strategy targets a set of priority problems that are national in scope and where innovation is needed to ensure progress: reducing greenhouse gases and ozone, restoring water quality, and addressing water infrastructure. EPA's innovation strategy commits the Agency to exploring all potential avenues to address these diverse issues—regulations, policy, guidance, voluntary initiatives, and compliance assistance. By exploring these and other options, we can create a more diverse portfolio of solutions for these and other problems in the future.

Developing Problem-Solving Tools and Approaches: EPA needs new environmental protection tools and approaches that not only solve existing environmental problems, but also prevent the emergence of new problems. The future system of environmental protection must include many more options for addressing environmental challenges. It will rely less on technology requirements and more on tailored strategies that address the needs of whole facilities, communities, or industry sectors. The system also must place greater emphasis on pollution prevention and natural resource conservation. EPA's innovation strategy, for example, calls for improving the use and deployment of information resources and supporting environmental technology innovation. It also calls for increasing the use of incentives,

encouraging the use of environmental management systems, and developing results-oriented performance goals and measures.

Creating a Culture and Organizational Systems to Foster Innovation: The fourth element of EPA's innovation strategy is designed to foster innovation through changes to EPA's organizational culture and management systems. It recognizes the need for improvements to planning, budgeting, and accountability processes and for investing in our human capital. It also calls for greater attention to futures planning to ensure that EPA and its partners are aware of and ready to respond to new trends and opportunities that can affect environmental quality.

A Strategic Approach for Reducing the Growing Electronics Waste Stream

With the increasing reliance on electronics, how can the United States best address the burgeoning problem of electronic waste? Part of the solution is supporting the market for environmentally-preferable electronic products. That is the goal of the Federal Electronics Challenge, an EPA partnership program that is designed to prevent pollution from the electronics waste stream by leveraging the \$65 billion spent annually in the U.S. on electronic equipment and services. Under this challenge, government agencies commit to making electronic purchases that meet certain environmental criteria, such as reduced use of toxic substances, virgin materials, and energy, thereby harnessing their considerable buying power to ensure that these greener goods are available for many other purchasers as well.

Collaborating on Common Goals

The second major component of this cross-goal strategy—collaboration—is critical to addressing today's more complex and often controversial issues by breaking through institutional and other barriers to achieve more comprehensive results than EPA could by working alone. The Agency has a long history of working successfully with others on environmental problems, producing some of our most significant achievements. Collaborative approaches can produce more effective and durable decisions, because they generate a shared sense of ownership among stakeholders expected to implement them. Collaboration on data gathering and analysis boosts the potential for agreement and can transform our understanding of environmental problems.

The Agency will continue to enhance our capacity to collaborate with others, and will stress increased "collaboration competency" for managers and staff so they know when and how to engage productively with others. Further, we are working to identify new opportunities for greater stakeholder involvement, expanding the availability of internal and external collaborative process experts to help facilitate complex decision making, and implementing a linked set of initiatives with other federal agencies to strengthen our collective ability to work together with the public.

With States

The unique relationship between EPA and states is a cornerstone of the nation's environmental protection system. Together, EPA and the states have brought about

significant improvements in environmental quality and public health. Delegated state programs conduct much of the day-to-day work involved in environmental programs—including issuing permits, conducting compliance and enforcement activities, and monitoring environmental conditions—and EPA oversees these activities.

In addition to its partnerships with individual state environmental, public health, and agriculture agencies, EPA also works at the national level with a variety of associations representing state governments. These organizations provide the state perspective that EPA needs to help shape its policies and programs. EPA has worked closely with the National Governors Association, National Council of State Legislatures, and the Environmental Council of the States (ECOS), as well as groups representing managers of specific environmental media programs, such as the Association of State and Interstate Water Pollution Control Administrators.

In 1995, EPA and state officials agreed to create the National Environmental Performance Partnership System (NEPPS), the foundation for our work with states. Through this system of performance-based partnerships, EPA and states are setting environmental priorities and program strategies together, making improvements in how we measure performance, implementing innovative solutions to environmental problems, and enhancing how we collect and manage information. A critical aspect of this continuing work is finding ways to maximize flexibility so that states can address their own priority needs while ensuring accountability for results.

Collaborating with States on Environmental Data

One of the best examples of state and EPA collaboration is the National Environmental Information Exchange Network. Designed to help states and EPA share information more efficiently and effectively over the Internet, this system provides real-time access to higher quality data while saving agencies time and money previously spent on paper-based data entry and reporting. Since 2002, EPA has provided over \$80 million in grants to help states, as well as tribes and territories, develop this Web-based system. The results are revolutionizing the exchange of environmental data. Several states are now using the Exchange Network to allow industries to submit their water discharge monitoring reports electronically. Others are using it to provide the public with timely beach closure and advisory information.

With Tribes

EPA's work with tribes is based on the recognition that tribes have unique cultural, jurisdictional, and legal issues that must be considered when coordinating and implementing environmental programs in Indian country. One of their cultural distinctions is a longstanding commitment to environmental stewardship. Native Americans recognize the importance of not just protecting the environment, but of pursuing a longer-term goal of sustainability—a perspective that has much to offer as EPA pursues stewardship efforts.

Our approach with tribes is to work with each one on a government-to-government basis. The Agency's 1984 Indian Policy formally recognizes the

uniqueness of tribes and their rights as sovereign governments. In keeping with that policy, EPA will pursue innovative and coordinated programs that complement tribal government structures and incorporate tribal priorities to protect human health and the environment in Indian country.

As part of the National Tribal Operations Committee, the EPA Administrator, Deputy Administrator, and other senior Agency officials work with 19 elected or appointed tribal leaders, who comprise the National Tribal Caucus, to address environmental and human health issues in Indian country. EPA's nine regions with federal Indian tribes have similar working relationships or mechanisms in place for this purpose. EPA also works directly with individual Indian tribes.

With Local Governments

Local governments understand how environmental quality affects their communities, and they are uniquely positioned to collaborate with EPA, other public agencies, and the private sector in finding ways to make life better for their citizens. Local governments also have regulatory tools, such as land use planning authorities, building and health codes, and other ordinances that can be used to address problems falling outside federal or state jurisdiction. At the national level, EPA's Local Government Advisory Committee provides advice and recommendations for building state and local capacity to deliver environmental services and programs.

Learning from Local Leaders

As Bartow County, Georgia has shown, strong models of collaborative environmental problem-solving can be found at the local level. A fast-growing area northwest of Atlanta, Bartow County is implementing the first county-wide environmental management system in the nation. Designed to significantly reduce pollution across the county, this program is the result of a partnership that includes six cities, two school districts, the local chamber of commerce, several industry leaders, and the agricultural community. Over the past several years, the county has conducted a baseline audit of environmental performance and has developed environmental management resources, such as a Web site database for tracking air emissions, waste minimization, and water quality, and an air quality "tool box" for local officials. Air emissions have already been reduced by 25 percent. Based on the results, this program is gaining attention at all levels of government. For example, it was among the models showcased at the 2005 White House Conference on Cooperative Conservation.

With Other Federal Agencies

A 2004 Executive Order of the President on Cooperative Conservation put new emphasis on the need for collaboration on environmental problem-solving by calling for expanded cooperation among federal agencies with environmental and natural resource responsibilities. EPA will continue to be an active partner in Cooperative Conservation and will seek opportunities for further coordination with our federal partners.

One especially important component of Cooperative Conservation is a competency-based approach to developing collaboration and partnering skills in the federal workforce. In 2006, EPA developed a dynamic initial plan, which will be revised

through dialogue with Agency staff and management, to ensure the appropriate inclusion of these skills in the hiring, training, and recognition of EPA employees. By implementing this plan, EPA will enhance the capacity of its workforce to foster collaborative problem-solving and promote attainment of the Agency's environmental and public health objectives.

With Other Countries

As our understanding of environmental issues has increased, so has our understanding of the need to partner with other countries on environmental goals. Recognizing that international cooperation is vital to achieving our mission, EPA has established three strategic priority areas for our international engagement: (1) reduce transboundary pollution; (2) advance U.S. interests abroad; and (3) promote good governance.

Reduce Transboundary Pollution: Air pollution and toxic substances generated in other countries circulate through the atmosphere and can ultimately reach the United States. EPA must therefore address international sources of pollutants to meet many of its domestic environmental protection goals. The majority of all mercury deposited in the U.S., for example, originates from outside of our borders. Due to inadequate wastewater treatment, water-borne disease is greater along the U.S.-Mexico border than in the rest of the United States. Solving these and other problems requires strong collaboration between EPA and its international partners. In many cases, it is more efficient to reduce emissions from foreign sources than from domestic ones.

Advance U.S. Interests Abroad: The shared goal of protecting human health and the environment for future generations can be used to open doors between the United States and foreign governments. Assistance that advances this goal in other countries can be an effective part of a larger U.S. strategy for promoting sustainable development and advancing democratic ideals. EPA supports U.S. diplomatic, trade, and foreign policy goals that extend far beyond EPA's domestic agenda.

Promote Good Environmental Governance: Good environmental governance abroad not only yields a cleaner environment, it helps ensure that U.S. companies and communities compete on an equal footing in the international marketplace. In particular, EPA works with U.S. trading partners to help them promote the effective enforcement of their own environmental laws. Through leadership in the Organization for Economic Cooperation and Development, EPA supports environmental performance reviews of other countries so that good governance best practices—such as providing access to information, collaborating with diverse stakeholders, providing transparency in environmental decision making—are shared, and countries are continually challenged to improve.

BEST AVAILABLE SCIENCE

Effective, proactive environmental protection requires a strong foundation of scientific knowledge. Accordingly, the Environmental Protection Agency (EPA) utilizes the best available scientific theories, data, and models to anticipate potential threats, evaluate risks, identify solutions, and develop standards to meet its mission to protect the environment and safeguard human health. Investments in science at EPA over the past 35 years have yielded a rich dividend in environmental protection.

EPA's science strategy is designed to generate data necessary for understanding and managing risks and to guide research designed to reduce uncertainty in Agency decision making. Agency scientists and engineers, as they help shape scientifically sound and cost-effective solutions to environmental problems consider four dimensions: asking the right questions and assessing Information; science quality; using science correctly; and, measuring success.

Asking the Right Questions and Assessing Scientific Information

EPA works with states and tribes and across public and private sectors, drawing on the best available scientifically informed information to aid Agency decision makers in asking the right questions and in clearly characterizing problems. EPA determines the science necessary to address problems through interaction with other agencies, academia, and the private sector, and after coordinated science planning. Science activities at EPA are conducted through four means that are coordinated and reinforcing, as described below.

The Agency's intramural research program is designed to conduct leading-edge research and to foster the sound use of science and technology. EPA research is critical for improving our understanding of key processes—biological, physical/chemical, social, and others—that underlie and drive environmental systems, and that provide the fundamental scientific basis for understanding, forecasting, and responding to a wide variety of environmental problems. The direction of EPA research is described in research strategies, documented as performance measures in research multi-year plans, and summarized in each of the *Strategic Plan* goals. EPA's multi-year research plans (MYPs) provide a transparent and forward-looking view of the Agency's research agenda by identifying long-term goals in a 5- to 10-year planning window and by annually updating performance goals and associated annual performance measures (<http://www.epa.gov/osp/research.htm>). To ensure the quality of EPA's MYPs, EPA program offices and regions are involved directly with the research planning process. Each MYP undergoes rigorous, independent peer review.

A key science product arising from the intramural research program that is widely used to inform Agency programs is the Integrated Risk Information System (IRIS). The IRIS program maintains an electronic database of information on human health effects that may result from exposure to various chemicals in the environment. It is an important risk assessment tool for EPA's regulatory programs, the states, and industry.

EPA continuously updates older IRIS assessments and adds new assessments. All IRIS assessments are externally peer-reviewed.

Within each of the Agency's program offices there exist scientists and engineers with specialized knowledge relevant to the program's mission. Toxicologists, hydrologists, and ecologists are typical of the specialized personnel employed by EPA to understand and apply best available science to the implementation of programs. Examples of their work include: identifying appropriate criteria for water quality assessment; setting air pollutant standards that are protective of human health; understanding fate and transport of pollutants in soil and groundwater; and, understanding the complex interaction of ecosystem responses to stress.

EPA's regional offices rely on scientific expertise in much the same way as do the Agency's program offices. The regions maintain the National Regional Science Council (NRSC) with representation from each of the 10 Regional Science Councils. The NRSC functions to strengthen science in the regions by: developing informational products; sponsoring conferences, workshops, and training; fostering collaborative efforts; and, identifying common regional needs. Details can be found in the Regional Science Portal at <http://intranet.epa.gov/ospintra/scienceportal/>. The Tribal Science Council (TSC) is another important forum that encourages key stakeholders to work collaboratively with EPA on environmental scientific issues, including research, monitoring, modeling, data, technology, and training in Indian country.

The Science to Achieve Results (STAR) program, a competitive solicitation process that includes independent peer review, provides the funds supporting research grants and graduate fellowships in numerous environmental science and engineering disciplines. STAR engages the nation's best scientists and engineers in targeted research that complements EPA's intramural research program and those of our federal agency partners. In addition, through this same competitive process, EPA periodically establishes large research centers to address specific areas of national concern. At present, these centers focus on children's health, hazardous substances, particulate matter, and estuarine and coastal monitoring.

The EPA Science Inventory (<http://cfpub.epa.gov/si/index.cfm>) reflects the full range of science activities across the Agency, including research, technical assistance, assessments, scientific and technical products, and peer reviews. The Science Inventory is a searchable, Agency-wide catalogue of science activities and peer-reviewed products and EPA archival records. This Inventory helps EPA scientists and managers track and coordinate scientific initiatives across the Agency and serves as an accessible public resource for people interested in the state-of-the-science at EPA.

Assuring Science Quality

EPA's quality assurance programs ensure the integrity of environmental data by overseeing management of monitoring programs, approving data collection activity plans, and evaluating monitoring and laboratory practices. These functions are

governed by EPA's Information Quality Guidelines (<http://www.epa.gov/quality/informationguidelines/>). As part of the 2002 guidelines, regulators must ensure that the information presented in support of risk assessments is sufficiently comprehensive, informative, and accessible to the public so that risk assessment methodology, as well as the Agency's plans for identifying and evaluating risks, are transparent and understood by affected populations.

The EPA Agency-wide Quality System assures the quality of environmental information using criteria that are appropriate for the intended use of the information and the resources available. To facilitate the correction of mistakes, the Agency provides an Integrated Error Correction Process (<http://www.epa.gov/cdx/iecp.html>).

Consistent Agency-wide application of peer review has been an EPA priority for many years. External peer review of scientific work products by qualified, independent scientists enhances credibility, uncovers technical problems, identifies additional information needs, and ensures that conclusions follow from data using generally accepted scientific standards. The National Academy of Sciences (NAS), EPA's Science Advisory Board (SAB), and the Board of Scientific Counselors (BOSC) are among the scientific organizations that conduct external scientific oversight and advise EPA. EPA's Peer Review Policy provides that major scientifically and technically based work products related to Agency decisions-- intended to support the most important decisions or that have special importance in their own right-- should be externally peer-reviewed.

The basis for EPA's peer review policy is articulated in the document "Peer Review and Peer Involvement at the U.S. Environmental Protection Agency" (<http://www.epa.gov/osa/spc/pdfs/perevmem.pdf>). In addition to this policy, EPA published the second edition of the Peer Review Handbook in 2000, providing detailed guidance for implementing the policy (<http://epa.gov/osa/spc/2peerrev.htm>).

Using Science Correctly

EPA's organizing principle for generating and using scientific information is the risk assessment/risk management paradigm (See Figure X). Risk assessment is the process that scientists use to understand and evaluate the relative size (magnitude) and likelihood (probability) of risk posed to human health and ecosystems by environmental stressors, such as air pollution or chemicals in drinking water. Risk assessments play an important role in Agency decisions and, as appropriate, they are integrated with other information, such as economic data and engineering studies, as part of a complete scientific analysis to inform decisions. Risk management involves determining whether and how risks should be reduced. Scientific analyses, taken together with other factors, such as public values and statutory mandates, inform Agency management decisions.

Making environmental decisions built on sound science includes ensuring that scientific findings in risk assessments are properly described. The Risk Assessment

Forum (RAF) is a standing committee of senior EPA scientists. It was established to promote Agency-wide consensus on difficult and controversial risk assessment issues and to ensure that this consensus is incorporated into appropriate Agency risk assessment guidance. The RAF focuses on generic issues fundamental to the risk assessment process and related science policy issues.

To characterize risk assessments properly, the knowledge, assumptions, and uncertainties underlying the science must be clearly stated. The EPA Risk Characterization Policy and Handbook provides guidance for risk characterization that is designed to ensure that critical information from each stage of a risk assessment is used in forming conclusions about risk. The policy calls for a transparent process and products that are clear, consistent, and reasonable. The handbook is designed to provide risk assessors, risk managers, and other decision makers with an understanding of the goals and principles of risk characterization (<http://www.epa.gov/OSA/spc/pdfs/rchandbk.pdf>).

The Agency's Action Development Process is in place to ensure that Agency decisions are well informed by science and that the Agency's information is of the highest quality. This process allows the Agency's senior managers to be proactive, soliciting a broad range of regulatory and non-regulatory options and analytic approaches at the earliest stages of the effort. Of particular importance to the Action Development Process is ensuring that EPA scientists, economists, and others with technical expertise are appropriately involved in determining needed analyses and research, identifying alternatives, and selecting options.

EPA plans scientific analyses in the regulatory decision-making process through the use of "analytic blueprints." Analytic blueprints lay out the sequence and nature of the scientific analyses and data needed to inform regulatory decisions. As the Agency is faced with more complex environmental science in its decision making, EPA scientists will be increasingly relied on to ensure that EPA's policies are informed by the best available science.

To support our increasing science requirements, there are a number of entities within EPA that assist the Agency. For example, the Office of the Science Advisor (OSA) helps ensure that consistent, cross-Agency scientific results, aided by technical evaluation and peer review, are part of all regulatory decisions. OSA played an active part in establishing the Human Studies Review Board. The Office's continuing involvement in promoting a sound scientific underpinning for our regulatory actions will help us strengthen our future environmental protection efforts.

EPA's Science Policy Council (SPC), chaired by the Agency's Science Advisor, deals with significant science policy issues that go beyond regional and program boundaries. Most recently, the Council was instrumental in producing the Agency's Nanotechnology White Paper and the Risk Assessment Principles and Practices Staff Paper. With a goal of integrating policies that guide Agency decision makers in their use of scientific and technical information, the SPC works to successfully implement

selected initiatives recommended by external advisory bodies such as the National Research Council and the Science Advisory Board.

The Council on Regulatory Environmental Modeling (CREM) was created and charged by the SPC to develop guidance on development and use of environmental models. In particular, the CREM is to promote transparency in model design and develop a publicly accessible inventory of EPA's most frequently used models. Because of the critical importance of sound data, EPA has established a Forum on Environmental Measurements to ensure laboratory competency and the development of validated analytical methods.

Scientific information often includes some degree of uncertainty, opening results to a diversity of interpretations. Increasingly, scientists are able to calculate and quantify uncertainty. Consider, for example, nutrients, pathogens, and sediments which are the stressors most often cited in reports by the states as contributing to the listing of surface waters as "impaired." The impact of these stressors on water quality is substantial. The ability to reliably measure pathogens and to infer their sources within watersheds is very limited, and the quantitative dose-response data for sediments are virtually non-existent. Thus, uncertainty is "high." This uncertainty is a limiting factor in the ability of EPA and the states to successfully implement the steps needed to meet water quality goals. Accordingly, a high value is attached to research on these problems.

Efforts to reduce the magnitude of uncertainty factors used to calculate the reference dose, reference concentration, or benchmark dose are also a priority for EPA. For example, if the same mode or mechanism of toxicity could be demonstrated to occur in humans and animals, then the uncertainty factor for animal-to-human extrapolation might be reduced in the risk assessment. The Stochastic Human Exposure and Dose Simulation (SHEDS) model and Exposure Related Dose Estimating Model (ERDEM) are examples of promising physically-based probabilistic computer models designed to estimate human exposure, absorbed dose, and eliminated dose on which the Agency expects to continue work.

Measuring Success

Measuring the Agency's performance is key to improving it. EPA is implementing the President's Management Agenda to improve research and development (R&D) program management and effectiveness through its application of explicit R&D investment criteria. By carefully examining the relevance, quality, and performance of our research program, EPA is improving R&D program management, better informing R&D program funding decisions, and increasing public understanding of the benefits and effectiveness of the federal investment in R&D.

Agency R&D programs strive to articulate why their investment is important, relevant, and appropriate. EPA R&D programs have well-conceived plans that identify program goals and priorities and links to Agency program and regional office needs, as

well as to national needs. This coordination occurs in many ways, but significant among them are the Research Coordination Teams associated with each research area that include program office, regional, and ORD personnel.

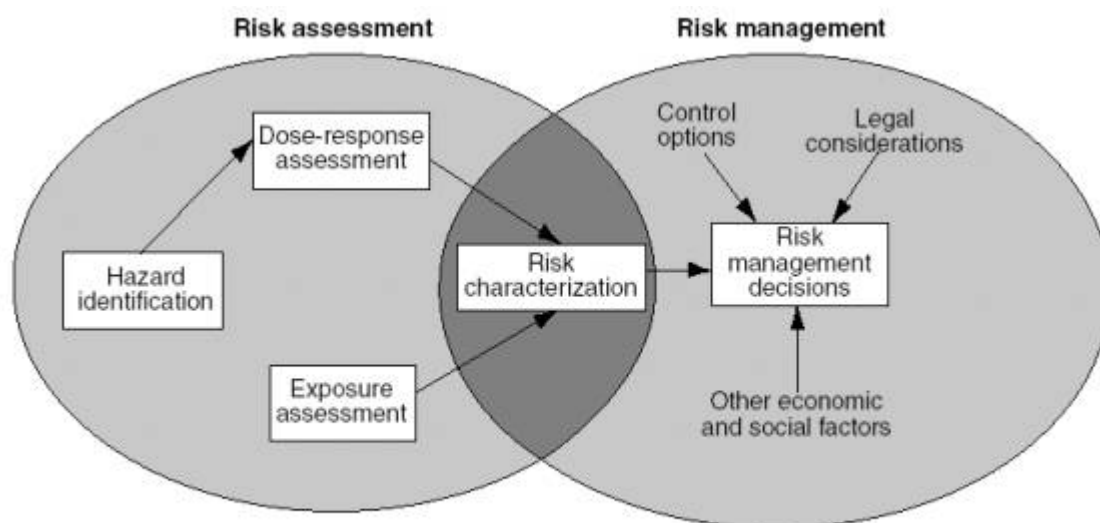
Regulatory agencies are increasingly being held accountable for demonstrating that public expenditures result in measurable outcomes. For environmental protection, that means linking regulatory and policy decisions to quantifiable improvements in public health and ecological condition. An example is the link between fewer cardiovascular deaths and reduced PM2.5 emissions.

The goals and objectives in this *Strategic Plan* are characterized by quantifiable targets that are scientifically associated with environmental outcomes. Increasingly, through scientific knowledge built on empirical observations and research, EPA is able to measure the effectiveness of our programs to accomplish our identified priorities and to adjust and improve them to gain efficiencies. The environmental outcome strategic targets associated with each of the five EPA Goals illustrate how existing information is being used to assess performance. Continued improvement will require strengthening systems to monitor environmental conditions, as well as improving existing or developing new surveillance systems to track the status and trends of the ecological or health outcomes of interest.

The EPA *Draft Report on the Environment* (RoE) is integrating both existing and new research to advance performance measures that will help EPA describe current national environmental conditions and trends and identify additional research needs. The 2007 release of the RoE is designed to communicate EPA's current understanding of the conditions and trends in the environment and human health in a way that is succinct and understandable to the public. The RoE will assist the Agency in framing new innovative solutions, such as stewardship, to address complex cross-goal issues, and advance rigorous scientific approaches to measuring the associated sustainability outcomes.

Strengthening science at EPA is an ongoing effort, one of continuously improving the scientific bases for the environmental policy decisions that impact the nation. A strong science foundation is increasingly critical to informing the actions EPA takes on behalf of the American public in achieving the universal goal of a cleaner and healthier environment.

Figure X



Source: EPA Office of Research and Development.

Appendix C: Social Costs and Benefits

Evaluating the benefits and cost of EPA programs is extremely useful for strategic planning at EPA. Generally, the Agency examines how it can allocate resources and target policies so as to achieve the maximum net benefits for society, given statutory and other considerations. In addition to using benefit-cost analysis in our strategic planning, Presidential Executive Order 12866ⁱ Regulatory Planning and Review requires EPA to use benefit-cost analysis when formulating economically significant regulations. Specifically, Executive Order 12866 directs that agencies “in choosing among alternative regulatory approaches ...should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages, distributive impacts, and equity), unless a statute requires another regulatory approach.” In a similar manner, the development of strategic goals and objectives also should reflect approaches that maximize net benefits and provide the best investment of society’s limited resources.

EPA regularly publishes benefit-cost analyses of its proposed and final regulations, and the Office of Management and Budget also produces estimates of the economic consequences of federal regulations in its annual *Report to Congress on the Costs and Benefits of Federal Regulations*.ⁱⁱ It is often very difficult to provide quantitative estimates of the costs, and particularly the benefits, of environmental policies because many non-cancer health and ecological benefits do not easily lend themselves to monetization. But even when data are limited, assessing benefits and costs still can be valuable because it enumerates the types of beneficial and detrimental consequences of policy actions.

Appendix A of EPA’s 2003-2008 *Strategic Plan* presented a description of the social costs and benefits of its programs for the year 2002. The analysis was limited largely because EPA’s economic models and tools have not been developed to estimate the aggregate costs or benefits of achieving the kind of ambitious, broad, long-term goals adopted in strategic planning.

Although new analyses have not been performed for the 2006-2011 *Strategic Plan*, EPA will separately be providing additional information on some of the social costs and benefits of its programs and policies. For example, the Agency anticipates releasing a report in Spring 2007 on the results of its 2006 Pollution Abatement Cost and Expenditures Survey. Earlier versions of the survey support many of the estimates used in the 2003-2008 *Strategic Plan* appendix, but results from the current survey will not be available in time to be used in the 2006-2011 *Strategic Plan*. EPA’s 2003–2008 *Strategic Plan* Social Cost Appendix can be accessed at: <http://www.epa.gov/ocfo/plan/2003sp.pdf> (pages 173-214).

ⁱ The Executive Order 12866 – (Federal Register: September 30, 1993, Vol. 58, No.190, Page 51735) and can be accessed at: <http://www.epa.gov/fedrgstr/eo/eo12866.htm>

ⁱⁱ OMB’s annual report to congress can be accessed at www.whitehouse.gov/omb/info/regpol-reports_congress.html